



# **C2PC CERTIFICATION TEST REPORT**

**Report Number. :** 12552285-E3V2

**Applicant :** SONOS INC.  
614 CHAPALA STREET  
SANTA BARBARA, CA 93101, U.S.A

**Model :** S22

**FCC ID :** SBVRM016

**IC :** 5373A-RM016

**EUT Description :** 802.11a/b/g/n HT20 CLIENT DEVICE

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART E  
ISED RSS-247 ISSUE 2  
ISED RSS-GEN ISSUE 5

**Date Of Issue:**

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## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	4/12/2019	Initial Issue	-
V2	4/15/2019	Updated Section 5.2	K.Kedida

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SONOS INC.  
614 CHAPALA STREET  
SANTA BARBARA, CA 93101, U.S.A.

**EUT DESCRIPTION:** 802.11a/b/g/n HT20 CLIENT DEVICE

**MODEL:** S22

**SERIAL NUMBER:** 78-28-CA-F0-00-2E-C (Radiated Sample)  
78-28-CA-F0-00-14 (Conducted Sample)

**DATE TESTED:** January 15 – 23, 2019

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC KDB 662911 D01 Multiple Transmitter Output v02r01, FCC KDB 789033 D02 v02r01, ANSI C63.10-2013, RSS-GEN Issue 5, and RSS-247 Issue 2.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, 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	47658 Kato Rd
<input checked="" type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input checked="" type="checkbox"/> Chamber I (ISED:2324A-5)
<input checked="" type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber J (ISED:2324A-6)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED:2324A-1)
	<input type="checkbox"/> Chamber G (ISED:22541-4)	<input type="checkbox"/> Chamber L (ISED:2324A-3)
	<input type="checkbox"/> Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED company address code 22541 with site numbers 22541 -1 through 22541-5, respectively. Chambers K and L are covered under ISED company address code 2324A with site numbers 2324A-1 and 2324A-3, respectively.

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

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

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

## 5. EQUIPMENT UNDER TEST

### 5.1. EUT DESCRIPTION

The EUT is 802.11 a/b/g/n HT20 CLIENT DEVICE.

### 5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
<b>5.2 GHz band, 2TX</b>			
5180-5240	802.11a	16.06	40.36
5180-5240	802.11n HT20	16.20	41.69
<b>5.3 GHz band, 2TX</b>			
5260-5320	802.11a	19.19	82.99
5260-5320	802.11n HT20	20.44	110.66
<b>5.6 GHz band, 2TX</b>			
5500-5700	802.11a	19.52	89.54
5500-5700	802.11n HT20	20.72	118.03
<b>5.8 GHz band, 2TX</b>			
5745-5825	802.11a	19.43	87.70
5745-5825	802.11n HT20	20.80	120.23

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency (MHz)	5GHz Max Antenna Gain dBi	
	Chain 0 / (Vertical Polarization)	Chain 1 (Vertical Polarization)
5180 - 5850	1.65	1.7

### 5.4. SOFTWARE AND FIRMWARE

The EUT software ware installed during testing was 44.2-53220-RF-Complianc\_20180523.

The test utility software used during testing was Sonos Compliance GUI V2.2.



## 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated bandage, harmonics, and spurious emissions from 1 GHz to 18GHz were performed. The EUT was set to transmit at the Low/Middle/High channels with designed (target) output powers.

Radiated emission below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT was set to transmit at the channel with highest output power as worst-case scenario.

The EUT can only be setup in desktop orientation; therefore, all radiated testing was performed with the EUT in desktop orientation.

Worst-case data rates as provided by the client were:

802.11a: 6Mbps  
 802.11n HT20mode: MCS3

## 5.6. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

This is to request a class II permissive change for FCC ID: SBVRM016 original grated on 12/31/2018.

The major change filed under this application is:

Change#1: The S18 and S22 share the same MediaTek MT7615 radio board. The 18 is 3x3 where as the S22 is a 2x2, both models use the same Chain 0 and 1 antennas.

Change#2 Antenna gain has changed as shown below:

S18 Max Antenna Gain dBi				
Frequency	Chain 0	Chain 1	Chain 2	Type
2412 - 2472	2.1	1.4	1.17	WLAN
5180 - 5859	0.6	2.6	NA	
2412 - 2472	3.9	NA	NA	BLE

S22 Max Antenna Gain dBi				
Frequency	Chain 0	Chain 1		Type
2412 - 2472	1.4	0.1		WLAN
5180 - 5859	1.65	1.7		
2412 - 2472	4.1	NA		BLE

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	X230	SON-00001034	N/A
AC Adapter	Lenovo	ADLX65NCT2A	11S36200293ZZ10034A2ZK	N/A

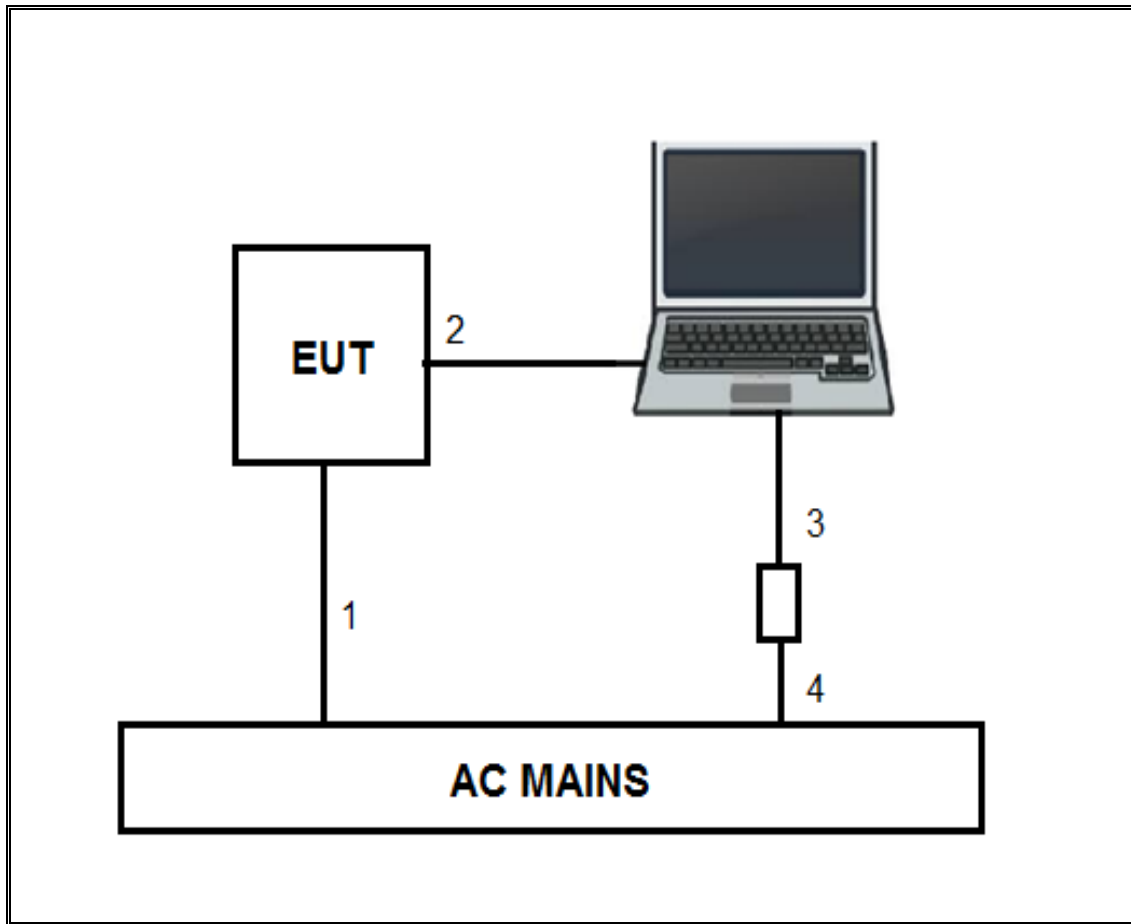
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC Power	1	AC	Unshielded	2	AC Mains to EUT
2	Ethernet	1	RJ45	Unshielded	10	EUT to Laptop
3	DC Power	1	DC	Shielded	1.2	AC/DC Adapter to Laptop
4	AC Power	1	AC	Unshielded	1	AC Mains to AC/DC Adapter

**TEST SETUP**

The EUT is a stand-alone unit, and the radio is exercised by Sonos Compliance GUI test utility software via Ethernet.

**SETUP DIAGRAMS**



## **6. MEASUREMENT METHOD**

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section B.

Conducted Output Power: KDB 789033 D02 v02r01, Sections II.E.3.b (Method PM-G) & II.E.2.b (Method SA-1).

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, and G.5.

## 7. 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	ID Num	Cal Due
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	PRE0180175	07/09/2019
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184971	11/13/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	06/21/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/24/2019
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T1165	12/01/2019
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T171460	08/01/2019
Amplifier, 1 to 8GHz, 35dB	Miteq Inc.	AMF-4D-01000800-30-29P	T1573	04/03/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1450	02/05/2019
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/16/2019
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0180917	4/25/2019
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1271	07/17/2019
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1225	04/10/2019
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	PRE0165308	01/08/2020
18 - 26.5 GHz Horn Antenna	Seavey Division	MWH-1826/B	T447	06/16/2019
Pre-Amp 1-26.5 GHz	ARA	8449B	T404	03/09/2019
EMI Reciever	Rohde & Schwarz	ESR	T1436	02/21/2019
L.I.S.N.	FCC INC.	FCC LISN 50/250	T1310	06/15/2019

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018
Antenna Port Software	UL	UL RF	Ver 8.4, June 12, 2018

## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

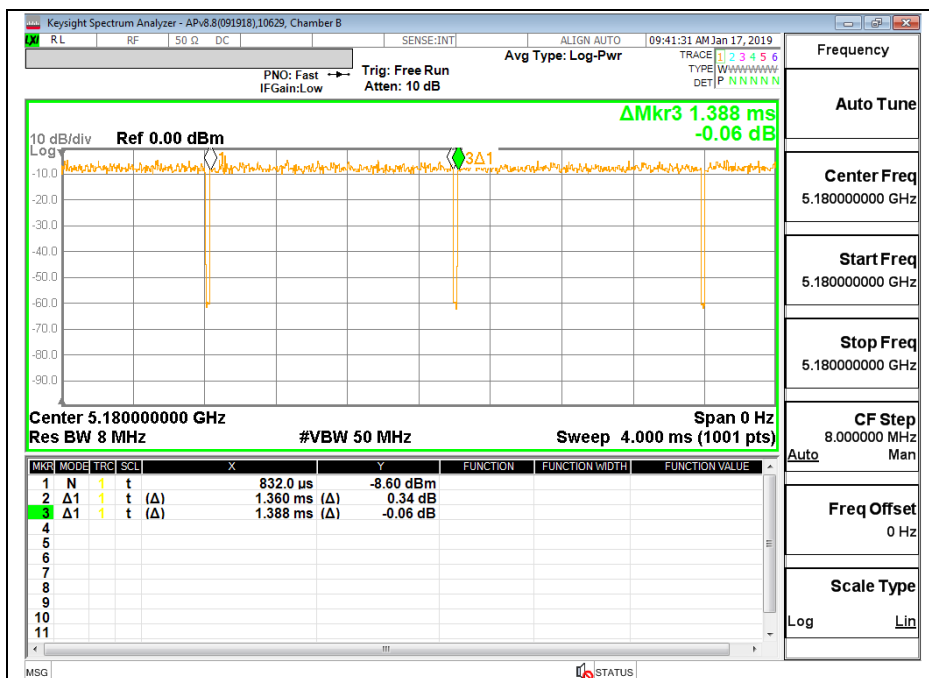
#### PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

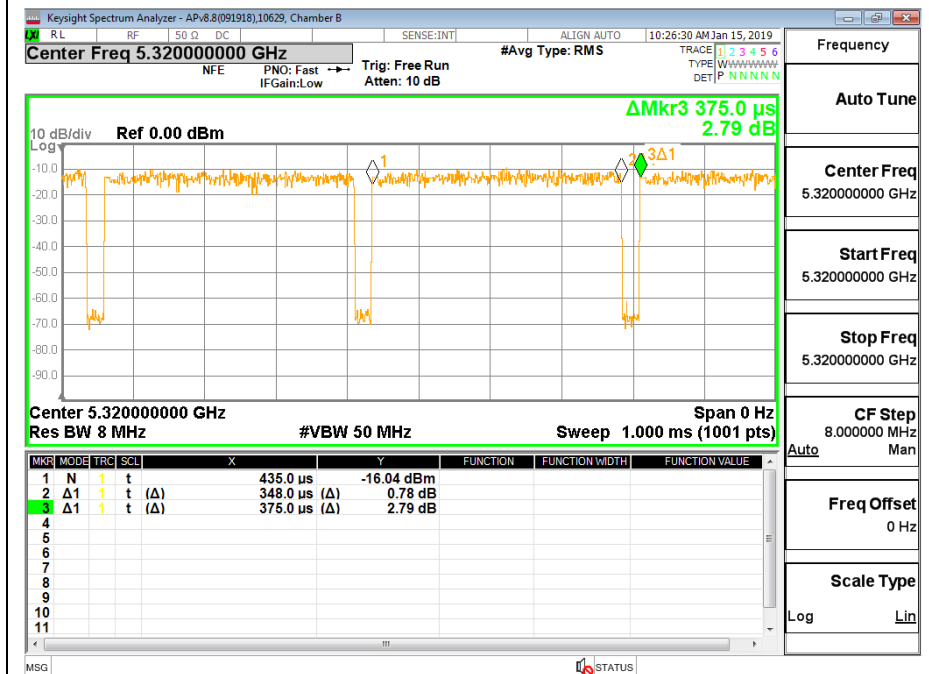
#### ON TIME AND DUTY CYCLE RESULTS

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	1.360	1.388	0.980	97.98%	0.09	0.735
802.11n HT20	0.348	0.375	0.928	92.80%	0.32	2.874

### DUTY CYCLE PLOTS



802.11a HT20



802.11n HT20

## 8.2. OUTPUT POWER AND PSD

### LIMITS

#### **FCC §15.407**

(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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. 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.

(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.



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**Bands 5.25-5.35 GHz and 5.47-5.725 GHz**

The maximum conducted output power over the frequency bands 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 megahertz. 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.

**Band 5.725-5.85 GHz**

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

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## **RSS-247**

### **Band 5.15-5.25 GHz**

The maximum e.i.r.p. shall not exceed 200 mW or  $10 + 10 \log_{10}B$ , dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

### **Band 5.25-5.35 GHz**

The maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10}B$ , dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10}B$ , dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

### **Bands 5.47-5.6 GHz and 5.65-5.725 GHz**

The maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10}B$ , dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10}B$ , dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

### **Band 5.725-5.85 GHz**

The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

## **TEST PROCEDURE**

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G) and for straddles channels KDB 789033 D02 v02r01, Section E.2.b (Method SA-1) was used.

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section F

**DIRECTIONAL ANTENNA GAIN**

For 2 TX:

Tx chains are uncorrelated for power and correlated for PSD due to the device supporting CDD in all MIMO modes. The directional gains are as follows:

<b>Band (GHz)</b>	<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Uncorrelated Chains Directional Gain (dBi)</b>	<b>Correlated Chains Directional Gain (dBi)</b>
5.2	1.65	1.70	1.68	4.69
5.3	1.65	1.70	1.68	4.69
5.6	1.65	1.70	1.68	4.69
5.8	1.65	1.70	1.68	4.69

**RESULTS**

### 8.2.1. 802.11a MODE IN THE 5.2 GHz BAND

#### Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)
Low	5180	16.50	1.68	4.69
Mid	5200	16.39	1.68	4.69
High	5240	16.42	1.68	4.69

#### Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	ISED EIRP Limit (dBm)	Max ISED Power (dBm)	Power Limit (dBm)	FCC PSD Limit (dBm/ 1MHz)	ISED eirp PSD Limit (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)
Low	5180	24.00	22.17	20.49	20.49	11.00	10.00	5.31
Mid	5200	24.00	22.15	20.47	20.47	11.00	10.00	5.31
High	5240	24.00	22.15	20.47	20.47	11.00	10.00	5.31

<b>Duty Cycle CF (dB)</b>	0.10	<b>Included in Calculations of Corr'd PSD</b>
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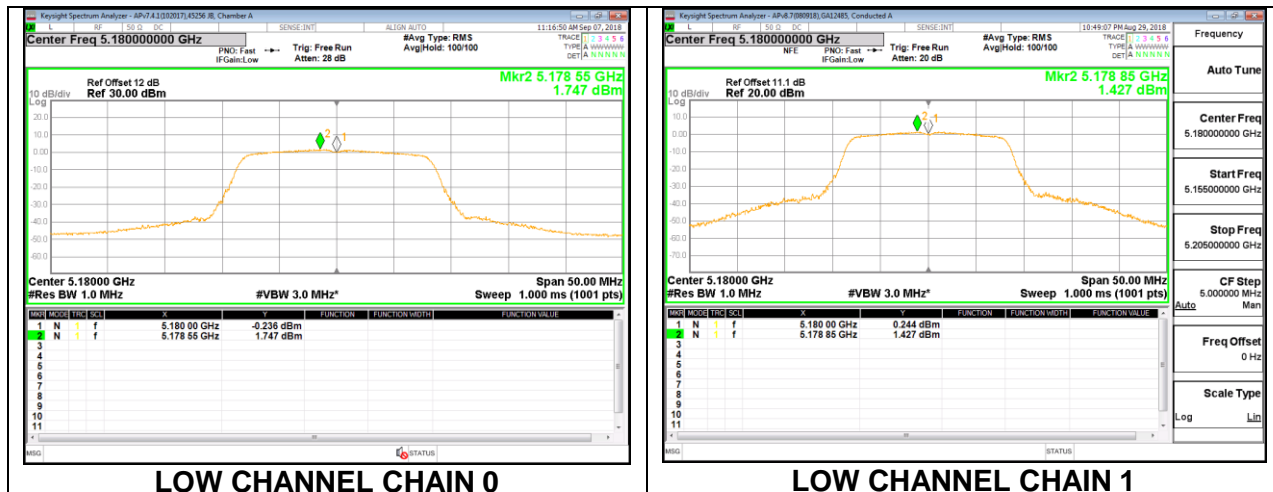
#### Output Power Results

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	5180	12.80	13.15	15.99	20.49	-4.51
Mid	5200	12.91	13.12	16.03	20.47	-4.44
High	5240	13.54	12.49	16.06	20.47	-4.42

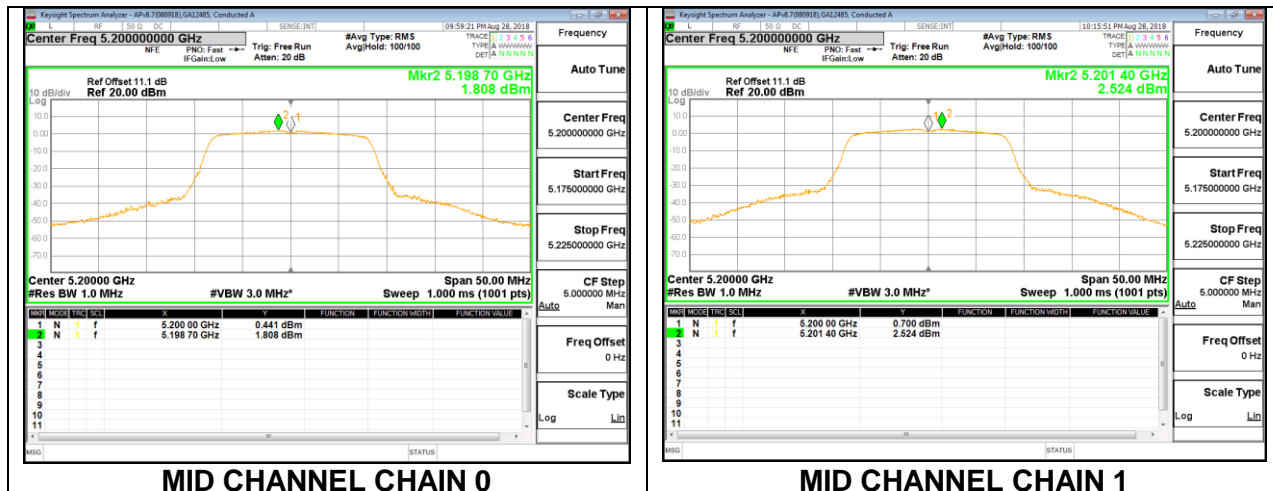
#### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 1MHz)	Chain 1 Meas PSD (dBm/ 1MHz)	Total Corr'd PSD (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)	PSD Margin (dB)
Low	5180	1.75	1.43	4.70	5.31	-0.61
Mid	5200	1.81	2.52	5.29	5.31	-0.02
High	5240	1.77	2.13	5.06	5.31	-0.25

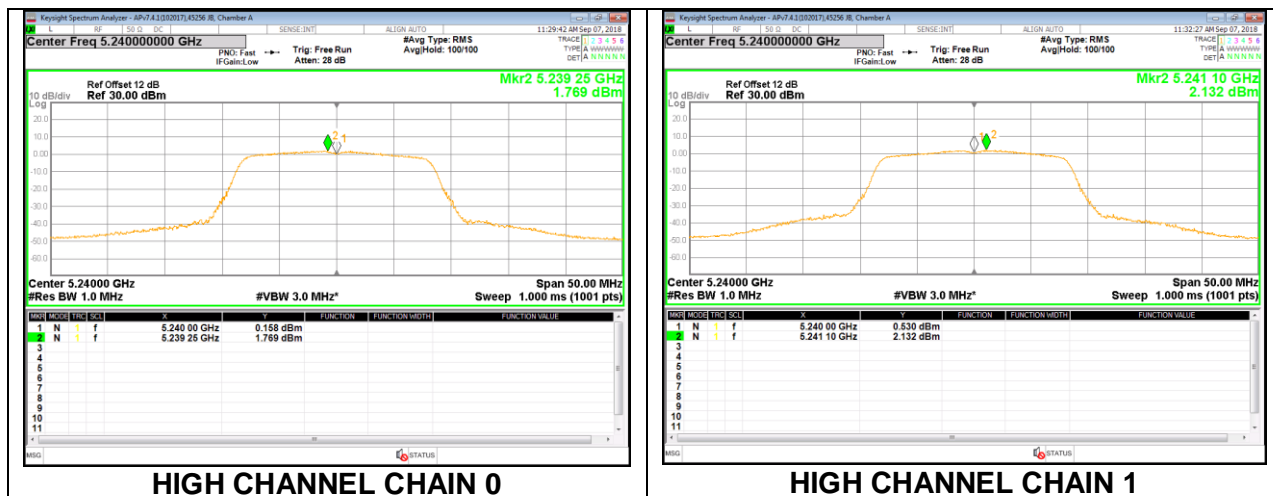
### LOW CHANNEL



### MID CHANNEL



### HIGH CHANNEL



**8.2.2. 802.11a MODE IN THE 5.3 GHz BAND**

**(FCC)**

**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/1MHz)
Low	5260	25.55	1.68	4.69	24.00	11.00
Mid	5300	22.55	1.68	4.69	24.00	11.00
High	5320	20.85	1.68	4.69	24.00	11.00

<b>Duty Cycle CF (dB)</b>	0.10	<b>Included in Calculations of Corr'd PSD</b>
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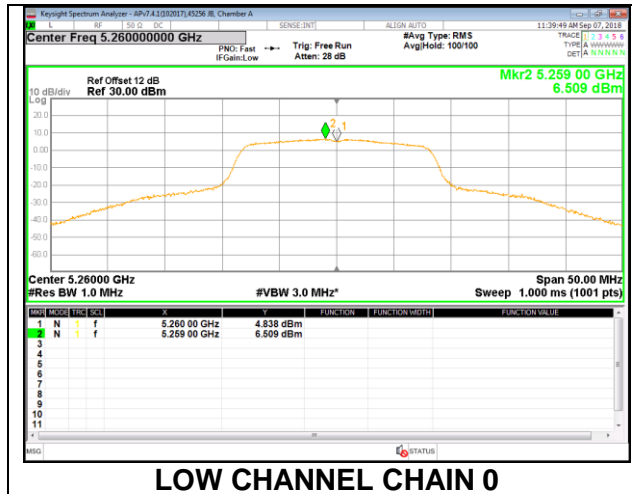
**Output Power Results**

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	5260	15.79	15.99	18.90	24.00	-5.10
Mid	5300	16	15.94	18.98	24.00	-5.02
High	5320	16.29	16.06	19.19	24.00	-4.81

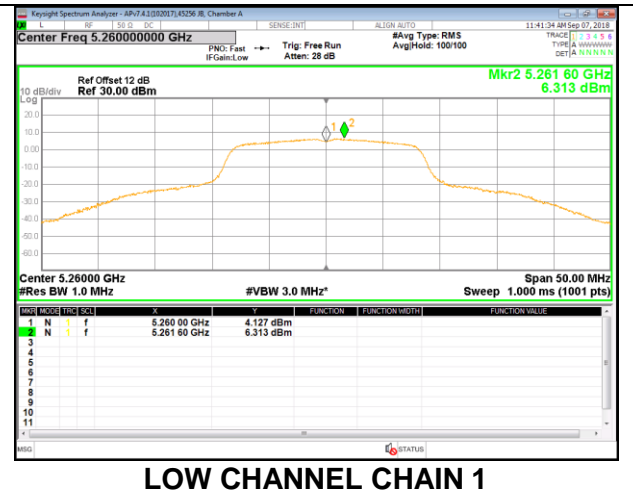
**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Low	5260	6.51	6.31	9.52	11.00	-1.48
Mid	5300	6.84	6.24	9.66	11.00	-1.34
High	5320	6.76	6.52	9.75	11.00	-1.25

### LOW CHANNEL

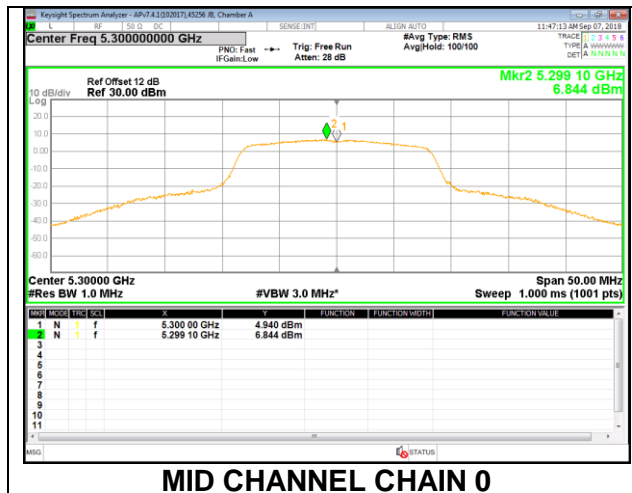


LOW CHANNEL CHAIN 0

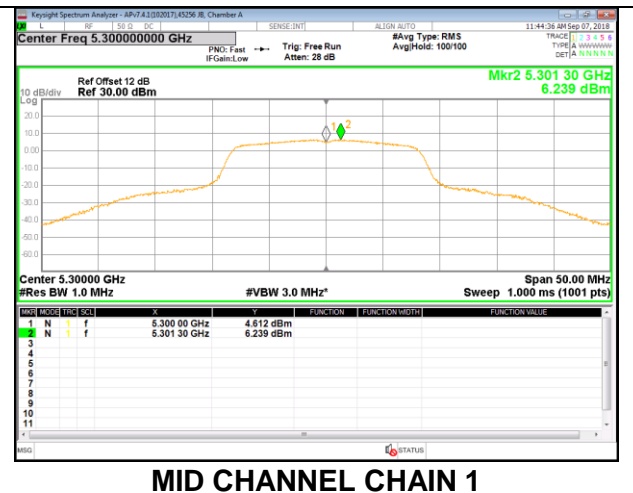


LOW CHANNEL CHAIN 1

### MID CHANNEL

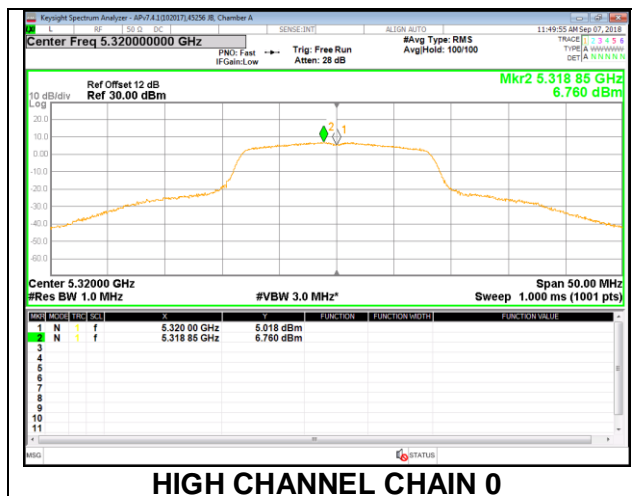


MID CHANNEL CHAIN 0

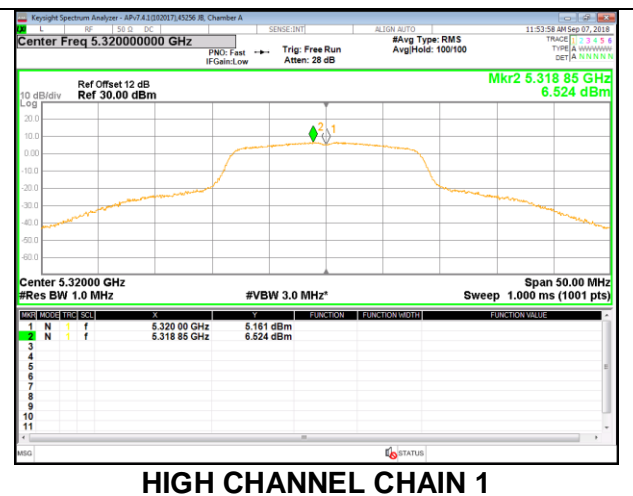


MID CHANNEL CHAIN 1

### HIGH CHANNEL



HIGH CHANNEL CHAIN 0



HIGH CHANNEL CHAIN 1

**(IC)**

**Bandwidth, Antenna Gain, and Limits**

Channel	Frequency (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Low	5260	16.47	1.71	4.67	23.17	11.00
Mid	5300	16.28	1.71	4.67	23.12	11.00
High	5320	16.31	1.71	4.67	23.12	11.00

<b>Duty Cycle CF (dB)</b>	0.10	<b>Included in Calculations of Corr'd PSD</b>
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**Output Power Results**

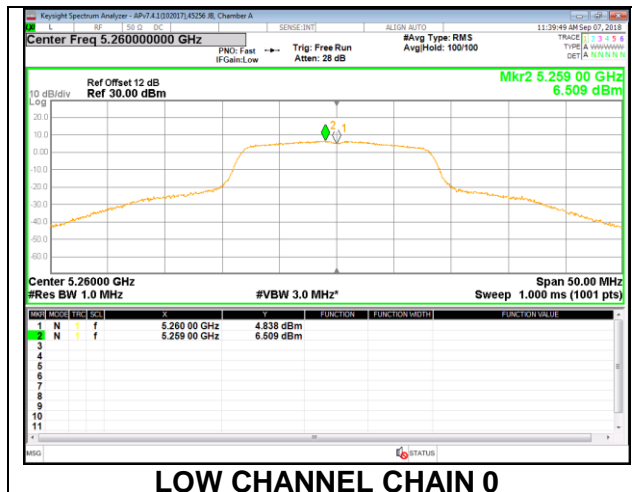
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	15.79	15.99	18.90	23.17	-4.27
Mid	5300	16	15.94	18.98	23.12	-4.14
High	5320	16.29	16.06	19.19	23.12	-3.94

**PSD Results**

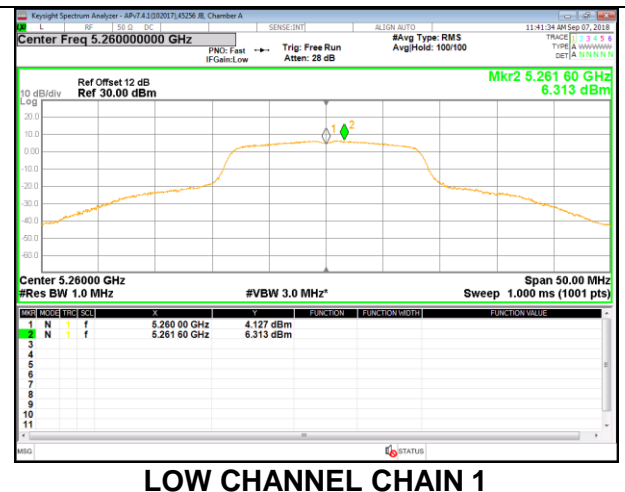
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Low	5260	6.51	6.31	9.52	11.00	-1.48
Mid	5300	6.84	6.24	9.66	11.00	-1.34
High	5320	6.76	6.52	9.75	11.00	-1.25



### LOW CHANNEL

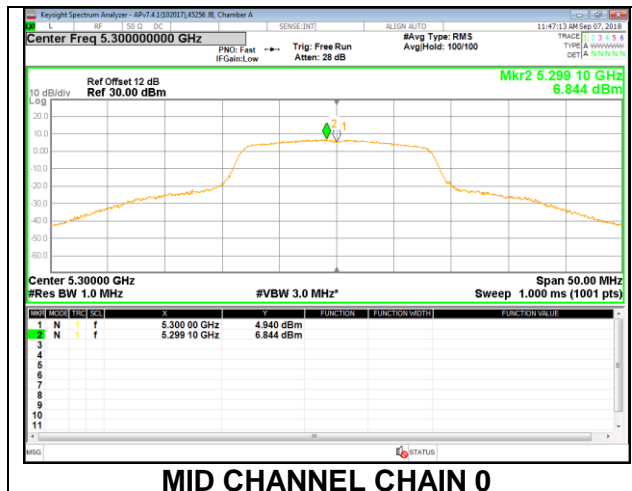


LOW CHANNEL CHAIN 0

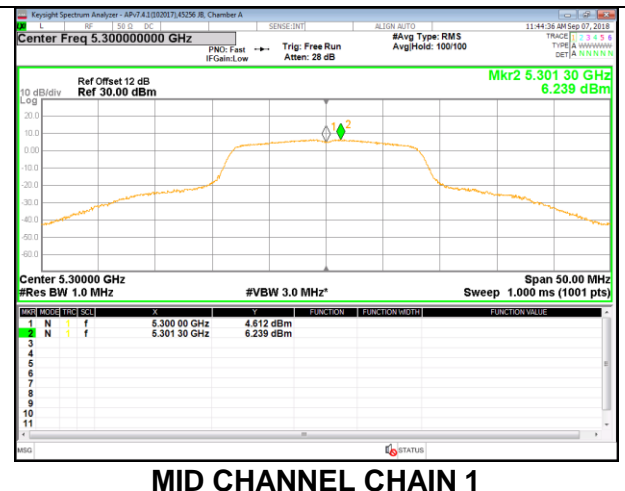


LOW CHANNEL CHAIN 1

### MID CHANNEL

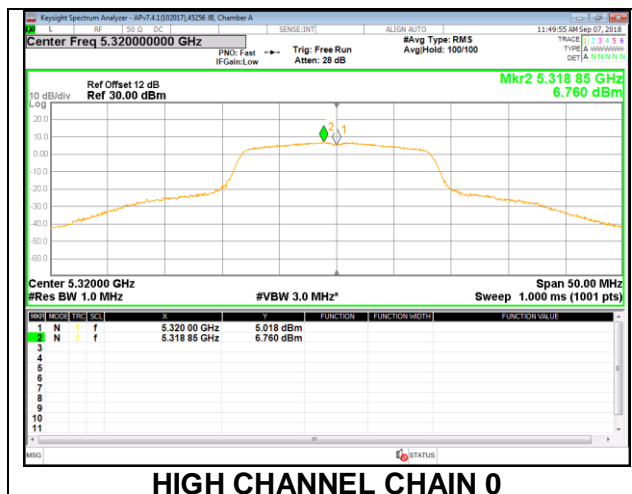


MID CHANNEL CHAIN 0

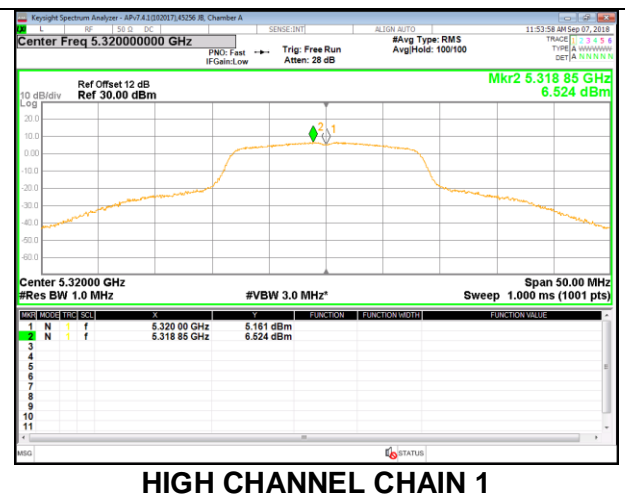


MID CHANNEL CHAIN 1

### HIGH CHANNEL



HIGH CHANNEL CHAIN 0



HIGH CHANNEL CHAIN 1

**8.2.3. 802.11a MODE IN THE 5.6 GHz BAND**

**(FCC+IC)**

**Bandwidth and Antenna Gain**

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)
Low	5500	21.00	16.35	1.68	4.69
Mid	5580	21.00	16.47	1.68	4.69
High	5700	20.75	16.30	1.68	4.69

**Limits**

Channel	Frequency (MHz)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Power Limit (dBm)	FCC PSD Limit (dBm/ 1MHz)	ISED PSD Limit (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)
Low	5500	24.00	23.14	29.14	23.14	11.00	11.00	11.00
Mid	5580	24.00	23.17	29.17	23.17	11.00	11.00	11.00
High	5700	24.00	23.12	29.12	23.12	11.00	11.00	11.00

<b>Duty Cycle CF (dB)</b>	0.32	<b>Included in Calculations of Corr'd Power &amp; PSD</b>
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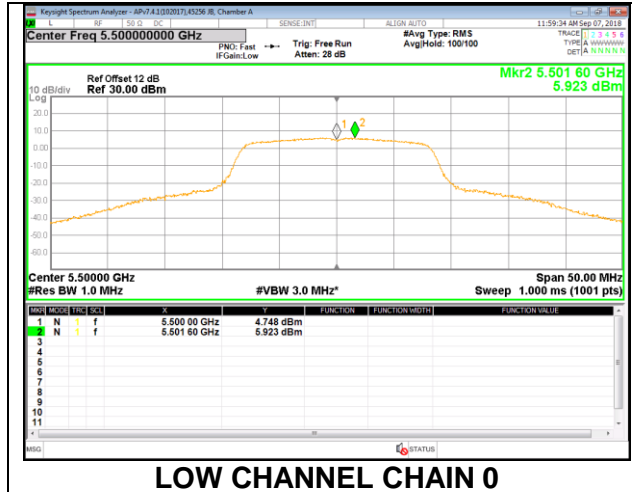
**Output Power Results**

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	5500	16.71	16.3	19.52	23.14	-3.62
Mid	5580	16.29	16.62	19.47	23.17	-3.70
High	5700	16.21	16.51	19.37	23.12	-3.75

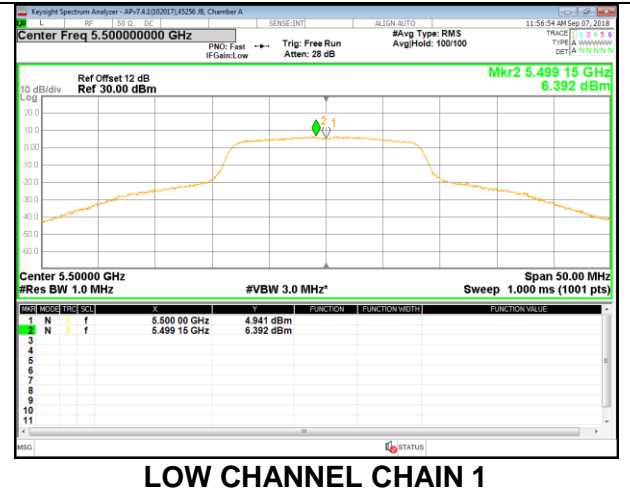
**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 1MHz)	Chain 1 Meas PSD (dBm/ 1MHz)	Total Corr'd PSD (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)	PSD Margin (dB)
Low	5500	5.92	6.39	9.494	11.00	-1.51
Mid	5580	6.42	7.11	10.112	11.00	-0.89
High	5700	6.19	5.91	9.382	11.00	-1.62

### LOW CHANNEL

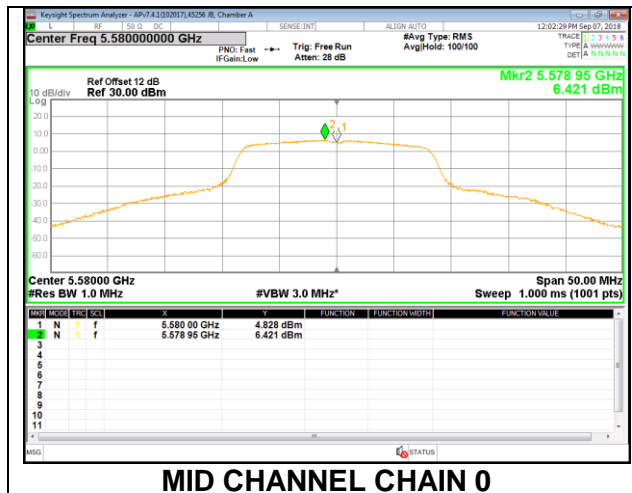


LOW CHANNEL CHAIN 0

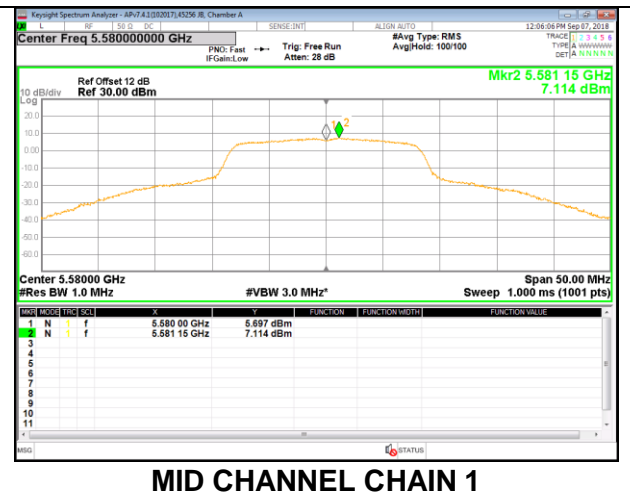


LOW CHANNEL CHAIN 1

### MID CHANNEL

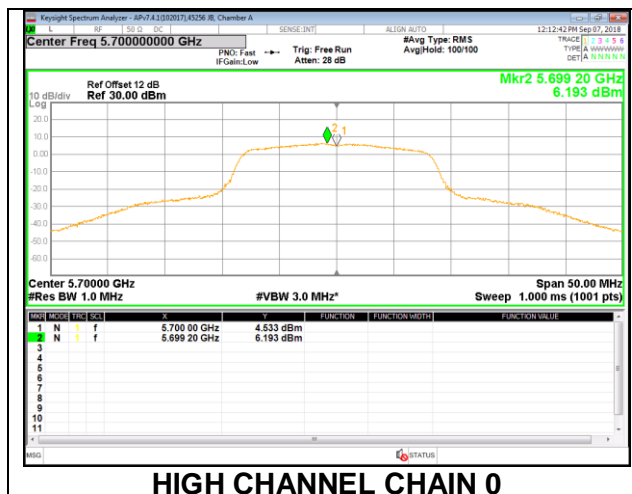


MID CHANNEL CHAIN 0

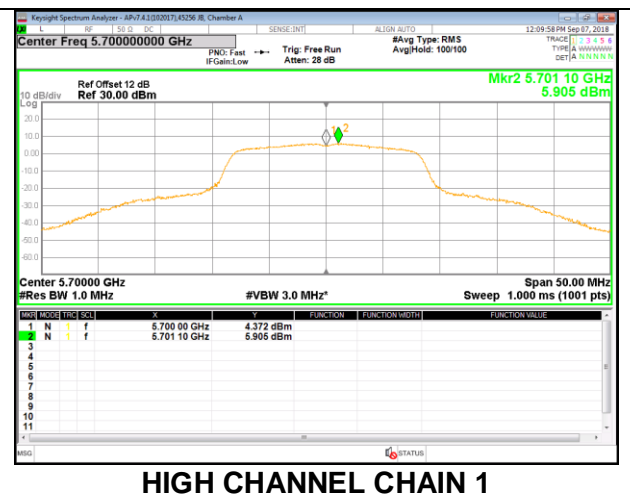


MID CHANNEL CHAIN 1

### HIGH CHANNEL



HIGH CHANNEL CHAIN 0



HIGH CHANNEL CHAIN 1

**8.2.4. 802.11a MODE IN THE 5.8 GHz BAND**

**(FCC+IC)**

**Antenna Gain and Limit**

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 1MHz)
Low	5745	1.68	4.69	30.00	30.00
Mid	5785	1.68	4.69	30.00	30.00
High	5825	1.68	4.69	30.00	30.00

<b>Duty Cycle CF (dB)</b>	0.32	<b>Included in Calculations of Corr'd Power &amp; PSD</b>
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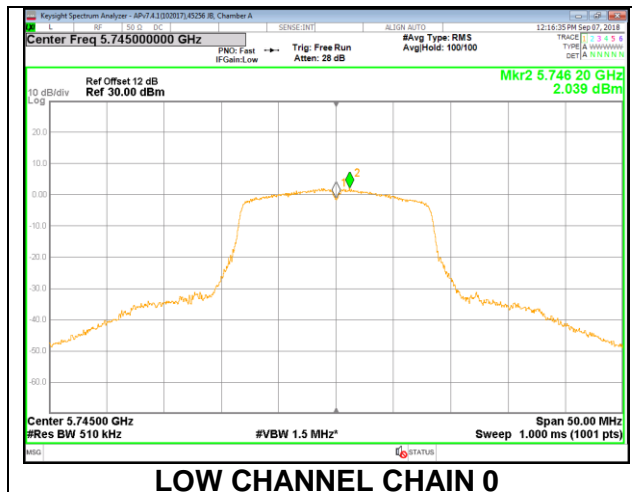
**Output Power Results**

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	5745	16.2	16.44	19.33	30.00	-10.67
Mid	5785	16.19	16.43	19.32	30.00	-10.68
High	5825	16.18	16.64	19.43	30.00	-10.57

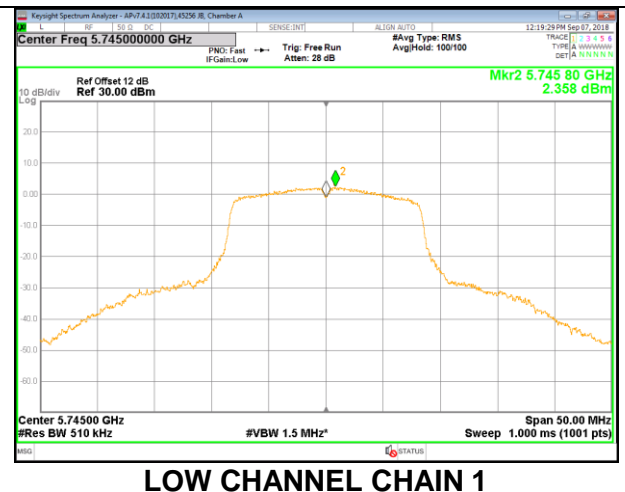
**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 1MHz)	Chain 1 Meas PSD (dBm/ 1MHz)	Total Corr'd PSD (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)	PSD Margin (dB)
Low	5745	2.04	2.36	5.532	30.00	-24.47
Mid	5785	1.97	2.23	5.428	30.00	-24.57
High	5825	2.12	2.06	5.422	30.00	-24.58

### LOW CHANNEL

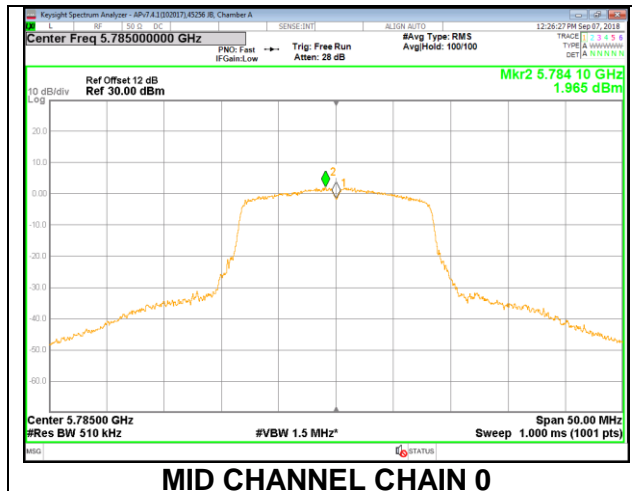


LOW CHANNEL CHAIN 0

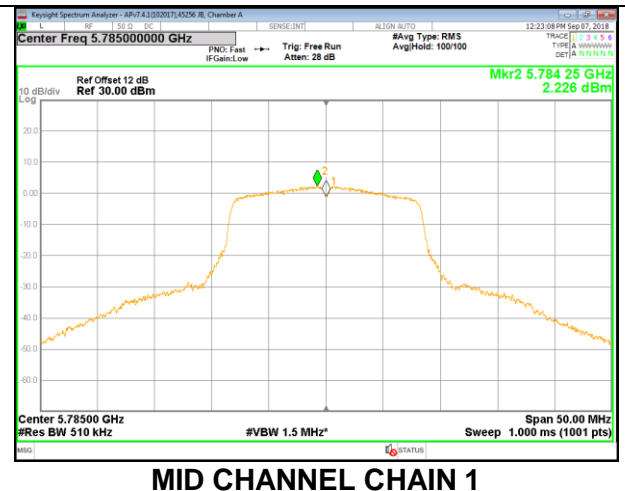


LOW CHANNEL CHAIN 1

### MID CHANNEL

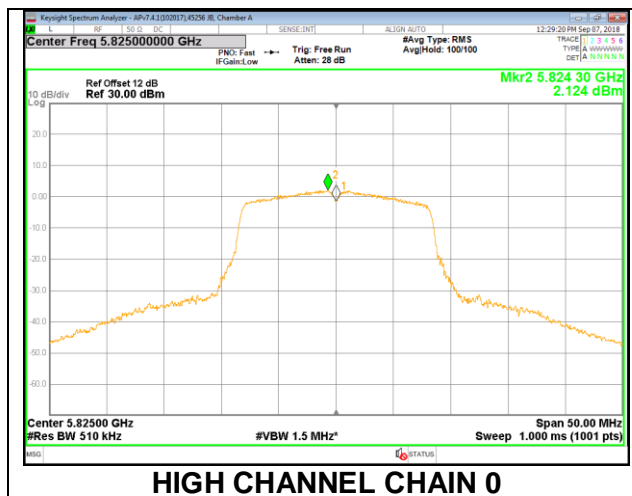


MID CHANNEL CHAIN 0

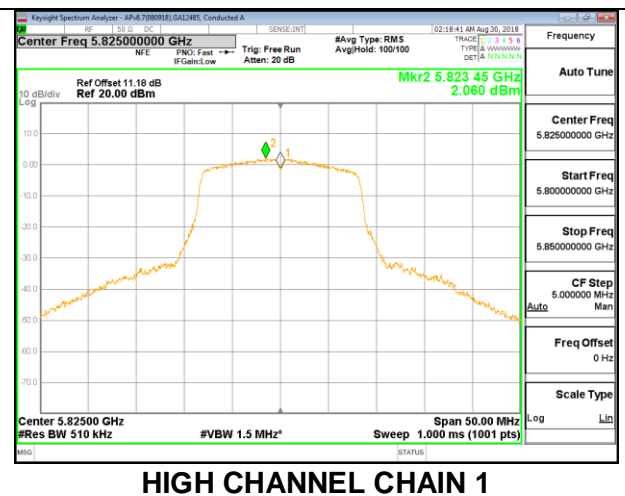


MID CHANNEL CHAIN 1

### HIGH CHANNEL



HIGH CHANNEL CHAIN 0



HIGH CHANNEL CHAIN 1

### 8.2.5. 802.11n HT20 MODE IN THE 5.2 GHz BAND

#### Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)
Low	5180	17.42	1.68	4.69
Mid	5200	17.63	1.68	4.69
High	5240	17.63	1.68	4.69

#### Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	ISED EIRP Limit (dBm)	Max ISED Power (dBm)	Power Limit (dBm)	FCC PSD Limit (dBm/ 1MHz)	ISED eirp PSD Limit (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)
Low	5180	24.00	22.41	20.73	20.73	11.00	10.00	5.31
Mid	5200	24.00	22.46	20.78	20.78	11.00	10.00	5.31
High	5240	24.00	22.46	20.78	20.78	11.00	10.00	5.31

<b>Duty Cycle CF (dB)</b>	0.32	<b>Included in Calculations of Corr'd PSD</b>
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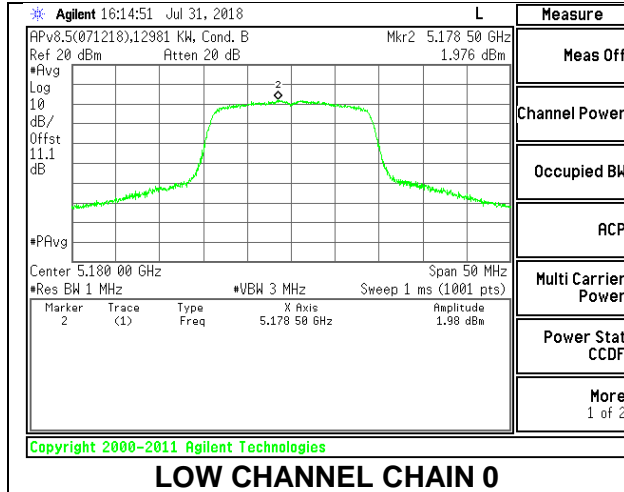
#### Output Power Results

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	5180	12.61	12.15	15.40	20.73	-5.33
Mid	5200	12.73	12.21	15.49	20.78	-5.29
High	5240	12.86	13.5	16.20	20.78	-4.58

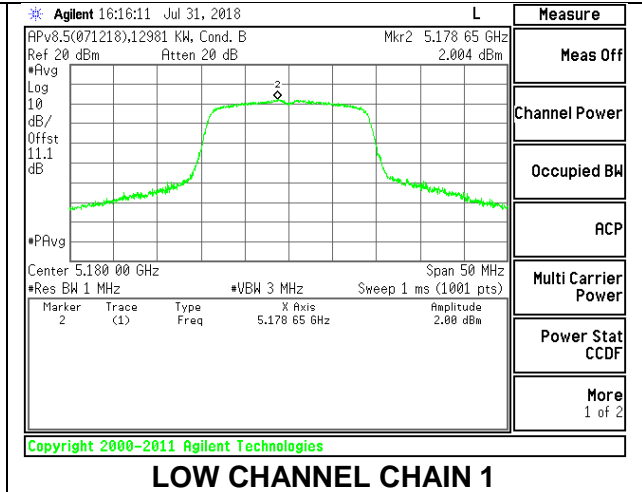
#### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 1MHz)	Chain 1 Meas PSD (dBm/ 1MHz)	Total Corr'd PSD (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)	PSD Margin (dB)
Low	5180	1.98	2.00	5.32	5.31	0.01
Mid	5200	2.14	1.76	5.28	5.31	-0.03
High	5240	1.60	1.83	5.05	5.31	-0.26

### LOW CHANNEL

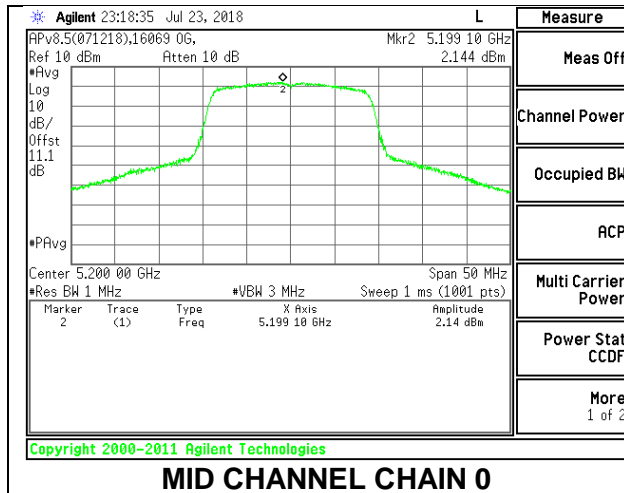


**LOW CHANNEL CHAIN 0**

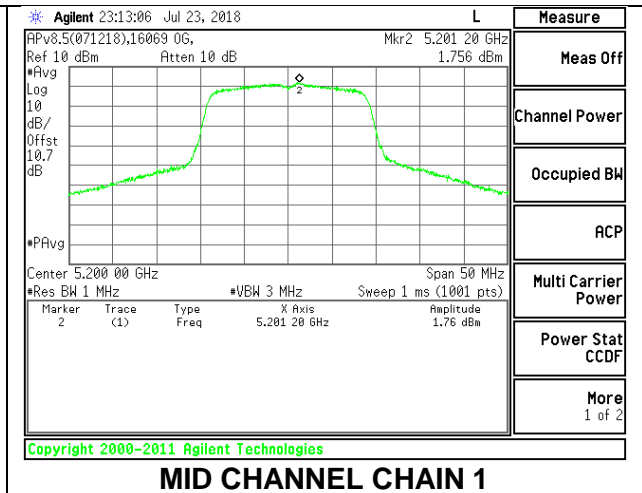


**LOW CHANNEL CHAIN 1**

### MID CHANNEL

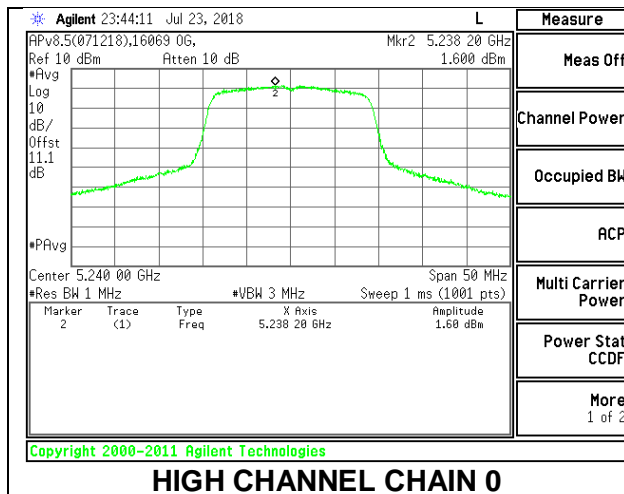


**MID CHANNEL CHAIN 0**

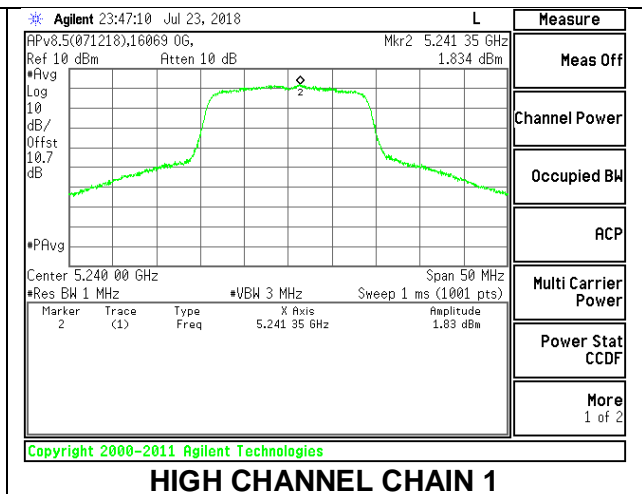


**MID CHANNEL CHAIN 1**

### HIGH CHANNEL



**HIGH CHANNEL CHAIN 0**



**HIGH CHANNEL CHAIN 1**

**8.2.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND**

**(FCC)**

**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/1MHz)
Low	5260	20.80	1.68	4.69	24.00	11.00
Mid	5300	22.00	1.68	4.69	24.00	11.00
High	5320	20.80	1.68	4.69	24.00	11.00

<b>Duty Cycle CF (dB)</b>	0.32	<b>Included in Calculations of Corr'd PSD</b>
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**Output Power Results**

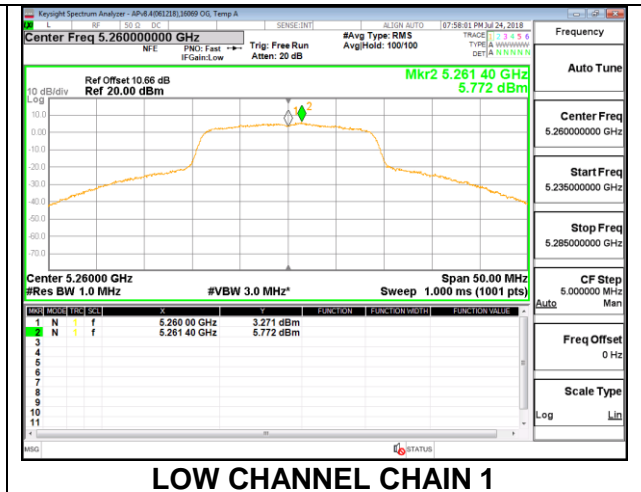
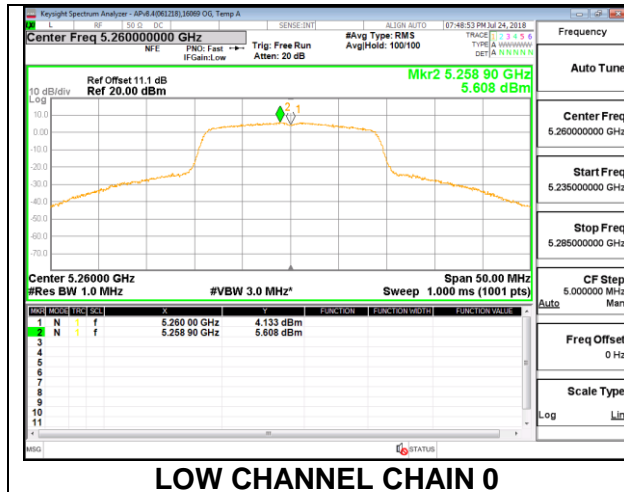
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	17.31	17.54	20.44	24.00	-3.56
Mid	5300	17.08	17.32	20.21	24.00	-3.79
High	5320	17.08	17.27	20.19	24.00	-3.81

**PSD Results**

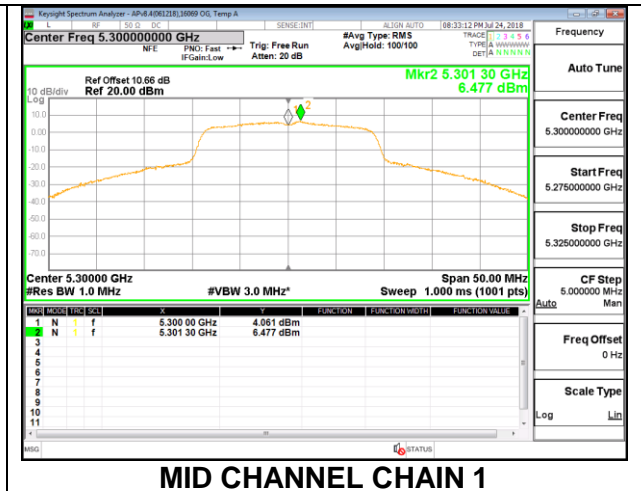
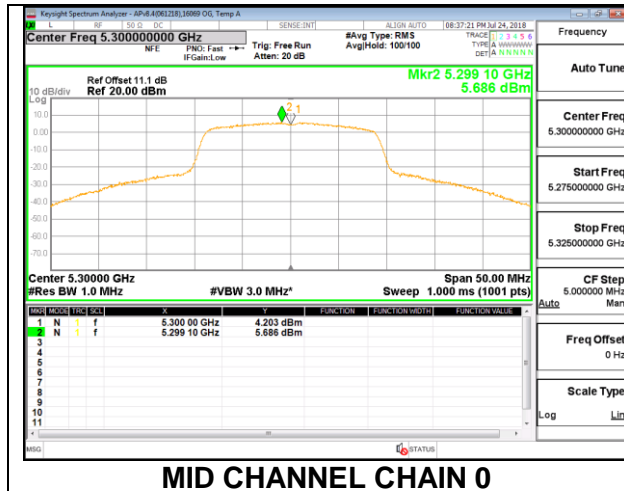
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Low	5260	5.61	5.77	9.02	11.00	-1.98
Mid	5300	5.69	6.48	9.43	11.00	-1.57
High	5320	5.55	5.99	9.10	11.00	-1.90



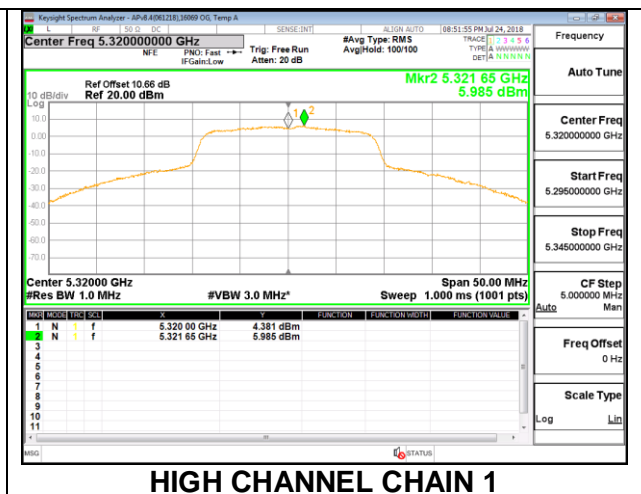
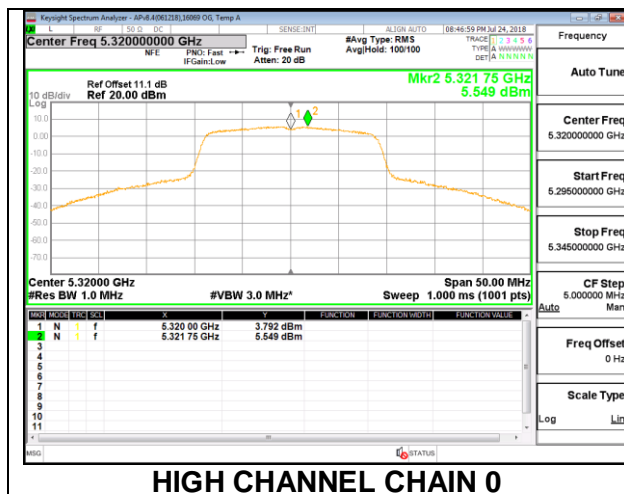
### LOW CHANNEL



### MID CHANNEL



### HIGH CHANNEL



**(IC)**

**Bandwidth, Antenna Gain, and Limits**

Channel	Frequency (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm/1MHz)
Low	5260	17.63	1.71	4.67	23.46	11.00
Mid	5300	17.83	1.71	4.67	23.51	11.00
High	5320	17.78	1.71	4.67	23.50	11.00

<b>Duty Cycle CF (dB)</b>	0.32	<b>Included in Calculations of Corr'd PSD</b>
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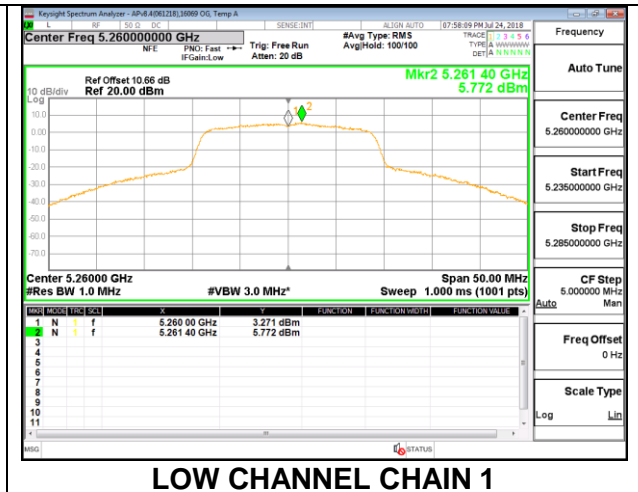
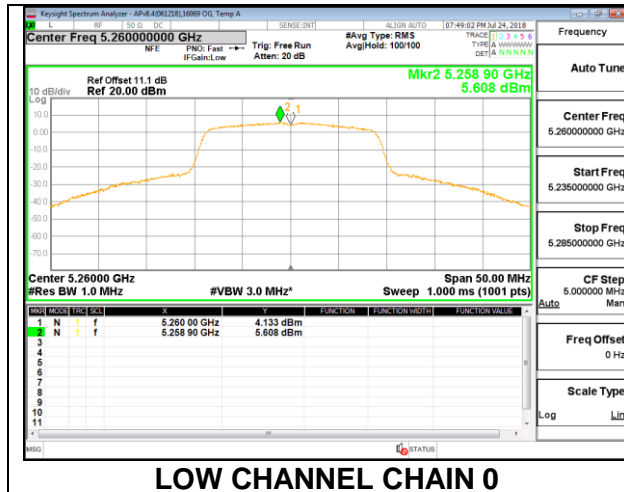
**Output Power Results**

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	5260	17.31	17.54	20.44	23.46	-3.03
Mid	5300	17.08	17.32	20.21	23.51	-3.30
High	5320	17.08	17.27	20.19	23.50	-3.31

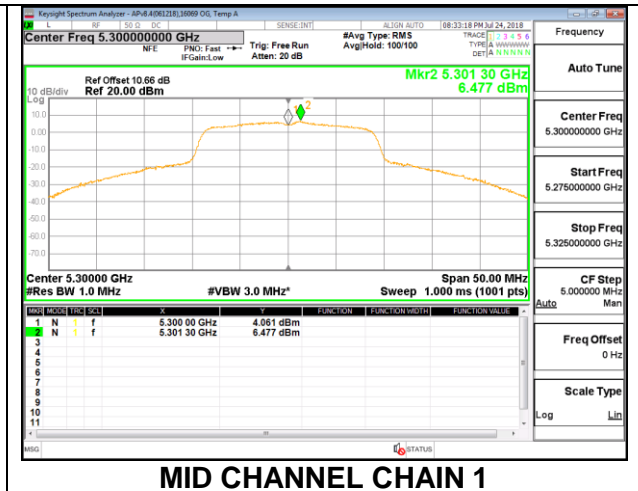
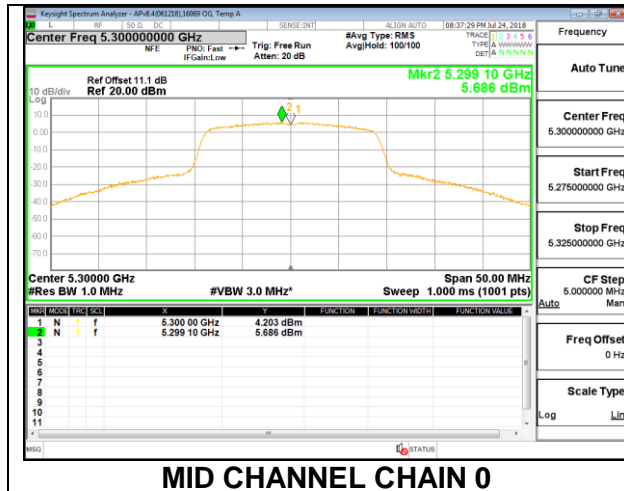
**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/1MHz)	Chain 1 Meas PSD (dBm/1MHz)	Total Corr'd PSD (dBm/1MHz)	PSD Limit (dBm/1MHz)	PSD Margin (dB)
Low	5260	5.61	5.77	9.02	11.00	-1.98
Mid	5300	5.69	6.48	9.43	11.00	-1.57
High	5320	5.55	5.99	9.10	11.00	-1.90

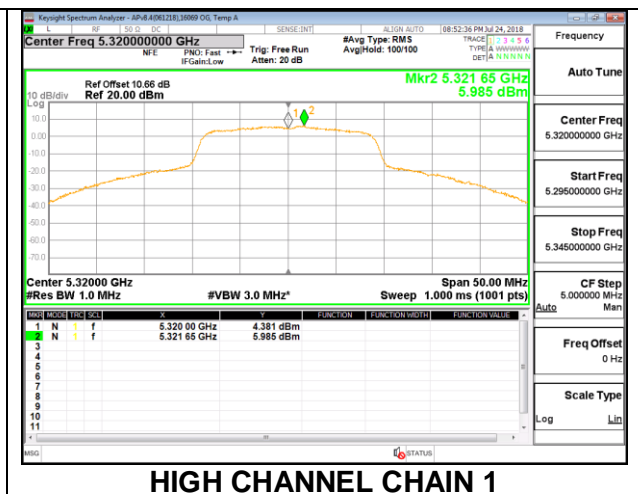
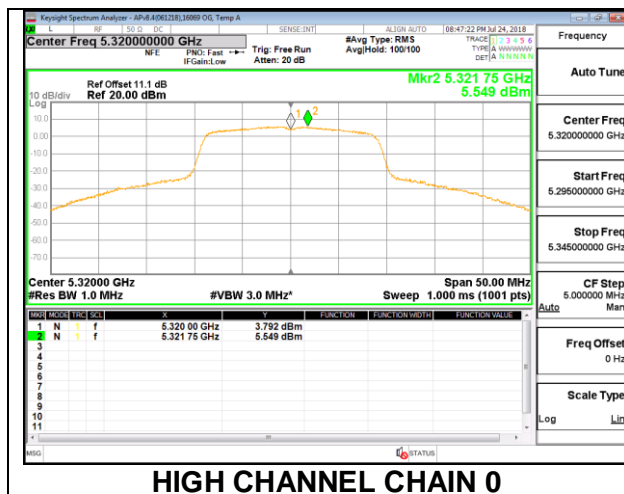
### LOW CHANNEL



### MID CHANNEL



### HIGH CHANNEL



**8.2.7. 802.11n HT20 MODE IN THE 5.6 GHz BAND**

**(FCC+IC)**

**Bandwidth and Antenna Gain**

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)
Low	5500	22.90	17.63	1.68	4.69
Mid	5580	23.15	17.72	1.68	4.69
High	5700	28.95	17.68	1.68	4.69

**Limits**

Channel	Frequency (MHz)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Power Limit (dBm)	FCC PSD Limit (dBm/ 1MHz)	ISED PSD Limit (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)
Low	5500	24.00	23.46	29.46	23.46	11.00	11.00	11.00
Mid	5580	24.00	23.48	29.48	23.48	11.00	11.00	11.00
High	5700	24.00	23.47	29.47	23.47	11.00	11.00	11.00

<b>Duty Cycle CF (dB)</b>	0.32	<b>Included in Calculations of Corr'd Power &amp; PSD</b>
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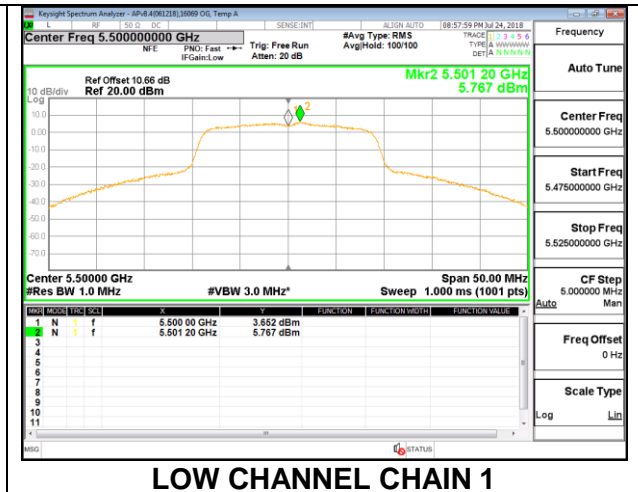
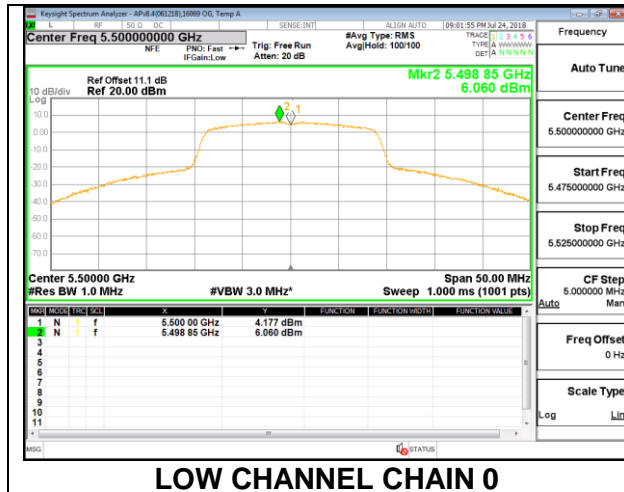
**Output Power Results**

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	5500	17.47	17.09	20.29	23.46	-3.17
Mid	5580	17.96	17.45	20.72	23.48	-2.76
High	5700	16.48	16.7	19.60	23.47	-3.87

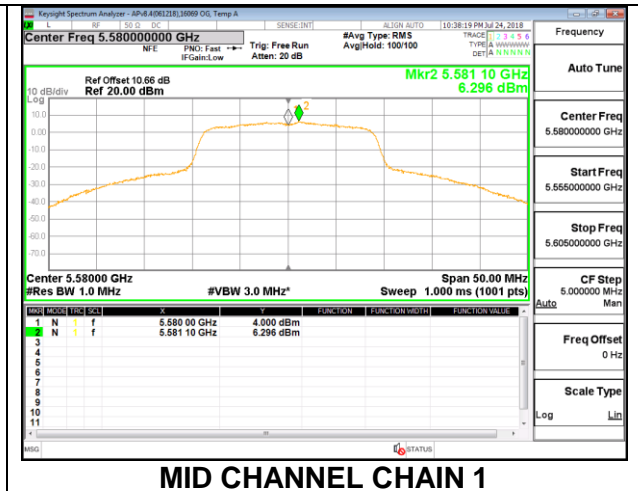
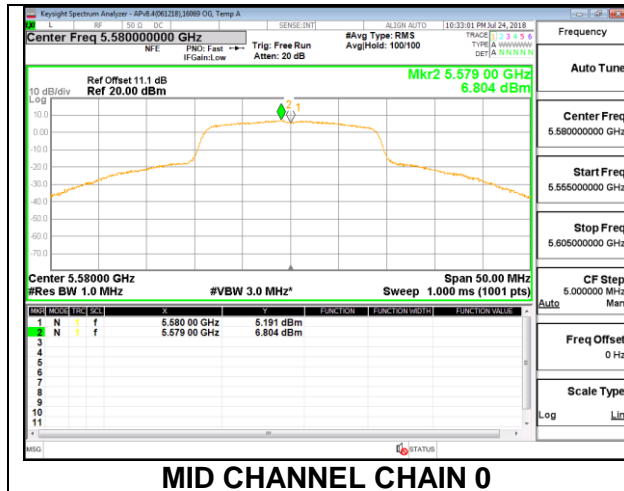
**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 1MHz)	Chain 1 Meas PSD (dBm/ 1MHz)	Total Corr'd PSD (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)	PSD Margin (dB)
Low	5500	6.06	5.77	9.246	11.00	-1.75
Mid	5580	6.80	6.30	9.888	11.00	-1.11
High	5700	5.92	6.29	9.435	11.00	-1.57

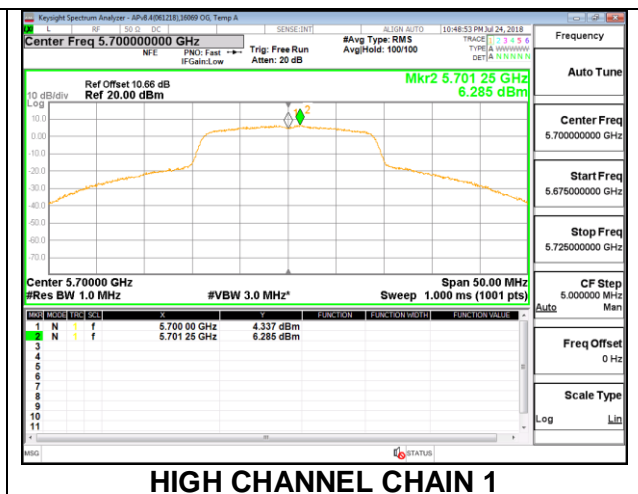
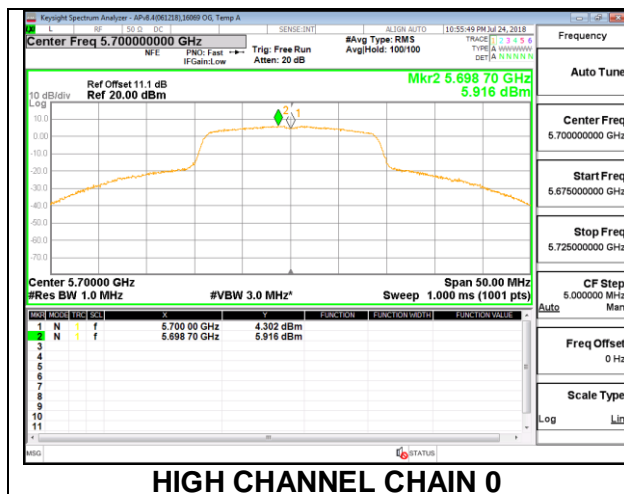
### LOW CHANNEL



### MID CHANNEL



### HIGH CHANNEL



**8.2.8. 802.11n HT20 MODE IN THE 5.8 GHz BAND**

**(FCC+IC)**

**Antenna Gain and Limit**

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/ 1MHz)
Low	5745	1.68	4.69	30.00	30.00
Mid	5785	1.68	4.69	30.00	30.00
High	5825	1.68	4.69	30.00	30.00

<b>Duty Cycle CF (dB)</b>	0.32	<b>Included in Calculations of Corr'd Power &amp; PSD</b>
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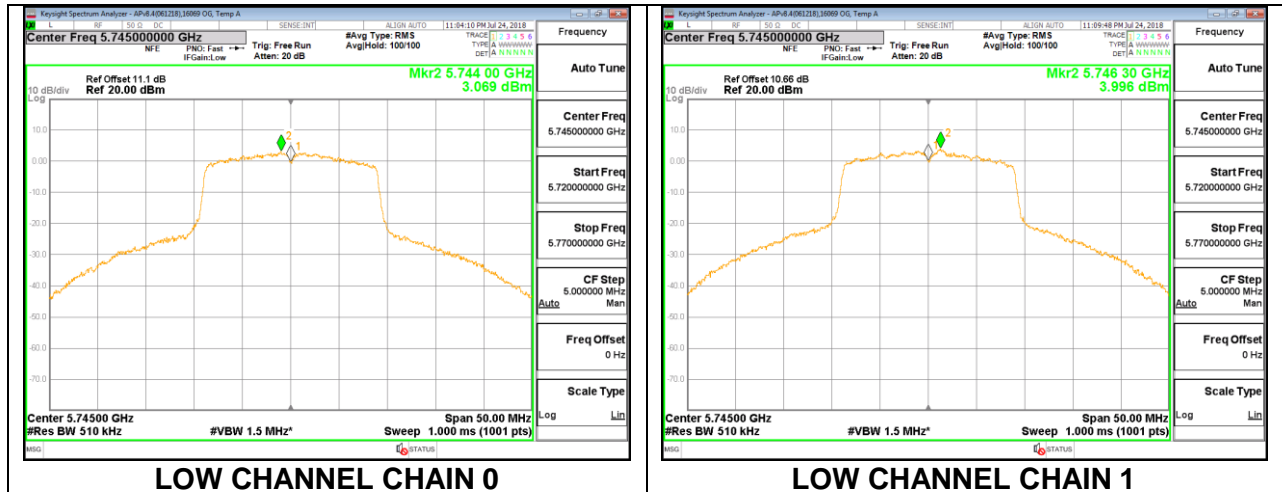
**Output Power Results**

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	5745	17.09	17.75	20.44	30.00	-9.56
Mid	5785	17.05	17.8	20.45	30.00	-9.55
High	5825	17.75	17.82	20.80	30.00	-9.20

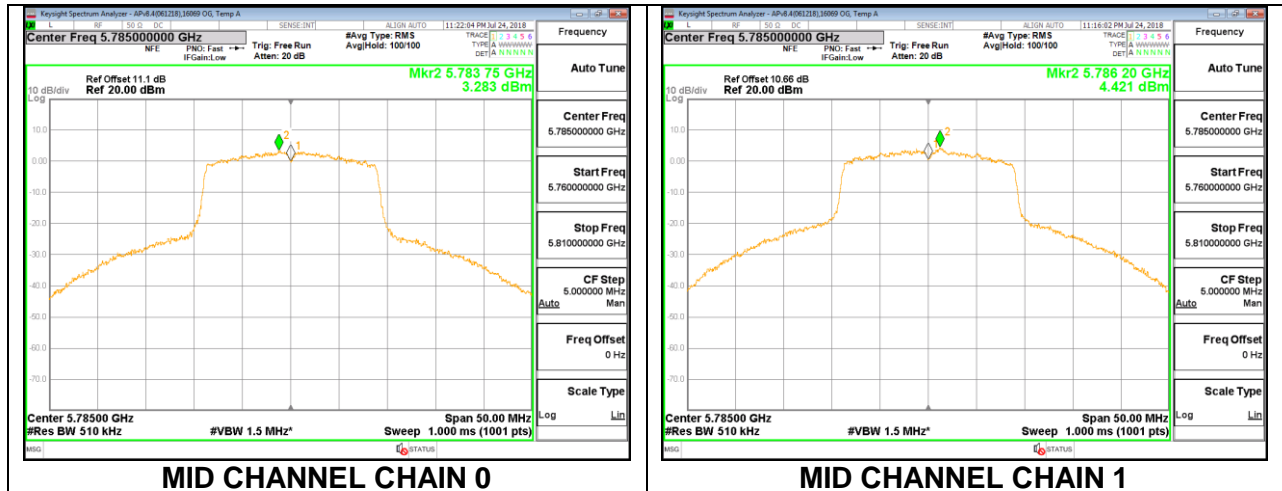
**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm/ 1MHz)	Chain 1 Meas PSD (dBm/ 1MHz)	Total Corr'd PSD (dBm/ 1MHz)	PSD Limit (dBm/ 1MHz)	PSD Margin (dB)
Low	5745	3.07	4.00	6.887	30.00	-23.11
Mid	5785	3.28	4.42	7.219	30.00	-22.78
High	5825	4.51	5.02	8.105	30.00	-21.90

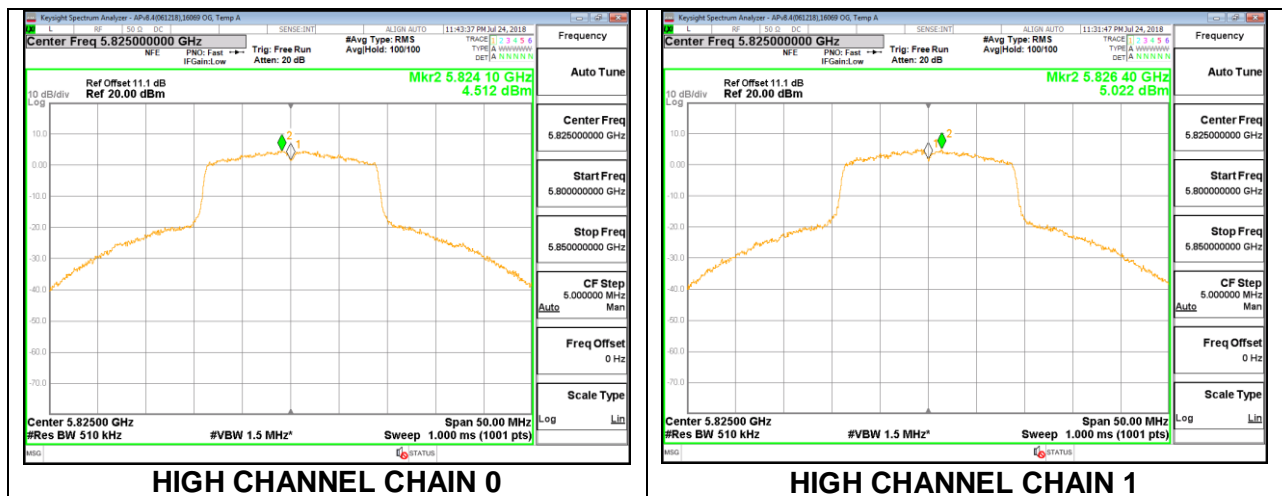
### LOW CHANNEL



### MID CHANNEL



### HIGH CHANNEL



**Note:** Please refer to UL 12166253-E3 report for the rest of conducted test items (99% bandwidth, 6dB bandwidth, Power Density, Conducted Spurious Emissions & AC Power Line Conducted Emissions)



## 9. RADIATED TEST RESULTS

### LIMITS

FCC §15.205 and §15.209 -Restricted bands

FCC §15.407(b)(1-3) -Un-Restricted bands

### After January 01, 2019 for Outside of the Restricted Bands Emissions

RSS 247 Issue 2 Sections

6.2.1.2 (for 5150-5250 MHz band)

6.2.2.2 (for 5250-5350 MHz band)

6.2.3.2 (for 5470-5600 MHz and 5650-5725 MHz bands)

6.2.4.2 (for 5725-5850 MHz band)

### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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 pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final 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 1GHz and 18GHz to 40 GHz is investigated with the transmitter set to transmit at the channel with highest output power as worst-case scenario. 1GHz to 18GHz was set to the lowest, middle, and highest channels in the 5 GHz bands.

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.

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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**KDB 414788 OATS and Chamber Correlation Justification**

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

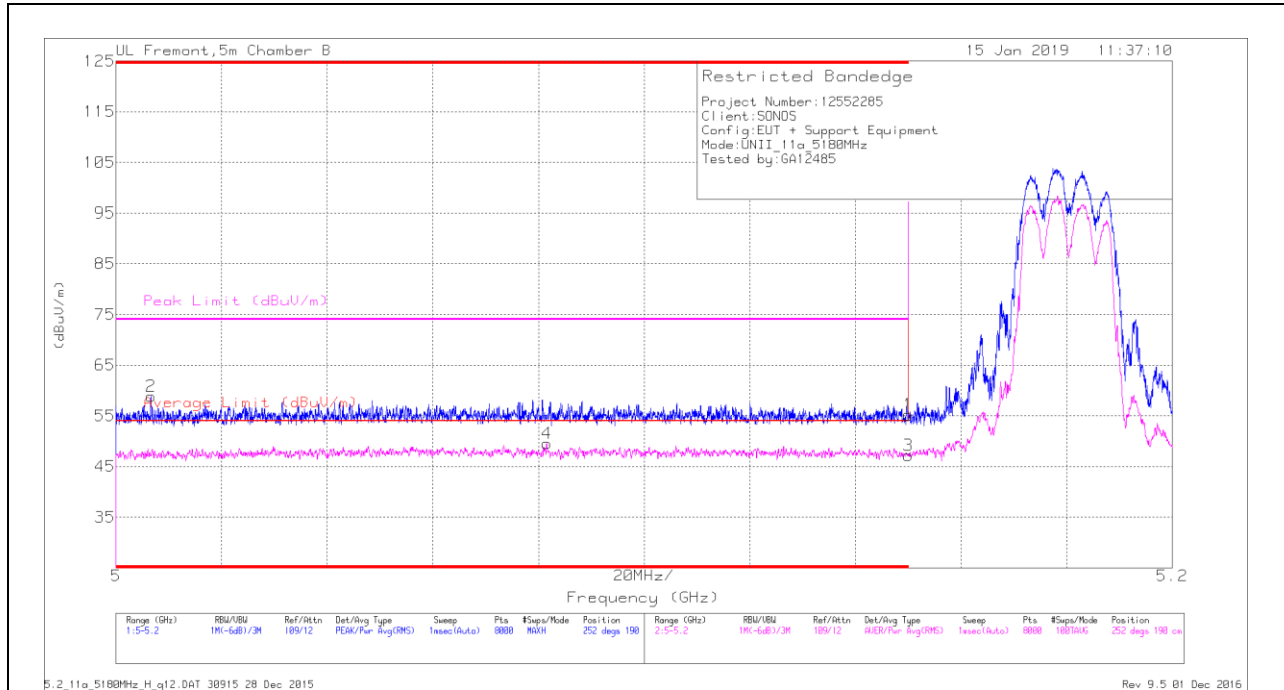
OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

## 9.1. TRANSMITTER ABOVE 1 GHz

### 9.1.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND

#### BANDEDGE (LOW CHANNEL)

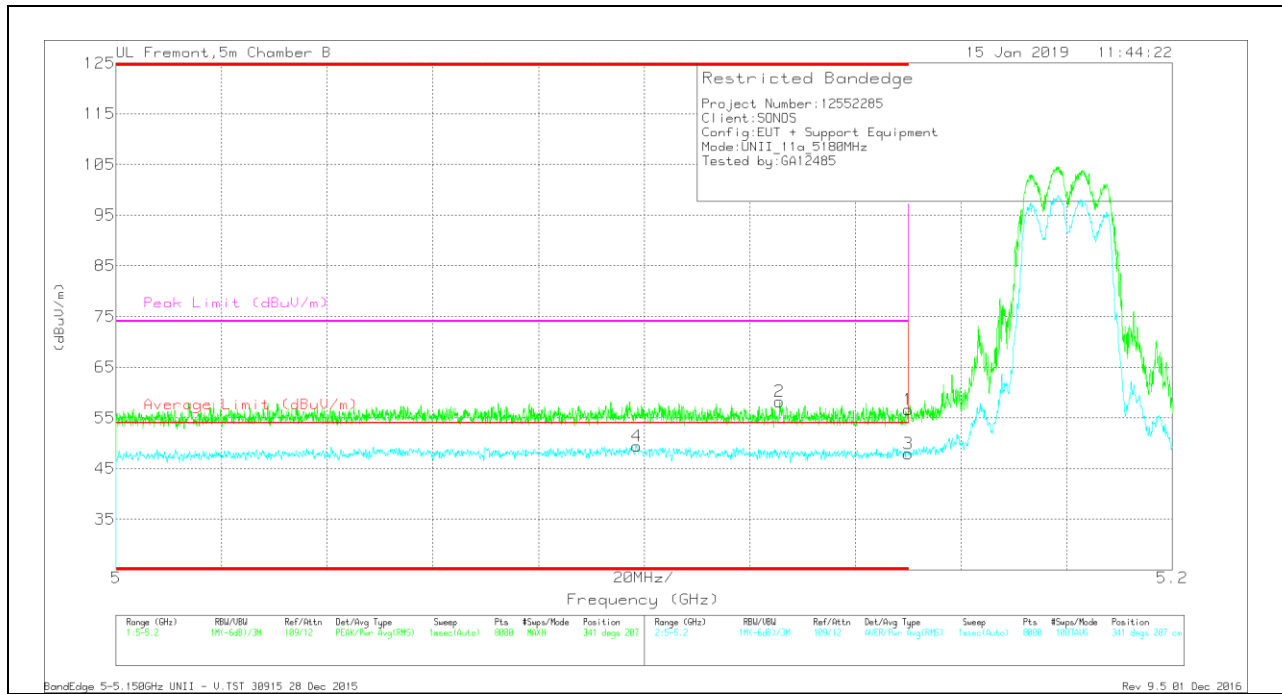
#### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.15	37.7	Pk	34.6	-17.1	0	55.2	-	-	74	-18.8	252	190	H
2	* 5.007	41.28	Pk	34.6	-17	0	58.88	-	-	74	-15.12	252	190	H
3	* 5.15	29.02	RMS	34.6	-17.1	.09	46.61	54	-7.39	-	-	252	190	H
4	* 5.082	31.53	RMS	34.5	-17.1	.09	49.02	54	-4.98	-	-	252	190	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 RMS - RMS detection

### VERTICAL RESULT

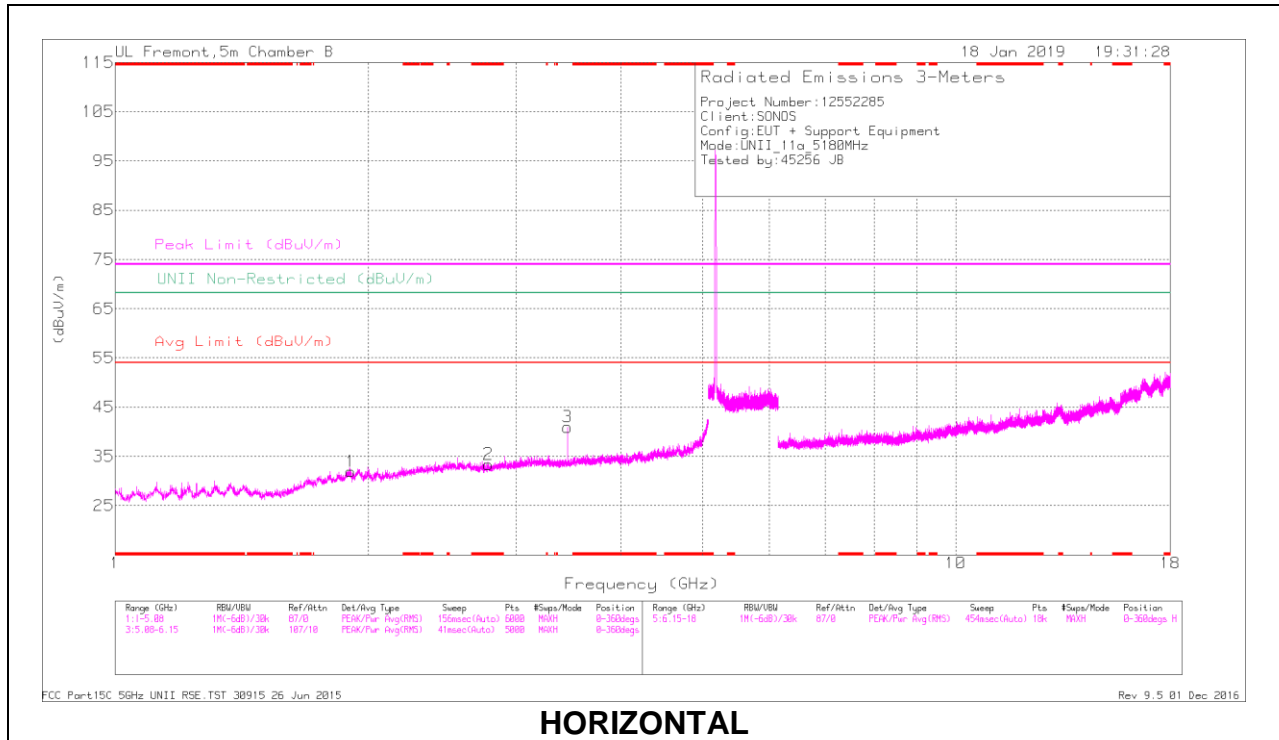


Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T663 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Correcte d Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 5.099	31.33	RMS	34.5	-17	.09	48.92	54	-5.08	-	-	341	207	V
2	* 5.126	40.78	Pk	34.6	-17.2	0	58.18	-	-	74	-15.82	341	207	V
1	* 5.15	39.08	Pk	34.6	-17.1	0	56.58	-	-	74	-17.42	341	207	V
3	* 5.15	29.82	RMS	34.6	-17.1	.09	47.41	54	-6.59	-	-	341	207	V

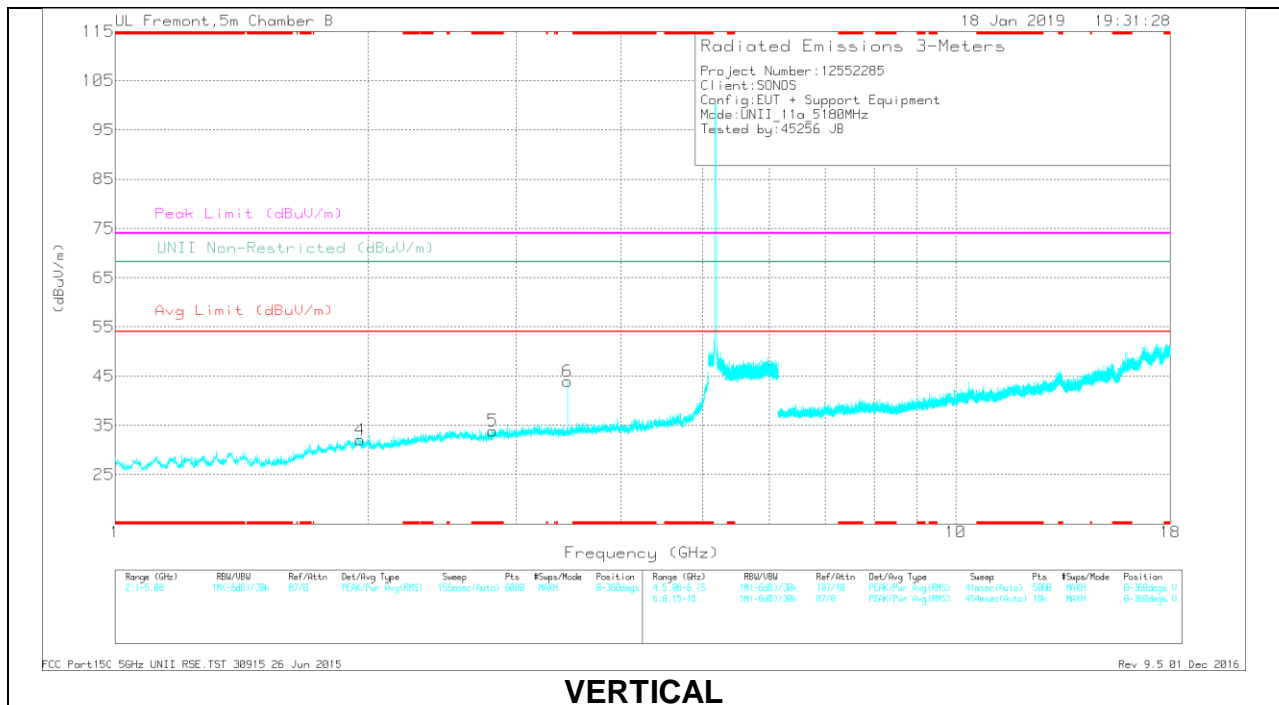
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 RMS - RMS detection

## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

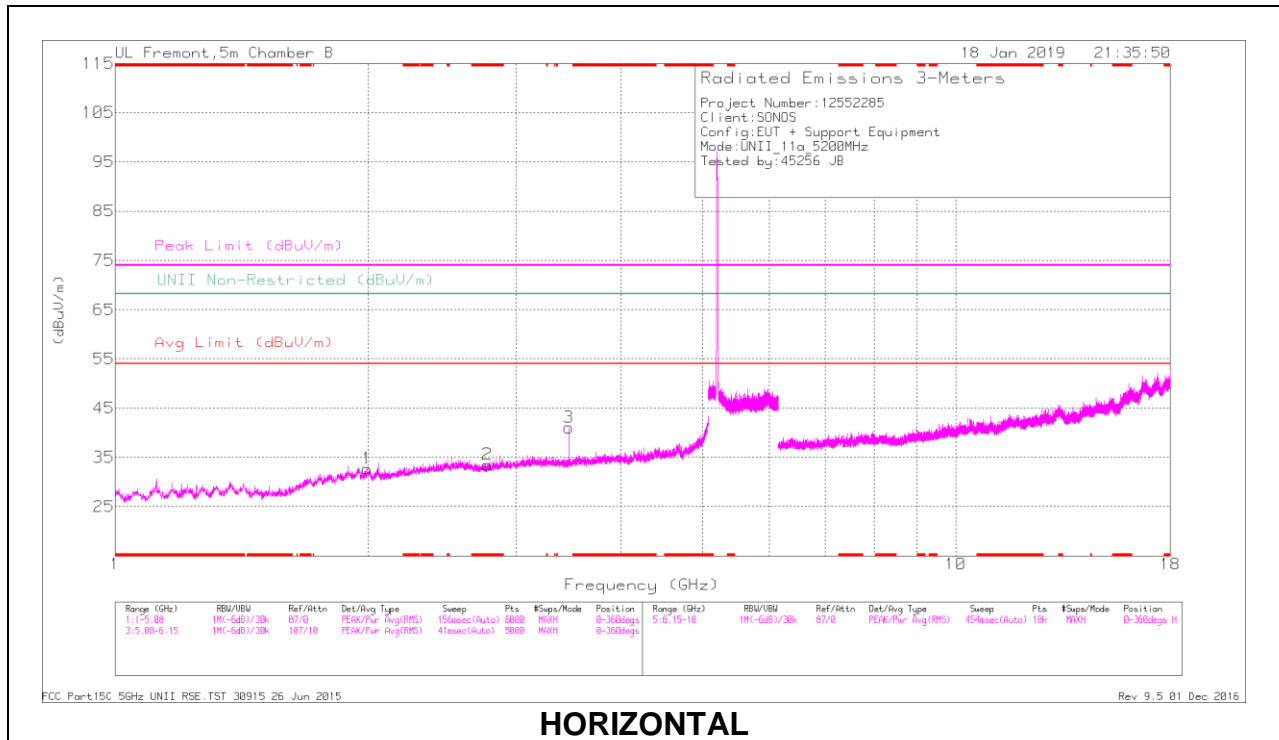
Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Ch/Filt/Pad (dB)	DC Corr (dB)	Correct d Reading (dBuVm)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.782	40.72	PK-U	32.4	-32.3	0	40.82	-	-	74	-33.18	-	-	169	387	H
	* 2.783	28.1	ADR	32.4	-32.3	.09	28.29	54	-25.71	-	-	-	-	169	387	H
5	* 2.812	40.12	PK-U	32.5	-31.9	0	40.72	-	-	74	-33.28	-	-	166	327	V
	* 2.814	27.82	ADR	32.5	-32	.09	28.41	54	-25.59	-	-	-	-	166	327	V
1	1.906	39.85	PK-U	31.1	-32.6	0	38.35	-	-	-	-	68.2	-29.85	338	109	H
4	1.957	39.97	PK-U	31	-32	0	38.97	-	-	-	-	68.2	-29.23	165	286	V
3	3.453	44.15	PK-U	32.9	-31.6	0	45.45	-	-	-	-	68.2	-22.75	240	102	H
6	3.453	43.79	PK-U	32.9	-31.6	0	45.09	-	-	-	-	68.2	-23.11	239	106	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

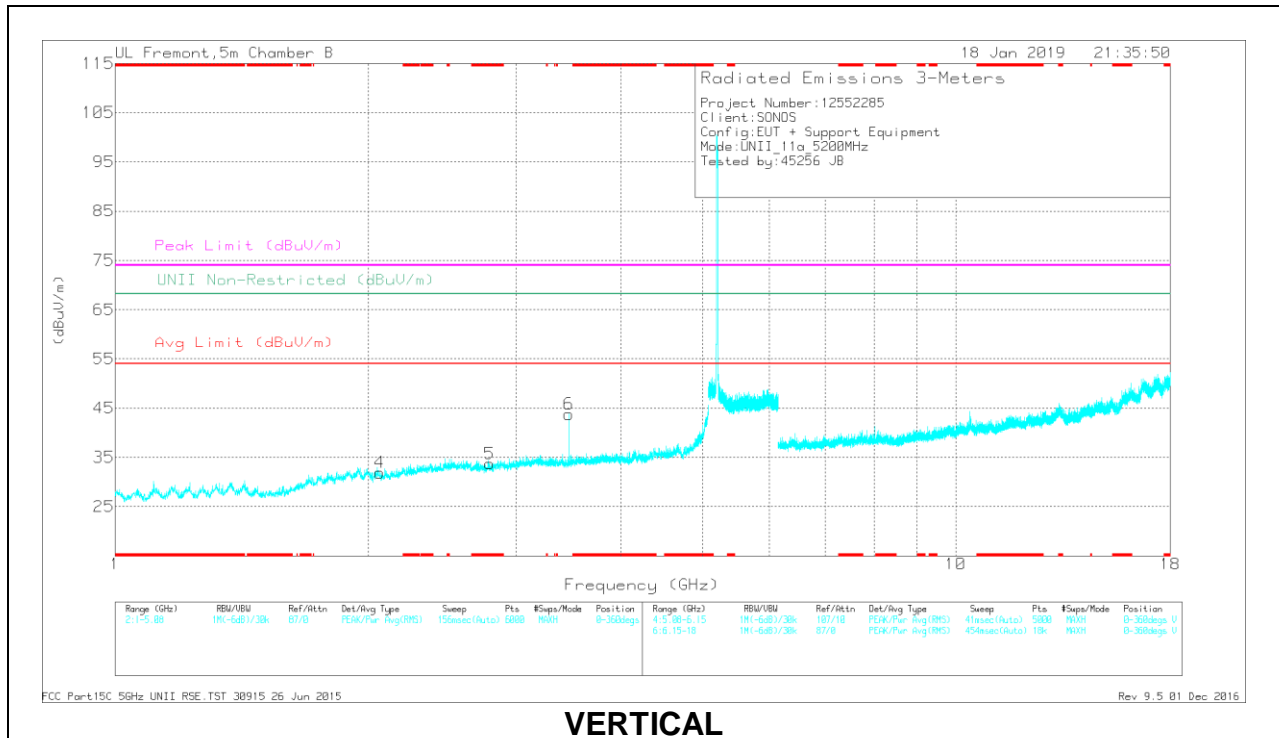
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

### MID CHANNEL RESULTS



### HORIZONTAL



### VERTICAL

**RADIATED EMISSIONS**

Frequency (GHz)	Meas Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cb/Filt/Pad (dB)	DC Corr (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
* 2.773	40.85	PK-U	32.4	-32.3	0	40.95	-	-	74	-33.05	-	-	266	126	H
* 2.774	28.15	ADR	32.4	-32.3	.09	28.34	54	-25.66	-	-	-	-	266	126	H
* 2.792	39.92	PK-U	32.4	-32.1	0	40.22	-	-	74	-33.78	-	-	114	316	V
* 2.791	28.05	ADR	32.4	-32.1	.09	28.44	54	-25.56	-	-	-	-	114	316	V
1.993	40.3	PK-U	30.9	-32	0	39.2	-	-	-	-	68.2	-29	205	231	H
2.066	40.66	PK-U	31	-33	0	39.66	-	-	-	-	68.2	-29.54	39	140	V
3.466	44.54	PK-U	32.9	-31.5	0	45.94	-	-	-	-	68.2	-22.26	127	205	H
3.467	45.47	PK-U	32.9	-31.5	0	46.87	-	-	-	-	68.2	-21.33	228	376	V

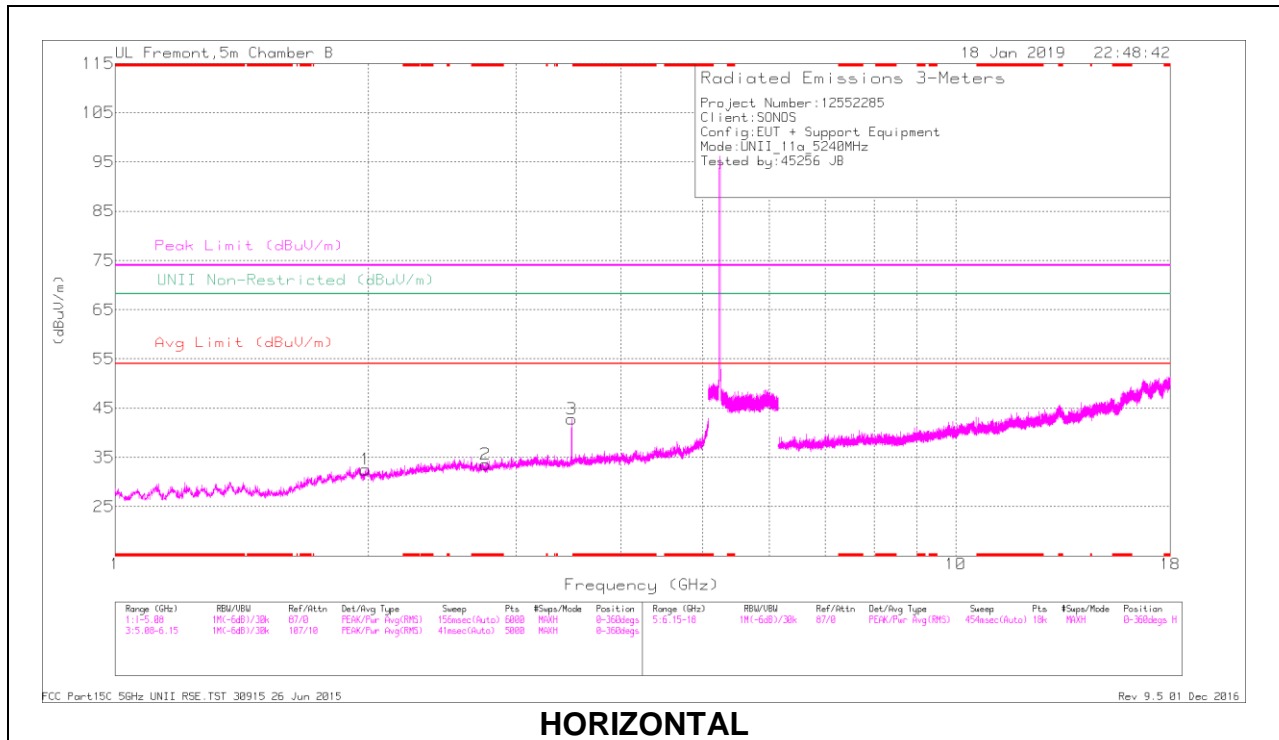
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

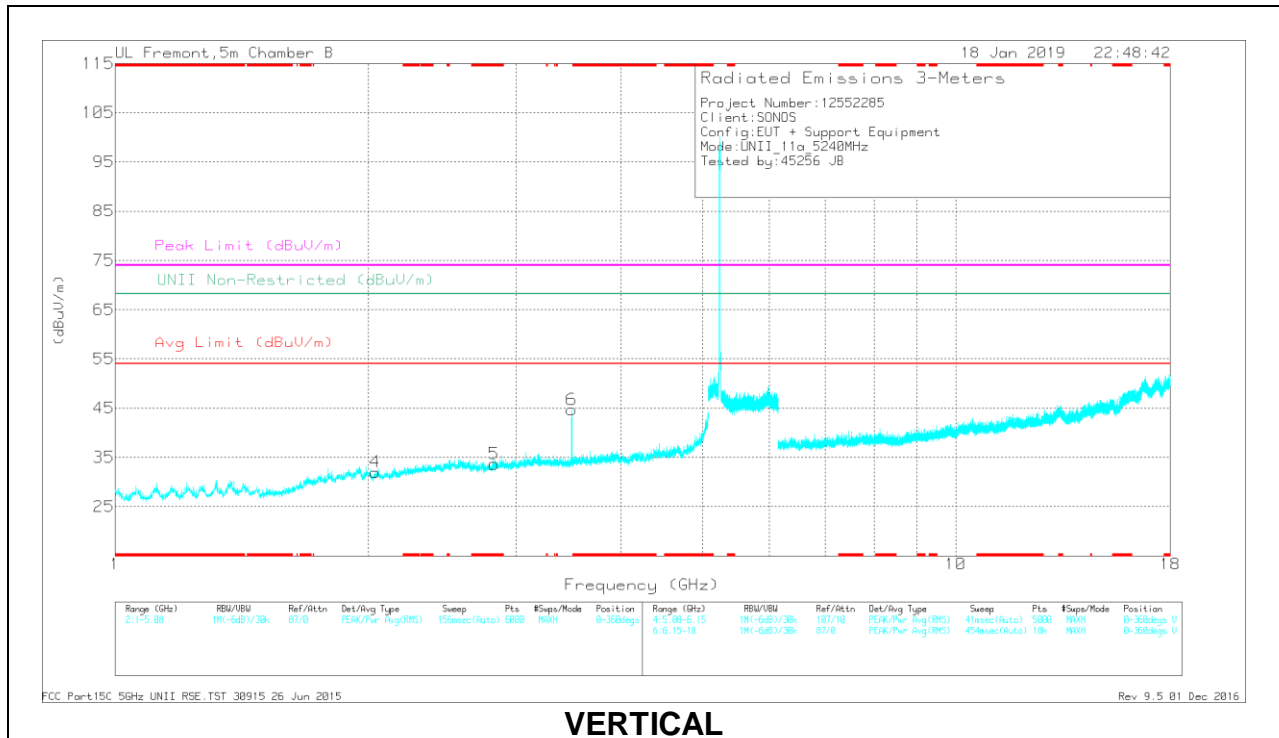
ADR - U-NII AD primary method, RMS average



### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Frequency (GHz)	Meas Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cb/Filt/Pad (dB)	DC Corr (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
* 2.759	39.77	PK-U	32.4	-32.1	0	40.07	-	-	74	-33.93	-	-	3	387	H
* 2.757	27.7	ADR	32.4	-32	.09	28.19	54	-25.81	-	-	-	-	3	387	H
* 2.826	40.05	PK-U	32.5	-32	0	40.55	-	-	74	-33.45	-	-	146	170	V
* 2.824	27.99	ADR	32.5	-32	.09	28.58	54	-25.42	-	-	-	-	146	170	V
1.987	39.84	PK-U	30.9	-31.8	0	38.94	-	-	-	-	68.2	-29.26	37	224	H
2.039	39.97	PK-U	31	-32.5	0	39.47	-	-	-	-	68.2	-29.73	63	393	V
3.493	46.27	PK-U	32.9	-31.2	0	47.97	-	-	-	-	68.2	-20.23	340	107	V
3.494	44.95	PK-U	32.9	-31.2	0	46.65	-	-	-	-	68.2	-21.55	125	257	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

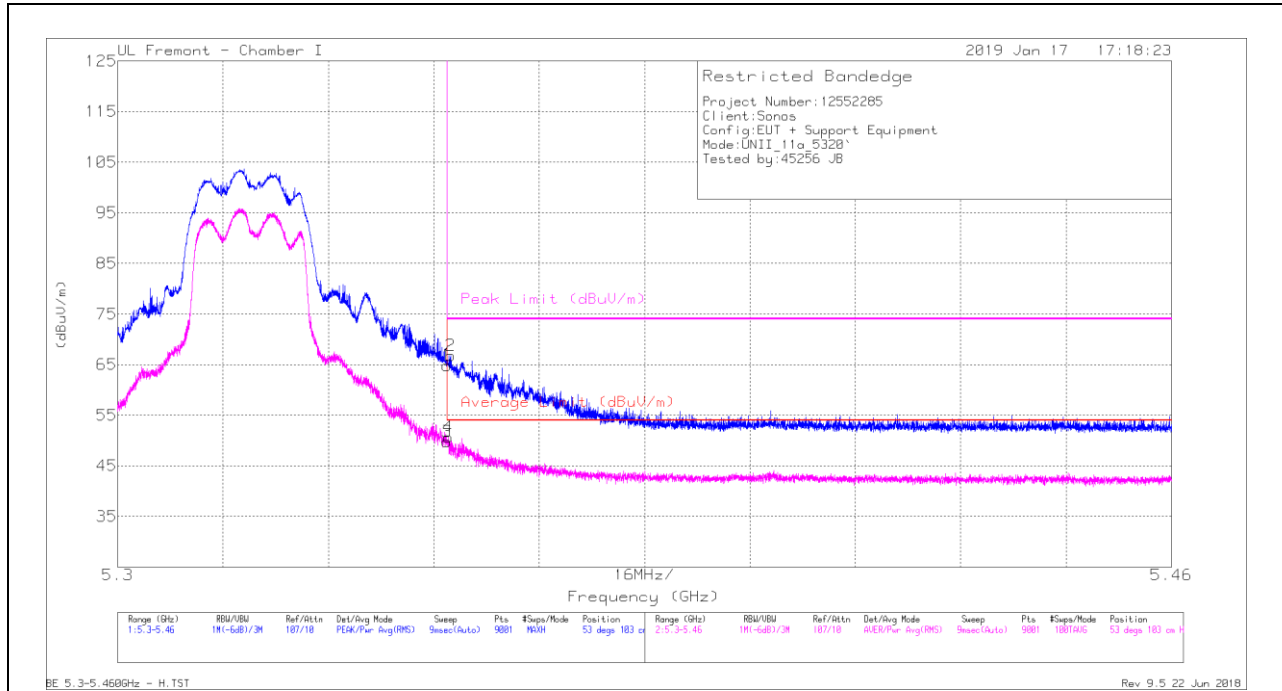
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

**9.1.2. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND**

**BANDEGE (HIGH CHANNEL)**

**HORIZONTAL RESULT**



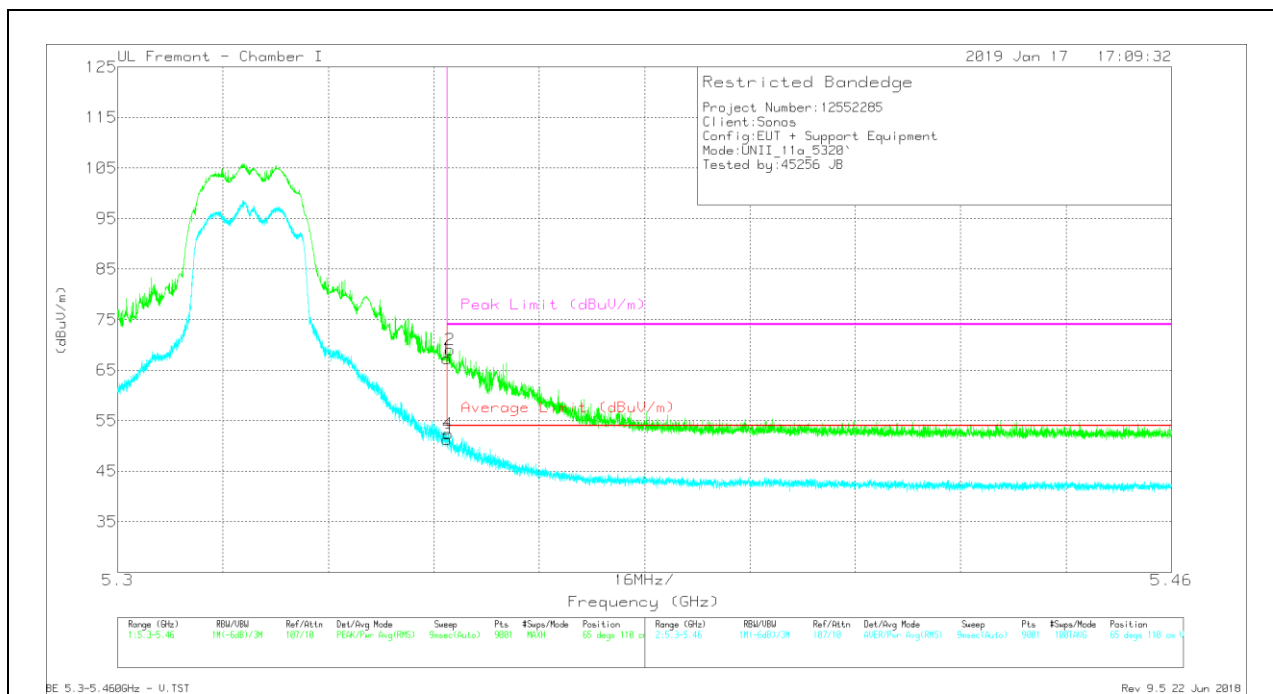
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T662 (dB/m)	Amp/Chl/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35	48.68	Pk	34.5	-18.3	0	64.88	-	-	74	-9.12	53	103	H
2	* 5.351	50.56	Pk	34.5	-18.3	0	66.76	-	-	74	-7.24	53	103	H
3	* 5.35	33.48	RMS	34.5	-18.3	.09	49.77	54	-4.23	-	-	53	103	H
4	* 5.35	34.43	RMS	34.5	-18.3	.09	50.72	54	-3.28	-	-	53	103	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT

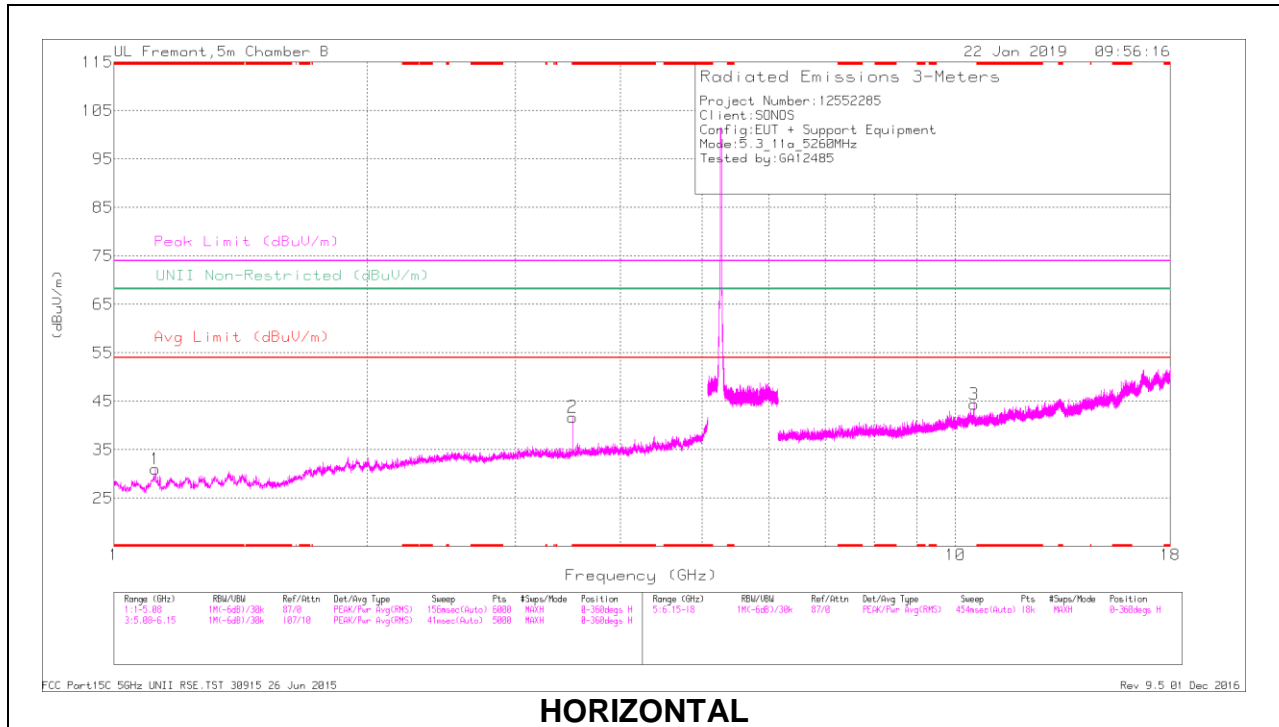


Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T662 (dB/m)	Amp/Chl/Filtr/Pad (dB)	DC Corr (dB)	Correcte d Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35	51.09	Pk	34.5	-18.3	0	67.29	-	-	74	-6.71	65	110	V
2	* 5.35	52.86	Pk	34.5	-18.3	0	69.06	-	-	74	-4.94	65	110	V
3	* 5.35	34.94	RMS	34.5	-18.3	.09	51.23	54	-2.77	-	-	65	110	V
4	* 5.35	36.14	RMS	34.5	-18.3	.09	52.43	54	-1.57	-	-	65	110	V

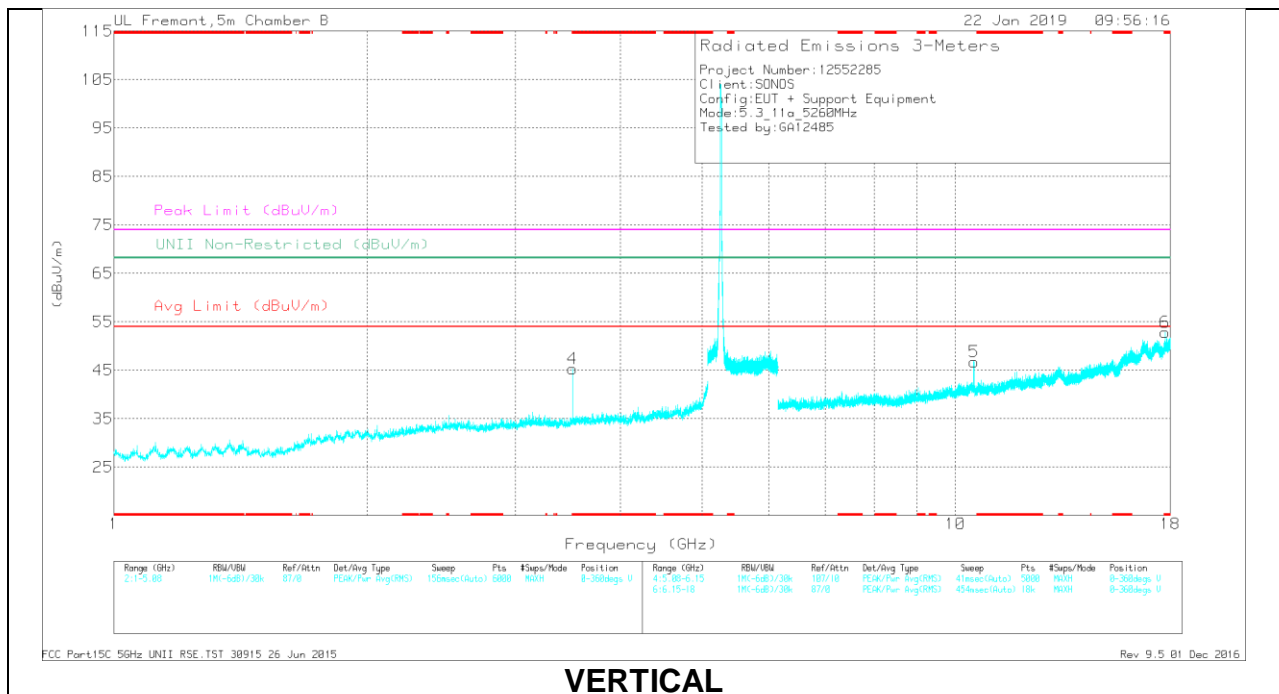
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 RMS - RMS detection

### HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS



**HORIZONTAL**



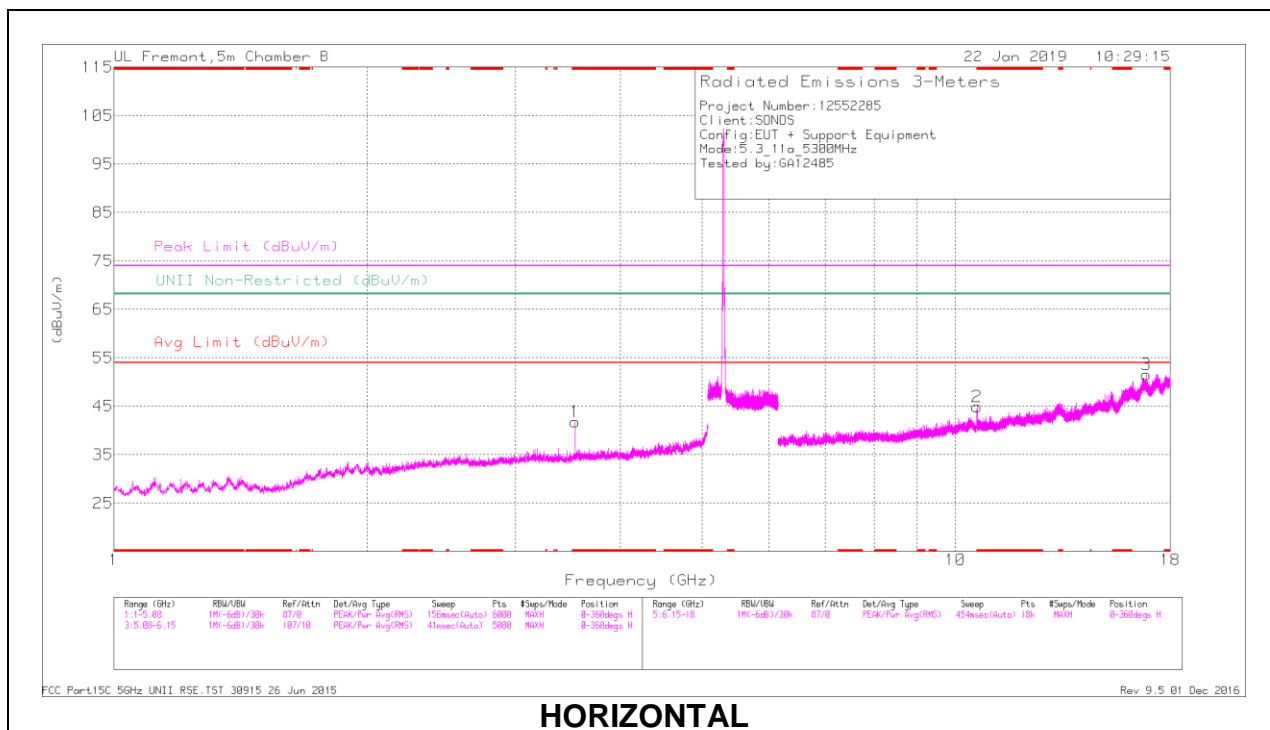
**VERTICAL**

**RADIATED EMISSIONS**

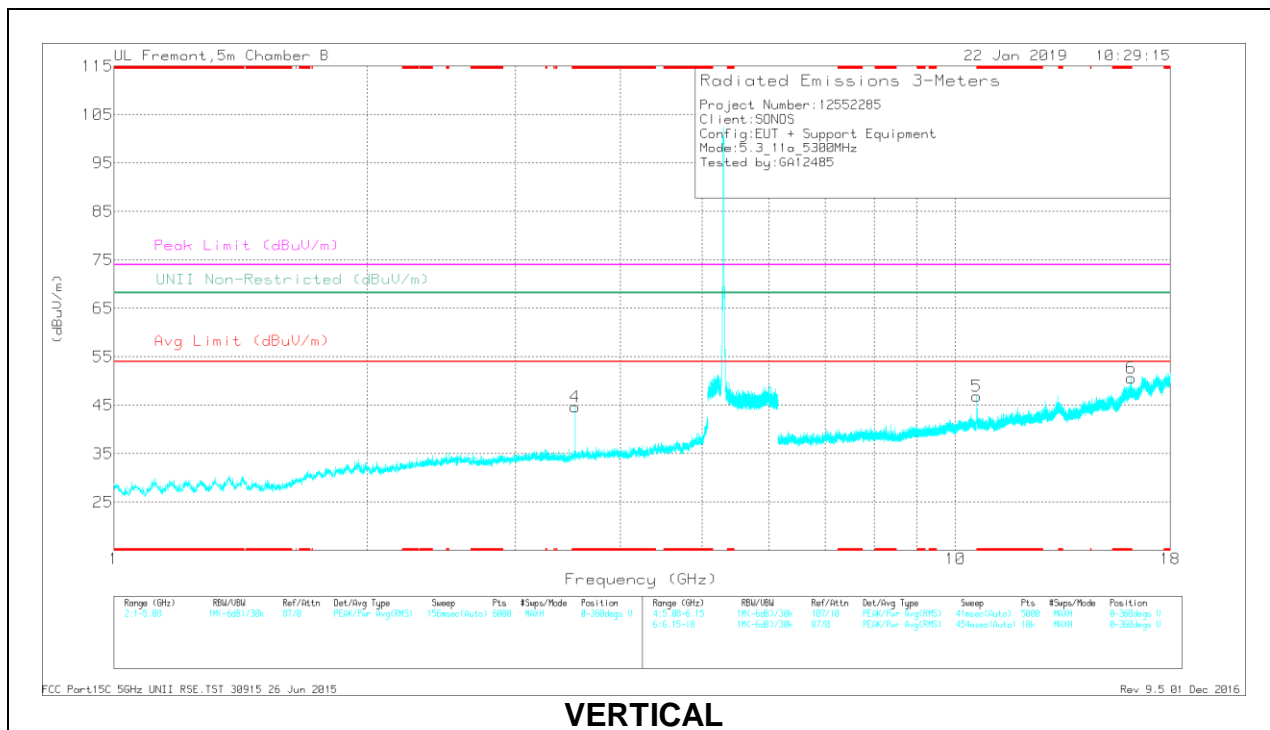
Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	AF T863 (dBm)	Amp/Coupl/Att/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.12	45.03	PK-U	27.4	-34	0	38.43	-	-	74	-35.57	-	-	130	194	H
	* 1.12	34.77	ADR	27.4	-34	.09	28.26	54	-25.74	-	-	-	-	130	194	H
2	* 3.507	44.92	PK-U	32.9	-30.9	0	46.92	-	-	74	-27.08	-	-	118	253	H
	* 3.507	40.13	ADR	32.9	-30.9	.09	42.22	54	-11.78	-	-	-	-	118	253	H
4	* 3.507	46.77	PK-U	32.9	-30.9	0	48.77	-	-	74	-25.23	-	-	219	203	V
	* 3.507	43.04	ADR	32.9	-30.9	.09	45.13	54	-8.87	-	-	-	-	219	203	V
6	* 17.751	31.1	PK-U	44.2	-17.7	0	57.6	-	-	74	-16.4	-	-	347	321	V
	* 17.752	17.38	ADR	44.2	-17.7	.09	43.97	54	-10.03	-	-	-	-	347	321	V
5	10.515	33.63	PK-U	37.8	-23	0	48.43	-	-	-	-	68.2	-19.77	119	108	V
3	10.525	35.31	PK-U	37.8	-23.1	0	50.01	-	-	-	-	68.2	-18.19	123	366	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK-U - U-NII: Maximum Peak  
 ADR - U-NII AD primary method, RMS average

### MID CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	AF T863 (dBm)	Amp/Coupl/Fur/Pad (dB)	DC Corr (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	* 3.533	43.65	PK-U	33	-30.4	0	46.25	-	-	74	-27.75	-	-	226	173	H
	* 3.533	37.96	ADR	33	-30.4	.09	40.65	54	-13.35	-	-	-	-	226	173	H
4	* 3.533	45.86	PK-U	33	-30.4	0	48.46	-	-	74	-25.54	-	-	339	102	V
	* 3.533	41.8	ADR	33	-30.4	.09	44.49	54	-9.51	-	-	-	-	339	102	V
2	* 10.605	36.71	PK-U	37.7	-23	0	51.41	-	-	74	-22.59	-	-	138	109	H
	* 10.604	23.78	ADR	37.7	-23	.09	38.57	54	-15.43	-	-	-	-	138	109	H
5	* 10.602	37.26	PK-U	37.7	-23.1	0	51.86	-	-	74	-22.14	-	-	129	301	V
	* 10.601	23.03	ADR	37.7	-23.1	.09	37.72	54	-16.28	-	-	-	-	129	301	V
6	* 16.173	30.96	PK-U	43	-18.6	0	55.36	-	-	74	-18.64	-	-	347	366	V
	* 16.172	17.54	ADR	43	-18.7	.09	41.93	54	-12.07	-	-	-	-	347	366	V
3	16.853	30.15	PK-U	44.3	-18.1	0	56.35	-	-	-	-	68.2	-11.85	228	366	H

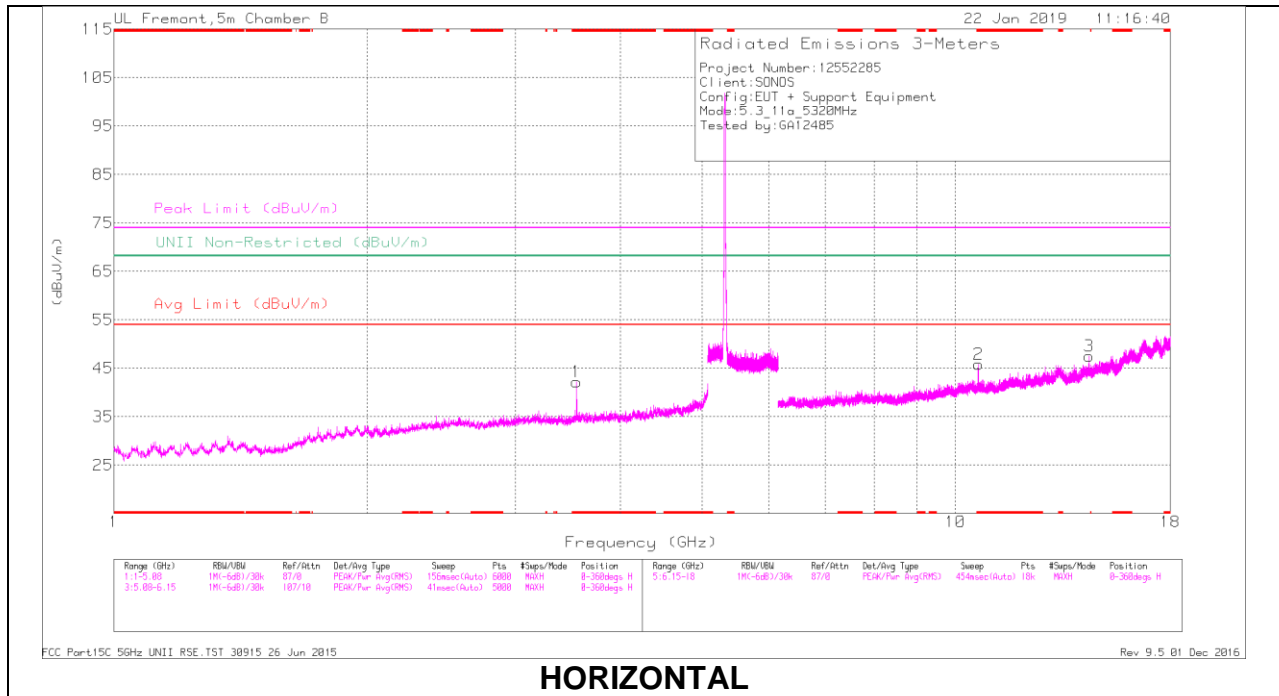
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

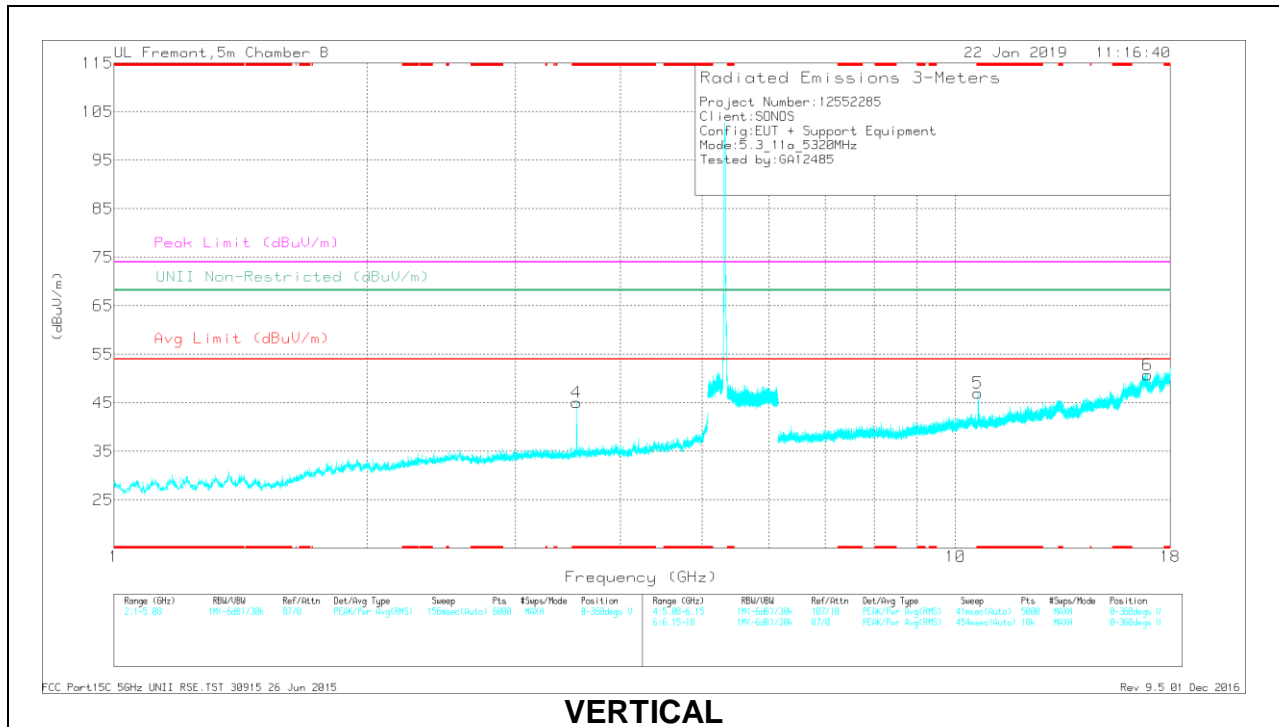
ADR - U-NII AD primary method, RMS average



### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

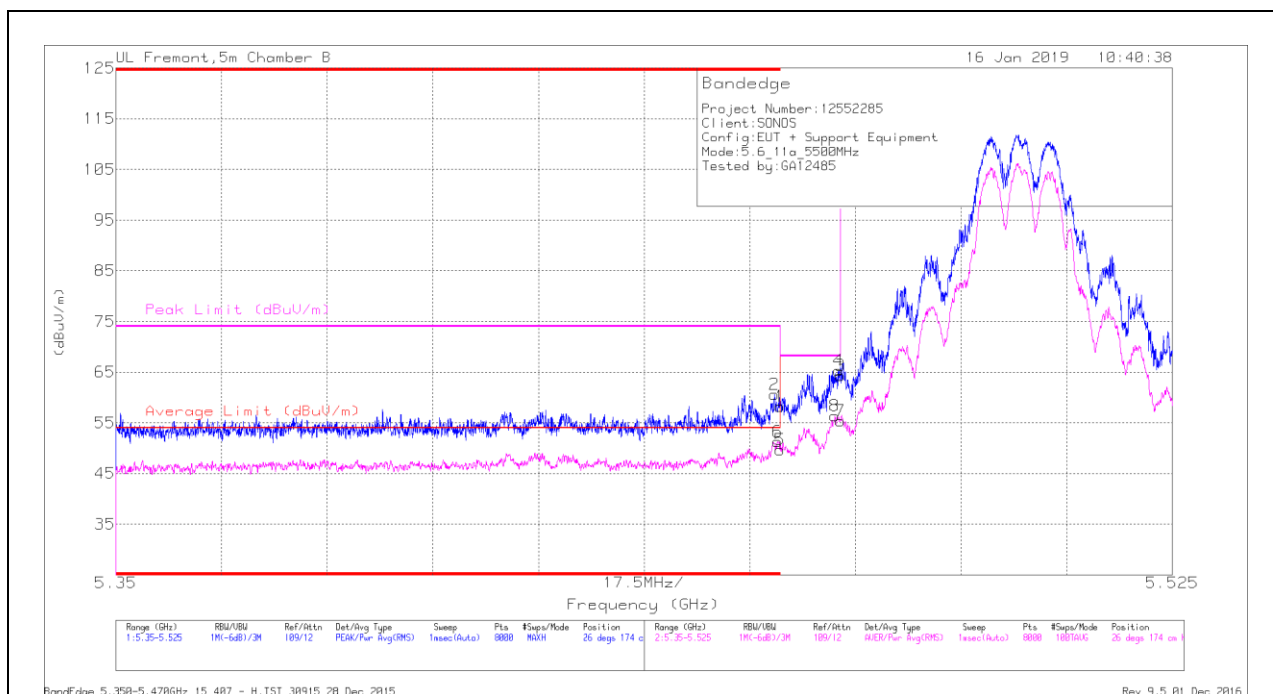
Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	AF T863 (dBm)	AmpCntrl/PwrPad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.547	44.24	PK-U	33.1	-30.5	0	46.84	-	-	74	-27.16	-	-	355	108	H
	* 3.547	38.79	ADR	33.1	-30.5	.09	41.48	54	-12.52	-	-	-	-	355	108	H
4	* 3.547	46.41	PK-U	33.1	-30.5	0	49.01	-	-	74	-24.99	-	-	217	216	V
	* 3.547	42.47	ADR	33.1	-30.5	.09	45.16	54	-8.84	-	-	-	-	217	216	V
2	* 10.646	36.67	PK-U	37.8	-22.6	0	51.87	-	-	74	-22.13	-	-	123	289	H
	* 10.646	23.07	ADR	37.8	-22.6	.09	38.36	54	-15.64	-	-	-	-	123	289	H
5	* 10.641	39.11	PK-U	37.8	-22.6	0	54.31	-	-	74	-19.69	-	-	312	261	V
	* 10.64	27.03	ADR	37.8	-22.6	.09	42.32	54	-11.68	-	-	-	-	312	261	V
3	14.411	32.64	PK-U	40.1	-20.4	0	52.34	-	-	-	-	68.2	-15.86	123	183	H
6	16.927	29.88	PK-U	43.9	-18.4	0	55.38	-	-	-	-	68.2	-12.82	280	138	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK-U - U-NII: Maximum Peak  
 ADR - U-NII AD primary method, RMS average

**9.1.3. TX ABOVE 1 GHz 802.11a MODE IN THE 5.6 GHz BAND**

**BANDEGE (LOW CHANNEL)**

**HORIZONTAL RESULT**



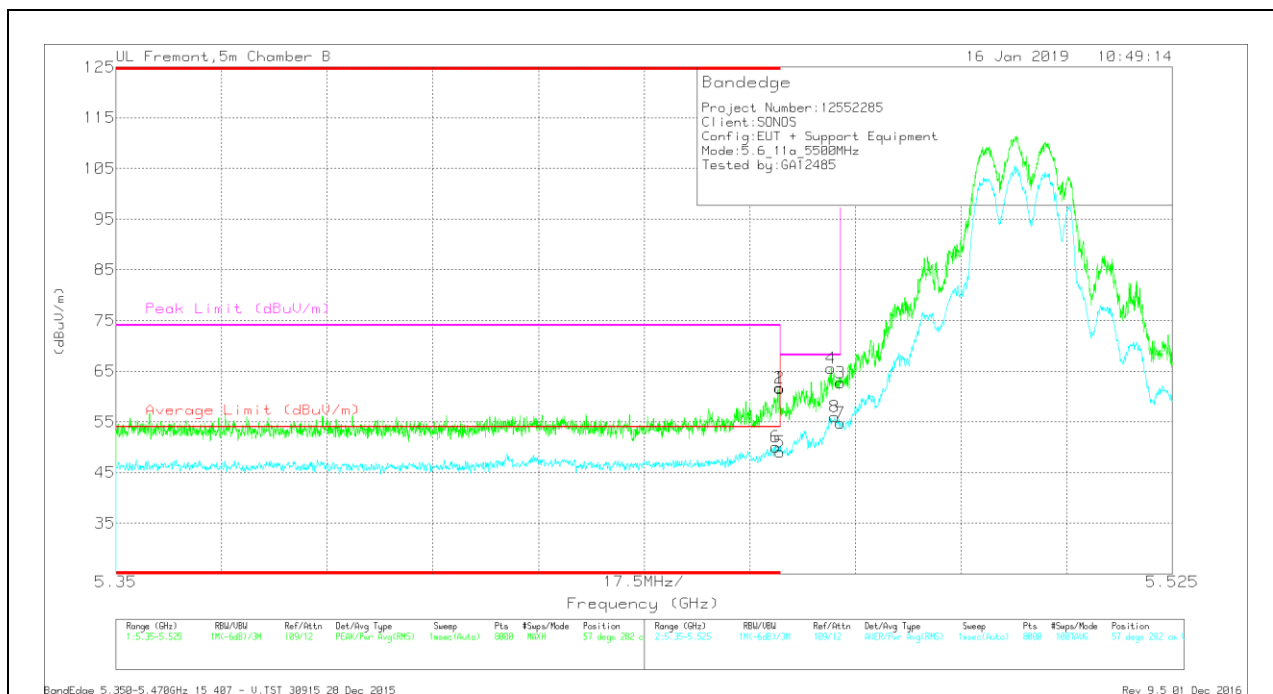
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Ch/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 5.459	43.43	Pk	35.3	-18.1	0	60.63	-	-	74	-13.37	26	174	H
1	* 5.46	41.08	Pk	35.3	-18.1	0	58.28	-	-	74	-15.72	26	174	H
5	* 5.46	31.86	RMS	35.3	-18.1	0.09	49.15	54	-4.85	-	-	26	174	H
6	* 5.46	33.48	RMS	35.3	-18.1	0.09	50.77	54	-3.23	-	-	26	174	H
8	5.469	38.62	RMS	35.3	-18.2	0.09	55.81	-	-	-	-	26	174	H
3	5.47	47.24	Pk	35.3	-18.2	0	64.34	-	-	68.2	-3.86	26	174	H
4	5.47	48.16	Pk	35.3	-18.2	0	65.26	-	-	68.2	-2.94	26	174	H
7	5.47	37.71	RMS	35.3	-18.2	0.09	54.9	-	-	-	-	26	174	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T663 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Correcte d Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 5.459	32.28	RMS	35.3	-18.1	0.09	49.57	54	-4.43	-	-	57	282	V
1	* 5.46	44.45	Pk	35.3	-18.1	0	61.65	-	-	74	-12.35	57	282	V
2	* 5.46	44.5	Pk	35.3	-18.1	0	61.7	-	-	74	-12.3	57	282	V
5	* 5.46	31.26	RMS	35.3	-18.1	0.09	48.55	54	-5.45	-	-	57	282	V
4	5.468	48.39	Pk	35.3	-18.1	0	65.59	-	-	68.2	-2.61	57	282	V
8	5.469	38.27	RMS	35.3	-18.2	0.09	55.46	-	-	-	-	57	282	V
3	5.47	45.56	Pk	35.3	-18.2	0	62.66	-	-	68.2	-5.54	57	282	V
7	5.47	37.09	RMS	35.3	-18.2	0.09	54.28	-	-	-	-	57	282	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 RMS - RMS detection