

# Digital Path

TEST REPORT FOR

**5212/5213 Radio**  
**Model: G3RL10 V2**

Tested To The Following Standards:

FCC Part 15 Subpart E Section(s)

**15.207 & 15.407**  
**(NII 5.15 – 5.25GHz)**

Report No.: 98485-13

Date of issue: July 22, 2016



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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## ADMINISTRATIVE INFORMATION

### Test Report Information

**REPORT PREPARED FOR:**

Digital Path  
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**REPORT PREPARED BY:**

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REPRESENTATIVE: Brock Eastman  
Customer Reference Number: DP-CA-103

Project Number: 98485

**DATE OF EQUIPMENT RECEIPT:**

May 16, 2016

**DATE(S) OF TESTING:**

May 16, 2016 thru June 28, 2016

### Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



**Steve Behm**  
*Director of Quality Assurance & Engineering Services*  
*CKC Laboratories, Inc.*

## Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):  
CKC Laboratories, Inc.  
1120 Fulton Place  
Fremont, CA 94539

## Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

## Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	90477	A-0136
Mariposa D	US0103	SL2-IN-E-1147R	3082A-1	784962	A-0136

## SUMMARY OF RESULTS

**Standard / Specification: FCC Part 15 Subpart E - 15.407 (NII)**

Test Procedure	Description	Modifications	Results
15.215	Occupied Bandwidth	NA	Pass
15.407(a)(1)	Output Power	NA	Pass
15.407(a)(1)	Power Spectral Density	NA	Pass
15.407(a)(1)(iii)	EIRP at >30° Elevation	NA	Pass
15.407(g)	Frequency Stability	NA	Pass
15.407(b)	Radiated Emissions & Band Edge	Mod. #1	Pass
15.207	AC Conducted Emissions	Mod. #1	Pass

NA = Not Applicable

### Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
Modification #1: Added Ferrite Manuf: Steward, Model: 28A2024-0A0 to pass 240MHz on both the LAN and POE Ethernet cables going to the EUT.

**Modifications listed above must be incorporated into all production units.**

### Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

## EQUIPMENT UNDER TEST (EUT)

During testing numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

### Configuration 1

#### *Equipment Tested:*

Device	Manufacturer	Model #	S/N
5212/5213 Radio	Digital Path	G3RL10 V2	00:0D:B9:20:90:CC
POE Power Adapter	HP	FAS24000050-C44	NA

#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
AC/DC power Adapter	HP	Series PPP012H-S	F12941126327228
Laptop Computer	HP	Probook 6565b	NA

### Configuration 2

#### *Equipment Tested:*

Device	Manufacturer	Model #	S/N
5212/5213 Radio	Digital Path	G3RL10 V2	00:0D:B9:2C:02:5C
11 dBi Integrated Omni Antenna (PTMP)	Digital Path Networks	DP-5G11-360	NA
18 dBi Integrated Panel Antenna (PTP)	Digital Path Networks	DP-5G18-30	NA
17 dBi External Sector Antenna (PTMP)	Ubiquity Networks	AM-5AC17-90	AM5A19587
22 dBi External Sector Antenna (PTMP)	Ubiquity Networks	AM-5AC22-45	AM5K03047
23 dBi External Panel Antenna (PTP)	Arc Wireless	ARC-5G23-10	NA
V5 Battery Box	Digital Path Networks	NA	NA
Power Supply	Condor	STD-2472P	NA

#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
AC/DC power Adapter	HP	Series PPP012H-S	F12941126327228
Laptop Computer	HP	Probook 6565b	NA

### Configuration 3

*Equipment Tested:*

Device	Manufacturer	Model #	S/N
5212/5213 Radio	Digital Path	G3RL10 V2	00:0D:B9:2C:02:5C
11 dBi Integrated Omni Antenna (PTMP)	Digital Path Networks	DP-5G11-360	NA
18 dBi Integrated Panel Antenna (PTP)	Digital Path Networks	DP-5G18-30	NA
17 dBi External Sector Antenna (PTMP)	Ubiquity Networks	AM-5AC17-90	AM5A19587
22 dBi External Sector Antenna (PTMP)	Ubiquity Networks	AM-5AC22-45	AM5K03047
23 dBi External Panel Antenna (PTP)	Arc Wireless	ARC-5G23-10	NA
19 dBi External Sector Antenna (PTMP)	Ubiquity Networks	AM-5G19	AM5160154
20 dBi External Sector Antenna (PTMP)	Ubiquity Networks	AM-5G20	AM5C40145
21 dBi External Sector Antenna (PTMP)	Ubiquity Networks	AM-5G21-60	AM5L13747
V5 Battery Box	Digital Path Networks	NA	NA
Power Supply	Condor	STD-2472P	NA

*Support Equipment:*

Device	Manufacturer	Model #	S/N
AC/DC power Adapter	HP	Series PPP012H-S	F12941126327228
Laptop Computer	HP	Probook 6565b	NA

### Configuration 4

*Equipment Tested:*

Device	Manufacturer	Model #	S/N
5212/5213 Radio	Digital Path	G3RL10 V2	00:0D:B9:2C:02:5C
Power Supply	Condor	STD-2472P	NA
V5 Battery Box	Digital Path Networks	NA	NA

*Support Equipment:*

Device	Manufacturer	Model #	S/N
AC/DC power Adapter	HP	Series PPP012H-S	F12941126327228
Laptop Computer	HP	Probook 6565b	NA

## General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.11a
Operating Frequency Range:	5.15 – 5.25 GHz
Modulation Type(s):	OFDM
Maximum Duty Cycle:	100%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Integrated Panel / 18dBi Omni / 11dBi External Diamond Arc Wireless / 23dBi Sector / 22dBi Sector / 17dBi Sector / 20dBi Sector / 19dBi Sector / 21dBi
Beamforming Type:	None
Antenna Connection Type:	Integral PCB Trace (11dBi and 18dBi Antennas) and External Connector (SMA) for 17dBi, 19dBi, 20dBi, 22dBi and 23dBi antennas
Nominal Input Voltage:	24VDC POE
Firmware / Software used for Test:	Web interface on EUT to Atheros TX99 Tool: Aquila 9.2.14.



## FCC Part 15 Subpart E

### 15.215 Occupied Bandwidth

Test Setup/Conditions			
Test Location:	Mariposa Lab A	Test Engineer:	Randal Clark / Benny Lovan
Test Method:	ANSI C63.10 (2013) KDB 789033 D02 v01r02	Test Date(s):	5/18/2016
Configuration:	1		
Test Setup:	The EUT is setup on a table with its antenna port directly connected to an analyzer through 9dB of attenuation.		

Environmental Conditions			
Temperature (°C)	26	Relative Humidity (%):	42

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02668	Spectrum Analyzer	Agilent	E4446A	8/14/2015	8/14/2016
02134	Attenuator	Weinschel	54-3	12/8/2014	12/8/2016
P01949	Attenuator	Weinschel	54A-6	12/8/2014	12/8/2016
03355	Cable	AstroLab	32026-2-29094K-48TC	12/8/2014	12/8/2016

#### **20dB Occupied Bandwidth**

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
5170	0	OFDM	21127	None	NA
5220	0	OFDM	21071		
5240	0	OFDM	20870		

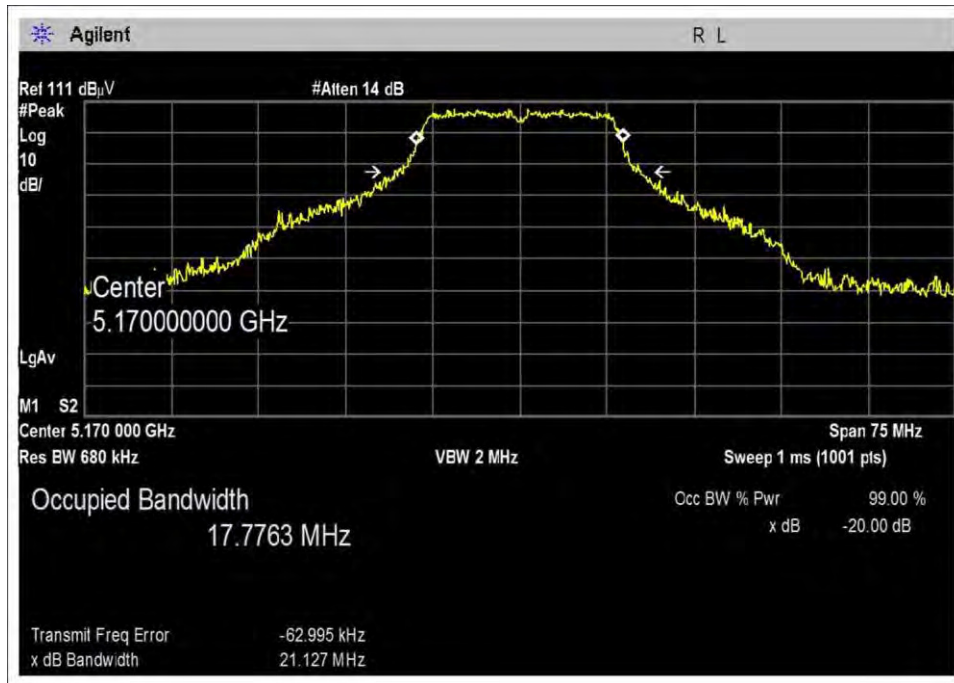
NA = Not Applicable

#### **99% Occupied Bandwidth**

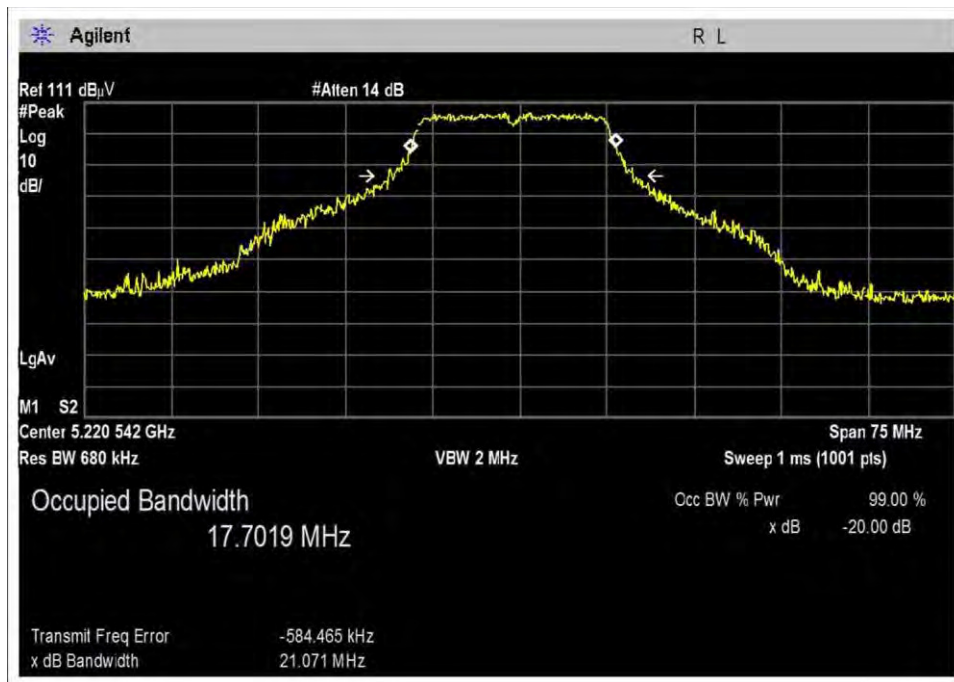
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
5170	0	OFDM	17776	None	NA
5220	0	OFDM	17701		
5240	0	OFDM	17737		

NA = Not Applicable

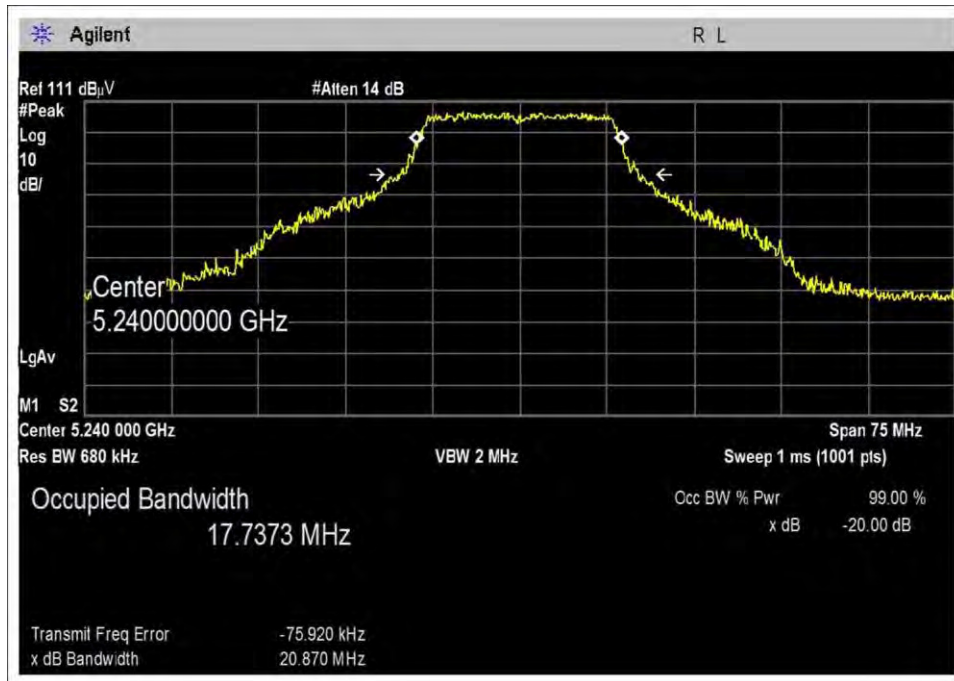
## Plots



Low Channel



Middle Channel



High Channel

**Test Setup Photo**



## 15.407(a) Power Output

Test Setup/Conditions – RF Conducted Measurement			
Test Location:	Mariposa Lab A	Test Engineer:	Randal Clark and Benny Lovan
Test Method:	ANSI C63.10 (2013) KDB 789033 D02 v01r02	Test Date(s):	5/18/2016-5/19/2016
Configuration:	1		
Test Setup:	The EUT is setup on a table with its antenna port directly connected to an analyzer through 9dB of attenuation. The EUT has two antenna ports that are identical. Testing was performed on Port 0		

Environmental Conditions			
Temperature (°C)	22-26	Relative Humidity (%):	42-51

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02668	Spectrum Analyzer	Agilent	E4446A	8/14/2015	8/14/2016
02134	Attenuator	Weinschel	54-3	12/8/2014	12/8/2016
P01949	Attenuator	Weinschel	54A-6	12/8/2014	12/8/2016
03355	Cable	AstroLab	32026-2-29094K-48TC	12/8/2014	12/8/2016
03338	Multimeter	Extech	MM570A	1/22/2015	1/2/2017

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V <sub>Minimum</sub> (dBm)	V <sub>Nominal</sub> (dBm)	V <sub>Maximum</sub> (dBm)	Max Deviation from V <sub>Nominal</sub> (dB)
5170	OFDM / Ant Port 0	14.98	15.01	14.92	0.09
5220	OFDM / Ant Port 0	15.39	15.33	15.33	0.06
5235	OFDM / Ant Port 0	15.42	15.30	15.44	0.44

Test performed using operational mode with the highest output power, representing worst case.

### **Parameter Definitions:**

Measurements performed at input voltage V<sub>Nominal</sub> ± 15%.

Parameter	Value
V <sub>Nominal</sub> :	24 VDC
V <sub>Minimum</sub> :	20.4 VDC
V <sub>Maximum</sub> :	27.6 VDC

### Test Data Summary - RF Conducted Measurement

Measurement Option: AVGSA-1

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
5175	OFDM	18 dBi Panel	5.02	≤ 30	Pass
5220	OFDM	18 dBi Panel	9.94	≤ 30	Pass
5235	OFDM	18 dBi Panel	3.11	≤ 30	Pass
5175	OFDM	11 dBi Omni	9.65	≤ 25	Pass
5220	OFDM	11 dBi Omni	10.12	≤ 25	Pass
5240	OFDM	11 dBi Omni	2.85	≤ 25	Pass
5180	OFDM	23dBi Panel	5.05	≤ 30	Pass
5220	OFDM	23dBi Panel	10.12	≤ 30	Pass
5230	OFDM	23dBi Panel	4.54	≤ 30	Pass
5170	OFDM	22dBi Sector	-0.58	≤ 14	Pass
5220	OFDM	22dBi Sector	10.12	≤ 14	Pass
5235	OFDM	22dBi Sector	4.69	≤ 14	Pass
5170	OFDM	17dBi Sector	2.92	≤ 19	Pass
5220	OFDM	17dBi Sector	10.12	≤ 19	Pass
5235	OFDM	17dBi Sector	5.38	≤ 19	Pass
5170	OFDM	21dBi Sector	-1.48	≤ 15	Pass
5220	OFDM	21dBi Sector	10.12	≤ 15	Pass
5235	OFDM	21dBi Sector	5.55	≤ 15	Pass
5170	OFDM	20dBi Sector	0.28	≤ 16	Pass
5220	OFDM	20dBi Sector	10.12	≤ 16	Pass
5235	OFDM	20dBi Sector	6.49	≤ 16	Pass

Testing was performed on sector antennas, employing the same radio, with gains ranging from 17dBi to 22dBi. Since all antennas produced a passing result, the 19dBi antenna is determined to be covered within these measurements.

For access points using antennas other than in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(i):

$$Limit = 30 - Roundup(G - 6)$$

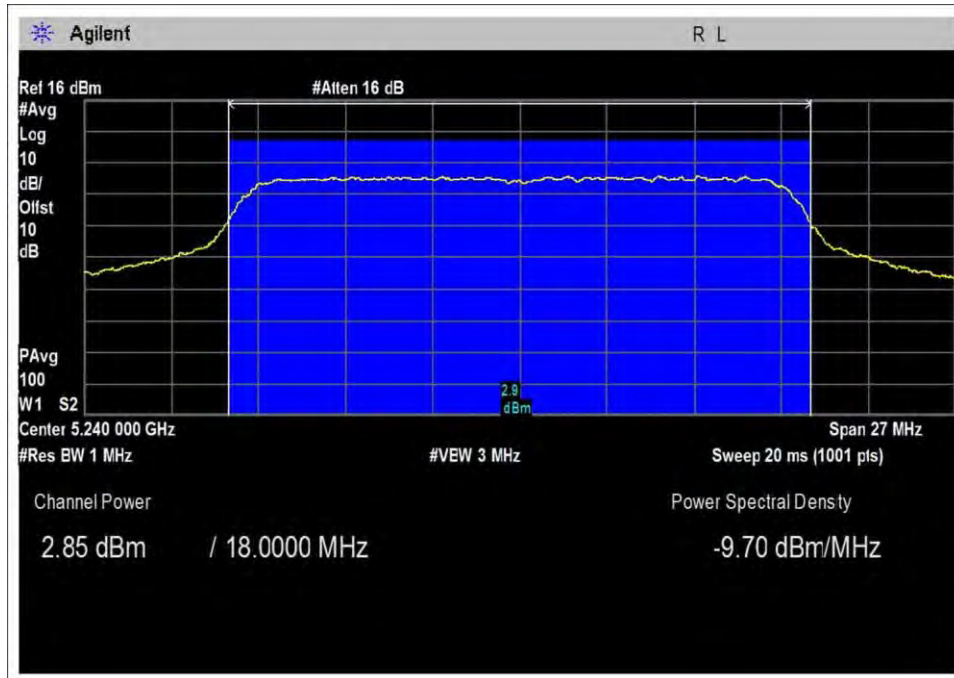
For access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(ii):

$$Limit = 30 - Roundup(G - 23)$$

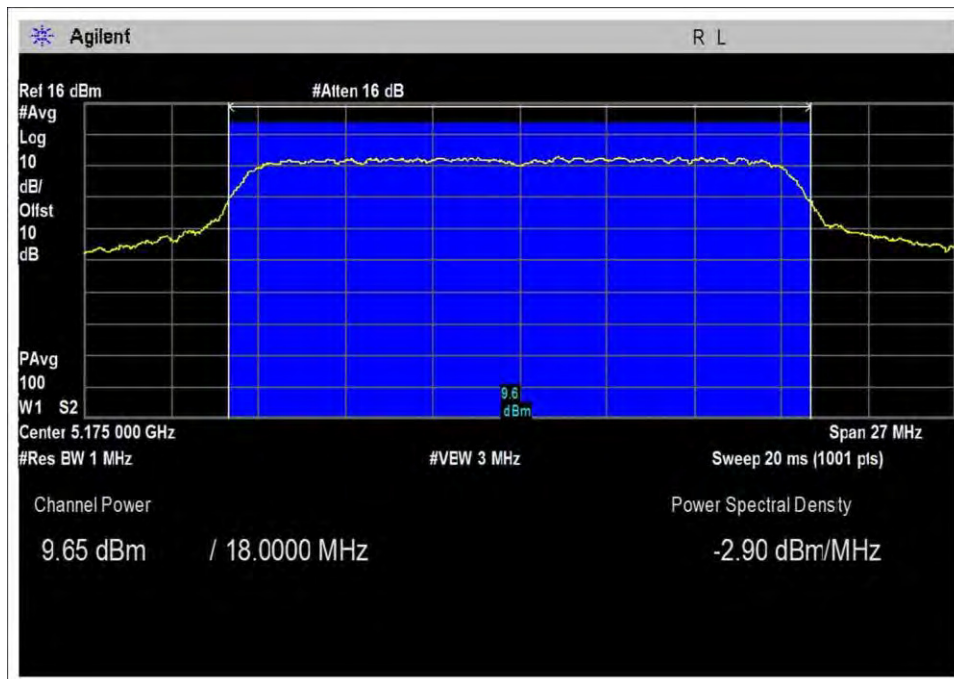
For client devices access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(iii):

$$Limit = 24 - Roundup(G - 6)$$

## Plots

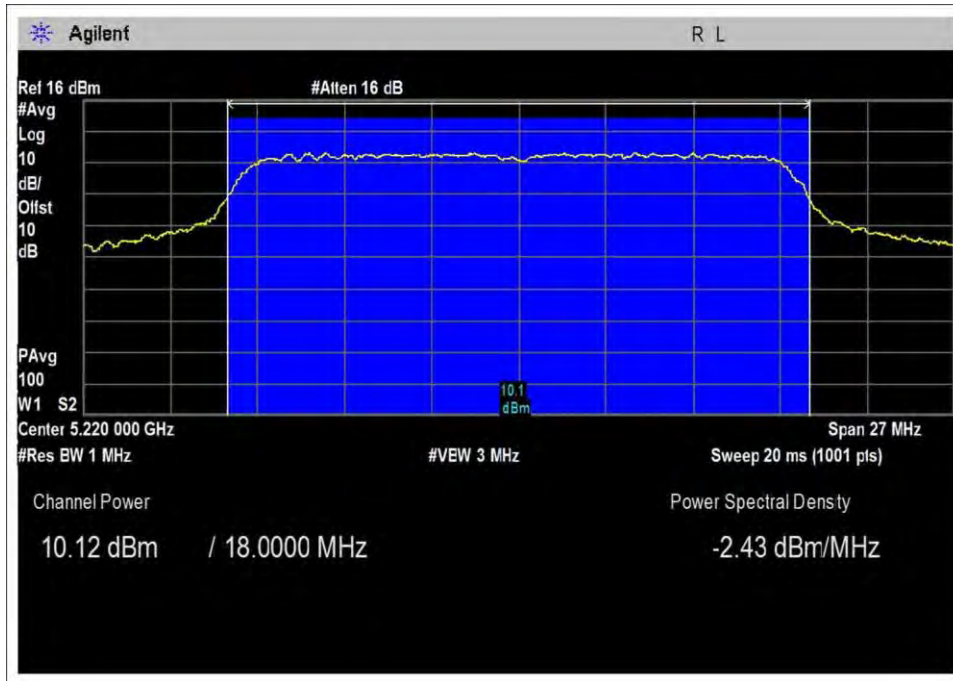


CHPWR 11dBi-HB-5.1-Set15

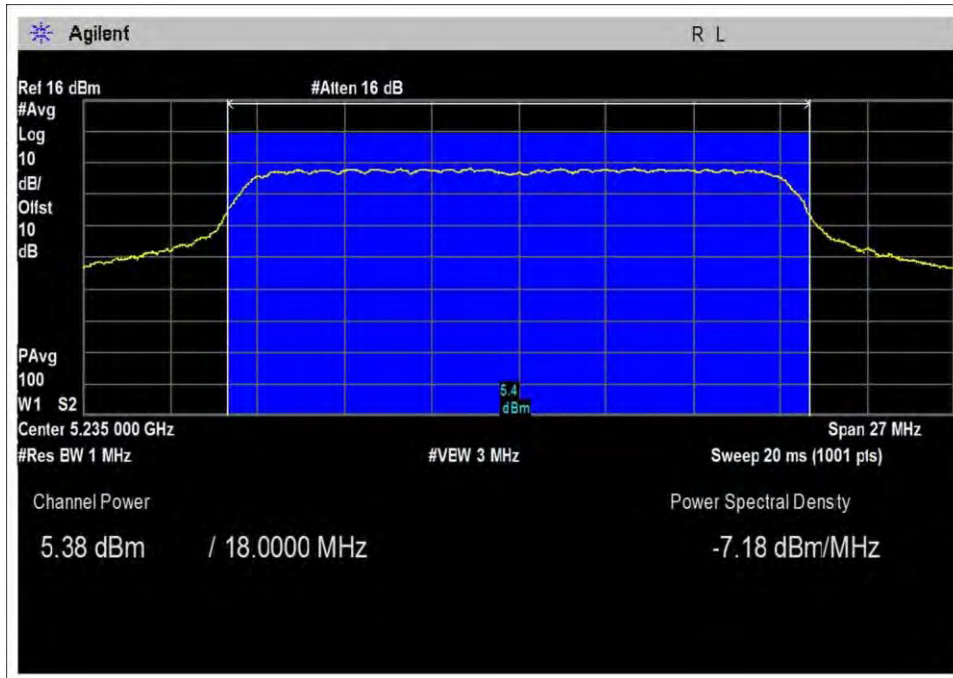


CHPWR 11dBi-LB-5.1-Set23



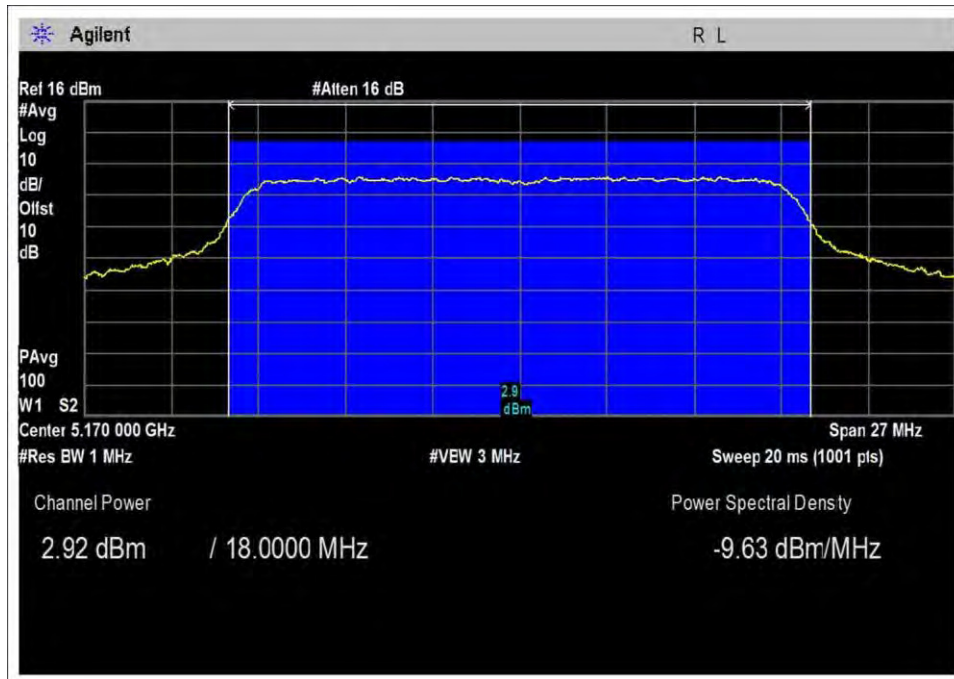


CHPWR 11dBi-MB-5.1-Set23

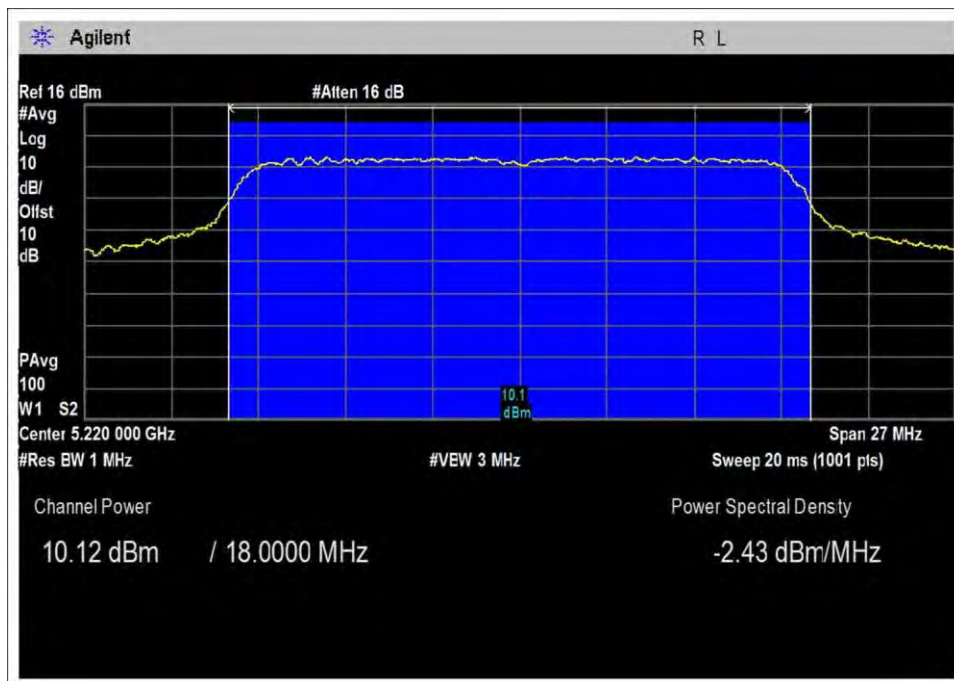


CHPWR 17dBi-HB-5.1-Set18.5

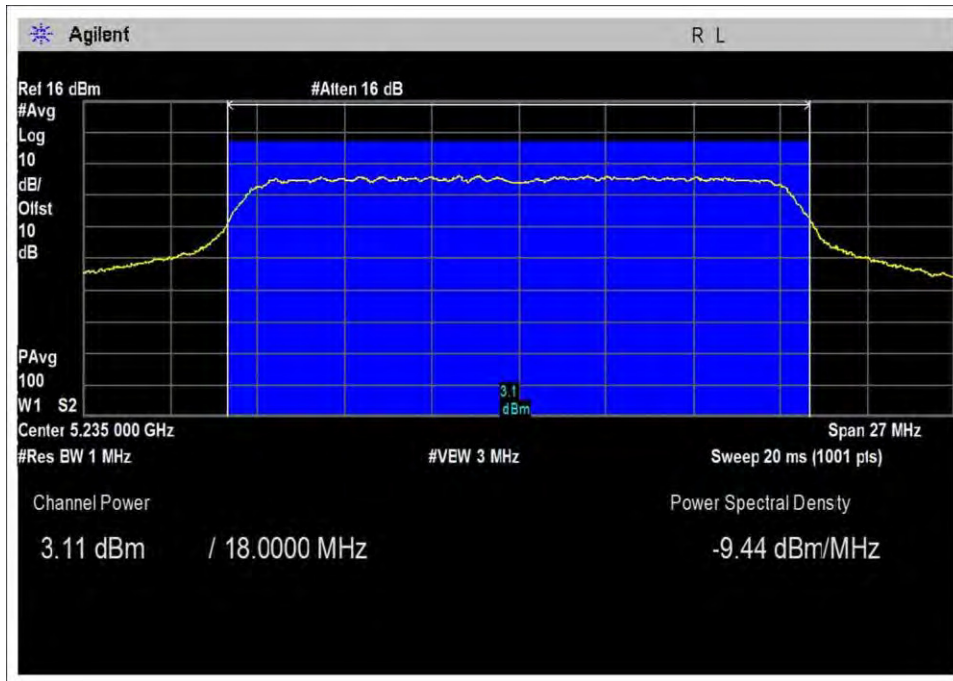




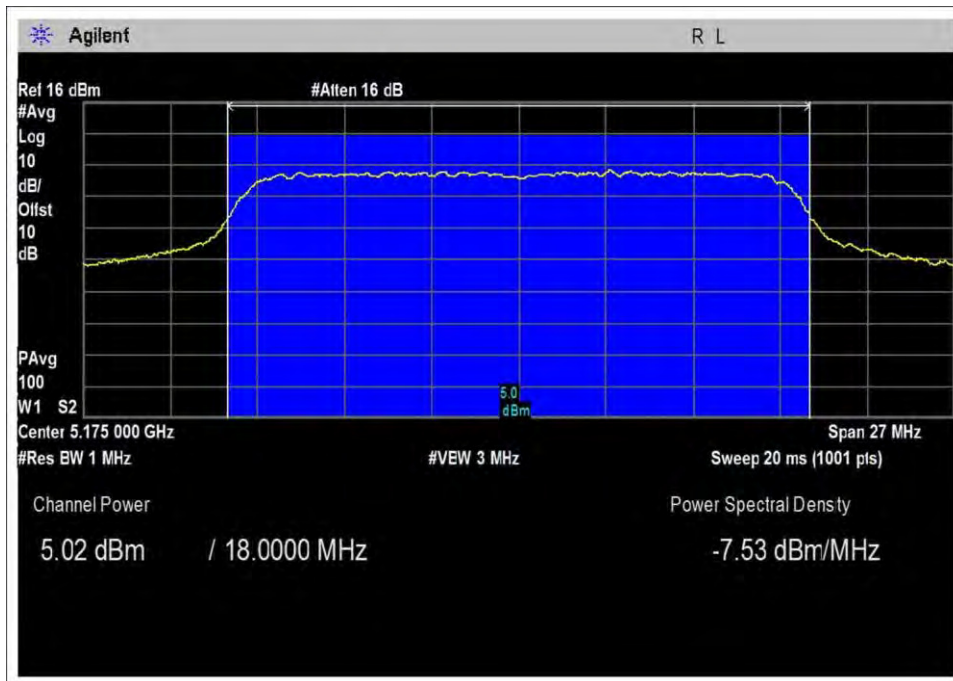
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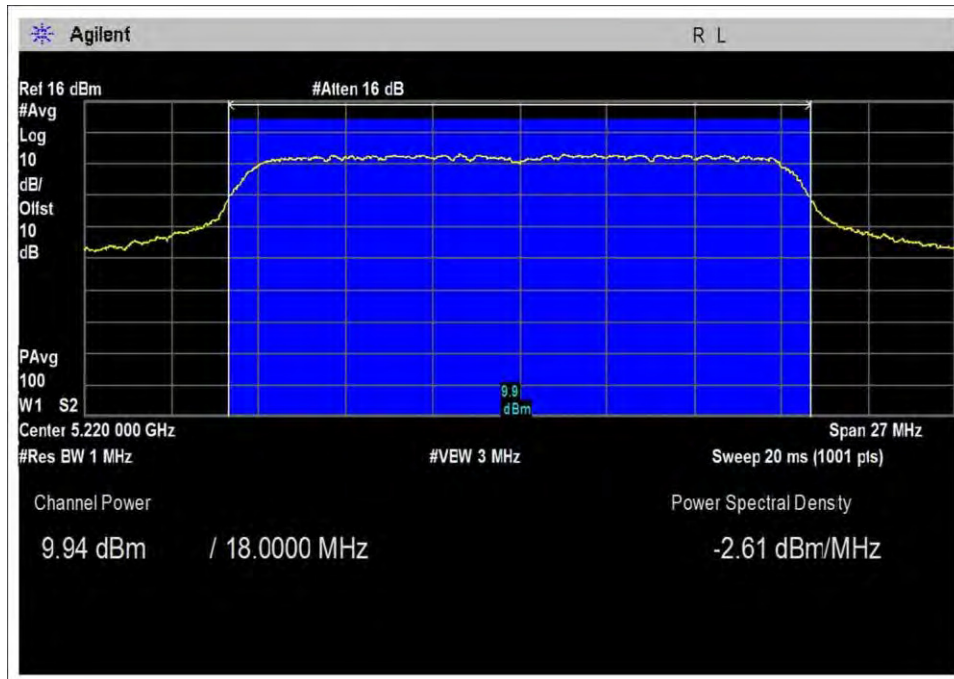
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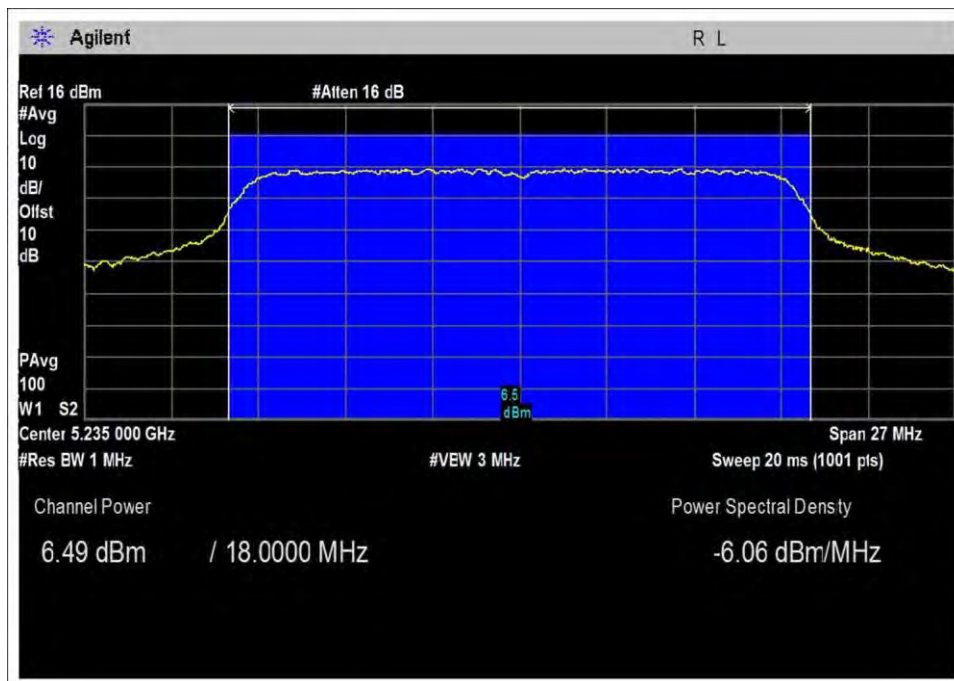
CHPWR 18dBi-HB-5.1-Set16



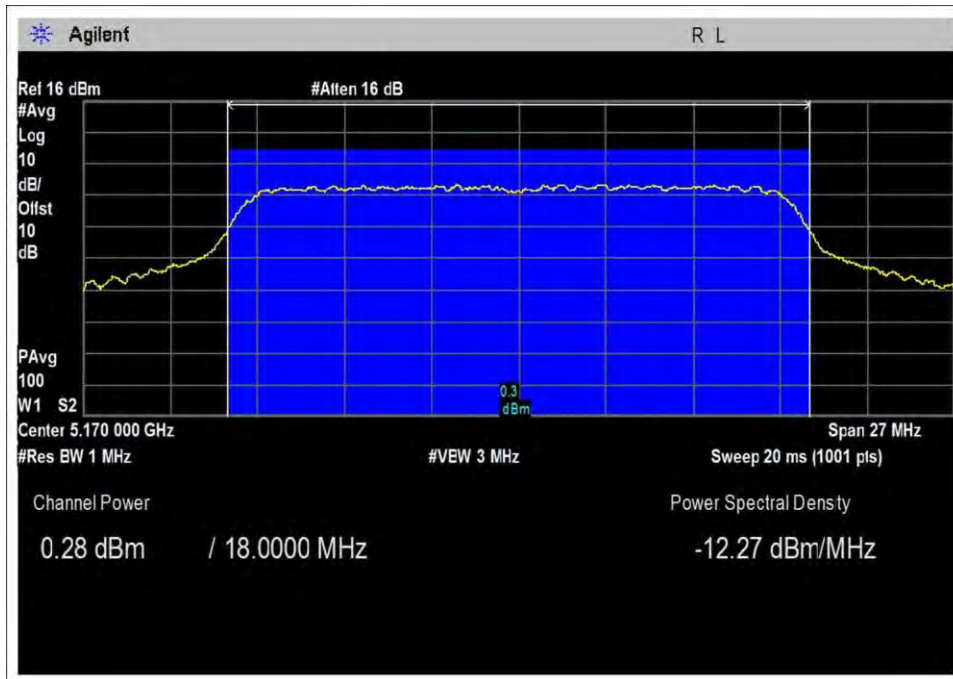
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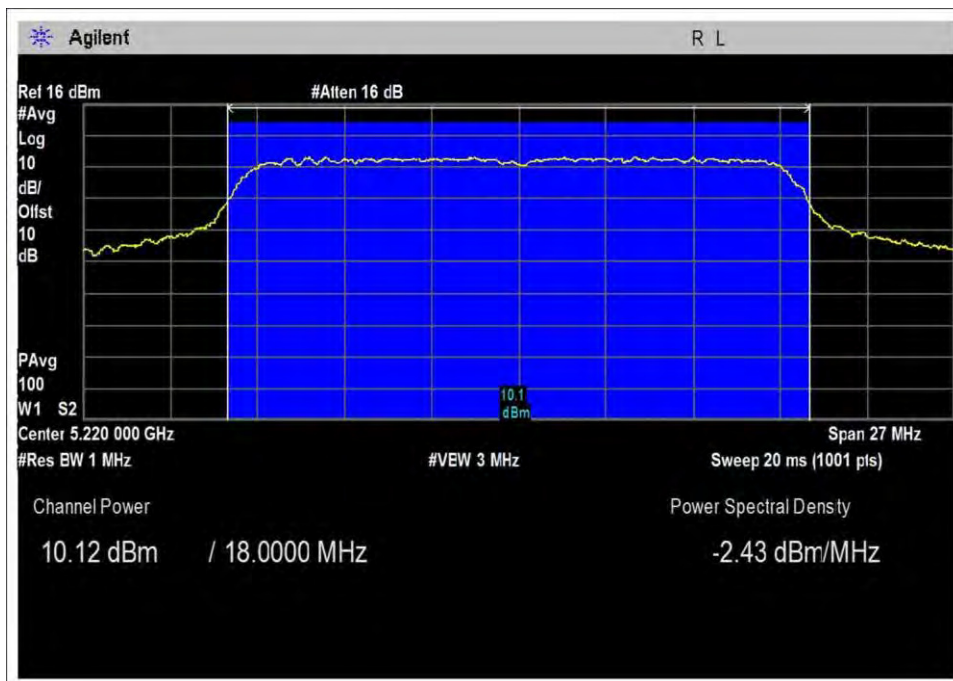
CHPWR 18dBi-MB-5.1-Set23



CHPWR 20dBi-HB-5.1-Set19

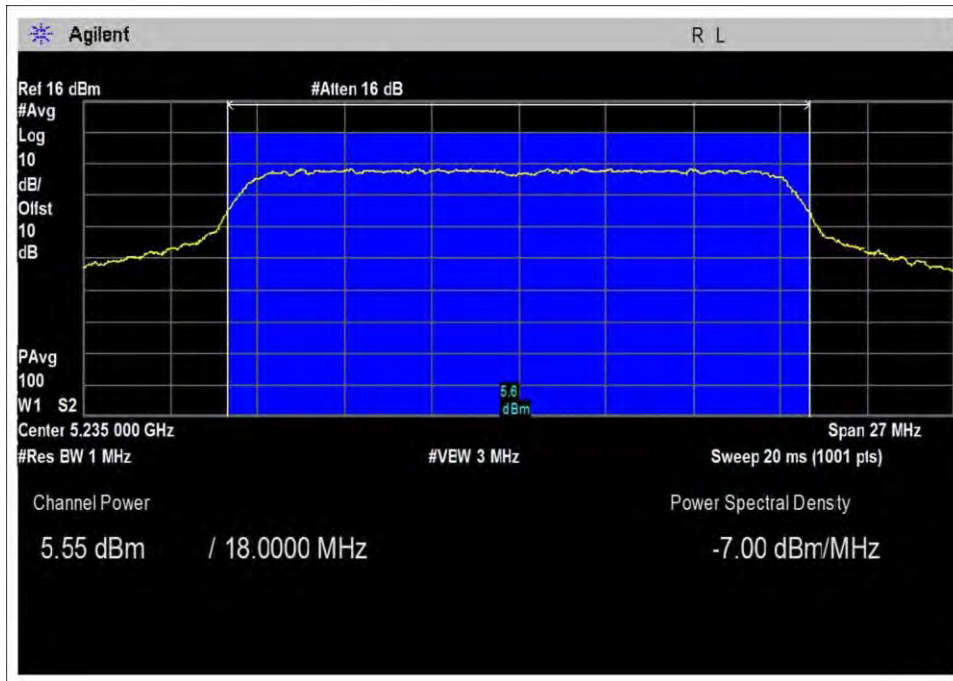


CHPWR 20dBi-LB-5.1-Set12.5

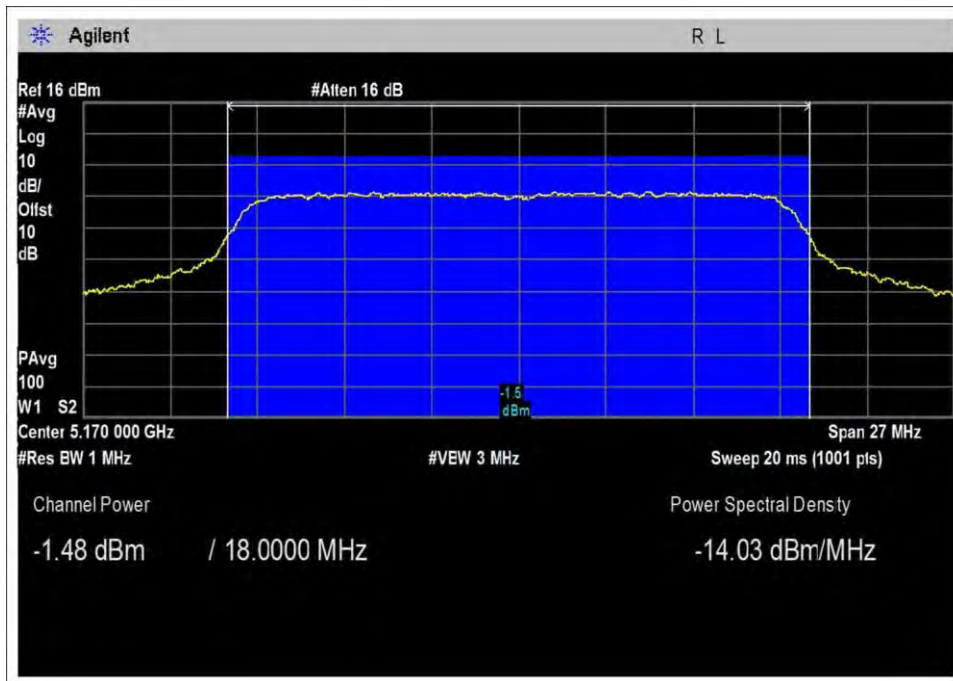


CHPWR 20dBi-MB-5.1-Set23

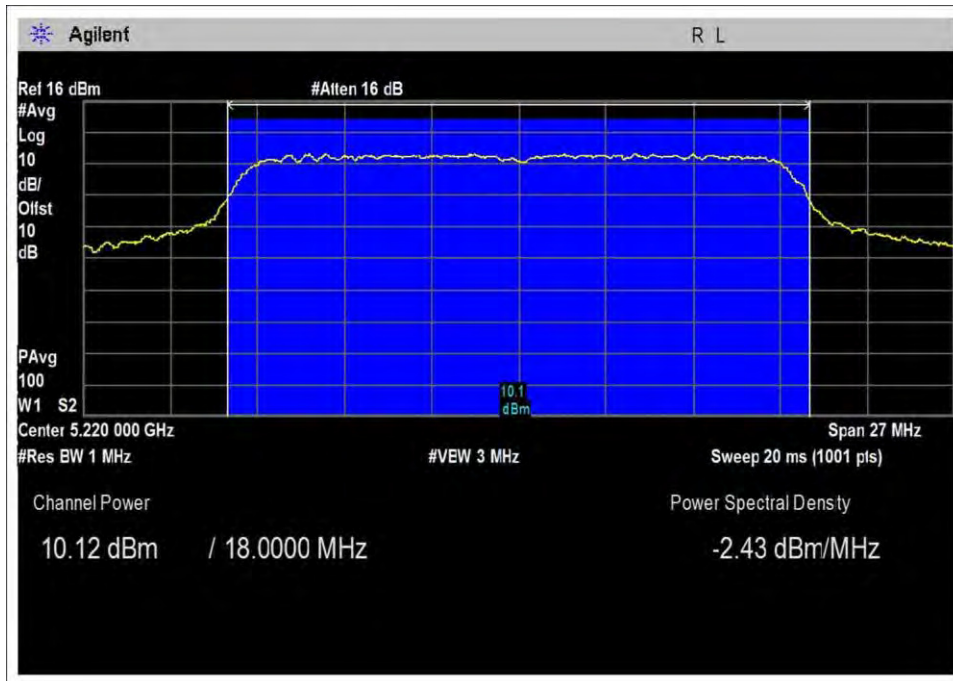




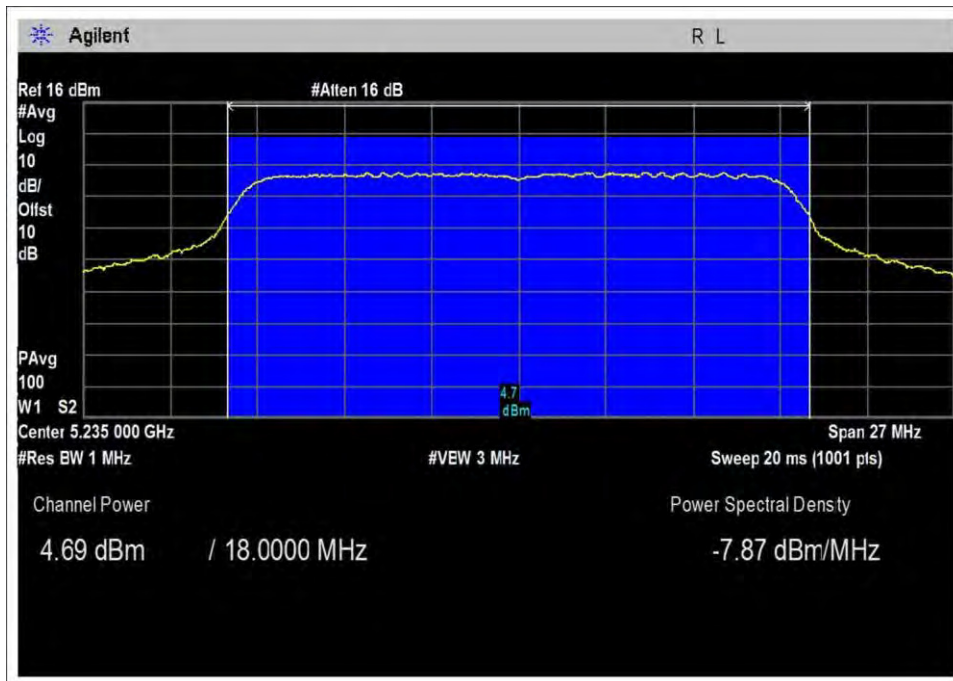
CHPWR 21dBi-HB-5.1-Set18



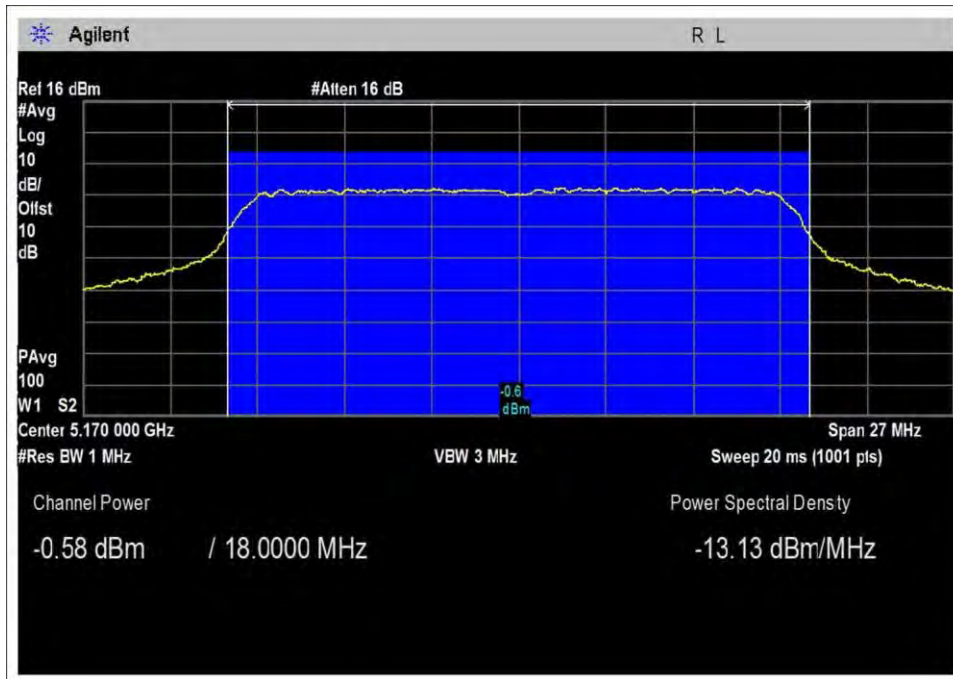
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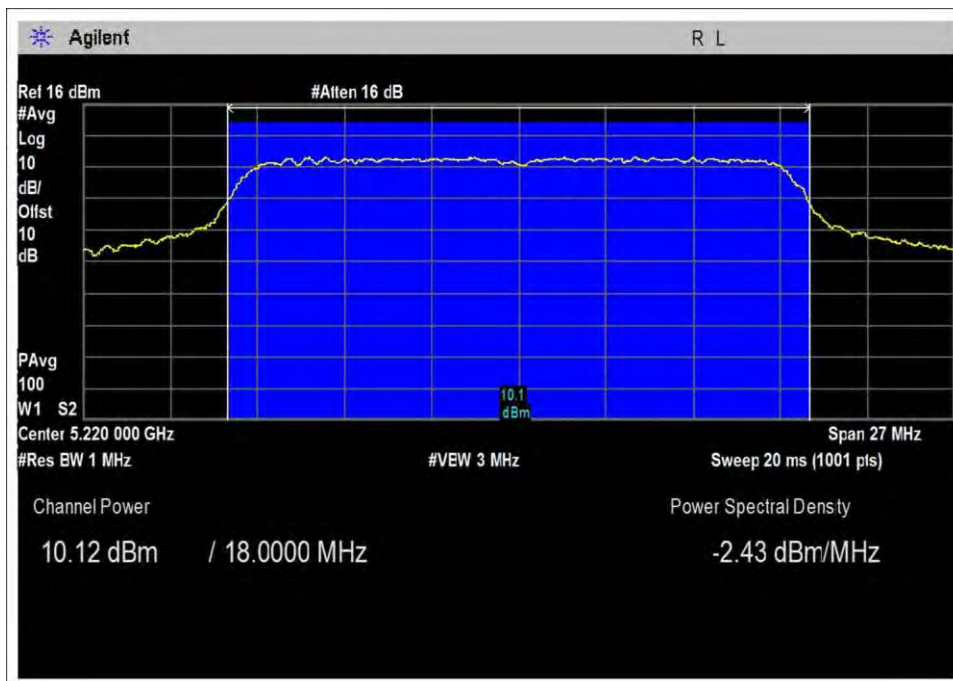
CHPWR 21dBi-MB-5.1-Set23



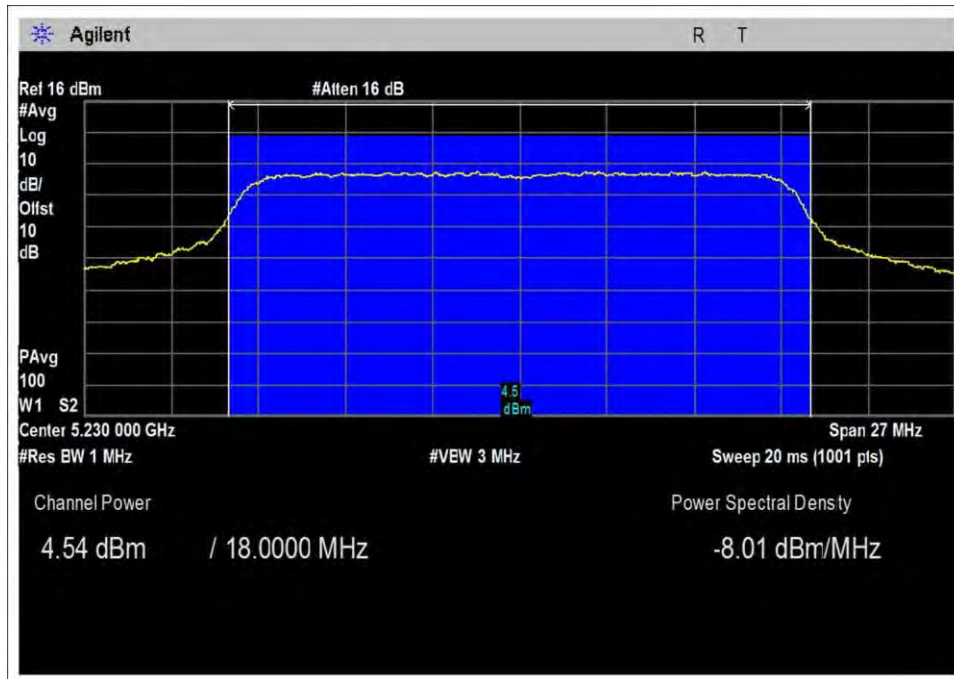
CHPWR 22dBi-HB-5.1-Set17.5



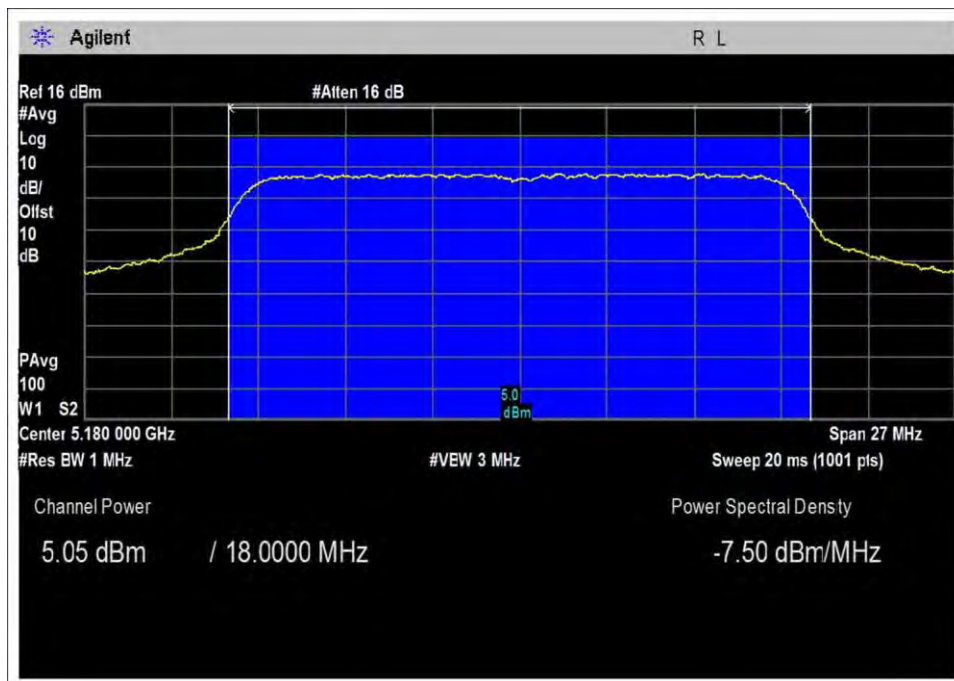
CHPWR 22dBi-LB-5.1-Set11.5



CHPWR 22dBi-MB-5.1-Set23

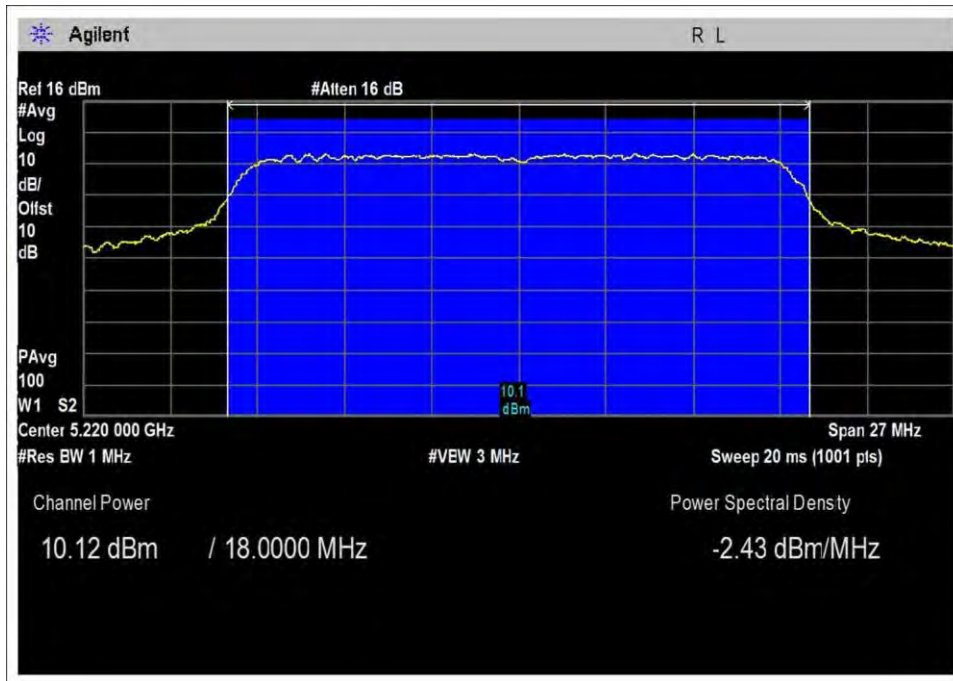


CHPWR 23dBi-HB-5.1-Set17



CHPWR 23dBi-LB-5.1-Set18





CHPWR 23dBi-MB-5.1-Set23

**Test Setup Photo**



## 15.407(a) Power Spectral Density

Test Setup/Conditions			
Test Location:	Mariposa Lab A	Test Engineer:	Randal Clark and Benny Lovan
Test Method:	ANSI C63.10 (2013) KDB 789033 D02 v01r02	Test Date(s):	5/18/2016-5/20/2016
Configuration:	1		
Test Setup:	The EUT is setup on a table with its antenna port directly connected to an analyzer through 9dB of attenuation. Software setting set to the max setting determined during band edge and channel power measurements.		

Environmental Conditions			
Temperature (°C)	22-26	Relative Humidity (%):	42-51

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02668	Spectrum Analyzer	Agilent	E4446A	8/14/2015	8/14/2016
02134	Attenuator	Weinschel	54-3	12/8/2014	12/8/2016
P01949	Attenuator	Weinschel	54A-6	12/8/2014	12/8/2016
03355	Cable	AstroLab	32026-2-29094K-48TC	12/8/2014	12/8/2016
03338	Multimeter	Extech	MM570A	1/22/2015	1/2/2017

Test Data Summary - RF Conducted Measurement					
Measurement Option: AVGSA-1					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm/MHz)	Limit (dBm/MHz)	Results
5175	OFDM	18 dBi Panel	-7.53	≤17	Pass
5220	OFDM	18 dBi Panel	-2.61	≤17	Pass
5235	OFDM	18 dBi Panel	-9.44	≤17	Pass
5175	OFDM	11 dBi Omni	-2.90	≤12	Pass
5220	OFDM	11 dBi Omni	-2.43	≤12	Pass
5240	OFDM	11 dBi Omni	-9.70	≤12	Pass
5180	OFDM	23dBi Panel	-7.5	≤17	Pass
5220	OFDM	23dBi Panel	-2.43	≤17	Pass
5230	OFDM	23dBi Panel	-8.01	≤17	Pass
5170	OFDM	22dBi Sector	-13.13	≤1	Pass
5220	OFDM	22dBi Sector	-2.43	≤1	Pass
5235	OFDM	22dBi Sector	-7.87	≤1	Pass
5170	OFDM	17dBi Sector	-9.63	≤6	Pass
5220	OFDM	17dBi Sector	-2.43	≤6	Pass
5235	OFDM	17dBi Sector	-7.18	≤6	Pass
5170	OFDM	21dBi Sector	-14.03	≤2	Pass
5220	OFDM	21dBi Sector	-2.43	≤2	Pass
5235	OFDM	21dBi Sector	-7.0	≤2	Pass
5170	OFDM	20dBi Sector	-12.27	≤3	Pass
5220	OFDM	20dBi Sector	-2.43	≤3	Pass
5235	OFDM	20dBi Sector	-6.06	≤3	Pass

Testing was performed on sector antennas, employing the same radio, with gains ranging from 17dBi to 22dBi. Since all antennas produced a passing result, the 19dBi antenna is determined to be covered within these measurements.

For access points using antennas other than in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(i):

$$Limit = 17 - Roundup(G - 6)$$

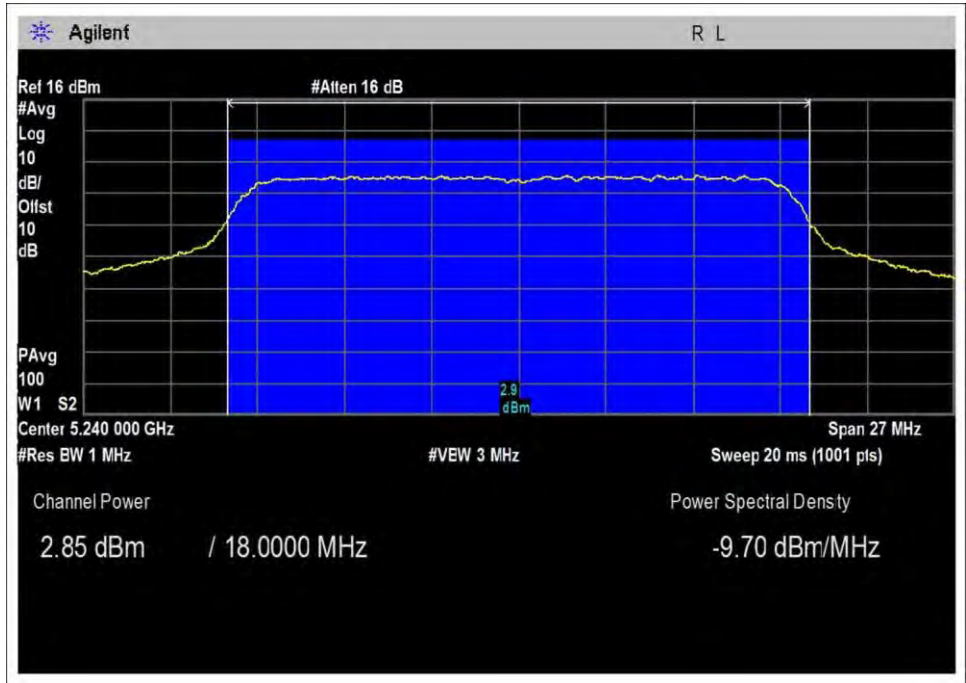
For access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(ii):

$$Limit = 17 - Roundup(G - 23)$$

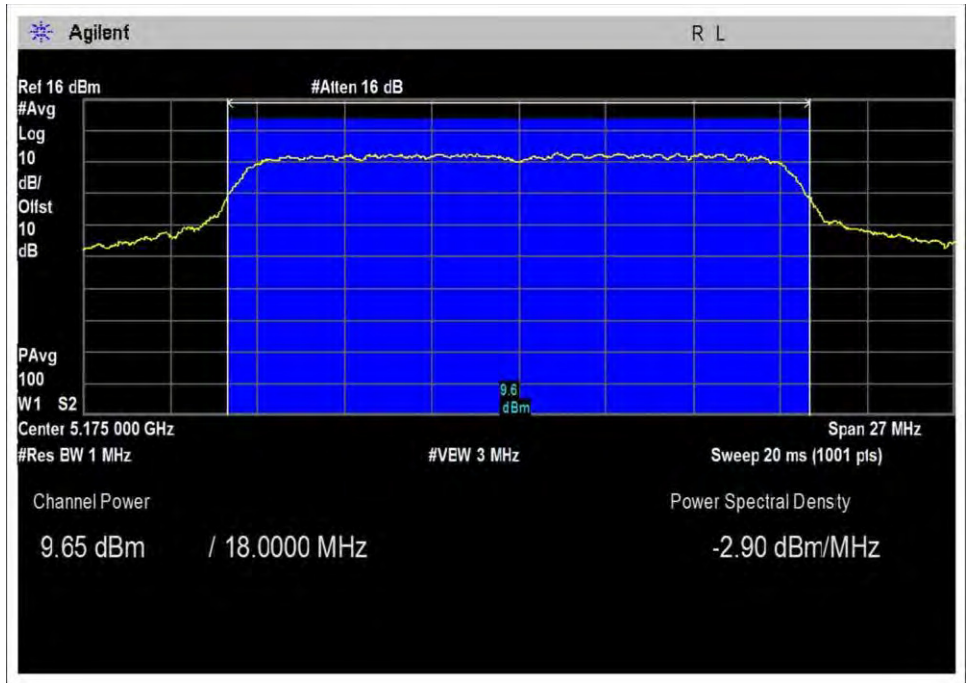
For client devices access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(iii):

$$Limit = 11 - Roundup(G - 6)$$

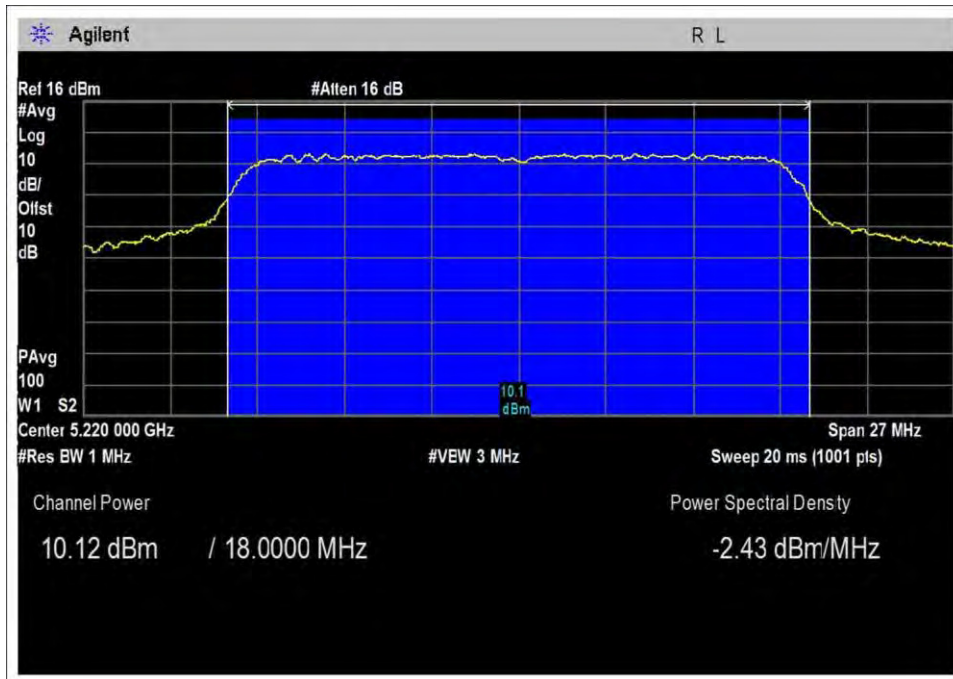
Plots



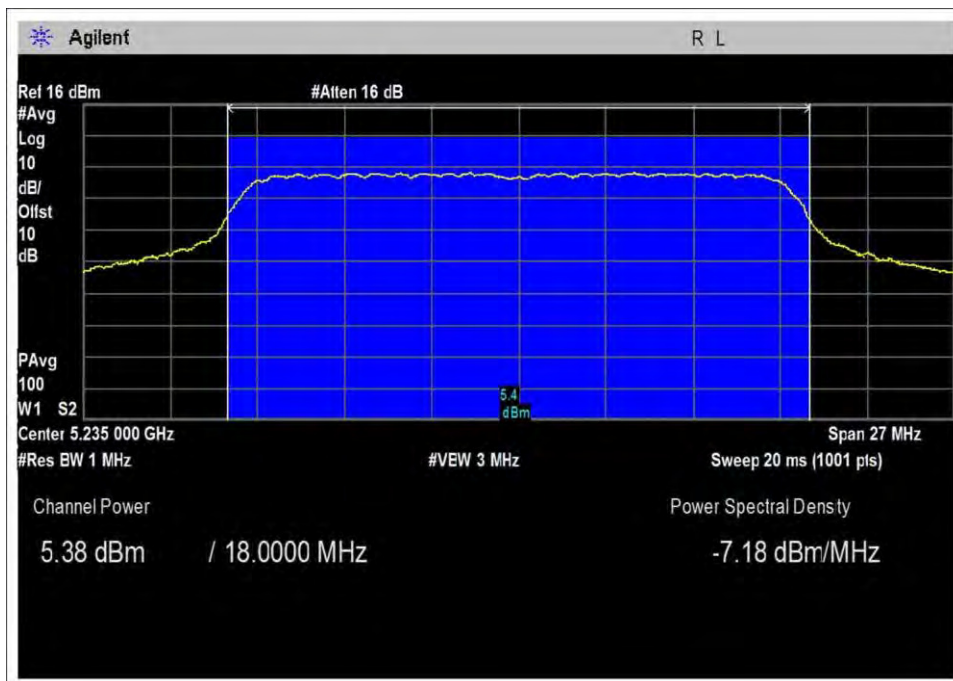
PSD 11dBi-HB-5.1-Set15



PSD 11dBi-LB-5.1-Set23

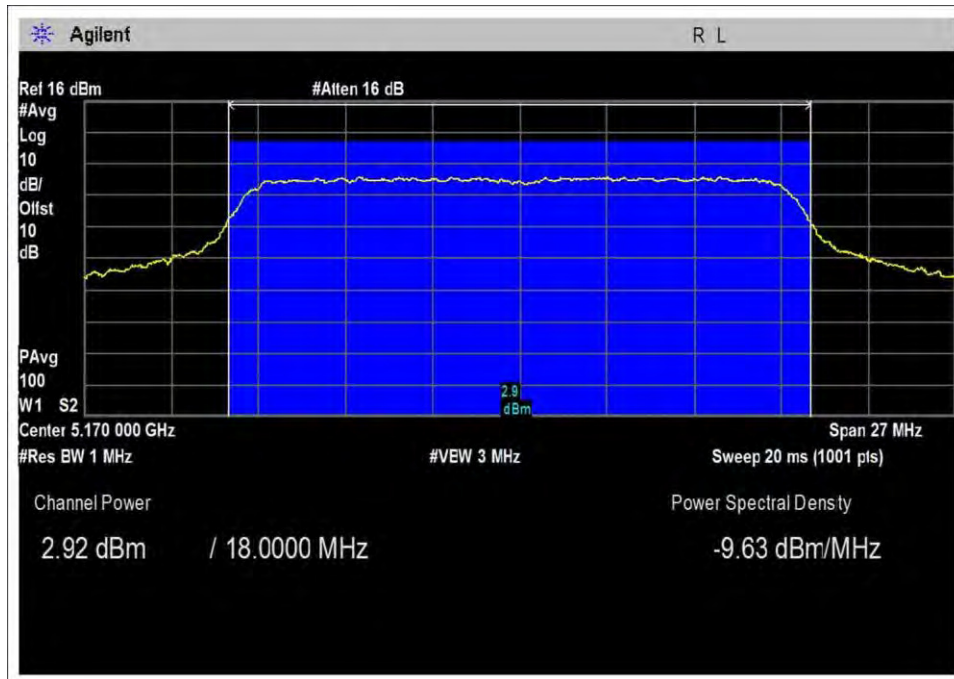


PSD 11dBi-MB-5.1-Set23

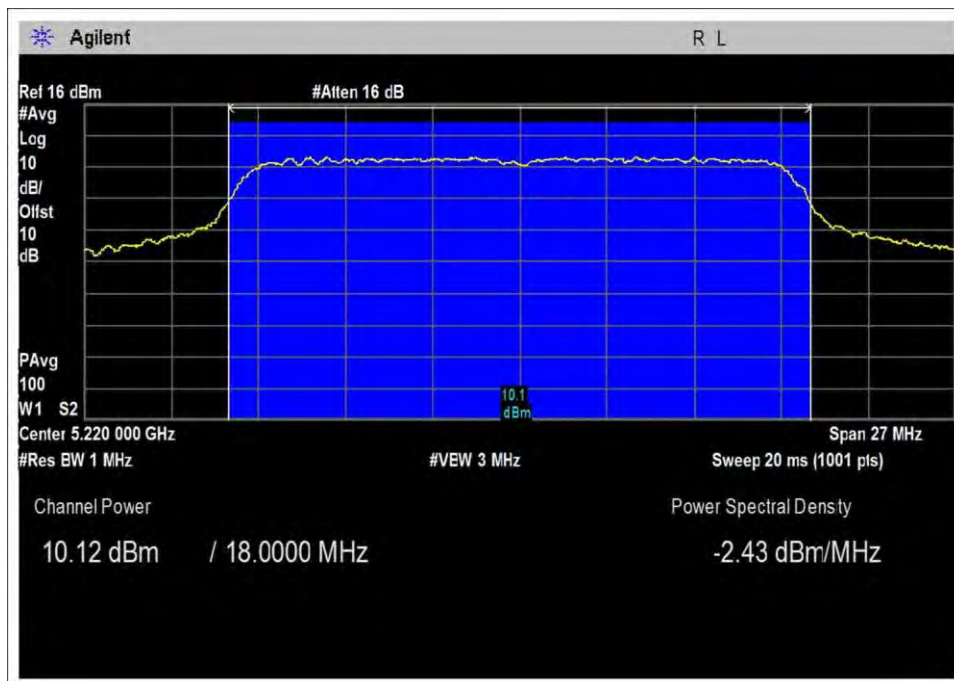


PSD 17dBi-HB-5.1-Set18.5

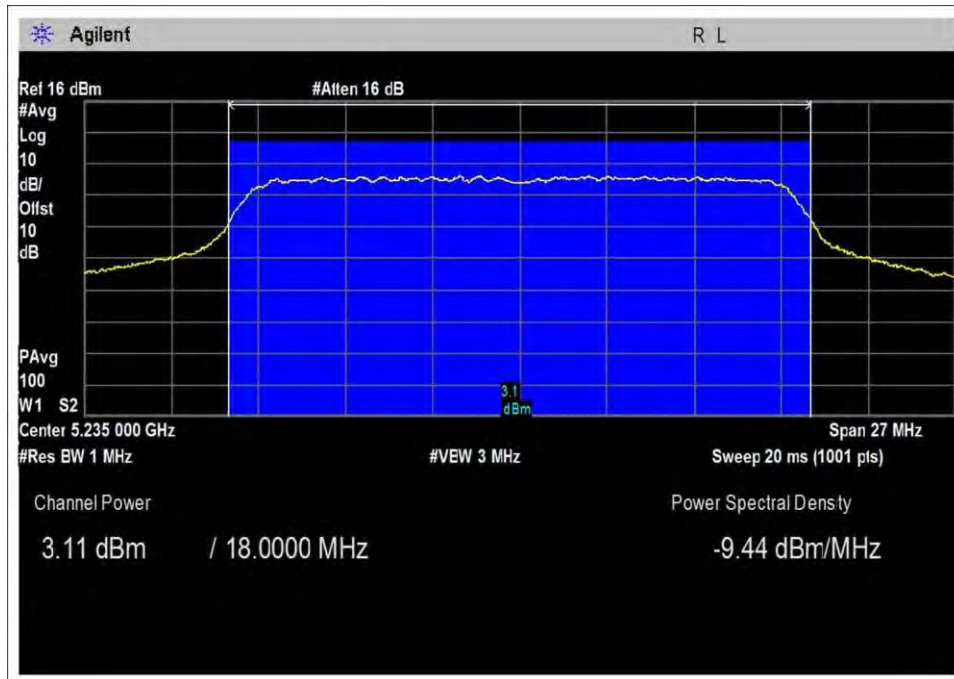




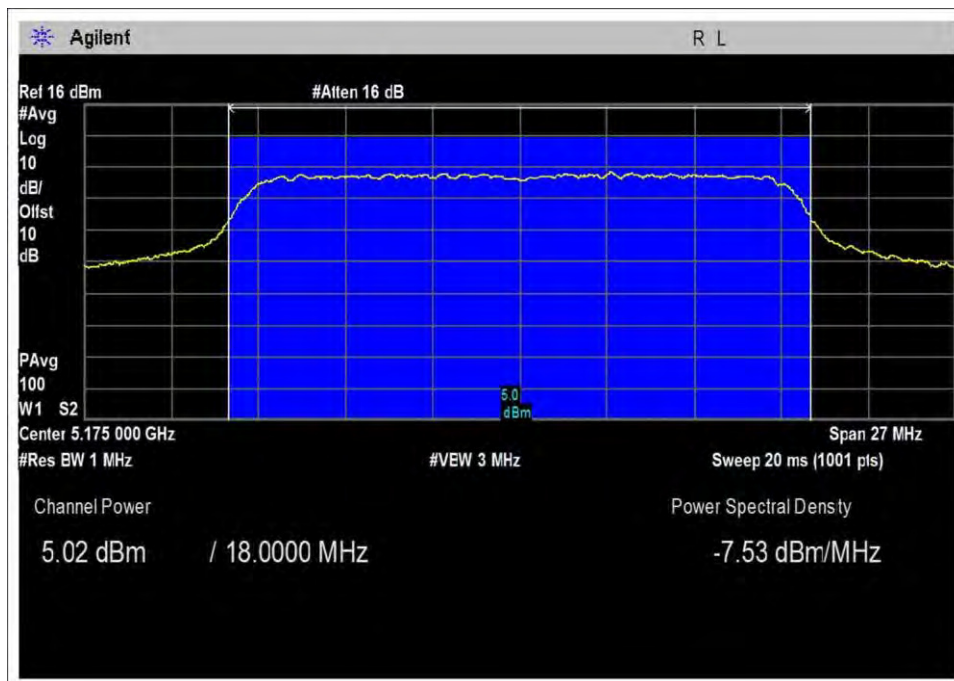
PSD 17dBi-LB-5.1-Set16



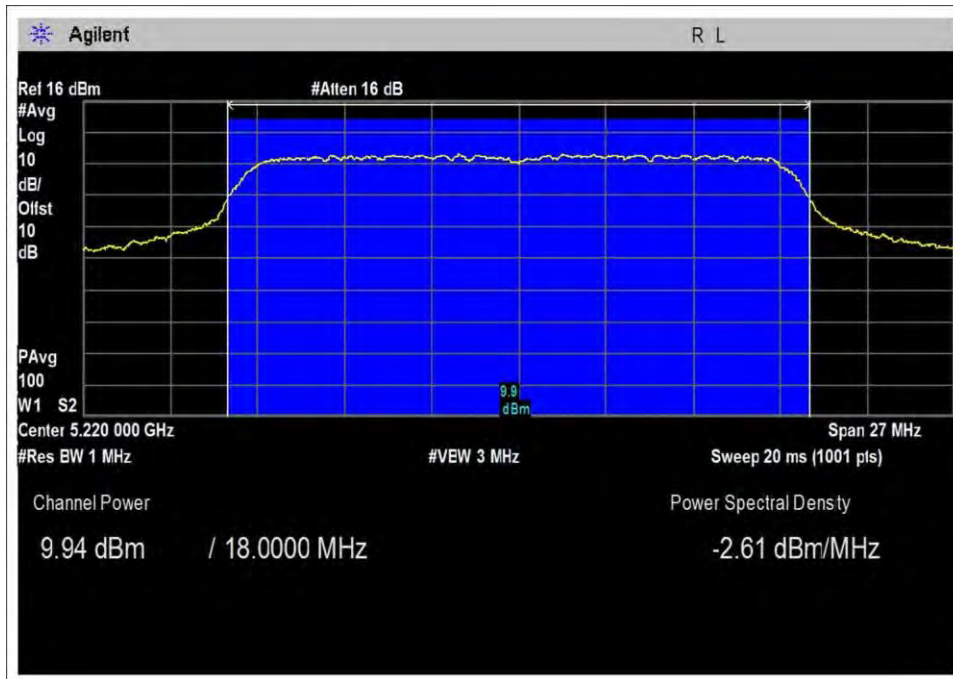
PSD 17dBi-MB-5.1-Set23



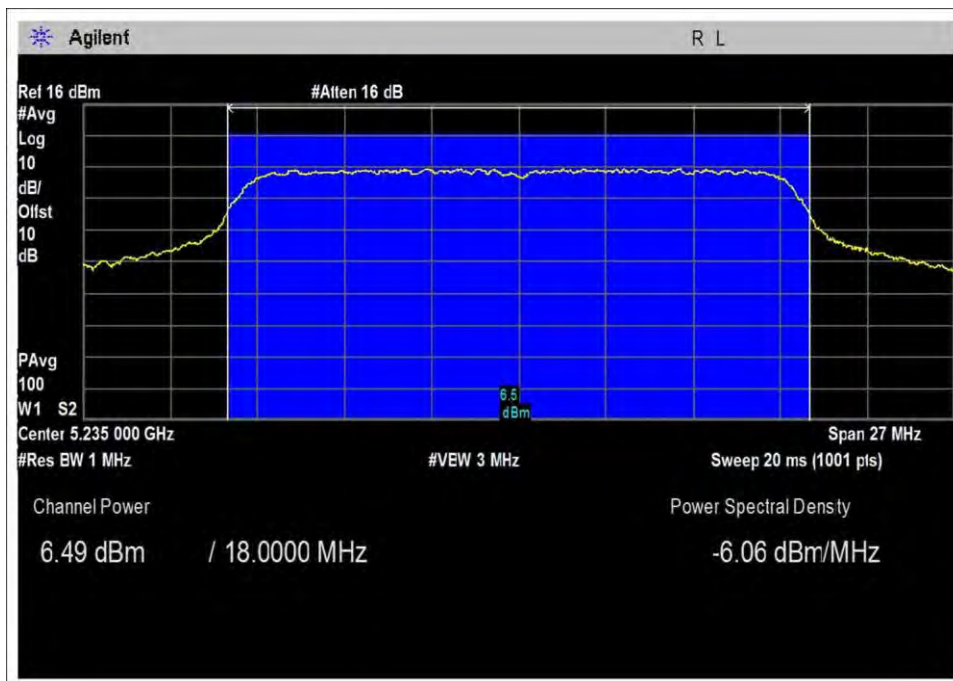
PSD 18dBi-HB-5.1-Set16



PSD 18dBi-LB-5.1-Set18.5

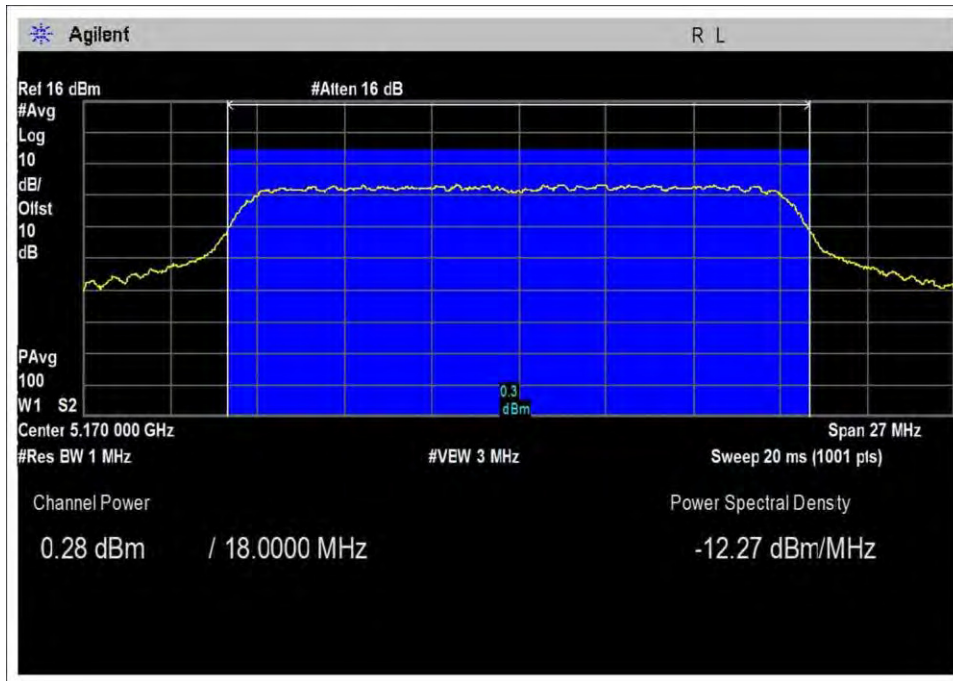


PSD 18dBi-MB-5.1-Set23

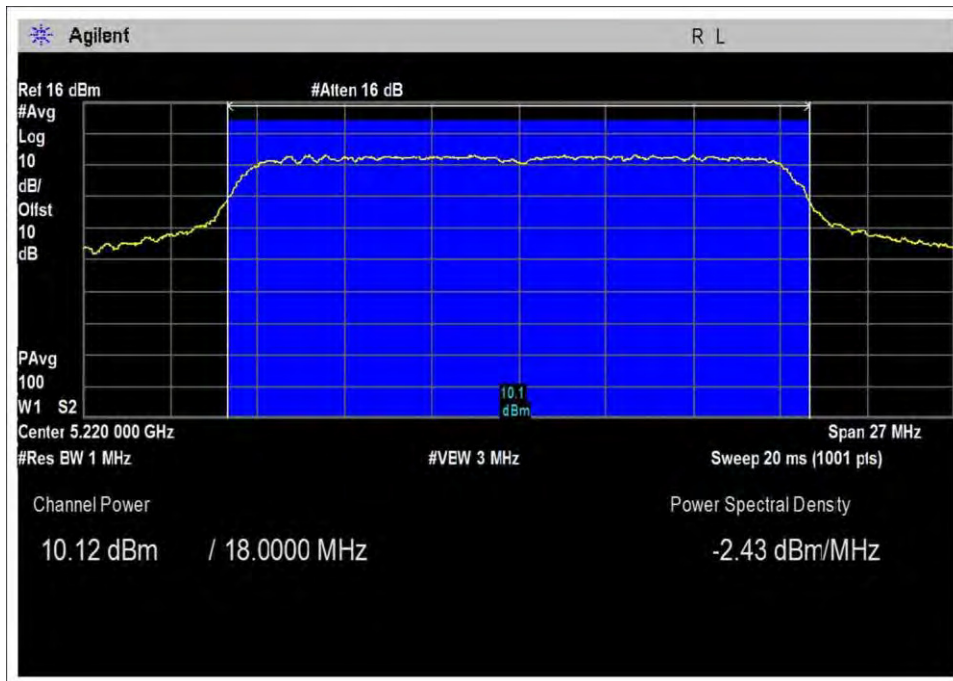


PSD 20dBi-HB-5.1-Set19

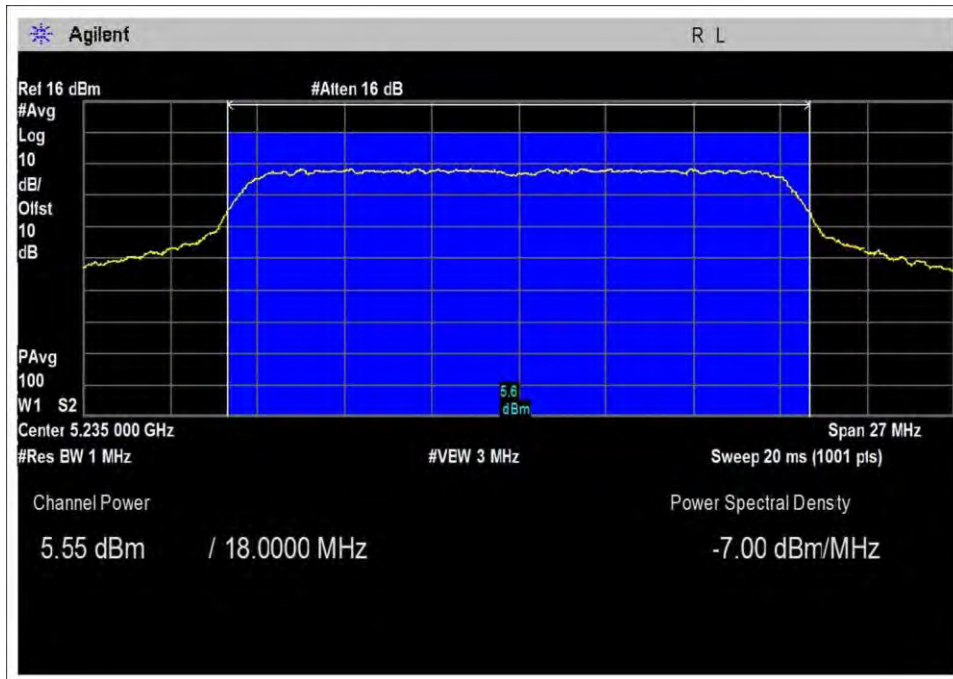




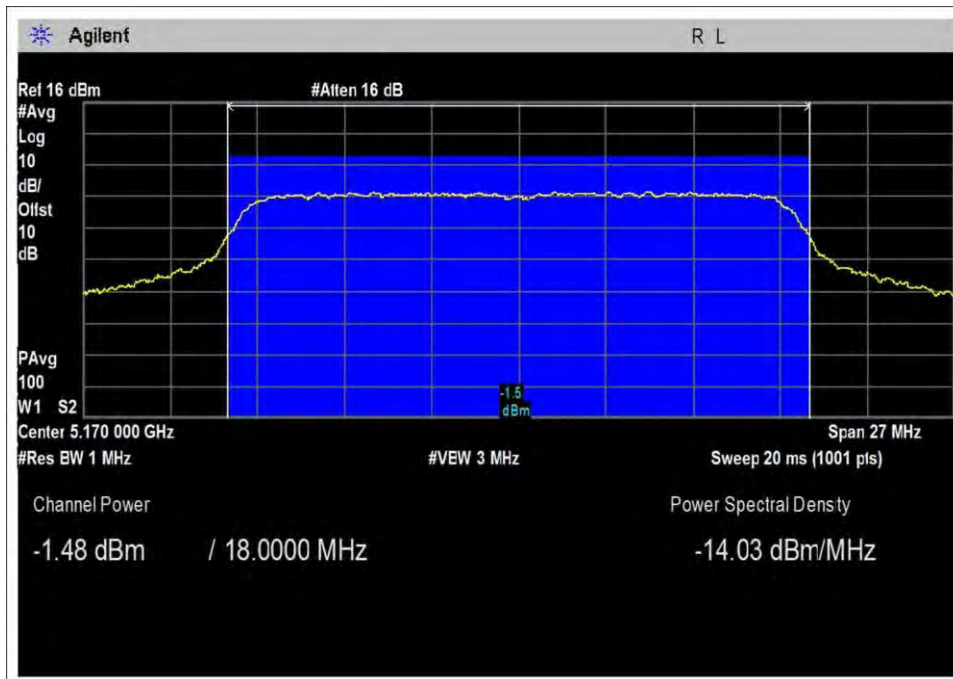
PSD 20dBi-LB-5.1-Set12.5



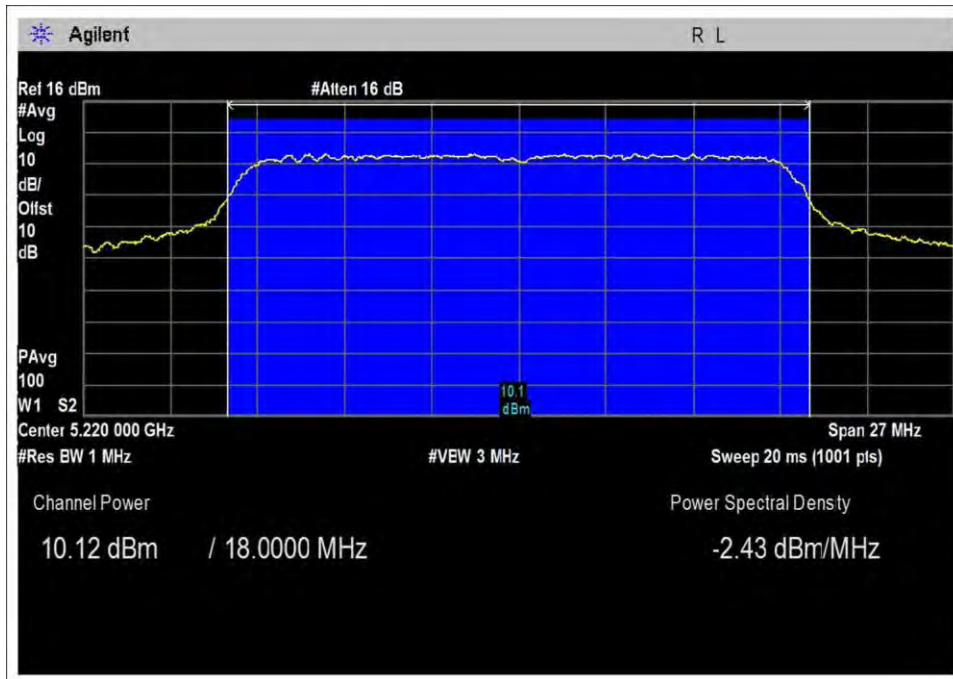
PSD 20dBi-MB-5.1-Set23



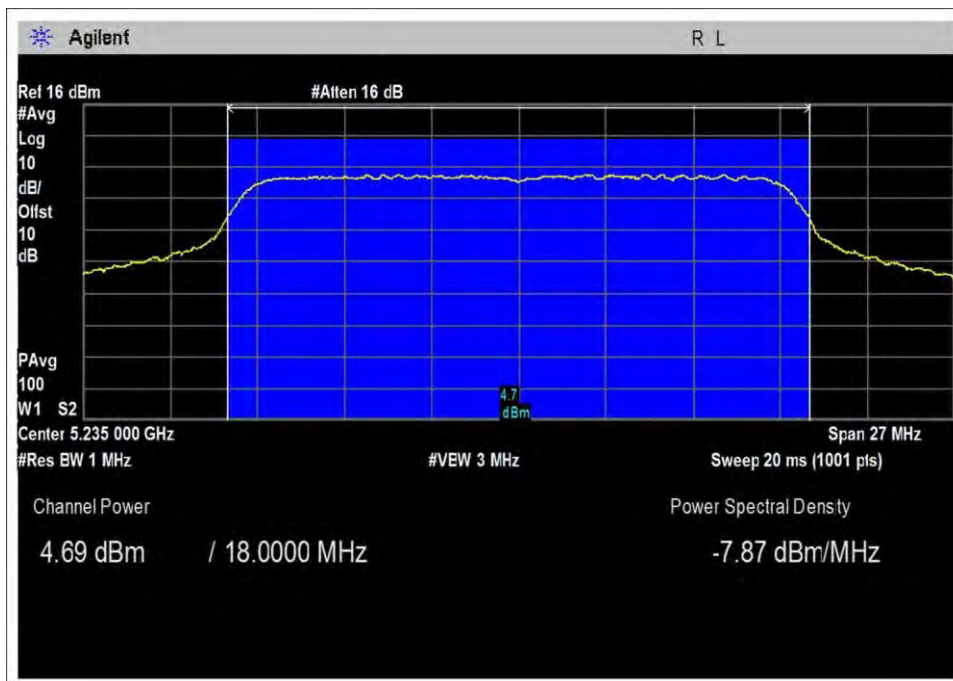
PSD 21dBi-HB-5.1-Set18



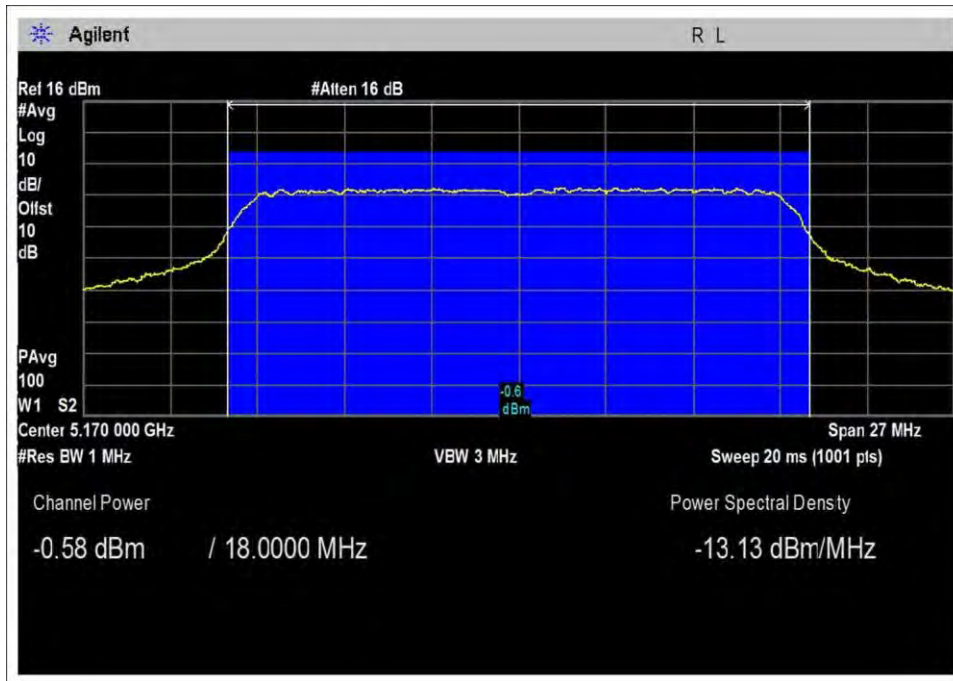
PSD 21dBi-LB-5.1-Set10.5



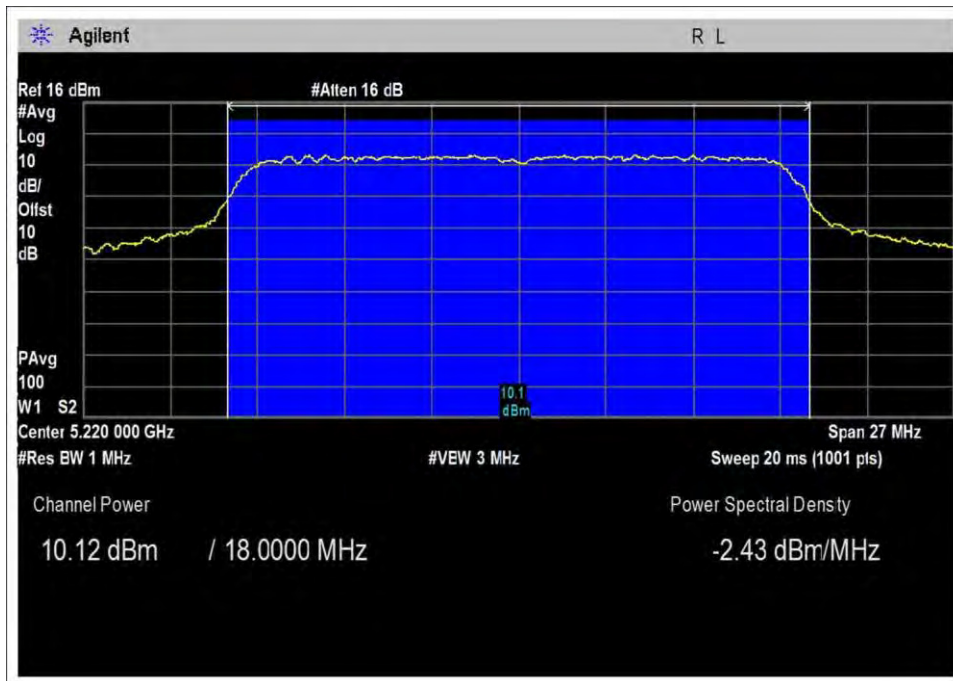
PSD 21dBi-MB-5.1-Set23



PSD 22dBi-HB-5.1-Set17.5

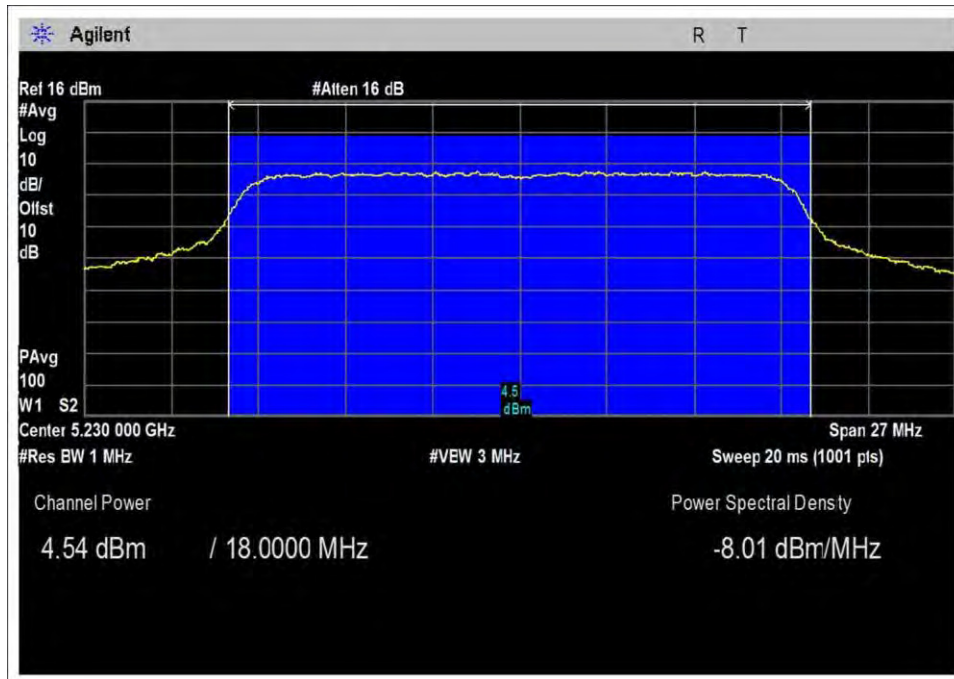


PSD 22dBi-LB-5.1-Set11.5

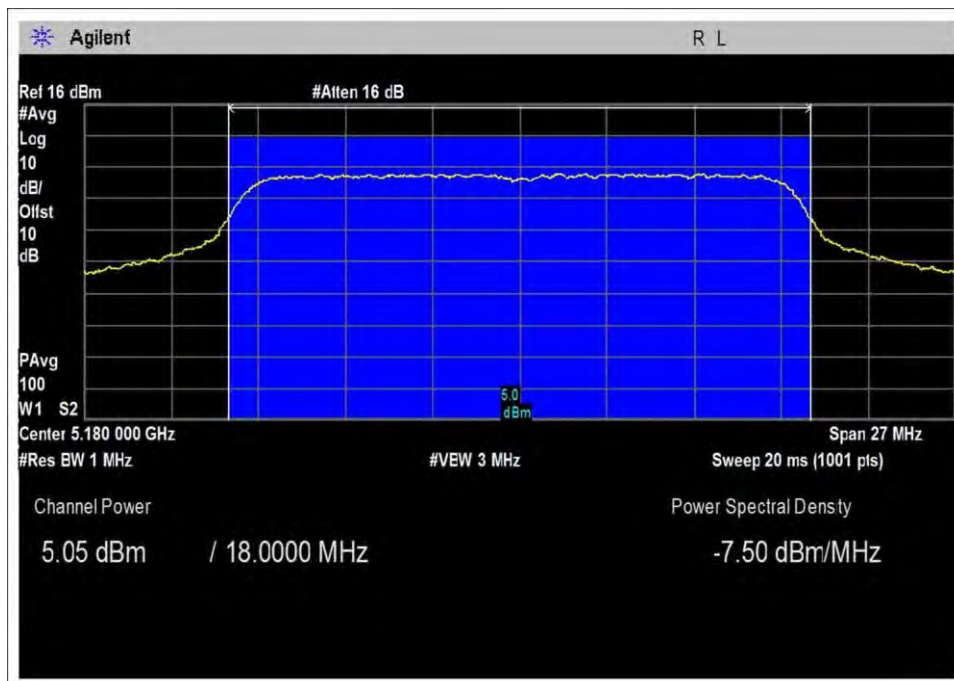


PSD 22dBi-MB-5.1-Set23

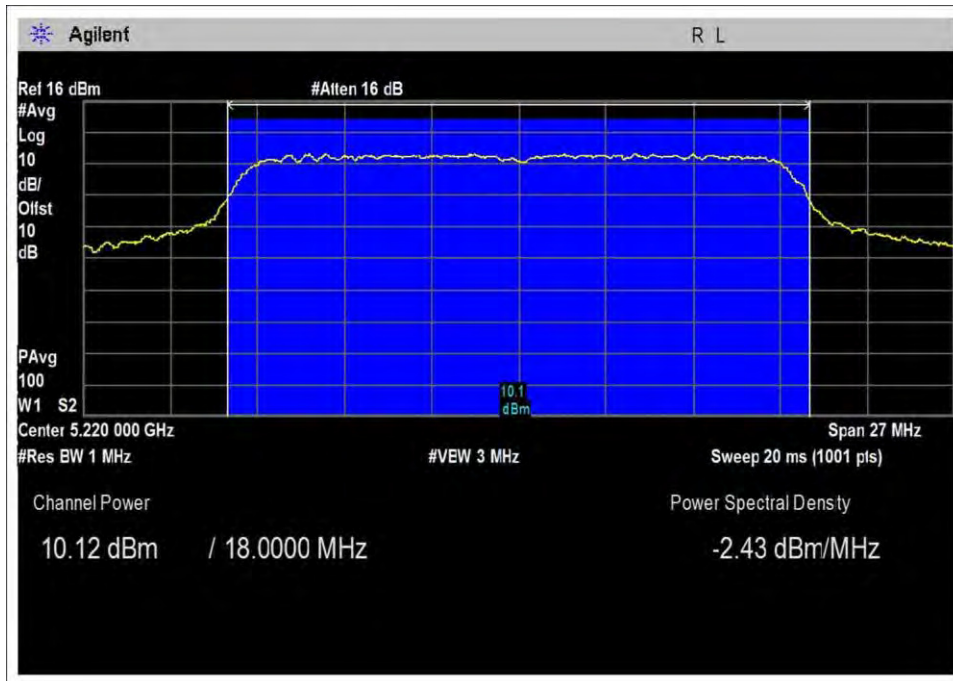




PSD 23dBi-HB-5.1-Set17



PSD 23dBi-LB-5.1-Set18



PSD 23dBi-MB-5.1-Set23

**Test Setup Photo**



### 15.407(a)(iii) EIRP at >30° Elevation

Test Location:	Mariposa Lab D	Test Engineer:	Randal Clark and Benny Lovan
Test Method:	ANSI C63.10 (2013) KDB 789033 D02 v01r02	Test Date(s):	5/23/2016
Configuration:	2		
Test Setup:	The EUT is setup horizontally on a Styrofoam table and oriented such that the face of the EUT is parallel to the table's 0 degree marker. The testing receive antenna is also oriented horizontal so that the polarity between receive antenna and EUT are consistent. Using a controller, the table is turned from 30 to 95 degrees in the direction that exposes the top of the EUT to the antenna slowly while simultaneously taking data that is later plotted. The angle that produced maximum radiation is where the power reading was taken.		

Environmental Conditions			
Temperature (°C)	18	Relative Humidity (%):	49

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
01273	Horn Antenna	EMCO	3115	2/3/2015	2/3/2017
P01403	Cable	Semflex	58758-23	12/8/2014	12/8/2016
P05904	Cable	AstroLab	32022-2-29094K-144TC	12/8/2014	12/8/2016
02668	Spectrum Analyzer	Agilent	E4446A	8/14/2015	8/14/2016

Test Data Summary - Radiated Measurement						
Measurement Option: AVGSA-1						
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Field Strength (dBuV/m @3m)	Calculated (dBm)	Limit (dBm)	Results
5220	OFDM	11dBi Omni	105.7	10.471	≤21	Pass
5220	OFDM	17dBi Sector	101.4	6.171	≤21	Pass
5220	OFDM	19 dBi Sector	98.6	3.371	≤21	Pass
5220	OFDM	20dBi Sector	104.8	9.571	≤21	Pass
5220	OFDM	21dBi Sector	108.6	13.371	≤21	Pass
5220	OFDM	22dBi Sector	109.9	14.671	≤21	Pass

RF power calculated in accordance with KDB 789033.

$$P(W) = \frac{(E \cdot d)^2}{30}$$

Or equivalently, in logarithmic form:

$$P(dBm) = E(dBuV/m) + 20LOG(d) - 104.77$$

**Test Setup / Conditions / Data**

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Digital Path**  
 Specification: **15.407(a)(1) Power Limit at 30 Degree Elevation**  
 Work Order #: **98485** Date: 5/17/2016  
 Test Type: **Radiated Scan** Time: 09:00:03  
 Tested By: Randal Clark Sequence#: 2  
 Software: EMITest 5.03.02

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 3			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 3			

***Test Conditions / Notes:***

Equipment is an outdoor access point for use in both PTP and PTMP applications. Software used: Web interface on EUT to Atheros TX99 Tool Aquila 9.2.14.

Modulation used: OFDM (802.11a)  
 Data rate: 54MBps (representative of worst case)  
 Antenna: As stated in notes  
 Power Output Software Setting: 23 (unless otherwise stated in the notes)

Frequency Range Investigated: Mid channel 5220 MHz

Temperature: 64°F  
 Relative Humidity: 49%

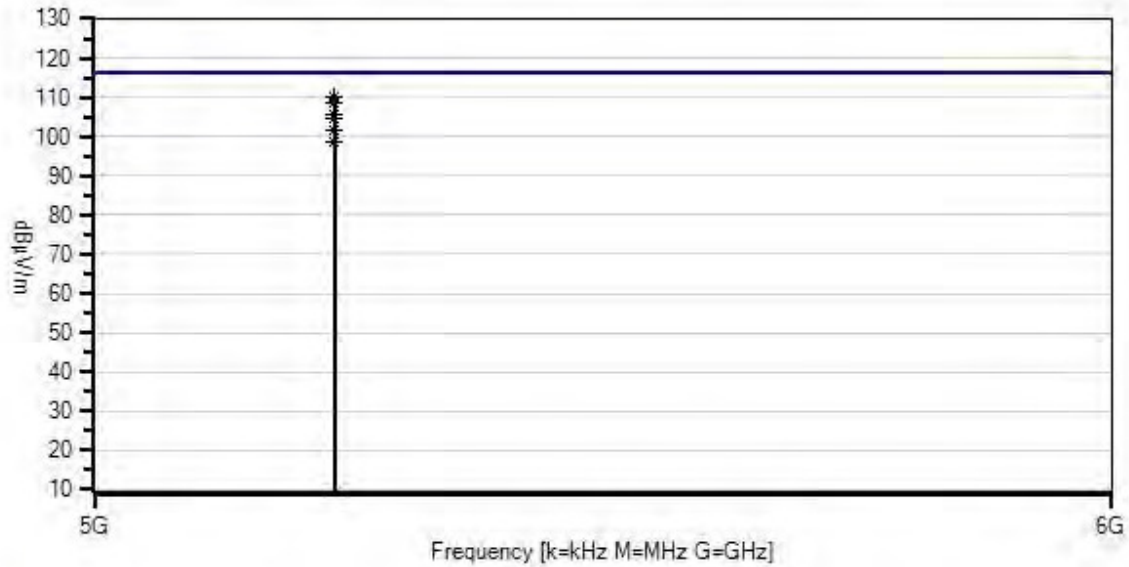
Test method: ANSI C63.10 (2013) and KDB 789033 D02 v01r02.

The receive antenna is co-polarized with the transmit antenna. The transmit antenna is set on its side and the table will be rotated 30 degrees for this measurement.

Power is measured using the integration method.



Digital Path Networks W/O#: 98485 Sequence#: 2 Date: 5/17/2016  
 15.407(a)(1) Power Limit at 30 Degree Elevation Test Distance: 3 Meters Vert

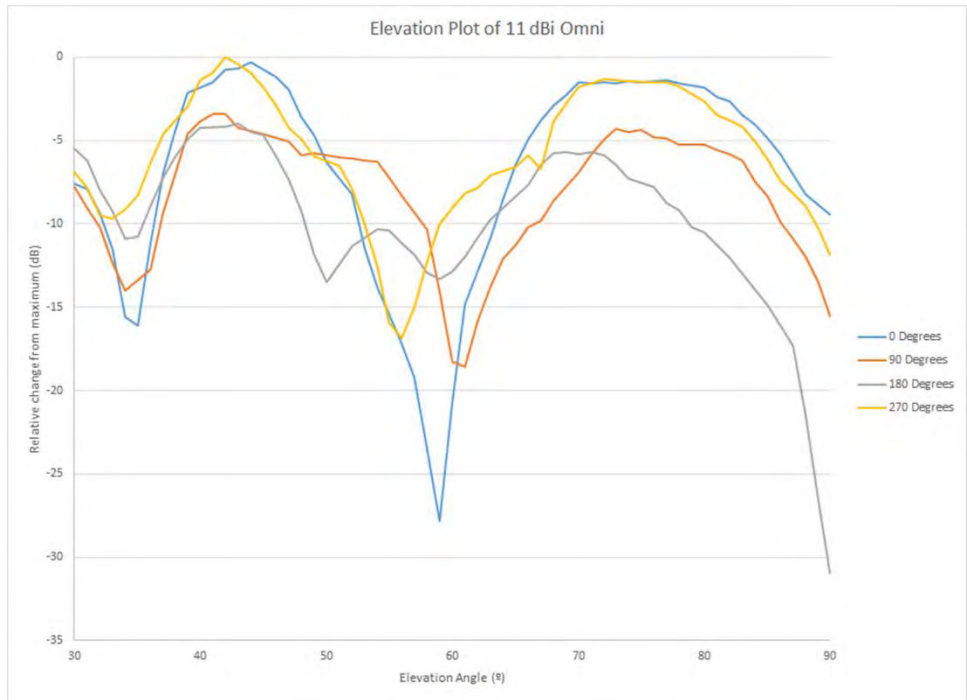


— Readings  
 × QP Readings  
 ▼ Ambient  
 ○ Peak Readings  
 \* Average Readings  
 1 - 15.407(a)(1) Power Limit at 30 Degree Elevation  
 Software Version: 5.03.02

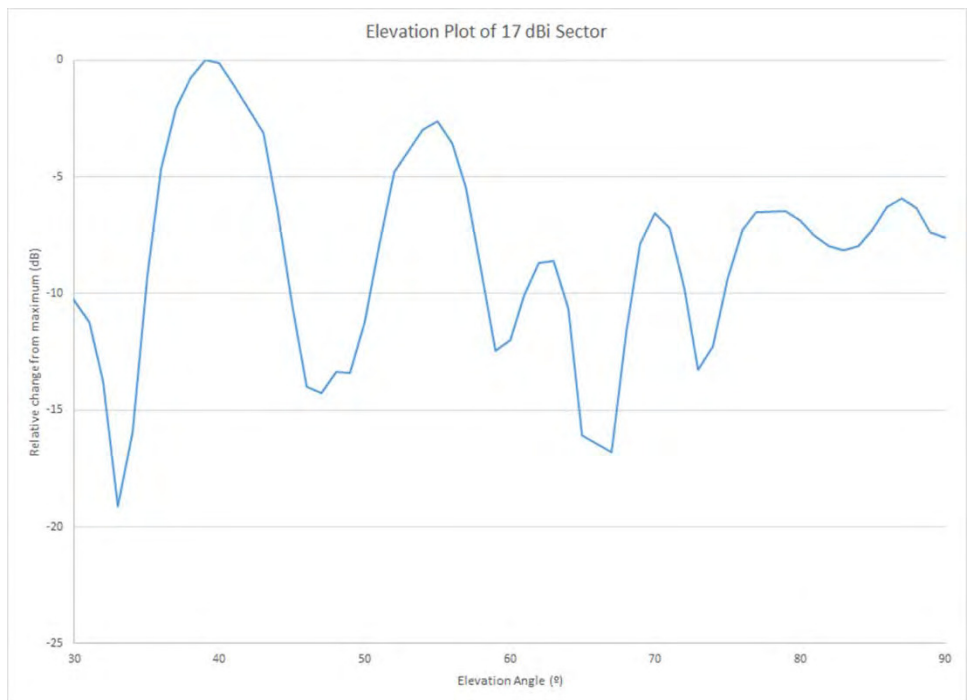
**Measurement Data:** Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5220.000M Ave	71.6	+31.3	+3.5	+3.5	+0.0	109.9	116.2 UNII1-(22dBi Sector)	-6.3	Vert
2	5220.000M Ave	70.3	+31.3	+3.5	+3.5	+0.0	108.6	116.2 UNII1-(21dBi Sector)	-7.6	Vert
3	5220.000M Ave	67.4	+31.3	+3.5	+3.5	+0.0	105.7	116.2 UNII1- (11dBi Omni) at 270°	-10.5	Vert
4	5220.000M Ave	66.5	+31.3	+3.5	+3.5	+0.0	104.8	116.2 UNII1-(20dBi Sector)	-11.4	Vert
5	5220.000M Ave	63.1	+31.3	+3.5	+3.5	+0.0	101.4	116.2 UNII1- (17dBi Sector)	-14.8	Vert
6	5220.000M Ave	60.3	+31.3	+3.5	+3.5	+0.0	98.6	116.2 UNII1-(19dBi Sector)	-17.6	Vert

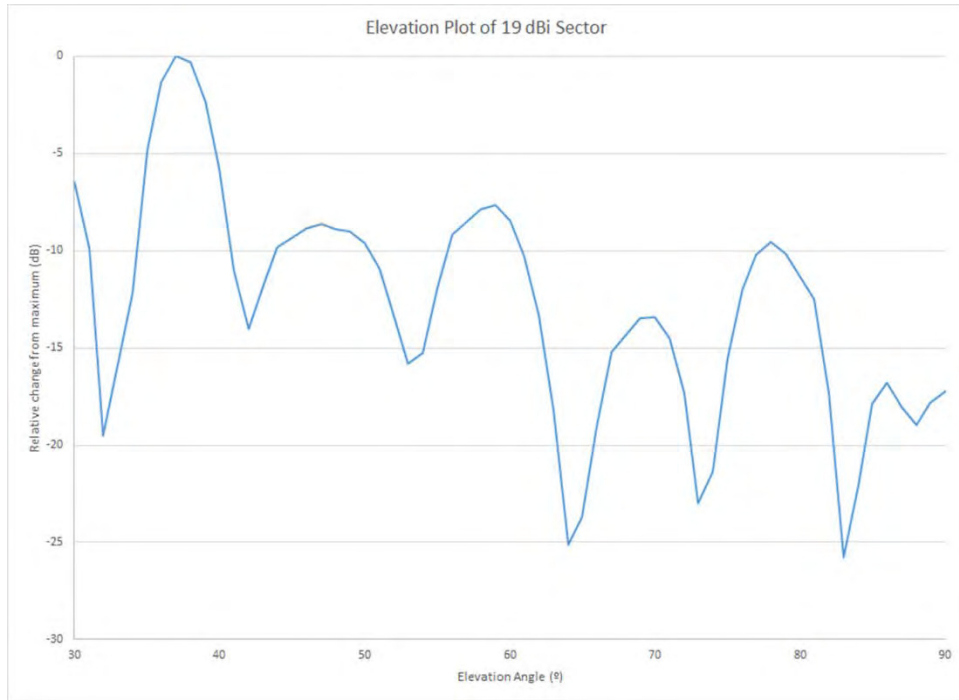
## Elevation Plots



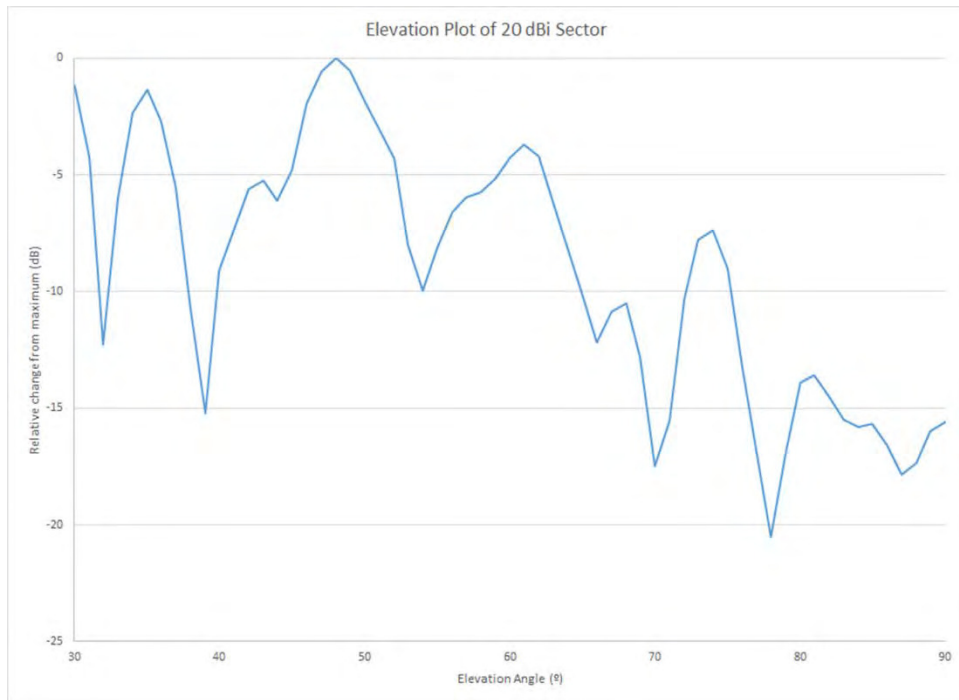
**11dBi**



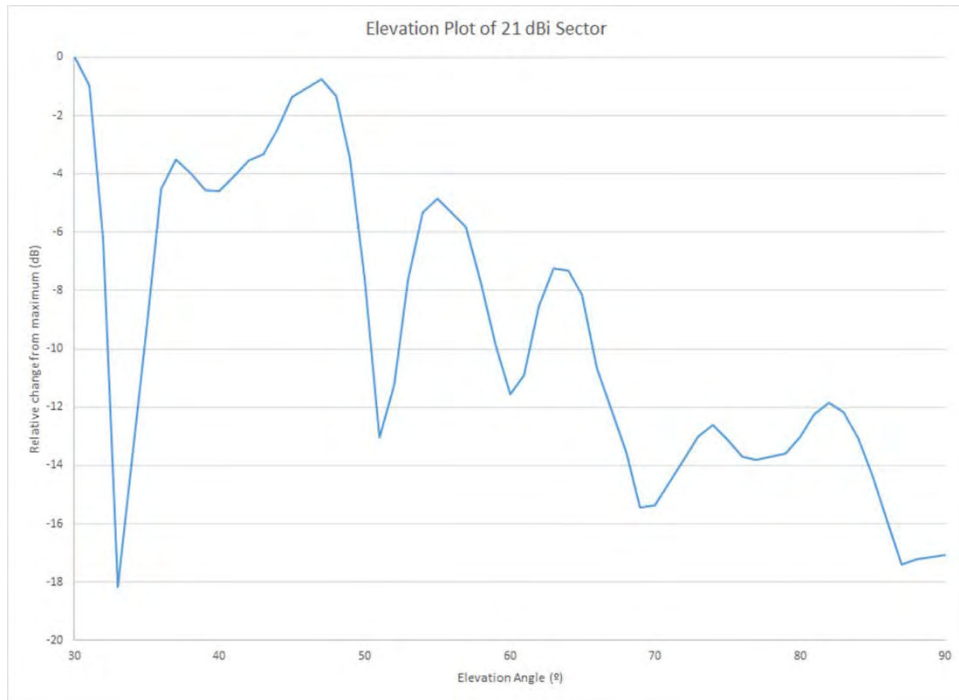
**17dBi**



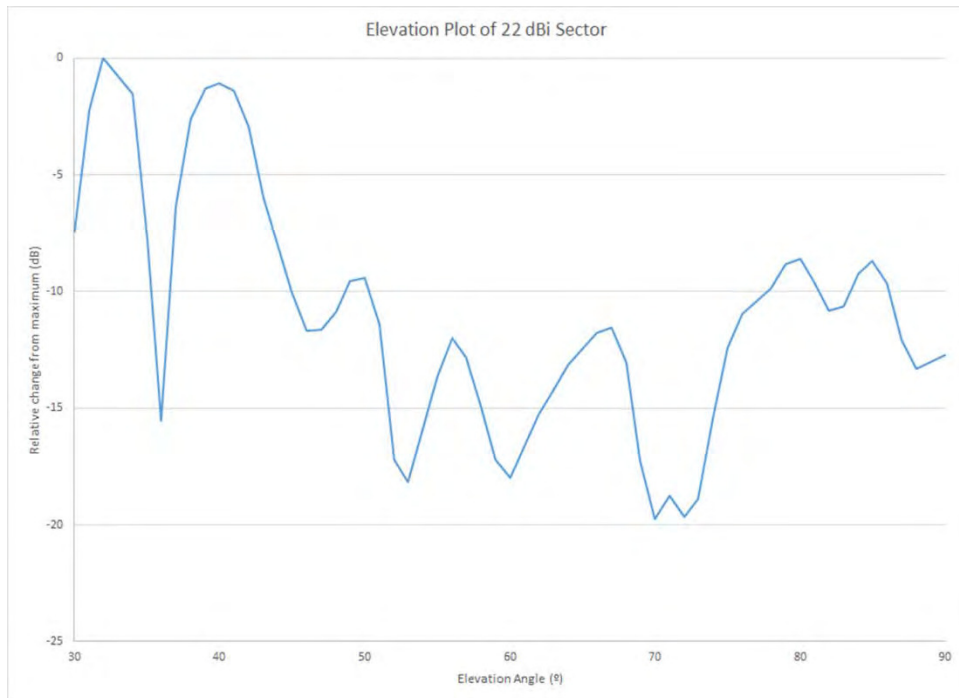
19dBi



20dBi



21dBi



22dBi

**Test Setup Photos**



11dBi



17dBi



19dBi



20dBi





21dBi



22dBi



## 15.407(g) Frequency Stability

### Test Setup/Conditions

Test Location:	Mariposa Lab A	Test Engineer:	Randal Clark and Benny Lovan
Test Method:	ANSI C63.10 (2013) KDB 789033 D02 v01r02	Test Date(s):	5/31/2016
Configuration:	1		
Test Setup:	The EUT is setup inside of a temperature chamber. A cable is connected to antenna port 0 and it is setup to transmit at the various low and high frequencies. A thermocouple that attaches to a calibrated multi-meter verifies the temperature within the chamber. A DC power source is used to do the voltage variation. Output of transmitter set to software setting 23.		

### Environmental Conditions

Temperature (°C)	21	Relative Humidity (%)	39
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### Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02668	Spectrum Analyzer	Agilent	E4446A	8/14/2015	8/14/2016
02134	Attenuator	Weinschel	54-3	12/8/2014	12/8/2016
P01949	Attenuator	Weinschel	54A-6	12/8/2014	12/8/2016
03355	Cable	AstroLab	32026-2-29094K-48TC	12/8/2014	12/8/2016
03338	Multimeter	Extech	MM570A	1/22/2015	1/2/2017
01879	Temperature Chamber	Thermotron	S-1.2 Min.	12/5/2014	12/5/2016

### Test Data Summary

Declared Temperature Range: -20 – 70 °C

Temperature (°C)	Voltage	Low Frequency (MHz)	High Frequency (MHz)	Limit (MHz)	Results
-20	V <sub>Nominal</sub>	5161.42	5248.50	All emissions remain within 5150-5250	Pass
-10	V <sub>Nominal</sub>	5161.42	5248.50		
0	V <sub>Nominal</sub>	5161.42	5248.50		
10	V <sub>Nominal</sub>	5161.50	5248.50		
20	V <sub>Minimum</sub>	5161.50	5248.50		
20	V <sub>Nominal</sub>	5161.42	5248.50		
20	V <sub>Maximum</sub>	5161.50	5248.50		
30	V <sub>Nominal</sub>	5161.50	5248.58		
40	V <sub>Nominal</sub>	5161.50	5248.58		
50	V <sub>Nominal</sub>	5161.67	5248.67		
60	V <sub>Nominal</sub>	5161.67	5248.67		
70	V <sub>Nominal</sub>	5161.50	5248.67		

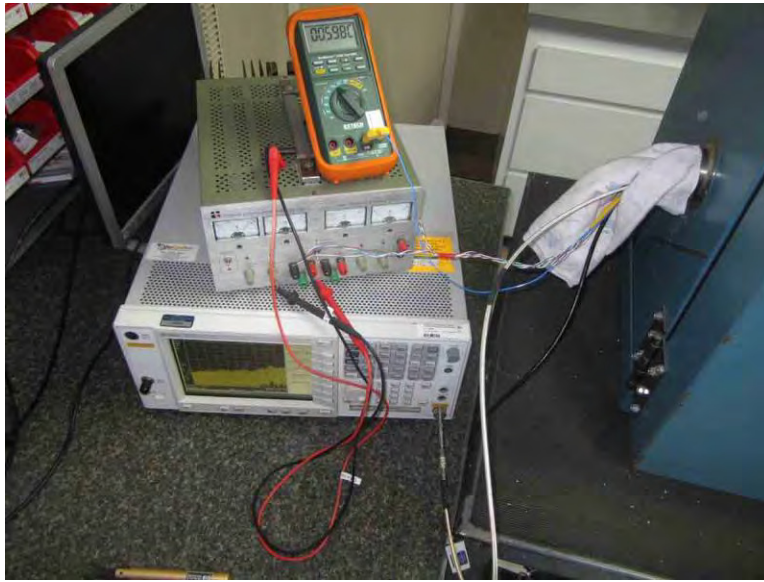
#### **Parameter Definitions:**

Measurements performed at input voltage V<sub>Nominal</sub> ± 15%.

Parameter	Value
V <sub>Nominal</sub> :	24VDC
V <sub>Minimum</sub> :	20.40 VDC
V <sub>Maximum</sub> :	27.60 VDC

**Test Setup Photos**





## 15.407(b) Radiated Emissions & Band Edge

### Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Digital Path**  
 Specification: **15.407(b) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **98485** Date: 5/27/2016  
 Test Type: **Radiated Scan** Time: 11:43:56  
 Tested By: Randal Clark Sequence#: 3  
 Software: EMITest 5.03.02

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

#### Test Conditions / Notes:

Equipment is an outdoor access point for use in both PTP and PTMP applications.  
 Modulation used: OFDM (802.11a)  
 Data rate: 54Mbps (representative of worst case)  
 Antenna: All antennas (11dBi, 17dBi, 18dBi, 20dBi, 21dBi, 22dBi and 23dBi)  
 Operational Frequency: Low mid and High (5170, 5220, 5240, 5735, 5800, 5840)  
 Power Output Setting: 23dBm

Frequency Range Investigated: 30-1000MHz  
 Highest Generated Frequency not related to radio: 500MHz

Temperature: 64°F  
 Relative Humidity: 49%

Test method: ANSI C63.10 (2013), KDB 789033 D02 v01r02

The EUT is setup on its antenna mount in the vertical orientation which is representative of normal installation. The unit has two cards within it and we are utilizing both radios for testing. Both radios are identical. A power supply is located on a table next to the mount.

Testing was performed on sector antennas, employing the same radio, with gains ranging from 17dBi to 22dBi. Since all antennas produced a passing result, the 19dBi antenna is determined to be covered within these measurements.

Emissions limits were derived from KDB 789033 D02 v01r02

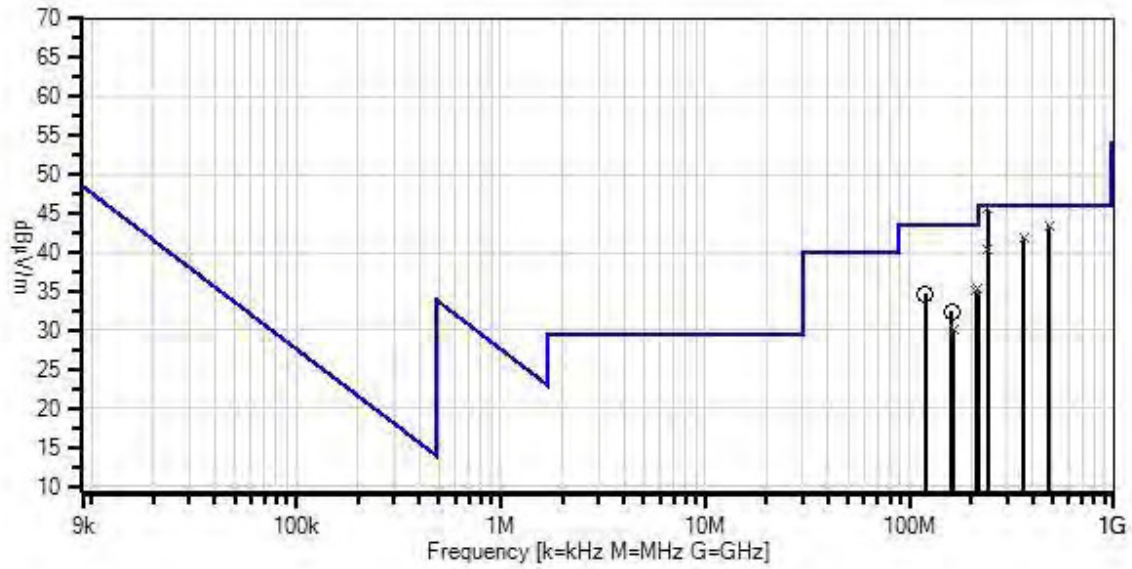
For emissions falling within the restricted bands as defined in 15.205, the limits of 15.209 were used.

For emissions falling outside of the restricted bands as defined in 15.205, the limits defined in 15.407(b) were used as shown in the calculation below:

$$\begin{aligned} \text{EIRP}[\text{dBm}] &= \text{E}[\text{dBuV/m}] - 95.2 \\ \text{E}[\text{dBuV/m}] &= \text{EIRP}[\text{dBm}] + 95.2 \\ \text{E}[\text{dBuV/m}] &= -27\text{dBm/MHz} + 95.2 \\ \text{E}[\text{dBuV/m}] &= 68.2\text{dBuV/m} \end{aligned}$$

Modification #1 was in place during testing.

Digital Path Networks WO#: 98485 Sequence#: 3 Date: 5/27/2016  
 15.407(b) / 15.209 Radiated Spurious Emissions Test Distance: 10 Meters Horiz.



- Readings
  - × QP Readings
  - ▼ Ambient
  - Peak Readings
  - \* Average Readings
  - 1 - 15.407(b) / 15.209 Radiated Spurious Emissions
- Software Version: 5.03.02



**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05656	Attenuator	PE7004-6	12/22/2015	12/22/2017
T2	AN01993	Biconilog Antenna	CBL6111C	3/11/2016	3/11/2018
T3	ANP06847	Cable	LMR195-FR-6	7/9/2015	7/9/2017
T4	ANMA10M	Cable		8/26/2014	8/26/2016
T5	ANP06883	Cable	LMR195-FR-3	10/27/2015	10/27/2017
T6	AN00449	Preamp-Top Amp (dB)	8447F	2/18/2016	2/18/2018
T7	ANP06230	Cable	CXTA04A-50	3/3/2016	3/3/2018
	AN02111	Spectrum Analyzer	8593EM	6/4/2015	6/4/2016

**Measurement Data:**

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	Reading listed by margin.			T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
			T1 dB	T2 dB	T3 dB						
1	240.023M	36.6	+6.0	+12.2	+0.4	+4.3	+10.5	45.6	46.0	-0.4	Vert
	QP		+0.2	-26.4	+1.8						
^	240.023M	38.3	+6.0	+12.2	+0.4	+4.3	+10.5	47.3	46.0	+1.3	Vert
			+0.2	-26.4	+1.8						
3	479.995M	26.7	+6.0	+18.2	+0.5	+6.3	+10.5	43.5	46.0	-2.5	Horiz
	QP		+0.3	-27.6	+2.6						
^	479.995M	29.9	+6.0	+18.2	+0.5	+6.3	+10.5	46.7	46.0	+0.7	Horiz
			+0.3	-27.6	+2.6						
5	361.723M	28.4	+6.0	+15.3	+0.5	+5.4	+10.5	42.0	46.0	-4.0	Vert
	QP		+0.3	-26.7	+2.3						
^	361.723M	31.3	+6.0	+15.3	+0.5	+5.4	+10.5	44.9	46.0	-1.1	Vert
			+0.3	-26.7	+2.3						
7	240.008M	31.4	+6.0	+12.2	+0.4	+4.3	+10.5	40.4	46.0	-5.6	Horiz
	QP		+0.2	-26.4	+1.8						
^	240.008M	32.5	+6.0	+12.2	+0.4	+4.3	+10.5	41.5	46.0	-4.5	Horiz
			+0.2	-26.4	+1.8						
9	211.996M	28.4	+6.0	+10.2	+0.4	+4.0	+10.5	35.0	43.5	-8.5	Vert
	QP		+0.2	-26.4	+1.7						
^	211.996M	32.7	+6.0	+10.2	+0.4	+4.0	+10.5	39.3	43.5	-4.2	Vert
			+0.2	-26.4	+1.7						
11	119.988M	28.9	+6.0	+11.6	+0.3	+2.9	+10.5	34.7	43.5	-8.8	Horiz
			+0.2	-27.0	+1.3						
12	216.381M	28.5	+6.0	+10.5	+0.4	+4.0	+10.5	35.3	46.0	-10.7	Vert
	QP		+0.2	-26.5	+1.7						
^	216.381M	34.5	+6.0	+10.5	+0.4	+4.0	+10.5	41.3	46.0	-4.7	Vert
			+0.2	-26.5	+1.7						
14	160.002M	26.8	+6.0	+10.5	+0.3	+3.4	+10.5	32.4	43.5	-11.1	Horiz
			+0.2	-26.8	+1.5						
15	163.902M	24.7	+6.0	+10.2	+0.3	+3.4	+10.5	30.1	43.5	-13.4	Vert
	QP		+0.2	-26.7	+1.5						
^	163.902M	33.3	+6.0	+10.2	+0.3	+3.4	+10.5	38.7	43.5	-4.8	Vert
			+0.2	-26.7	+1.5						

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Digital Path**  
 Specification: **15.407(b)(1) / 15.209 Radiated Spurious Emissions - AP / PTMP Devices**  
 Work Order #: **98485** Date: 5/26/2016  
 Test Type: **Radiated Scan** Time: 15:35:00  
 Tested By: Randal Clark Sequence#: 3  
 Software: EMITest 5.03.02

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 10			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 10			

**Test Conditions / Notes:**

Equipment is an outdoor access point for use in both PTP and PTMP applications.

Modulation used: OFDM (802.11a)  
 Data rate: 54Mbps (representative of worst case)  
 Antenna: 22dBi Sector, 21dBi Sector, 20dBi Sector 17dBi Sector, 23dBi External Diamond, 11dBi Omni, 18dBi Integrated panel.  
 Operational Frequency: 5170, 5220, 5235 and 5240 (Low, Mid and High)  
 Power Output Setting: 23dBm

Frequency Range Investigated: 1-40GHz  
 Highest Generated Frequency not related to radio: 500MHz

Temperature: 15°C  
 Relative Humidity: 74%

Test method: ANSI C63.10 (2013)

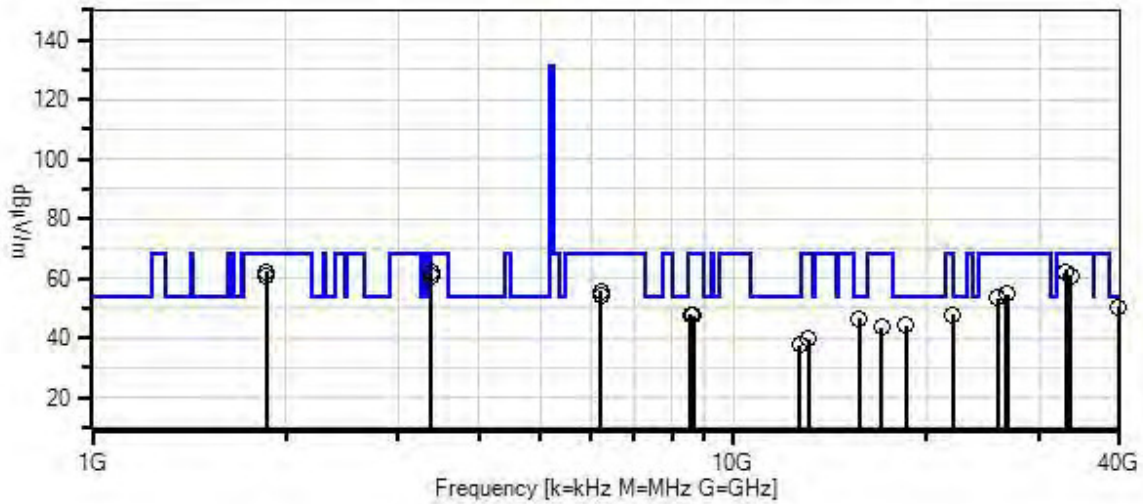
The EUT is setup on its antenna mount in the vertical orientation which is representative of normal installation. The unit has two cards within it and we are utilizing both radios for testing. Both radios are identical. A power supply is located on a table next to the mount. Testing was performed on sector antennas, employing the same radio, with gains ranging from 17dBi to 22dBi. Since all antennas produced a passing result, the 19dBi antenna is determined to be covered within these measurements.

Emissions limits were derived from KDB 789033 D02 v01r02  
 For emissions falling within the restricted bands as defined in 15.205, the limits of 15.209 were used.  
 For emissions falling outside of the restricted bands as defined in 15.205, the limits defined in 15.407(b) were used as shown in the calculation below:  
 $EIRP[dBm] = E[dBuV/m] - 95.2$   
 $E[dBuV/m] = EIRP[dBm] + 95.2$   
 $E[dBuV/m] = -27dBm/MHz + 95.2$   
 $E[dBuV/m] = 68.2dBuV/m$

Modification #1 was in place during testing.

**All signals in this data sheet are noise floor. No EUT emissions were observed.**

Digital Path Networks WD#: 98485 Sequence#: 3 Date: 5/26/2016  
 15.407(b)(1) / 15.209 Radiated Spurious Emissions - AP / PTMP Devices Test Distance: 3 Meters Horiz



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - AP / PTMP Devices

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	8/14/2015	8/14/2016
T1	ANP05904	Cable	32022-2-29094K-144TC	12/8/2014	12/8/2016
T2	ANP01403	Cable	58758-23	12/8/2014	12/8/2016
T3	AN02045	Horn Antenna-ANSI C63.5 Calibration	MWH-2640/B	5/7/2015	5/7/2017
T4	AN03361	Cable	32022-2-29094-48TC	12/8/2014	12/8/2016
T5	AN02115	Preamp	83051A	12/9/2014	12/9/2016
T6	AN01273	Horn Antenna	3115	2/3/2015	2/3/2017
T7	AN02118	High Pass Filter	84300-80039	12/9/2014	12/9/2016
	AN03366	Horn Antenna-ANSI C63.5 Calibration	GH-62-25	2/9/2016	2/9/2018
	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	39787.500 M	13.6	+12.9 -34.6	+16.2 +0.0	+38.6 +0.0	+3.8	+0.0	50.5	54.0	-3.5	Vert
Noisefloor											
2	39787.500 M	13.6	+12.9 -34.6	+16.2 +0.0	+38.6 +0.0	+3.8	+0.0	50.5	54.0	-3.5	Horiz
Noisefloor											
3	32936.000 M	32.9	+9.6 -32.7	+12.5 +0.0	+36.9 +0.0	+3.0	+0.0	62.2	68.2	-6.0	Vert
Noisefloor											
4	1866.000M	33.4	+2.1 +0.0	+2.0 +24.7	+0.0 +0.0	+0.0	+0.0	62.2	68.2	-6.0	Vert
Noise floor											
5	3371.113M	27.4	+2.8 +0.0	+2.8 +28.8	+0.0 +0.0	+0.0	+0.0	61.8	68.2	-6.4	Vert
Noise floor											
6	33505.000 M	31.3	+9.8 -32.6	+12.7 +0.0	+36.8 +0.0	+3.1	+0.0	61.1	68.2	-7.1	Horiz
Noisefloor											
7	3371.000M	26.5	+2.8 +0.0	+2.8 +28.8	+0.0 +0.0	+0.0	+0.0	60.9	68.2	-7.3	Horiz
Noise floor											
8	15667.000 M	36.1	+6.6 +0.0	+6.8 +0.0	+0.0 +0.0	+0.0	+0.0	46.6	54.0	-7.4	Horiz
Noise floor											
9	1866.000M	32.0	+2.1 +0.0	+2.0 +24.7	+0.0 +0.0	+0.0	+0.0	60.8	68.2	-7.4	Horiz
Noise floor											
10	18533.000 M	45.7	+7.3 +0.0	+7.7 +0.0	+0.0 +0.0	+0.0	+0.0	44.3	54.0	-9.7	Horiz
Noise floor											

11	6210.000M	16.3	+3.9 +0.0	+3.9 +31.5	+0.0 +0.0	+0.0	+0.0	55.6	68.2 Noise floor	-12.6	Vert
12	26681.000 M	33.4	+8.7 -35.8	+10.3 +0.0	+35.6 +0.0	+2.6	+0.0	54.8	68.2 Noisefloor	-13.4	Vert
13	26633.000 M	33.5	+8.7 -35.8	+10.2 +0.0	+35.6 +0.0	+2.6	+0.0	54.8	68.2 Noisefloor	-13.4	Horiz
14	6210.000M	15.2	+3.9 +0.0	+3.9 +31.5	+0.0 +0.0	+0.0	+0.0	54.5	68.2 Noise floor	-13.7	Horiz
15	25800.000 M	50.6	+8.6 +0.0	+9.9 +0.0	+0.0 +0.0	+0.0	+0.0	53.4	68.2 Noise floor	-14.8	Horiz
16	12667.000 M	29.0	+5.7 +0.0	+6.4 +0.0	+0.0 +0.0	+0.0	+0.0	37.8	54.0 Noise floor	-16.2	Horiz
17	8550.000M	32.6	+4.7 -31.7	+4.8 +34.2	+0.0 +1.7	+1.4	+0.0	47.7	68.2 Noise floor	-20.5	Horiz
18	21958.000 M	48.3	+7.9 +0.0	+8.6 +0.0	+0.0 +0.0	+0.0	+0.0	47.7	68.2 Noise floor	-20.5	Horiz
19	8648.000M	33.0	+4.7 -31.7	+4.8 +34.1	+0.0 +1.2	+1.4	+0.0	47.5	68.2 Noisefloor	-20.7	Vert
20	17014.000 M	30.0	+7.0 -34.6	+7.3 +0.0	+0.0 +1.3	+2.0	+0.0	43.6	68.2 Noisefloor	-24.6	Vert
21	13087.000 M	31.3	+5.8 -34.3	+6.4 +0.0	+0.0 +0.0	+1.7	+0.0	39.5	68.2 Noisefloor	-28.7	Vert



**Band Edge**

<b>Band Edge Summary</b>					
<b>Frequency (MHz)</b>	<b>Modulation</b>	<b>Ant. Type</b>	<b>Field Strength (dBuV/m @3m)</b>	<b>Limit (dBuV/m @3m)</b>	<b>Results</b>
5150	OFDM	11dBi Omni	53.5	< 54	Pass
5250	OFDM	11dBi Omni	67.6	< 68.2	Pass
5150	OFDM	18dBi Panel	53.5	< 54	Pass
5250	OFDM	18dBi Panel	67.5	< 68.2	Pass
5150	OFDM	17dBi Sector	53.4	< 54	Pass
5250	OFDM	17dBi Sector	66.1	< 68.2	Pass
5150	OFDM	20dBi Sector	53.0	< 54	Pass
5250	OFDM	20dBi Sector	67.4	< 68.2	Pass
5150	OFDM	21dBi Sector	53.2	< 54	Pass
5250	OFDM	21dBi Sector	67.7	< 68.2	Pass
5150	OFDM	22dBi Sector	53.5	< 54	Pass
5250	OFDM	22dBi Sector	66.9	< 68.2	Pass
5150	OFDM	23dBi Panel	53.3	< 54	Pass
5250	OFDM	23dBi Panel	67.1	< 68.2	Pass

**Band Edge Test Setup / Conditions / Data**

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Digital Path**  
 Specification: **15.407(b)(1) / 15.209 Radiated Spurious Emissions - Fixed PTP Devices**  
 Work Order #: **98485** Date: 6/28/2016  
 Test Type: **Radiated Scan** Time: 11:37:07  
 Tested By: Randal Clark Sequence#: 4  
 Software: EMITest 5.03.02

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 2			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 2			

**Test Conditions / Notes:**

Equipment is an outdoor access point for use in both PTP and PTMP applications.

Modulation used: OFDM (802.11a)  
 Data rate: 54Mbps (representative of worst case)  
 Antenna: 18dBi Panel, 23dBi Panel, 11dBi Omni, 17dBi Sector, 20dBi Sector, 21dBi Sector and 22dBi Sector  
 Power Output Setting: 23dBm

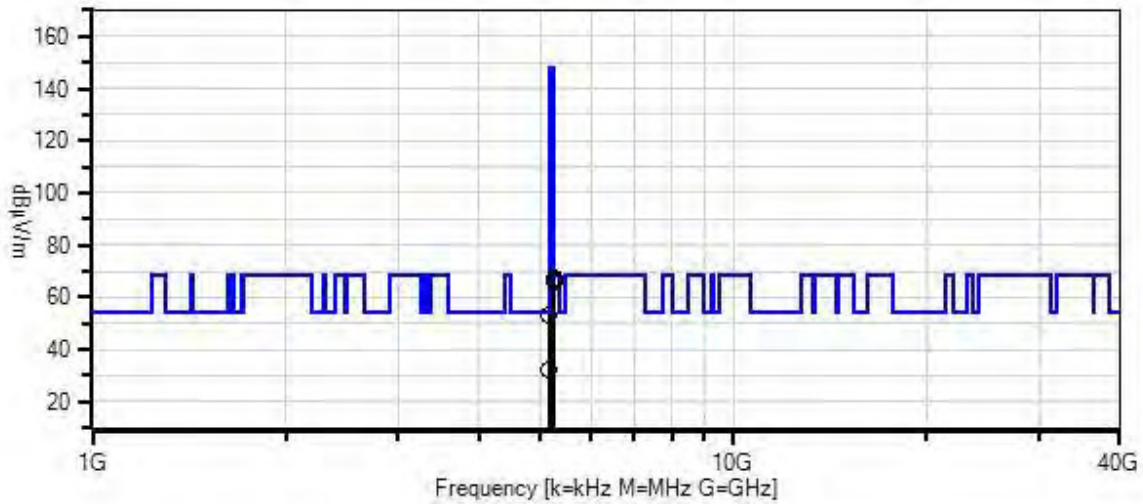
Frequency Range Investigated: Band Edge.

Temperature: 18°C  
 Relative Humidity: 21%

Test method: ANSI C63.10 (2013)

21dBi Sector Ant is only being measured on the vertical port only. The customer declares that the Horizontal port is not used.  
 17dBi Sector Ant is only being measured on the vertical port only. The customer declares that the Horizontal port is not used.  
 20dBi Sector Ant is only being measured on the vertical port only. The customer declares that the Horizontal port is not used.  
 22dBi Sector Ant is only being measured on the vertical port only. The customer declares that the Horizontal port is not used.

Digital Path Networks WO#: 98485 Sequence#: 4 Date: 6/28/2016  
15.407(b)(1) / 15.209 Radiated Spurious Emissions - Fixed PTP Devices Test Distance: 3 Meters Vert



- Readings
  - Peak Readings
  - × QP Readings
  - \* Average Readings
  - ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.407(b)(1) / 15.209 Radiated Spurious Emissions - Fixed PTP Devices

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01273	Horn Antenna	3115	2/3/2015	2/3/2017
T2	ANP05904	Cable	32022-2-29094K-144TC	12/8/2014	12/8/2016
T3	AN03155	Preamp	83017A	6/30/2015	6/30/2017
T4	AN03362	Cable	32022-2-29094-48TC	12/8/2014	12/8/2016

**Measurement Data:**

Reading listed by margin.

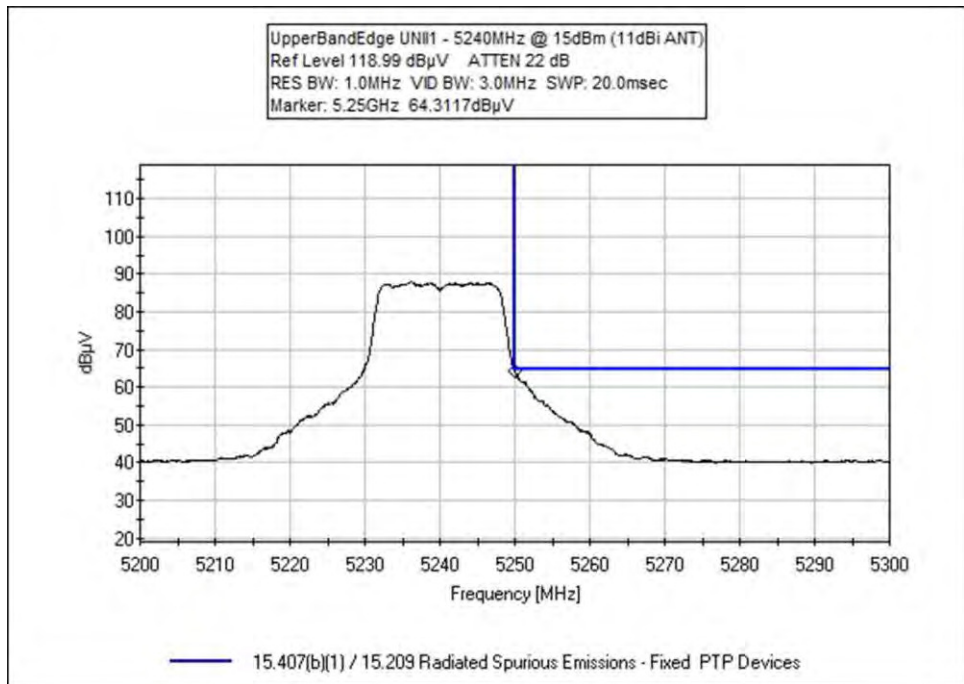
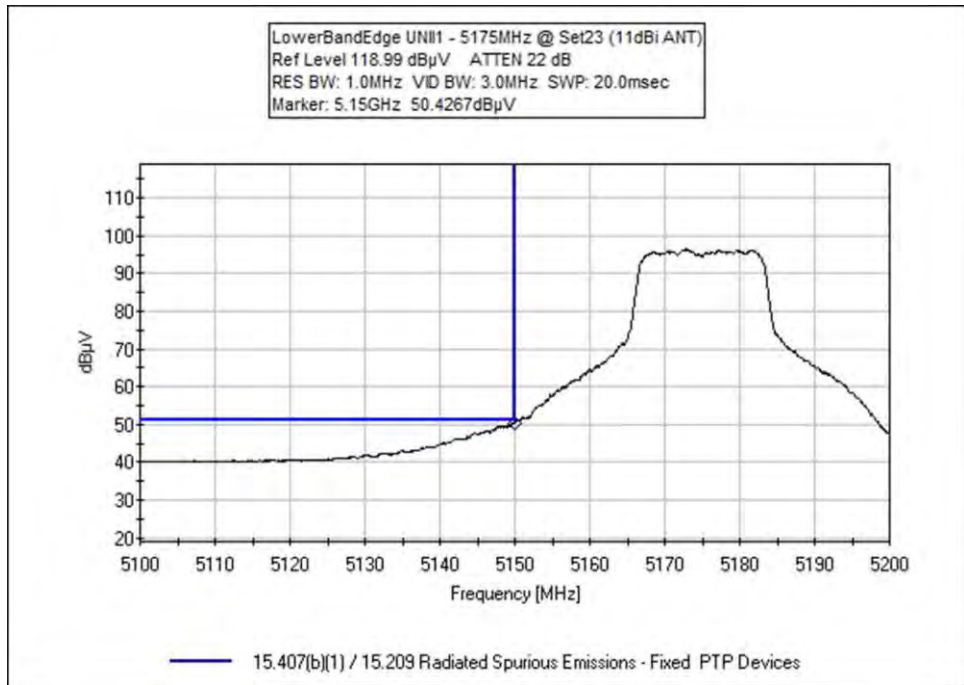
Test Distance: 3 Meters

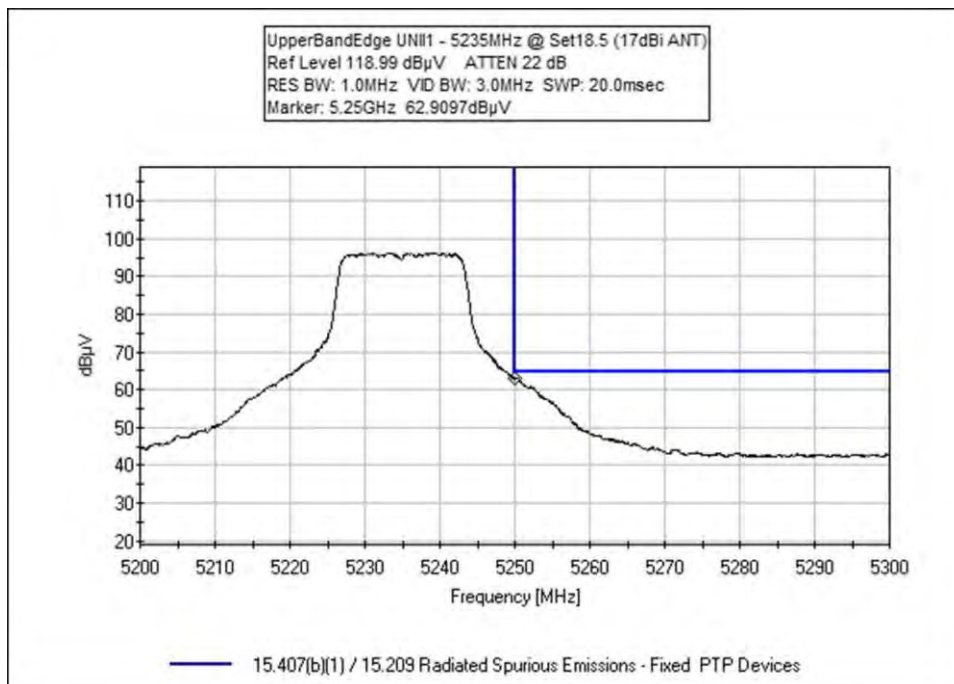
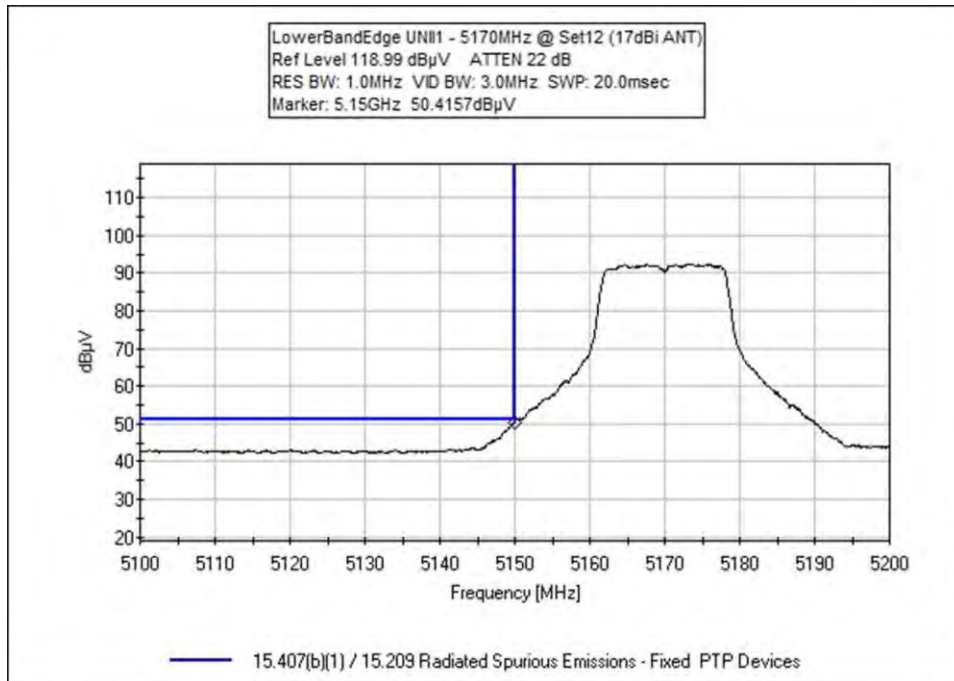
#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	5250.000M	64.4	+31.3	+3.6	-32.7	+1.1	+0.0	67.7	68.2 UpperBandEdge UNII1 - 5235MHz @ Set18 (21dBi ANT)	-0.5	Vert
2	5150.000M	50.5	+31.1	+3.5	-32.7	+1.1	+0.0	53.5	54.0 LowerBandEdge UNII1 - 5175MHz @ Set23 (11dBi ANT)	-0.5	Vert
3	5150.000M	50.5	+31.1	+3.5	-32.7	+1.1	+0.0	53.5	54.0 LowerBandEdge UNII1 - 5170MHz @ Set11.5 (22dBi ANT)	-0.5	Vert
4	5150.000M	50.5	+31.1	+3.5	-32.7	+1.1	+0.0	53.5	54.0 LowerBandEdge UNII1 - 5175MHz @ Set18.5 (18dBi ANT)	-0.5	Vert
5	5150.000M	50.4	+31.1	+3.5	-32.7	+1.1	+0.0	53.4	54.0 LowerBandEdge UNII1 - 5170MHz @ Set12 (17dBi ANT)	-0.6	Vert
6	5250.000M	64.3	+31.3	+3.6	-32.7	+1.1	+0.0	67.6	68.2 UpperBandEdge UNII1 - 5240MHz @ 15dBm (11dBi ANT)	-0.6	Vert
7	5250.000M	64.2	+31.3	+3.6	-32.7	+1.1	+0.0	67.5	68.2 Upper Band Edge UNII1 - 5235MHz @ Set16 (18dBi ANT)	-0.7	Vert
8	5150.000M	50.3	+31.1	+3.5	-32.7	+1.1	+0.0	53.3	54.0 LowerBandEdge UNII1 - 5180MHz @ Set18 (23dBi ANT)	-0.7	Vert

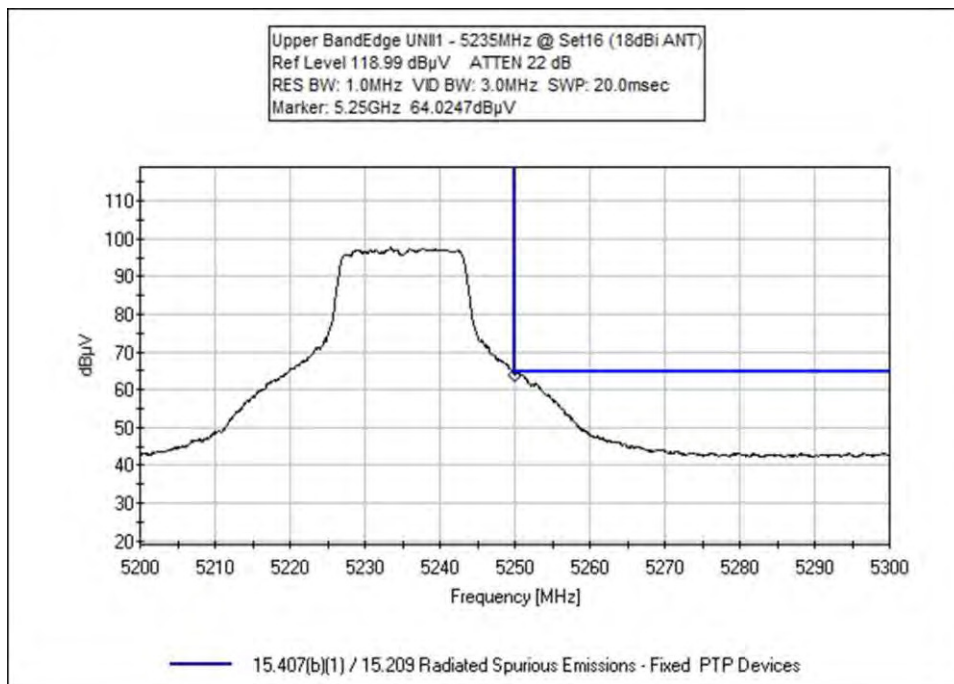
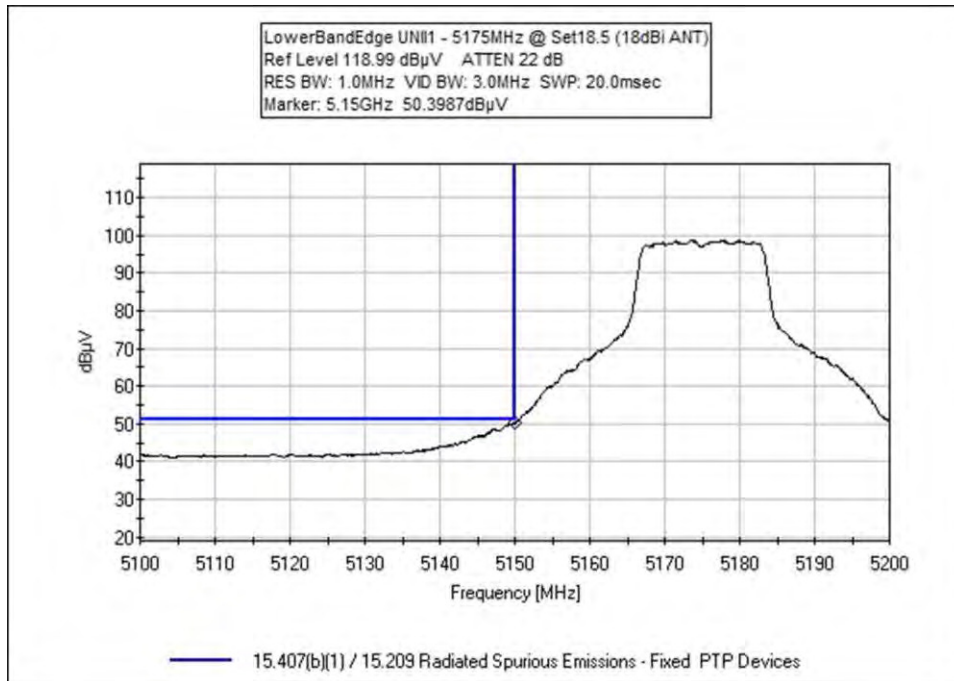
9	5150.000M	50.2	+31.1	+3.5	-32.7	+1.1	+0.0	53.2	54.0	-0.8	Vert
									LowerBandEdge UNII1 - 5170MHz @ Set10.5 (21dBi ANT)		
10	5250.000M	64.1	+31.3	+3.6	-32.7	+1.1	+0.0	67.4	68.2	-0.8	Vert
									UpperBandEdge UNII1 - 5235MHz @ Set19 (20dBi ANT)		
11	5150.000M	50.0	+31.1	+3.5	-32.7	+1.1	+0.0	53.0	54.0	-1.0	Vert
									LowerBandEdge UNII1 - 5170MHz @ Set12.5 (20dBi ANT)		
12	5250.000M	63.8	+31.3	+3.6	-32.7	+1.1	+0.0	67.1	68.2	-1.1	Vert
									Upper Band Edge UNII1 - 5230MHz @ Set17 (23dBi ANT)		
13	5250.000M	63.6	+31.3	+3.6	-32.7	+1.1	+0.0	66.9	68.2	-1.3	Vert
									UpperBandEdge UNII1 - 5235MHz @ Set17.5 (22dBi ANT)		
14	5250.000M	62.8	+31.3	+3.6	-32.7	+1.1	+0.0	66.1	68.2	-2.1	Vert
									UpperBandEdge UNII1 - 5235MHz @ Set18.5 (17dBi ANT)		
15	5150.000M	29.2	+31.1	+3.5	-32.7	+1.1	+0.0	32.2	54.0	-21.8	Horiz
									LowerBandEdge UNII1 - 5180MHz @ Set18 (23dBi ANT)		

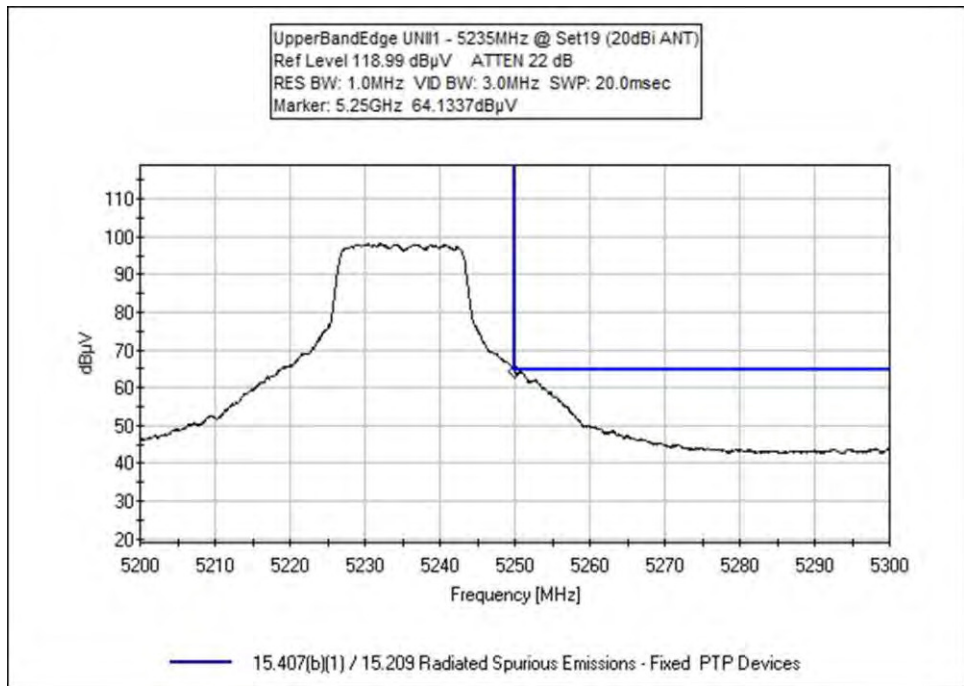
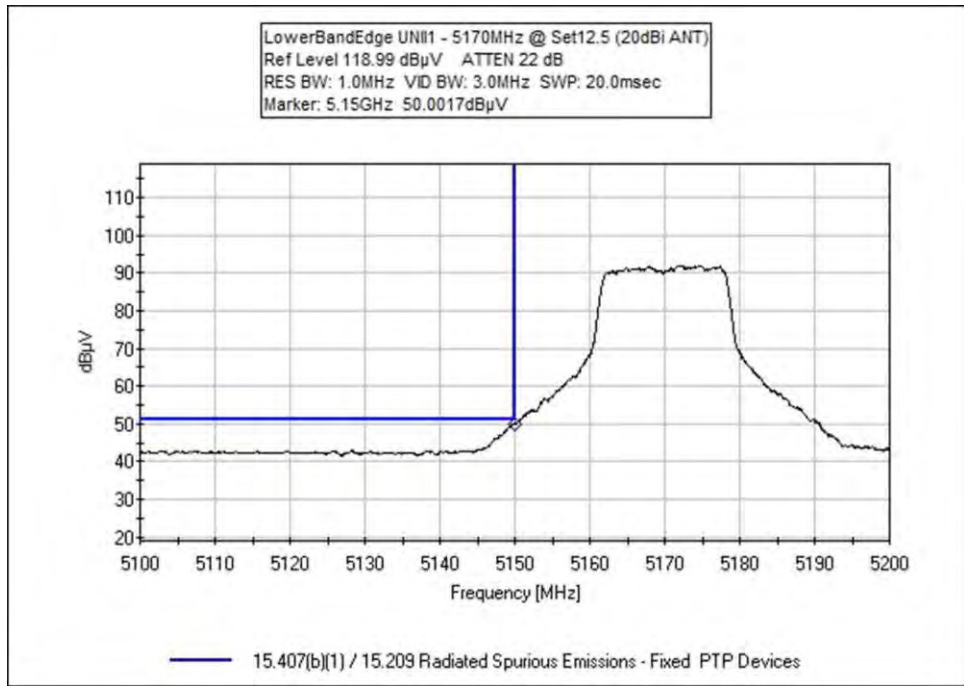


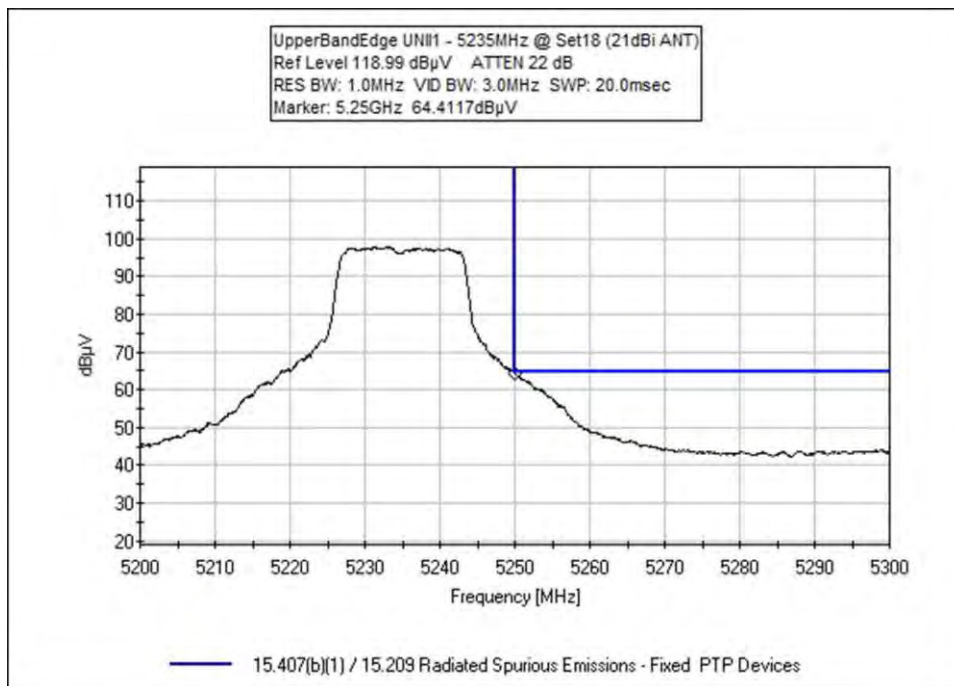
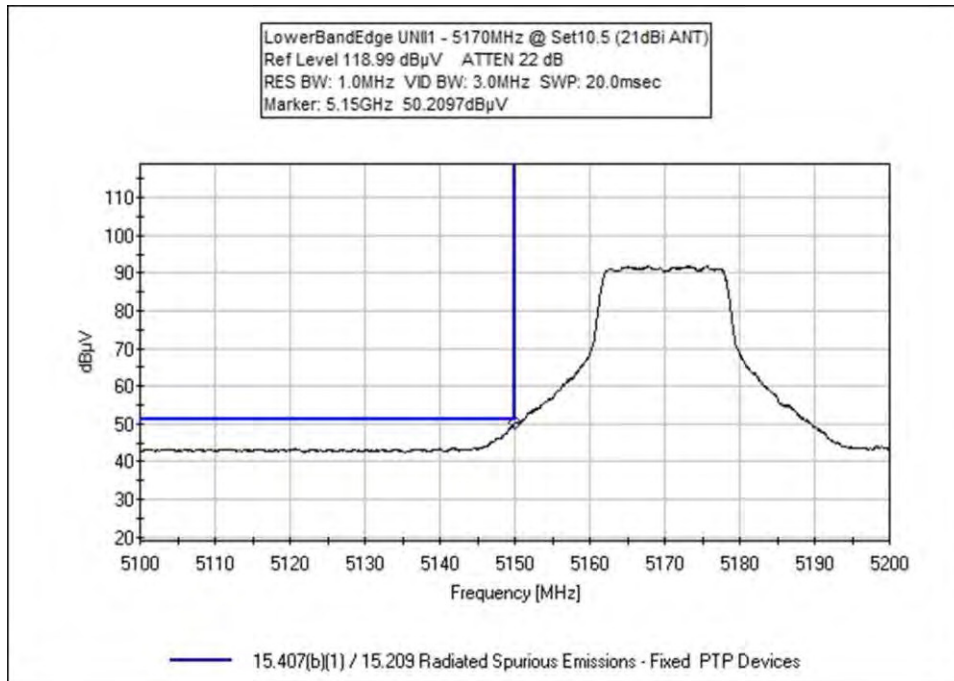
## Band Edge Plots



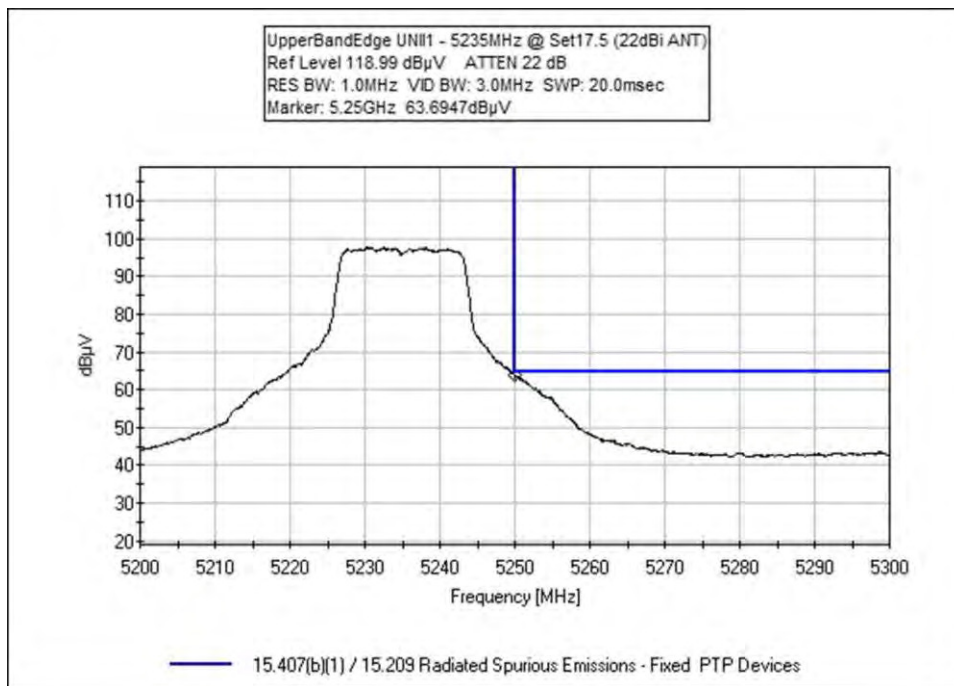
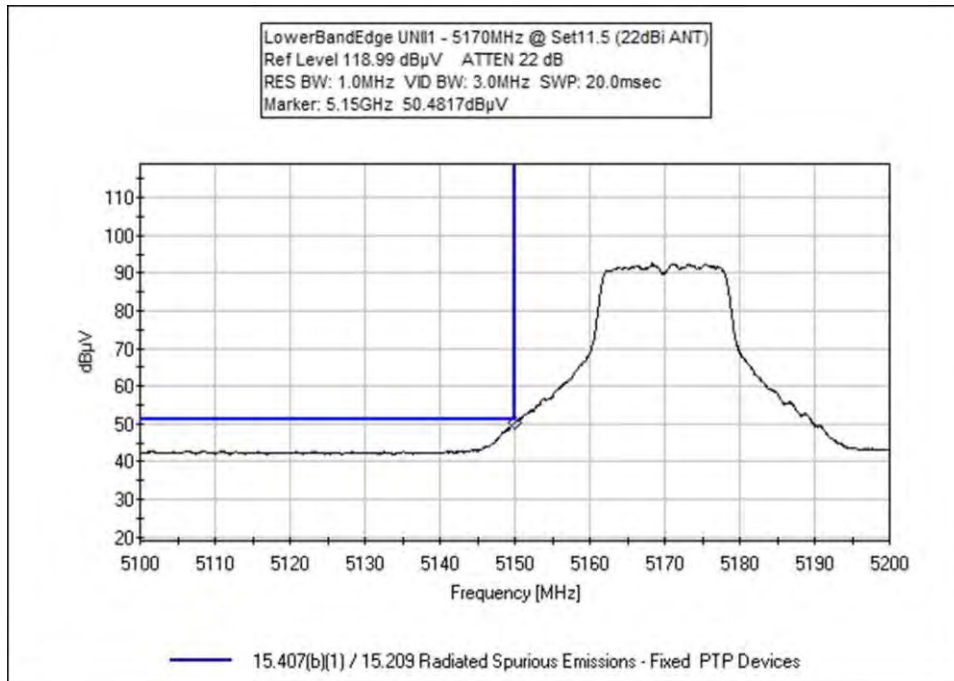




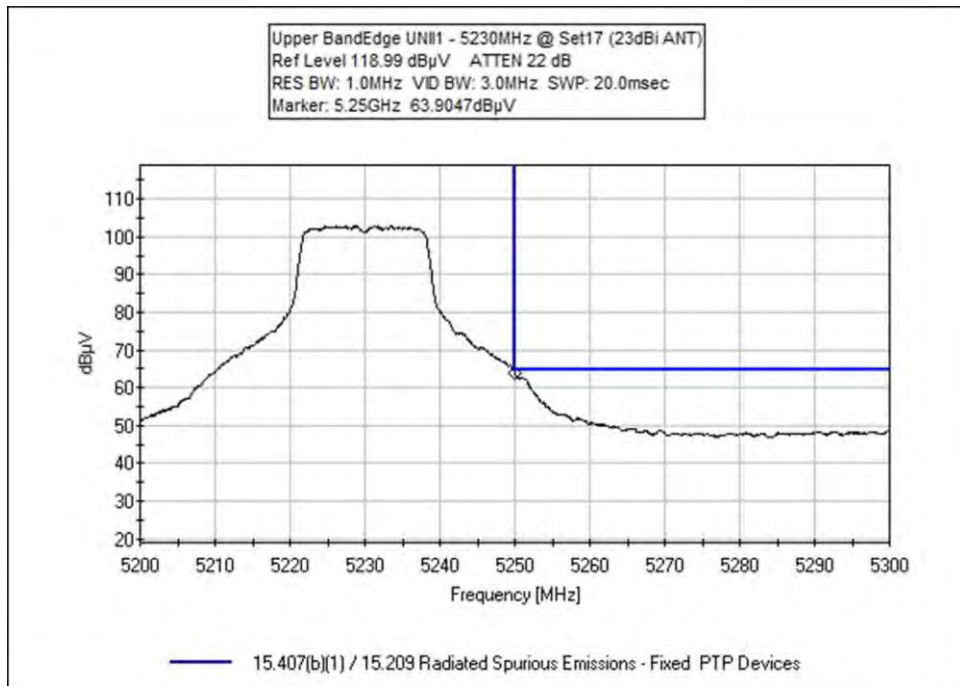
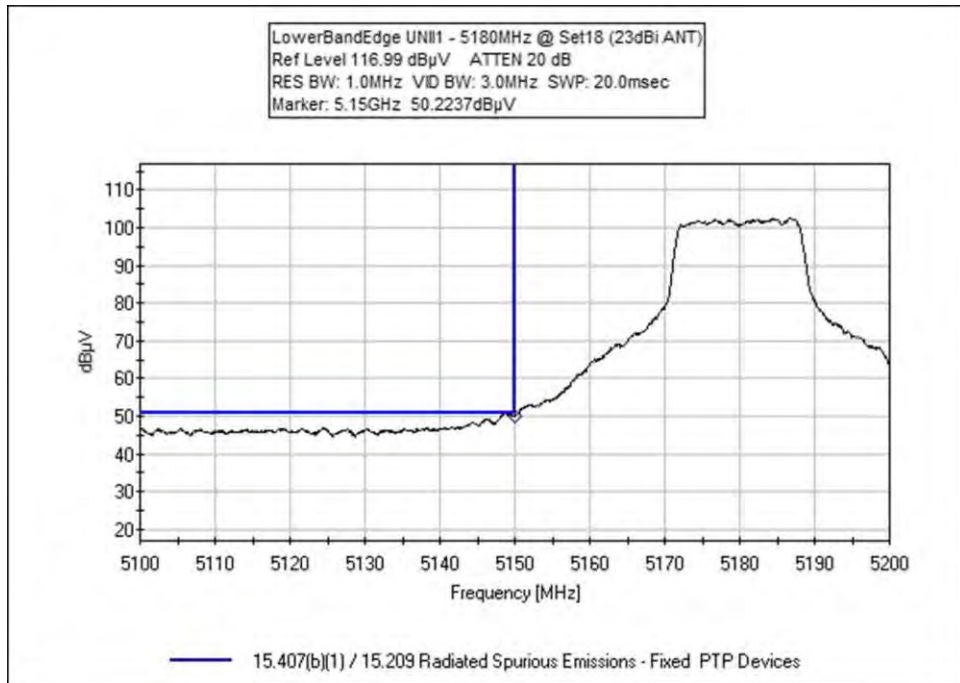




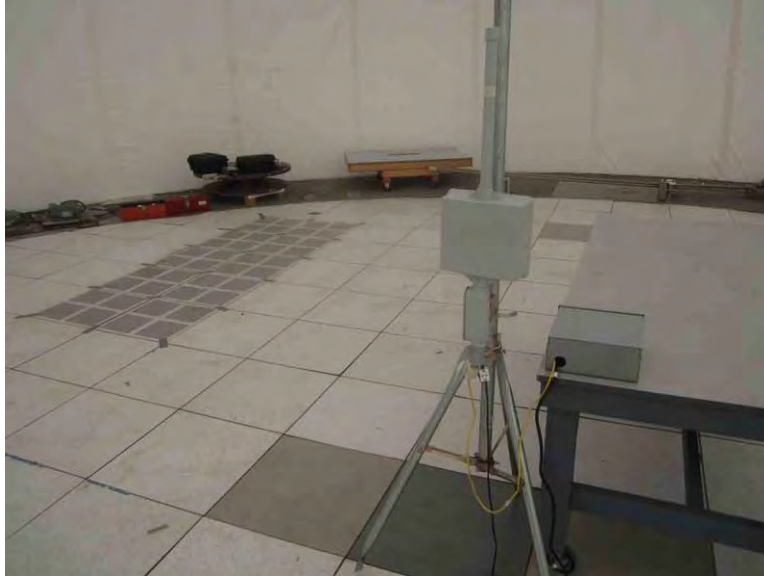








**Test Setup Photos**



11dBi and 18dBi, 30MHz – 1GHz



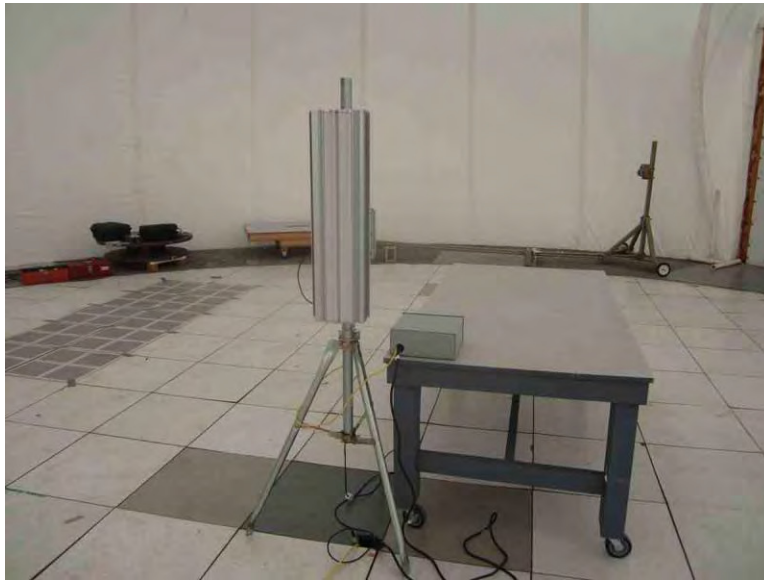
11dBi and 18dBi, 1 – 40GHz



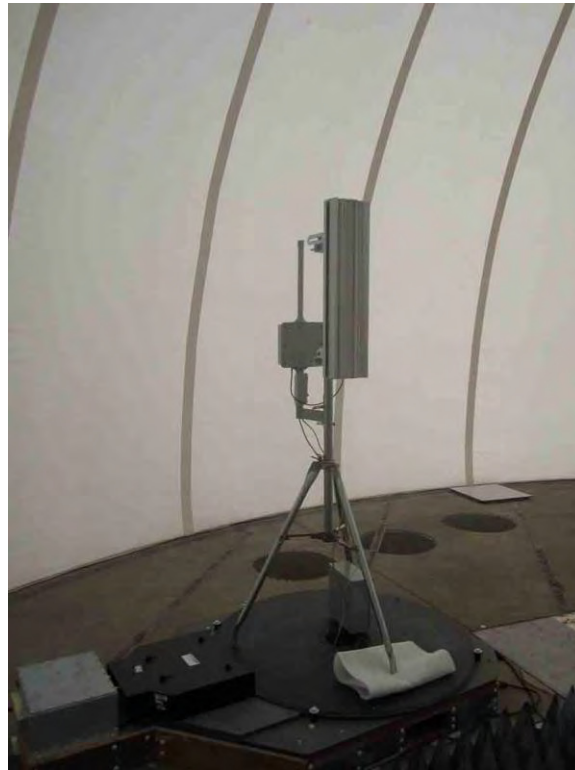
17dBi, 30MHz – 1GHz



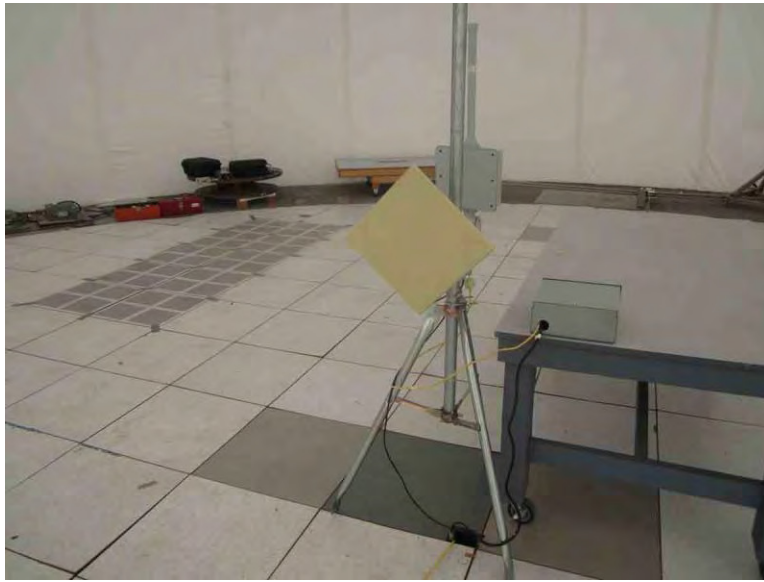
17dBi, 1 – 40GHz



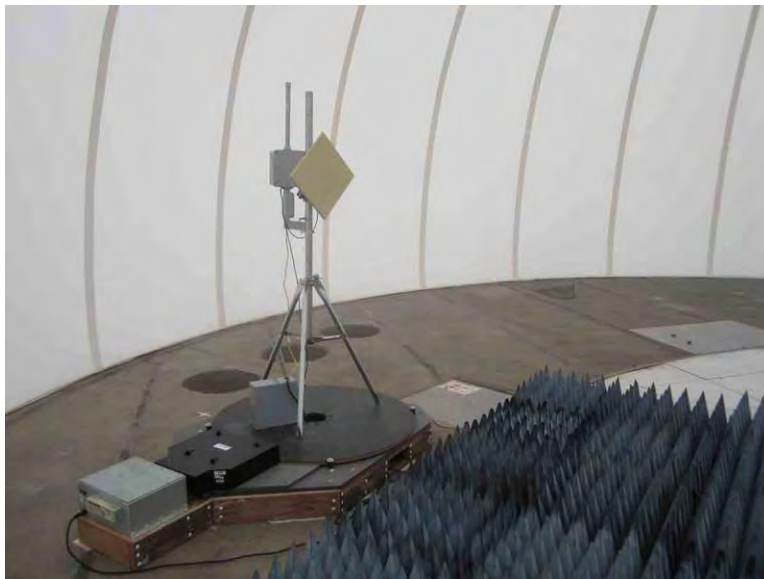
22dBi, 30MHz – 1GHz



22dBi, 1 – 40GHz



23dBi, 30MHz – 1GHz



23dBi, 1 – 40GHz



## 15.207 AC Conducted Emissions

### Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Digital Path**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **98485** Date: 5/17/2016  
 Test Type: **Conducted Emissions** Time: 16:23:46  
 Tested By: Randal Clark Sequence#: 4  
 Software: EMITest 5.03.02 120V 60Hz

#### Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

#### Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 4			

#### Test Conditions / Notes:

Equipment is an outdoor access point for use in both PTP and PTMP applications.

Modulation used: OFDM (802.11a)  
 Data rate: 54Mbps (representative of worst case)  
 Antenna: 5.1 OMNI and 5.8 Panel  
 Operational Frequency: 5220MHz (5.1 Omni) and 5790MHz (Panel)  
 Power Output Setting: 23dBm

Frequency Range Investigated: 150kHz - 30MHz  
 Highest Generated Frequency not related to radio: 500MHz

Temperature: 64°F  
 Relative Humidity: 49%

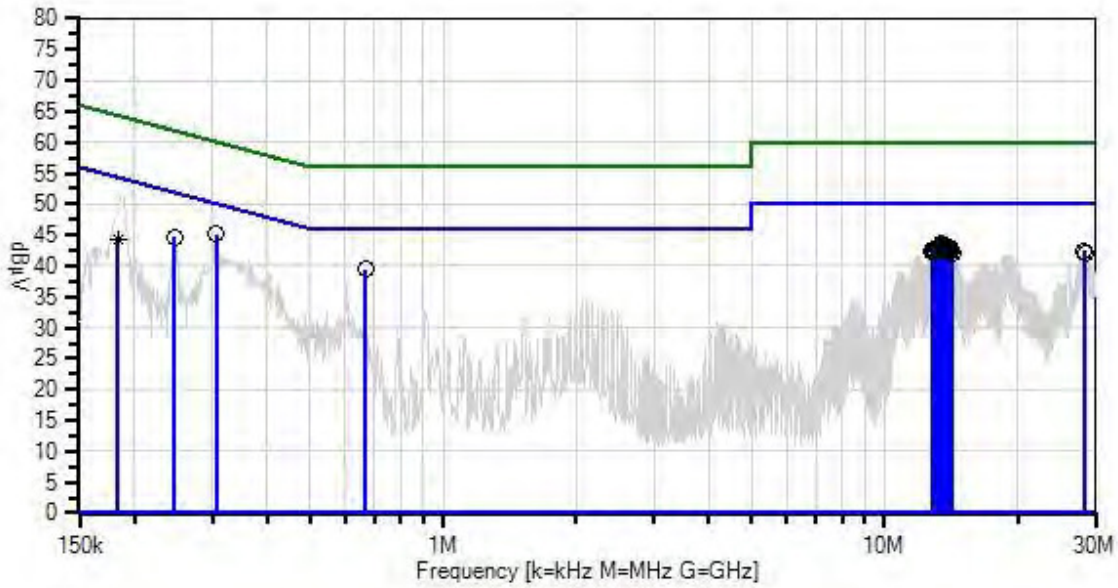
Test method: ANSI C63.10 (2013)

The EUT is setup on its antenna mount in the vertical orientation which is representative of normal installation. The unit has two cards within it and we are utilizing both radios for testing. Both radios are identical. A power supply is located on a table next to the mount.

Modification #1 was in place during testing.



Digital Path Networks WO#: 98485 Sequence#: 4 Date: 5/17/2016  
 15.207 AC Mains - Average Test Lead: 120V 60Hz Line



— Sweep Data  
 x QP Readings  
 Software Version: 5.03.02  
 — Readings  
 \* Average Readings  
 — 1 - 15.207 AC Mains - Average  
 o Peak Readings  
 ▼ Ambient  
 — 2 - 15.207 AC Mains - Quasi-peak

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06232	Cable	CXTA04A-35	3/3/2016	3/3/2018
T2	ANP05624	Attenuator	PE7010-10	1/15/2015	1/15/2017
T3	AN02609	High Pass Filter	HE9615-150K-50-720B	2/18/2016	2/18/2018
T4	ANP06847	Cable	LMR195-FR-6	7/9/2015	7/9/2017
T5	ANP06231	Cable	CXTA04A-70	3/3/2016	3/3/2018
	AN00374	50uH LISN-Return (dB)	8028-TS-50-BNC	1/4/2016	1/4/2017
T6	AN00374	50uH LISN-Line (dB)	8028-TS-50-BNC	1/4/2016	1/4/2017

**Measurement Data:**

Reading listed by margin.

Test Lead: Line

#	Freq MHz	Rdng dB $\mu$ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	307.076k	34.9	+0.0 +0.1	+9.9 +0.1	+0.2	+0.0	+0.0	45.2	50.0	-4.8	Line
2	13.391M	32.4	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	43.5	50.0	-6.5	Line
3	665.589k	29.0	+0.0 +0.1	+9.9 +0.1	+0.3	+0.0	+0.0	39.4	46.0	-6.6	Line
4	13.454M	32.1	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	43.2	50.0	-6.8	Line
5	13.202M	32.0	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	43.1	50.0	-6.9	Line
6	13.508M	32.0	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	43.1	50.0	-6.9	Line
7	13.941M	31.9	+0.2 +0.5	+9.9 +0.3	+0.2	+0.1	+0.0	43.1	50.0	-6.9	Line
8	13.265M	31.8	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.9	50.0	-7.1	Line
9	13.139M	31.7	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.8	50.0	-7.2	Line
10	12.959M	31.6	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.7	50.0	-7.3	Line
11	246.718k	34.4	+0.0 +0.0	+9.9 +0.1	+0.2	+0.0	+0.0	44.6	51.9	-7.3	Line
12	14.175M	31.5	+0.2 +0.5	+9.9 +0.3	+0.2	+0.1	+0.0	42.7	50.0	-7.3	Line
13	14.049M	31.5	+0.2 +0.5	+9.9 +0.3	+0.2	+0.1	+0.0	42.7	50.0	-7.3	Line
14	13.869M	31.5	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Line
15	13.995M	31.4	+0.2 +0.5	+9.9 +0.3	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Line
16	13.571M	31.5	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Line
17	13.328M	31.5	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Line

18	13.625M	31.5	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Line
19	13.752M	31.5	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Line
20	13.688M	31.5	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Line
21	13.022M	31.4	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.5	50.0	-7.5	Line
22	12.788M	31.4	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.5	50.0	-7.5	Line
23	13.085M	31.4	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.5	50.0	-7.5	Line
24	28.287M	30.5	+0.4 +0.7	+9.9 +0.6	+0.3	+0.1	+0.0	42.5	50.0	-7.5	Line
25	14.112M	31.3	+0.2 +0.5	+9.9 +0.3	+0.2	+0.1	+0.0	42.5	50.0	-7.5	Line
26	12.842M	31.3	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.4	50.0	-7.6	Line
27	13.815M	31.3	+0.2 +0.5	+9.9 +0.2	+0.2	+0.1	+0.0	42.4	50.0	-7.6	Line
28	14.238M	31.0	+0.2 +0.5	+9.9 +0.3	+0.2	+0.1	+0.0	42.2	50.0	-7.8	Line
29	28.465M	30.2	+0.4 +0.7	+9.9 +0.6	+0.3	+0.1	+0.0	42.2	50.0	-7.8	Line
30	183.447k Ave	34.0	+0.0 +0.0	+9.9 +0.1	+0.3	+0.0	+0.0	44.3	54.3	-10.0	Line
^	183.447k	40.5	+0.0 +0.0	+9.9 +0.1	+0.3	+0.0	+0.0	50.8	54.3	-3.5	Line

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Digital Path**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **98485** Date: 5/17/2016  
 Test Type: **Conducted Emissions** Time: 16:27:43  
 Tested By: Randal Clark Sequence#: 5  
 Software: EMITest 5.03.02 120V 60Hz

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 4			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 4			

**Test Conditions / Notes:**

Equipment is an outdoor access point for use in both PTP and PTMP applications.

Modulation used: OFDM (802.11a)  
 Data rate: 54Mbps (representative of worst case)  
 Antenna: 5.1 OMNI and 5.8 Panel  
 Operational Frequency: 5220MHz (5.1 Omni) and 5790MHz (Panel)  
 Power Output Setting: 23dBm

Frequency Range Investigated: 150kHz - 30MHz  
 Highest Generated Frequency not related to radio: 500MHz

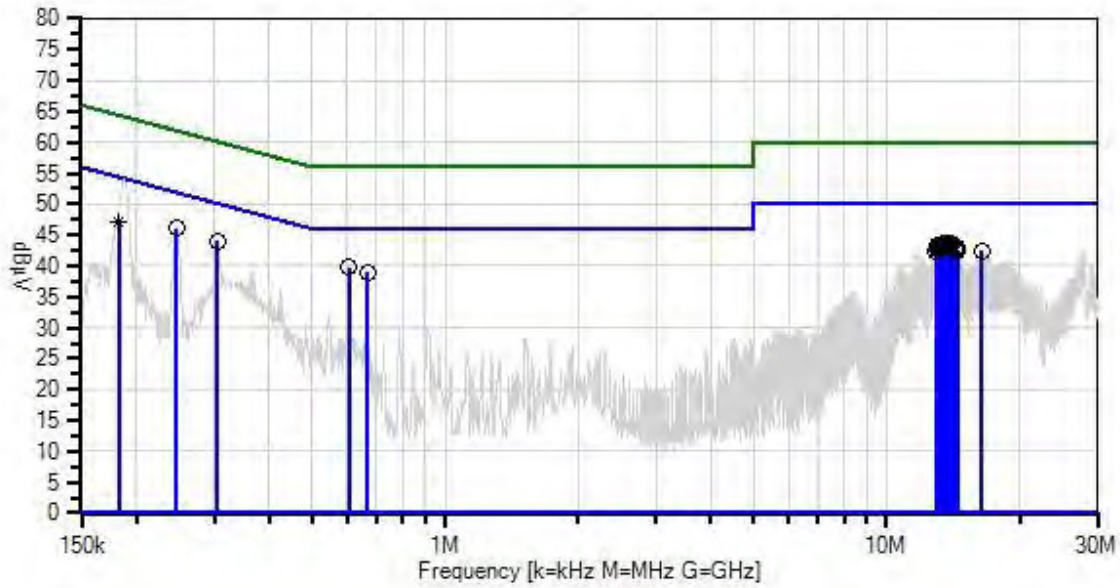
Temperature: 64°F  
 Relative Humidity: 49%

Test method: ANSI C63.10 (2013)

The EUT is setup on its antenna mount in the vertical orientation which is representative of normal installation. The unit has two cards within it and we are utilizing both radios for testing. Both radios are identical. A power supply is located on a table next to the mount.

Modification #1 was in place during testing.

Digital Path Networks WO#: 98485 Sequence#: 5 Date: 5/17/2016  
 15.207 AC Mains - Average Test Lead: 120V 60Hz Return



— Sweep Data	— Readings	○ Peak Readings
x QP Readings	* Average Readings	▼ Ambient
Software Version: 5.03.02	— 1 - 15.207 AC Mains - Average	— 2 - 15.207 AC Mains - Quasi-peak

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06232	Cable	CXTA04A-35	3/3/2016	3/3/2018
T2	ANP05624	Attenuator	PE7010-10	1/15/2015	1/15/2017
T3	AN02609	High Pass Filter	HE9615-150K-50-720B	2/18/2016	2/18/2018
T4	ANP06847	Cable	LMR195-FR-6	7/9/2015	7/9/2017
T5	ANP06231	Cable	CXTA04A-70	3/3/2016	3/3/2018
T6	AN00374	50uH LISN-Return (dB)	8028-TS-50-BNC	1/4/2016	1/4/2017
	AN00374	50uH LISN-Line (dB)	8028-TS-50-BNC	1/4/2016	1/4/2017

**Measurement Data:**

Reading listed by margin.

Test Lead: Return

#	Freq MHz	Rdng dB $\mu$ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	245.990k	35.8	+0.0 +0.0	+9.9 +0.2	+0.2	+0.0	+0.0	46.1	51.9	-5.8	Retur
2	305.621k	33.8	+0.0 +0.1	+9.9 +0.1	+0.2	+0.0	+0.0	44.1	50.1	-6.0	Retur
3	605.229k	29.4	+0.0 +0.1	+9.9 +0.1	+0.3	+0.0	+0.0	39.8	46.0	-6.2	Retur
4	13.995M	32.3	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.6	50.0	-6.4	Retur
5	14.058M	32.3	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.6	50.0	-6.4	Retur
6	13.391M	32.2	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.5	50.0	-6.5	Retur
7	13.697M	32.2	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.5	50.0	-6.5	Retur
8	13.752M	32.1	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.4	50.0	-6.6	Retur
9	13.878M	32.1	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.4	50.0	-6.6	Retur
10	13.932M	32.1	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.4	50.0	-6.6	Retur
11	13.328M	32.0	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.3	50.0	-6.7	Retur
12	13.508M	32.0	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.3	50.0	-6.7	Retur
13	13.571M	32.0	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.3	50.0	-6.7	Retur
14	13.634M	31.9	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.2	50.0	-6.8	Retur
15	13.815M	31.9	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.2	50.0	-6.8	Retur
16	12.968M	31.9	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.2	50.0	-6.8	Retur
17	13.031M	31.9	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.2	50.0	-6.8	Retur



18	13.265M	31.8	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.1	50.0	-6.9	Retur
19	14.355M	31.8	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.1	50.0	-6.9	Retur
20	13.445M	31.7	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	43.0	50.0	-7.0	Retur
21	665.588k	28.5	+0.0 +0.1	+9.9 +0.1	+0.3	+0.0	+0.0	38.9	46.0	-7.1	Retur
22	13.139M	31.6	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	42.9	50.0	-7.1	Retur
23	13.085M	31.5	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	42.8	50.0	-7.2	Retur
24	14.418M	31.5	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	42.8	50.0	-7.2	Retur
25	13.202M	31.4	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	42.7	50.0	-7.3	Retur
26	14.301M	31.3	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	42.6	50.0	-7.4	Retur
27	182.625k	36.6	+0.0 +0.0	+9.9 +0.2	+0.3	+0.0	+0.0	47.0	54.4	-7.4	Retur
^	182.625k	43.5	+0.0 +0.0	+9.9 +0.2	+0.3	+0.0	+0.0	53.9	54.4	-0.5	Retur
29	16.418M	30.9	+0.3 +0.6	+9.9 +0.5	+0.2	+0.1	+0.0	42.5	50.0	-7.5	Retur
30	12.905M	31.3	+0.2 +0.5	+9.9 +0.3	+0.2	+0.1	+0.0	42.5	50.0	-7.5	Retur
31	14.481M	31.1	+0.2 +0.5	+9.9 +0.4	+0.2	+0.1	+0.0	42.4	50.0	-7.6	Retur

**Test Setup Photo**



## Appendix A: Software Settings Information

		LOW		MID		HIGH	
Antenna	Notes	Channel	Power	Channel	Power	Channel	Power
<b>UNII 1 band</b>							
DP-5G18-30	18 dbi integrated panel	5175	18.5	5220	23	5235	16
DP-5G11-360	11dbi omni	5175	23	5220	23	5240	15
ARC-5G23-10	23 dbi external diamond arc wireless	5180	18	5220	23	5235	17
AM-5AC22-45	Ubnt 22dbi sector	5170	11.5	5220	23	5235	17.5
AM-5G17-90	Ubnt 17dbi sector	5170	16	5220	23	5235	18.5
AM-5G21-60	Ubnt 21dbi sector	5170	10.5	5220	23	5235	18
AM-5G20	20dBi Sector	5170	12.5	5220	23	5235	19
<p>Note: Testing was performed on sector antennas, employing the same radio, with gains ranging from 17dBi to 22dBi. Since all antennas produced a passing result, the 19dBi antenna is determined to be covered within these measurements.</p>							

# SUPPLEMENTAL INFORMATION

## Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

## Emissions Test Details

**TESTING PARAMETERS**

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

**CORRECTION FACTORS**

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBμV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBμV/m)

**TEST INSTRUMENTATION AND ANALYZER SETTINGS**

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

**SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS**

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

**Peak**

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

**Quasi-Peak**

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

**Average**

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.