

Application for FCC Certification  
On behalf of

Zhejiang Dahua Vision Technology Co., Ltd.

Product Name	Model No.
AP	DH-PFM880

FCC ID: SVNDH-PFM881

Prepared For : Zhejiang Dahua Vision Technology Co., Ltd.  
The 1st floor, building F, No1199  
Bin an road Changhe Street, Binjiang District,  
Hangzhou, P.R. China.

Prepared By : Audix Technology (Shanghai) Co., Ltd.  
3F 34Bldg 680 Guiping Rd.,  
Caohejing Hi-Tech Park,  
Shanghai 200233, China

Tel: +86-21-64955500  
Fax: +86-21-64955491

Report No. : ACI-F14144  
Date of Test : Sep. 11 – 19, 2014  
Date of Report : Sep. 22, 2014

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### TEST REPORT FOR FCC CERTIFICATE

Applicant : Zhejiang Dahua Vision Technology Co., Ltd.

Manufacturer : Zhejiang Dahua Vision Technology Co., Ltd.

EUT Description :

EUT	Model No.
AP	DH-PFM880

Power Supply : DC 24V (POE Power)

Test Voltage : AC 120V/60Hz (to POE adapter)

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2014  
AND ANSI C63.4-2003*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: DH-PFM880), which was tested on Sep. 11 – 19, 2014 is technically compliance with the FCC limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

***The test results for EUT's other function are contained in No. ACI-F14148, a FCC Verification report.***

Date of Test :                     Sep. 11 – 19, 2014                     Date of Report :                     Sep. 22, 2014                    

Producer :                     Kathy Wang                      
KATHY WANG / Supervisor

Review :                     Dio Yang                      
DIO YANG / Deputy Manager

**AUDIX**<sup>®</sup> For and on behalf of  
Audix Technology (Shanghai) Co., Ltd.

Signatory :                     Sammy Chen                      
Authorized Signature EMC SAMMY CHEN / Deputy Manager

# 1 SUMMARY OF STANDARDS AND RESULTS

## 1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
<b>EMISSION</b>			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2014 AND ANSI C63.4:2009 AND KDB789033 D02 v01	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2014 AND ANSI C63.4:2009 AND KDB789033 D02 v01	Pass	15.209 (a) 15.205 (a)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2014 AND ANSI C63.4:2009 AND KDB789033 D02 v01	Pass	15.407 (e)
Maximum Conducted Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2014 AND ANSI C63.4:2009 AND KDB789033 D02 v01 AND KDB662911	Pass	15.407 (a)(3)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2014 AND ANSI C63.4:2009 AND KDB789033 D02 v01 AND KDB662911	Pass	15.407 (a)(3)
Undesirable Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2014 AND ANSI C63.4:2009 AND KDB789033 D02 v01 AND KDB662911	Pass	15.407 (b)(4)
Frequency Stability	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2014 AND ANSI C63.4:2009 AND KDB789033 D02 v01	Pass	15.407 (g)

## 2 GENERAL INFORMATION

### 2.1 Description of Equipment Under Test

Description :

EUT	Model Number
AP	DH-PFM880

Type of EUT :  Production  Pre-product  Pro-type

Radio Tech : IEEE 802.11a/n HT20, HT40

Freq. Band : 5.8GHz band:  
For 802.11a & 802.11n HT20:  
5745MHz (Ch149), 5765MHz (Ch153),  
5785MHz (Ch157), 5805MHz (Ch161),  
5825MHz (Ch165)  
For 802.11n HT40:  
5755MHz (Ch151), 5795MHz (Ch159)

Tested Freq. : For 802.11a & 802.11n HT20:  
5745MHz (Ch149), 5785MHz (Ch157),  
5825MHz (Ch165)  
For 802.11n HT40:  
5755MHz (Ch151), 5795MHz (Ch159)

Modulation : OFDM

Transmit data rate : 802.11a:  
6, 9, 12, 24, 36, 48, 54 Mbps  
802.11n HT20:  
(MCS0-MCS7) 6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps

After testing, the highest peak output power of the EUT was at **6 Mbps** in 802.11a mode, **6.5 Mbps (MCS0)** in 802.11n HT20 mode.

So data rate mentioned above were representative selected to test in this report.

Test Mode : The EUT was set at TX100 test mode through test program “art” during all the test in the report, which means continuous TX with duty cycle 100%.

Antenna Gain : 16 dBi

POE Adapter : Manufacturer : Dahua  
Model Number : GRT-240050  
Input : AC100~240V 50/60Hz  
Output : DC24V --- 500mA

Applicant : Zhejiang Dahua Vision Technology Co., Ltd.  
The 1st floor, building F, No1199  
Bin an road Changhe Street, Binjiang District,  
Hangzhou, P.R. China.

Manufacturer : Zhejiang Dahua Vision Technology Co., Ltd.  
The 1st floor, building F, No1199  
Bin an road Changhe Street, Binjiang District,  
Hangzhou, P.R. China.

## 2.2 Description of Test Facility

Site Description (Semi-Anechoic Chamber) : Sept. 17, 1998 file on  
Mar 16, 2012 Renewed  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3 F 34 Bldg 680 Guiping Rd.,  
Caohejing Hi-Tech Park,  
Shanghai 200233, China

FCC registration Number : 91789

Accredited by NVLAP, Lab Code : 200371-0

## 2.3 Measurement Uncertainty

Conducted Emission Expanded Uncertainty : U = 2.77 dB

Radiated Emission Expanded Uncertainty (30-200MHz):  
U = 4.40dB (Horizontal)  
U = 4.40dB (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):  
U = 4.40dB (Horizontal)  
U = 5.44dB (Vertical)

Radiated Emission Expanded Uncertainty (Above 1GHz):  
U= 5.08 dB (1-6GHz)  
U= 5.24 dB (> 6GHz)

6 dB Bandwidth Expanded Uncertainty : U =  $\pm 1 \times 10^{-8}$

Maximum Conducted Output Power Expanded Uncertainty : U =  $\pm 1.56$ dB

Power Spectral Density Expanded Uncertainty : U =  $\pm 1.75$ dB

Undesirable Emission Expanded Uncertainty : U =  $\pm 1.75$ dB

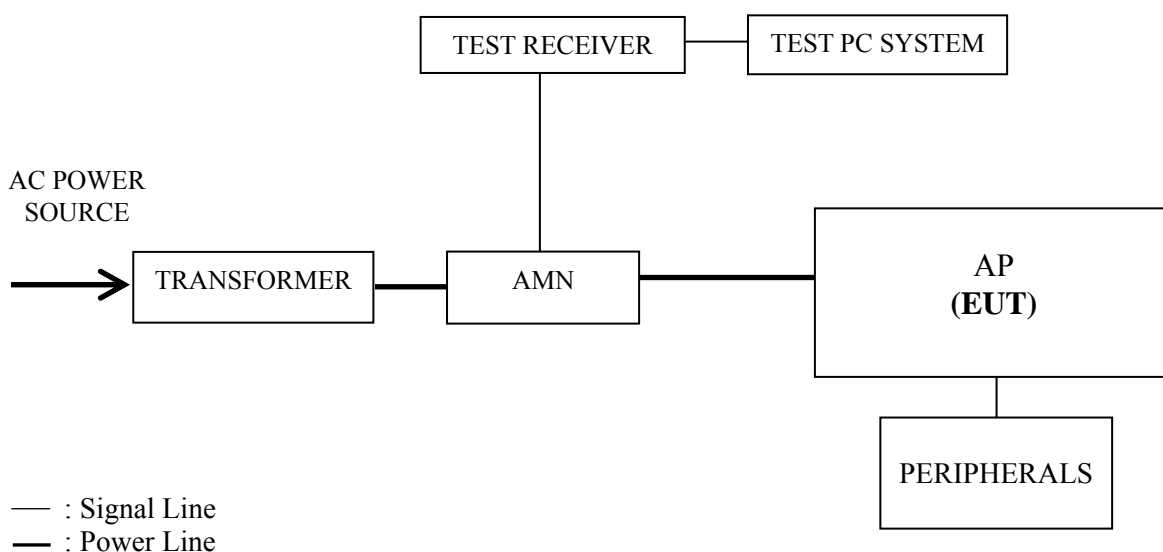
### 3 CONDUCTED EMISSION TEST

#### 3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101303	Sep 11, 2014	Sep 10, 2015
2.	Artificial Mains Network (AMN)	R&S	ENV4200	100125	Jun 27, 2014	Jun 26, 2015
3.	Software	Audix	E3	6.111206	--	--

#### 3.2 Block Diagram of Test Setup



#### 3.3 Conducted Emission Limits [FCC Part 15 Subpart C 15.207]

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

NOTE – \*Decreases with the logarithm of the frequency.

#### 3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner that tends to maximize its emission level in a normal application.



### 3.5 Operating Condition of EUT

- 3.5.1 Setup the EUT as shown in Sec. 3.2.
- 3.5.2 Turn on the power of all equipments and the EUT.
- 3.5.3 Set the EUT on the test mode (Transmitting), and then test.

### 3.6 Test Procedures

The EUT was connected to the power mains through an Artificial Mains Network (AMN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line (Line & Neutral) were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to ANSI C63.4:2003 during conducted emission test.

The bandwidth of R&S Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7.

### 3.7 Test Results

< **PASS** >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

Test Model	Data Page
DH-PFM880	P10

NOTE 1 – Factor = Cable Loss + AMN Factor.

NOTE 2 – Emission Level = Meter Reading + Factor.

NOTE 3 – “QP” means “Quasi-Peak” values, “AV” means “Average” values.

NOTE 4 – The worst emission is detected at 0.482 MHz (QP Value) with corrected signal level of 55.79 dB (μV) (limit is 56.30 dB (μV)), when the Line of the DH-PFM880 is connected to AMN.

EUT : AP Temperature : 25°C  
 Model No. : DH-PFM880 Humidity : 44%RH  
 Test Mode : Transmitting Date of Test : Sep. 16, 2014

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.343	42.20	10.44	52.64	59.14	6.50	QP
	<b>0.482</b>	<b>45.39</b>	<b>10.40</b>	<b>55.79</b>	<b>56.30</b>	<b>0.51</b>	
	0.544	41.60	10.39	51.99	56.00	4.01	
	0.812	43.39	10.39	53.78	56.00	2.22	
	1.095	42.60	10.38	52.98	56.00	3.02	
	4.420	43.50	10.43	53.93	56.00	2.07	
	0.343	29.30	10.44	39.74	49.14	9.40	AV
	0.482	30.79	10.40	41.19	46.30	5.11	
	0.544	27.30	10.39	37.69	46.00	8.31	
	0.812	26.49	10.39	36.88	46.00	9.12	
	1.095	23.80	10.38	34.18	46.00	11.82	
	4.420	25.30	10.43	35.73	46.00	10.27	
Neutral	0.407	43.10	10.41	53.51	57.70	4.19	QP
	0.477	45.10	10.39	55.49	56.39	0.90	
	0.549	41.80	10.38	52.18	56.00	3.82	
	0.752	43.90	10.38	54.28	56.00	1.72	
	1.085	44.10	10.39	54.49	56.00	1.51	
	4.111	43.80	10.48	54.28	56.00	1.72	
	0.407	33.20	10.41	43.61	47.70	4.09	AV
	0.477	34.30	10.39	44.69	46.39	1.70	
	0.549	32.40	10.38	42.78	46.00	3.22	
	0.752	33.30	10.38	43.68	46.00	2.32	
	1.085	30.20	10.39	40.59	46.00	5.41	
	4.111	27.00	10.48	37.48	46.00	8.52	

TEST ENGINEER: ERIC TANG

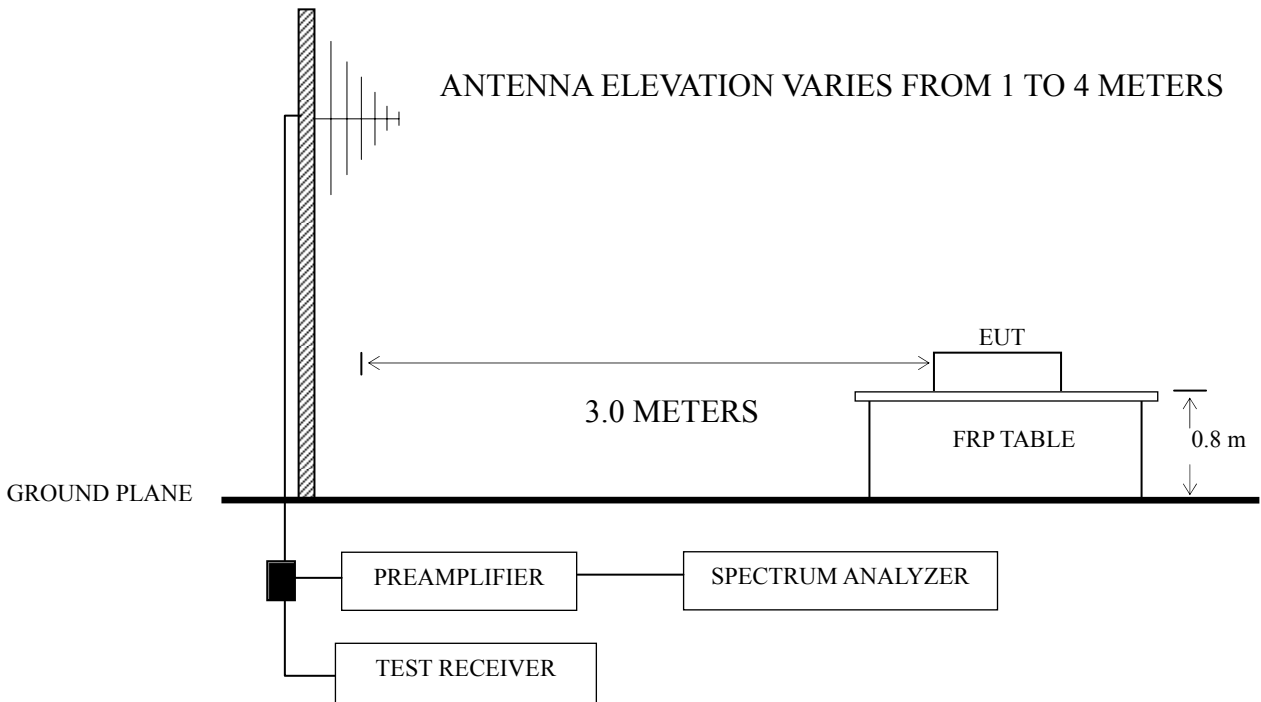
## 4 RADIATED EMISSION TEST

### 4.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Pre-Amplifier	Agilent	8447D	2944A10548	Sep 18, 2014	Mar 17, 2015
2.	Pre-Amplifier	Agilent	8449B	3008A00864	Mar 20, 2014	Mar 19, 2015
3.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015
4.	Test Receiver	R&S	ESCI	101302	Sep 03, 2014	Sep 02, 2015
5.	Bi-log Antenna	TESEQ	CBL6112D	23193	May 03, 2014	May 02, 2015
6.	Horn Antenna	EMCO	3115	9607-4878	Jun 16, 2014	Jun 15, 2015
7.	Horn Antenna	EMCO	3116	00062643	Jul 21, 2014	Jul 21, 2015
8.	50 $\Omega$ Coaxial Switch	Anritsu	MP59B	6200426390	Sep 18, 2014	Mar 17, 2015
9.	50 $\Omega$ Terminator	Audix	BNC	001	Mar 20, 2014	Mar 19, 2015
10.	50 $\Omega$ Terminator	Audix	BNC	002	Mar 20, 2014	Mar 19, 2015
11.	Software	Audix	E3	SET00200 9912M295-2	--	--

### 4.2 Block Diagram of Test Setup



■ : 50 ohm Coaxial Switch

### 4.3 Radiated Emission Limit [FCC Part 15 Subpart C 15.209]

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB (μV/m) = 20 log Emission Level (μV/m)  
 NOTE 2 - The tighter limit applies at the band edges.  
 NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.  
 NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz.  
 NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

### 4.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.3.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

## 4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 3.2.

4.5.2 Turn on the power of all equipment.

4.5.3 Turn the EUT on the test mode, and then test.

## 4.6 Test Procedures

The EUT was placed on a turntable that is 0.8 meter above ground. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.4:2003 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz and The Spectrum Agilent N9010A was set at 1MHz above 1GHz.

The frequency range from 30 MHz to 40 GHz was checked.

## 4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Test Model	Memo	Data Page
DH-PFM880	emissions < 1GHz	P15
DH-PFM880	Cabinet emission > 1GHz	P16

NOTE 1 – Level = Read Level + Antenna Factor + Cable Loss (<1GHz)

NOTE 2 – Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor (>1GHz)

NOTE 3 – EUT and its antenna configured in Lying, Side & Stand direction were all evaluated.

The emission levels recorded below is data of EUT configured in **Lying** direction and antenna configured in **Stand** direction, for this was the maximum emission direction during the test.

NOTE 4 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.

For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

**Worst case emission < 1GHz**

EUT : AP Temperature : 25°C  
 Model No. : DH-PFM880 Humidity : 45%RH  
 Test Mode : Transmitting Date of Test : Sep 18, 2014

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	163.86	20.41	9.10	1.29	30.80	43.50	12.70	QP
	194.90	21.74	7.80	1.39	30.93	43.50	12.57	
	255.04	19.42	11.90	1.64	32.96	46.00	13.04	
	319.06	21.86	14.49	1.84	38.19	46.00	7.81	
	377.26	14.64	14.73	2.00	31.37	46.00	14.63	
	<b>801.15</b>	<b>17.30</b>	<b>20.70</b>	<b>2.89</b>	<b>40.89</b>	<b>46.00</b>	<b>5.11</b>	
Vertical	30.97	14.23	18.27	0.54	33.04	40.00	6.96	QP
	109.54	12.68	12.33	1.04	26.05	43.50	17.45	
	185.20	17.81	8.90	1.37	28.08	43.50	15.42	
	322.94	12.20	14.73	1.86	28.79	46.00	17.21	
	668.26	12.60	19.25	2.64	34.49	46.00	11.51	
	<b>800.00</b>	<b>22.20</b>	<b>20.70</b>	<b>2.87</b>	<b>45.77</b>	<b>46.00</b>	<b>0.23</b>	

TEST ENGINEER: WENCY YANG

### Cabinet Emissions > 1GHz

For the cabinet-emission measurements, the antenna was replaced by a termination matching the 50Ω impedance of the antenna

EUT : AP Temperature : 25°C  
 Model No. : DH-PFM880 Humidity : 45%RH  
 Test Mode : Transmitting Date of Test : Sep 18, 2014

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	5179.05	30.90	34.04	8.05	34.94	38.05	54.00	15.95	Average
	5179.05	48.65	34.04	8.05	34.94	55.80	74.00	18.20	Peak
	<b>5725.00</b>	<b>34.62</b>	<b>34.70</b>	<b>8.42</b>	<b>35.05</b>	<b>42.69</b>	<b>54.00</b>	<b>11.31</b>	<b>Average</b>
	<b>5725.00</b>	<b>46.99</b>	<b>34.70</b>	<b>8.42</b>	<b>35.05</b>	<b>55.06</b>	<b>74.00</b>	<b>18.94</b>	<b>Peak</b>
	<b>5850.00</b>	<b>43.90</b>	<b>34.70</b>	<b>8.53</b>	<b>35.07</b>	<b>52.06</b>	<b>74.00</b>	<b>21.94</b>	<b>Peak</b>
	8013.02	39.16	38.83	10.28	35.30	52.97	74.00	21.03	Peak
	13957.53	35.72	41.30	14.21	34.60	56.63	74.00	17.37	Peak
	13957.53	18.32	41.30	14.21	34.60	39.23	54.00	14.77	Average
Vertical	3823.37	51.88	32.44	6.70	34.80	56.22	74.00	17.78	Peak
	3823.37	35.41	32.44	6.70	34.80	39.75	54.00	14.25	Average
	<b>5725.00</b>	<b>48.49</b>	<b>34.70</b>	<b>8.42</b>	<b>35.05</b>	<b>56.56</b>	<b>74.00</b>	<b>17.44</b>	<b>Peak</b>
	<b>5725.00</b>	<b>35.78</b>	<b>34.70</b>	<b>8.42</b>	<b>35.05</b>	<b>43.85</b>	<b>54.00</b>	<b>10.15</b>	<b>Average</b>
	<b>5850.00</b>	<b>51.88</b>	<b>34.70</b>	<b>8.53</b>	<b>35.07</b>	<b>60.04</b>	<b>74.00</b>	<b>13.96</b>	<b>Peak</b>
	<b>5850.00</b>	<b>37.38</b>	<b>34.70</b>	<b>8.53</b>	<b>35.07</b>	<b>45.54</b>	<b>54.00</b>	<b>8.46</b>	<b>Average</b>
	11500.20	37.12	39.50	13.43	35.60	54.45	74.00	19.55	Peak
	11500.20	21.47	39.50	13.43	35.60	38.80	54.00	15.20	Average
	17236.28	33.08	42.50	16.19	35.49	56.28	74.00	17.72	Peak
17236.28	15.80	42.50	16.19	35.49	39.00	54.00	15.00	Average	

TEST ENGINEER: WENCY YANG



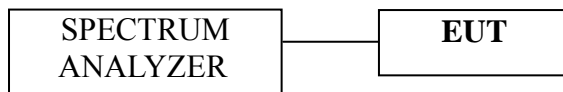
## 5 6 dB BANDWIDTH MEASUREMENT

### 5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

### 5.2 Block Diagram of Test Setup



### 5.3 Specification Limits (§15.407(e))

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### 5.4 Operating Condition of EUT

The test program “art” was used to enable the EUT to transmit data at different channel frequency individually.

### 5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Set RBW = 100 kHz, VBW ≥ 3 x RBW.

Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

The test procedure is defined in KDB789033 C) 2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz.

## 5.6 Test Results

### **PASSED.**

All the test results are attached in next pages.

(Test Date: Sep. 11, 2014 Temperature: 24°C Humidity: 45 %)

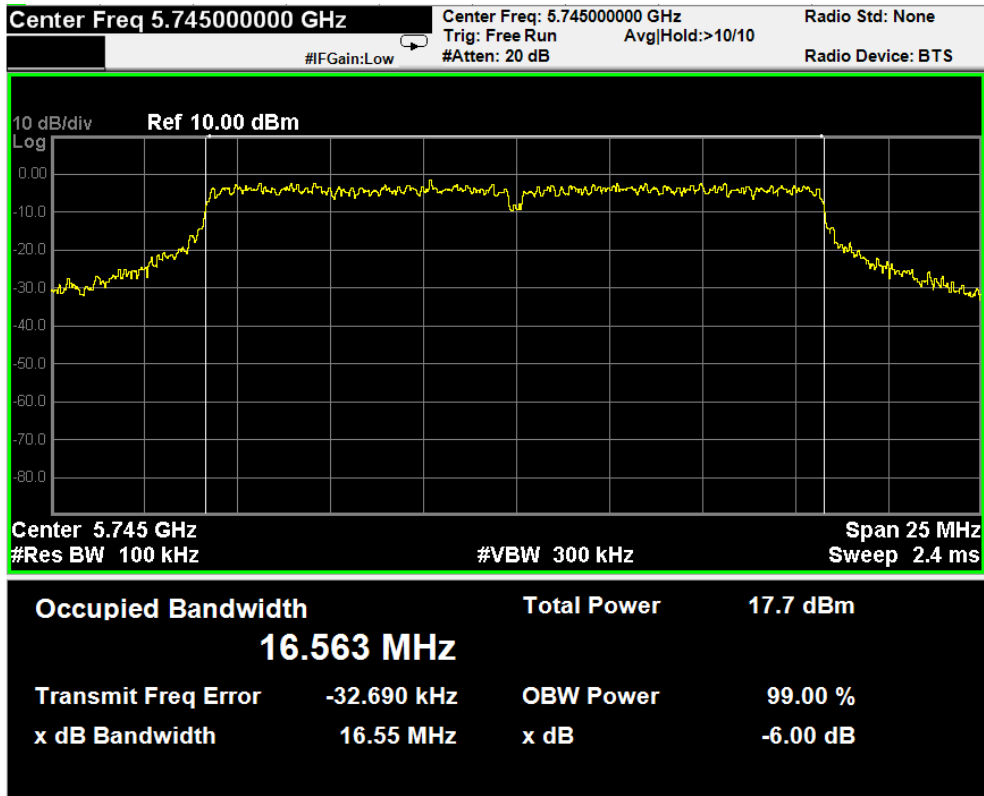
Left antenna port:

Modulation	Channel	Frequency	6dB Bandwidth
802.11a	149	5745 MHz	<b>16.55 MHz</b>
	157	5785 MHz	<b>16.57 MHz</b>
	165	5825 MHz	<b>16.56 MHz</b>
802.11n HT20	149	5745 MHz	<b>17.85 MHz</b>
	157	5785 MHz	<b>17.85 MHz</b>
	165	5825 MHz	<b>17.85 MHz</b>
802.11n HT40	151	5755 MHz	<b>36.59 MHz</b>
	159	5795 MHz	<b>36.60 MHz</b>

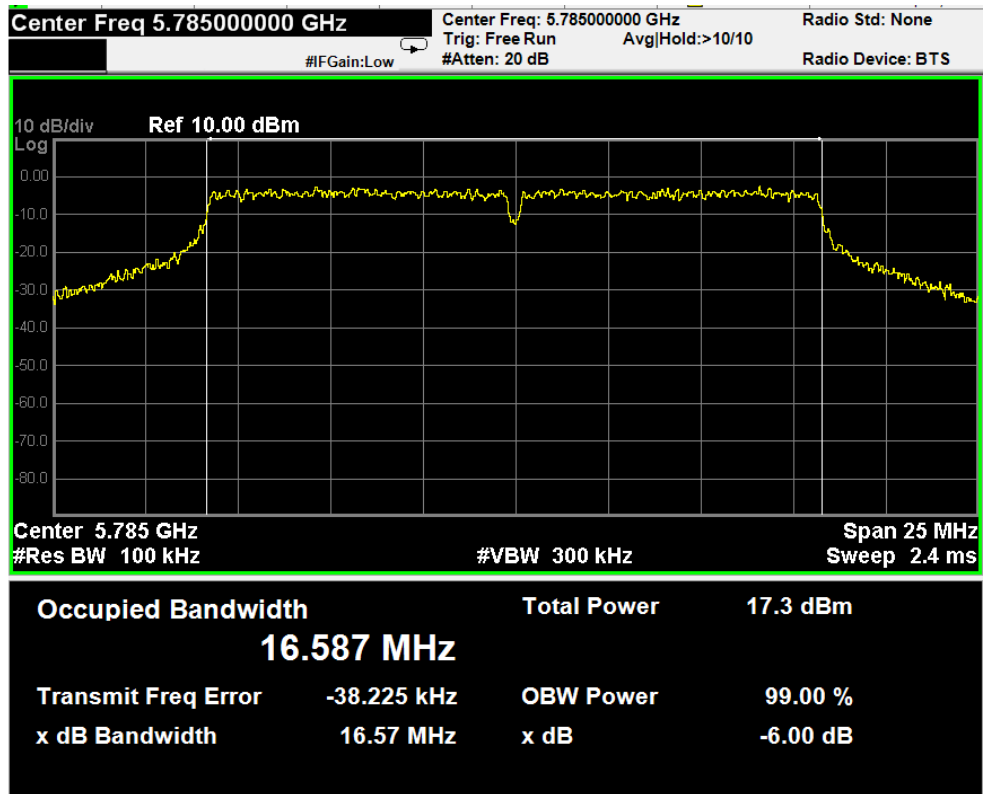
Right antenna port:

Modulation	Channel	Frequency	6dB Bandwidth
802.11a	149	5745 MHz	<b>16.53 MHz</b>
	157	5785 MHz	<b>16.57 MHz</b>
	165	5825 MHz	<b>16.50 MHz</b>
802.11n HT20	149	5745 MHz	<b>17.82 MHz</b>
	157	5785 MHz	<b>17.83 MHz</b>
	165	5825 MHz	<b>17.83 MHz</b>
802.11n HT40	151	5755 MHz	<b>36.57 MHz</b>
	159	5795 MHz	<b>36.55 MHz</b>

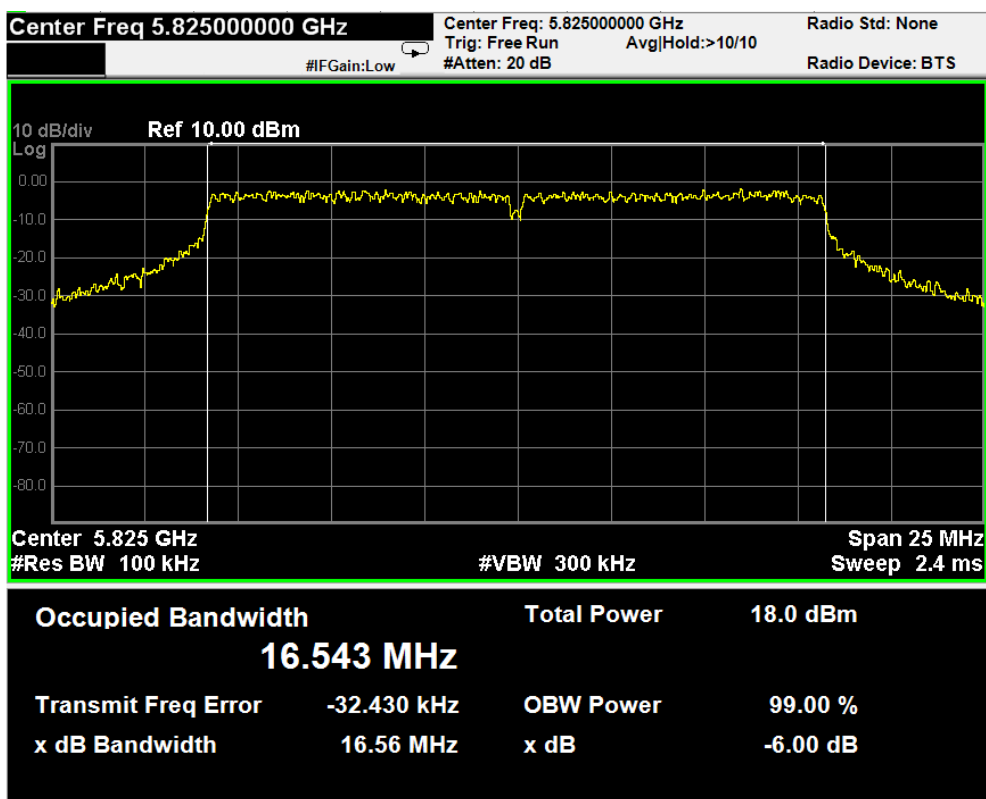
Left antenna port 802.11a Ch 149



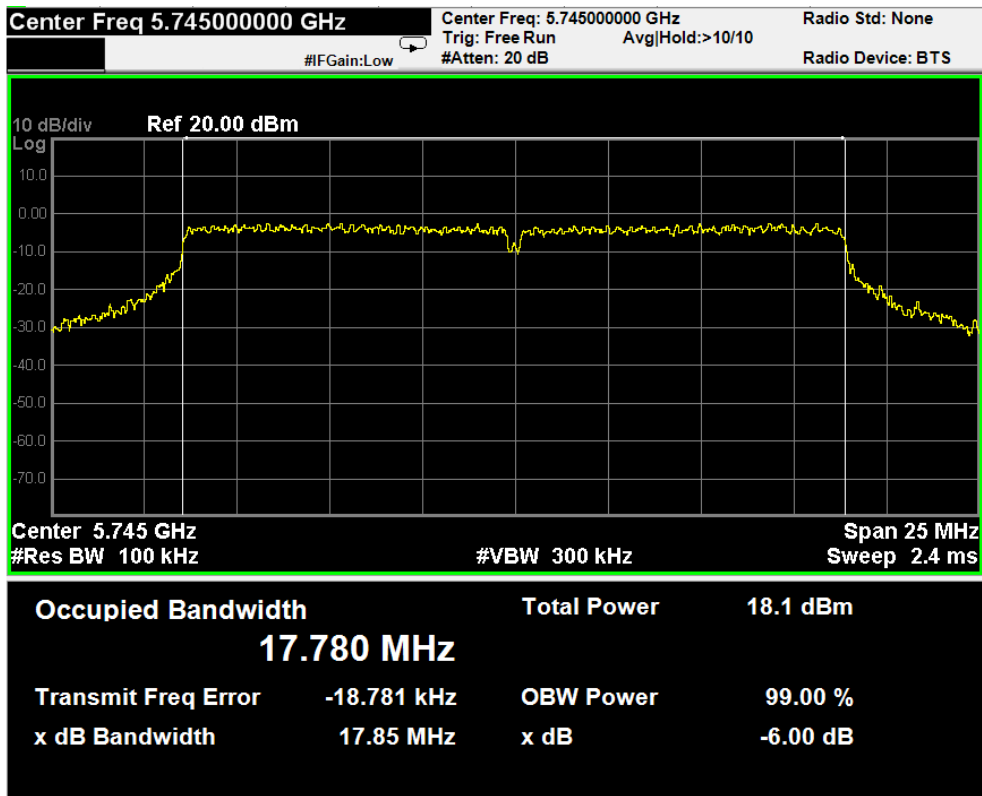
Left antenna port 802.11a Ch 157



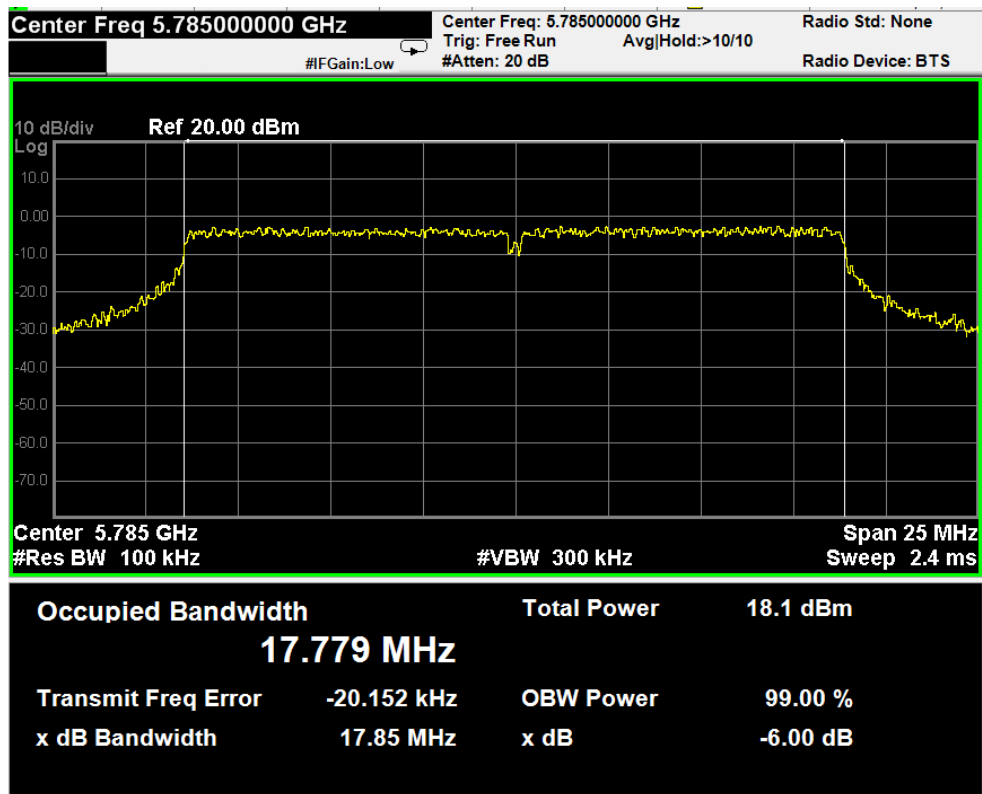
### Left antenna port 802.11a Ch 165



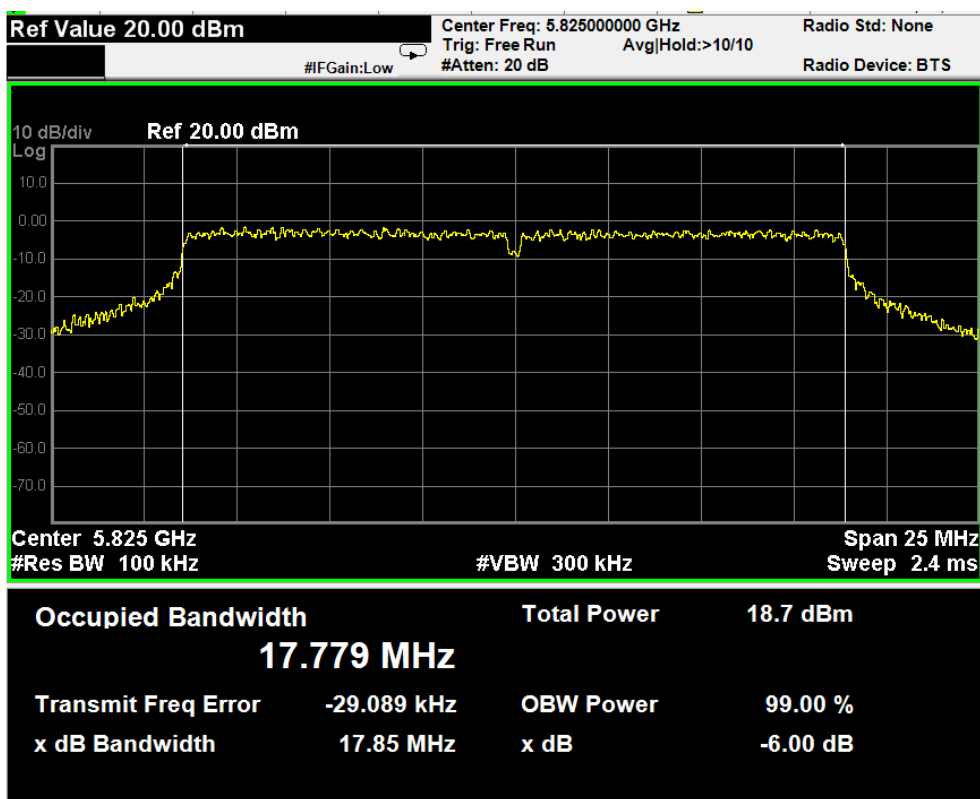
Left antenna port 802.11n HT20 Ch 149



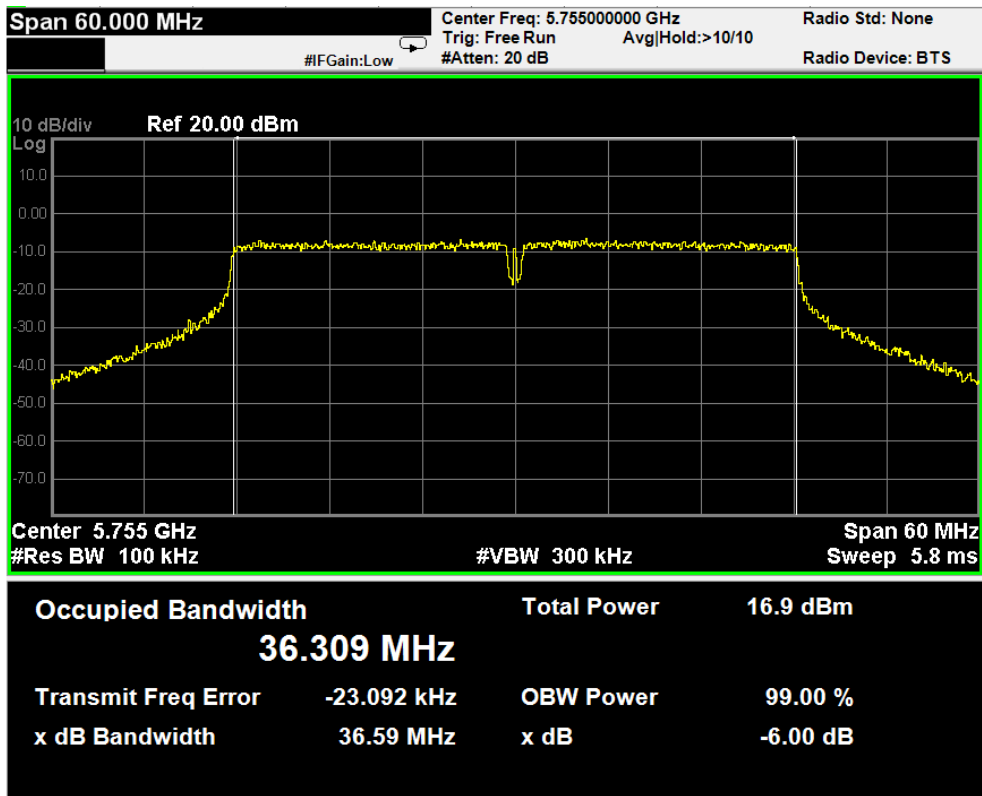
Left antenna port 802.11n HT20 Ch 157



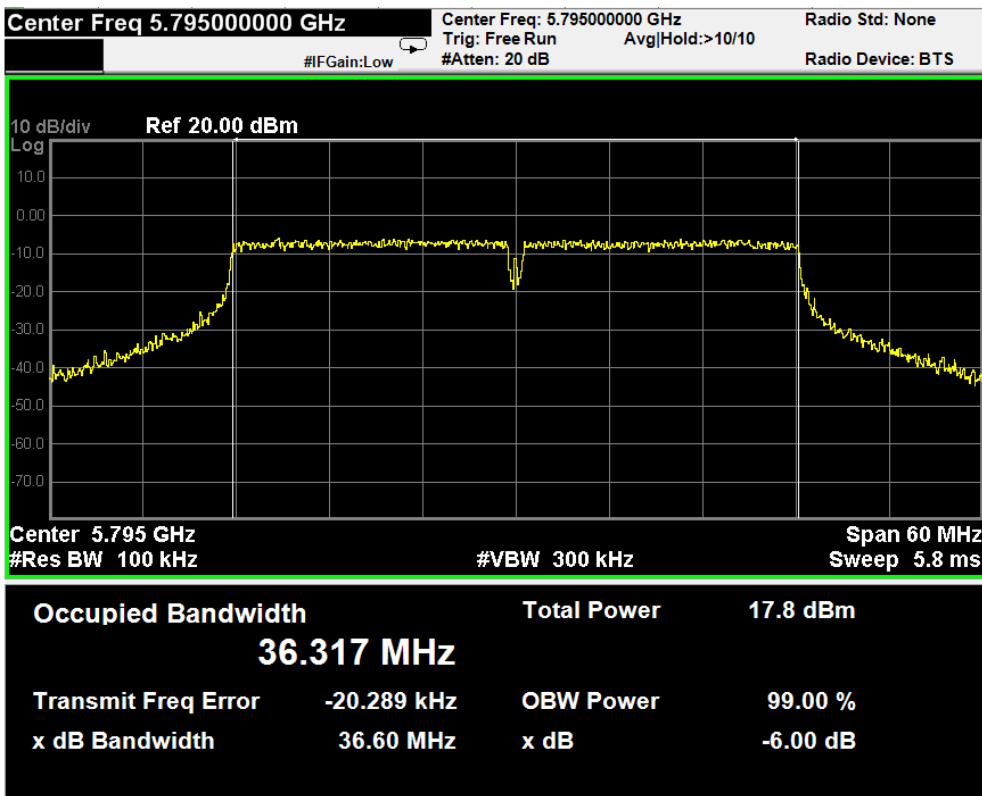
### Left antenna port 802.11n HT20 Ch 165



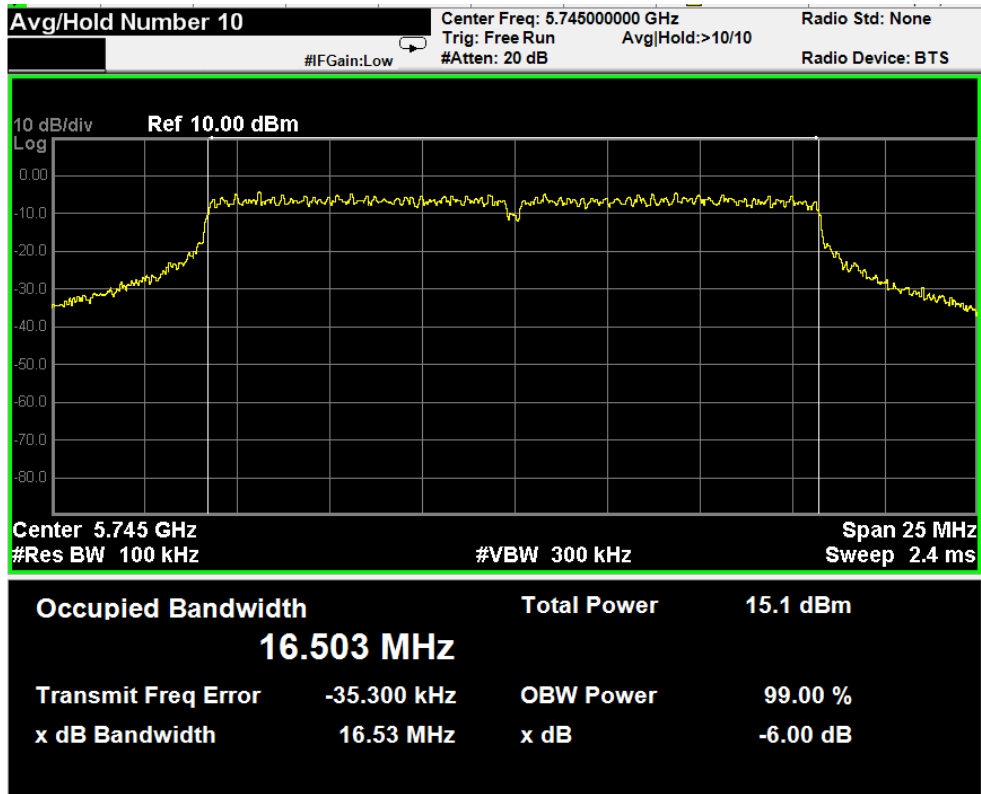
Left antenna port 802.11n HT40 Ch 151



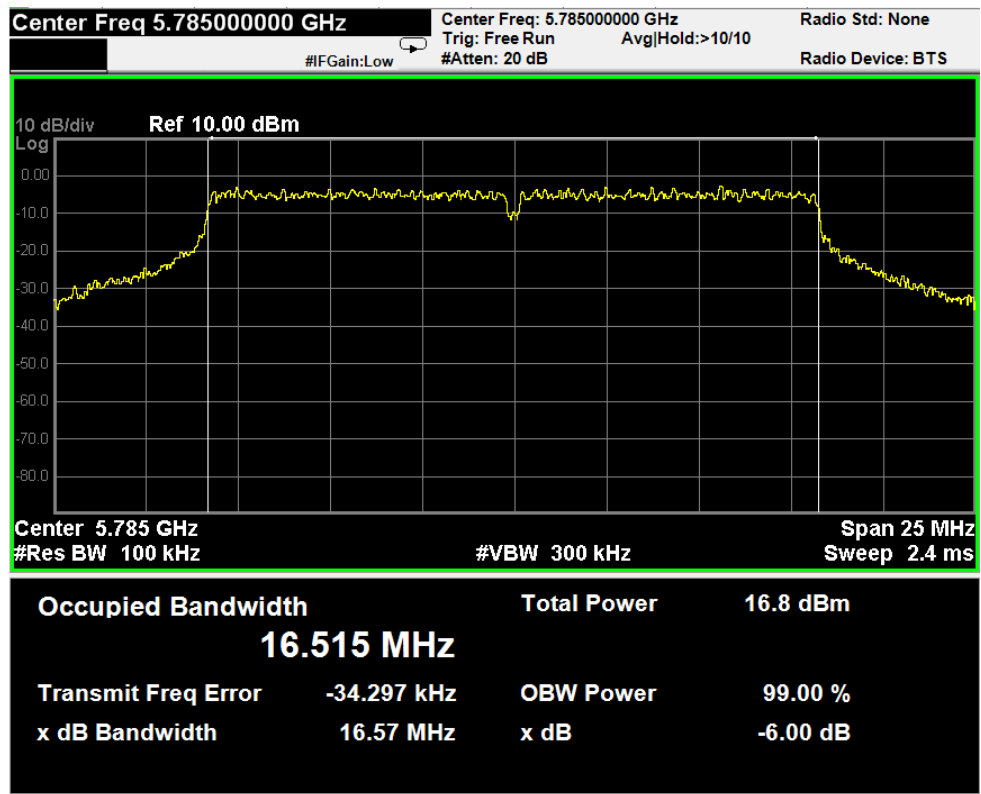
Left antenna port 802.11n HT40 Ch 159



**Right antenna port 802.11a Ch 149**

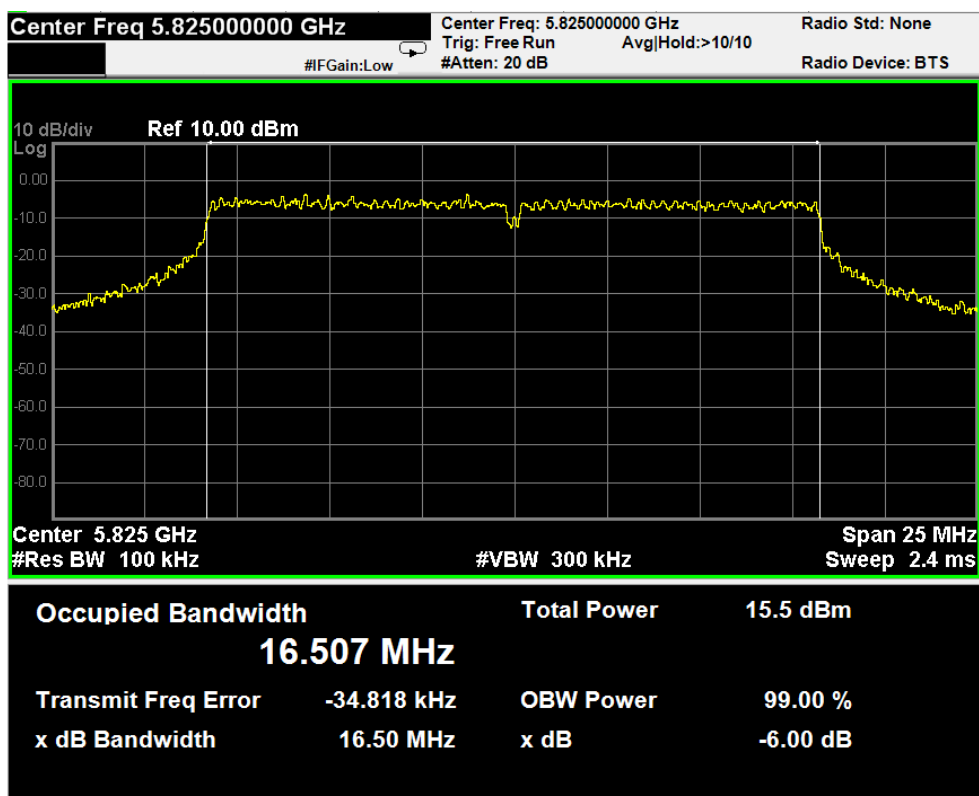


**Right antenna port 802.11a Ch 157**

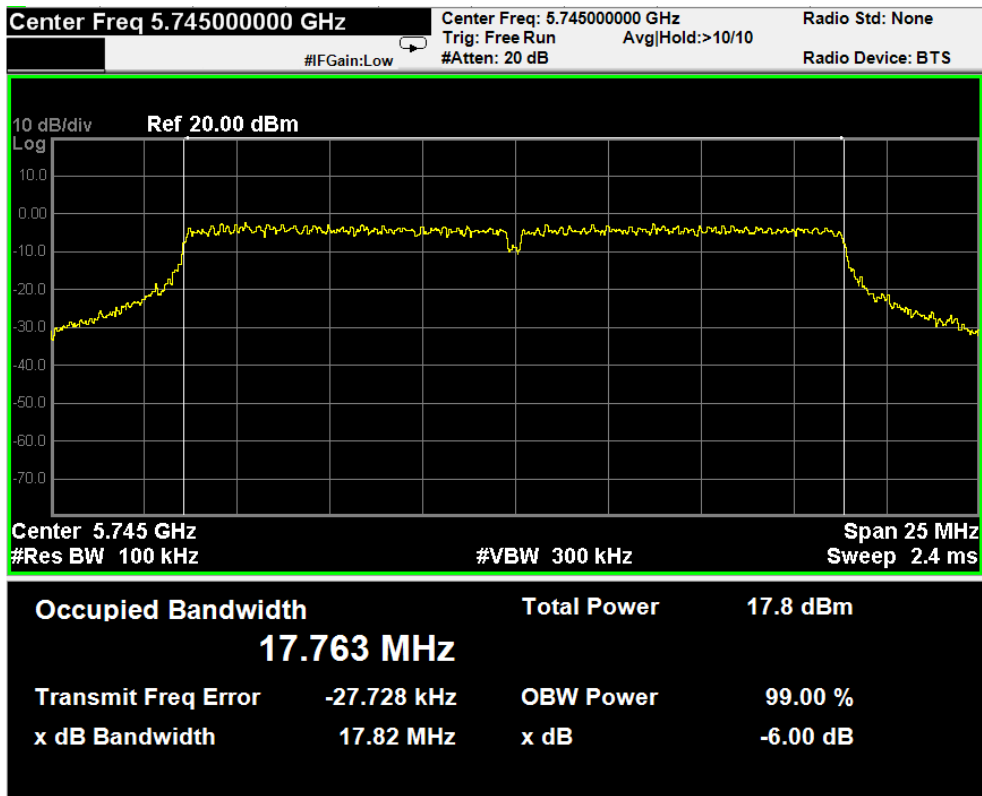




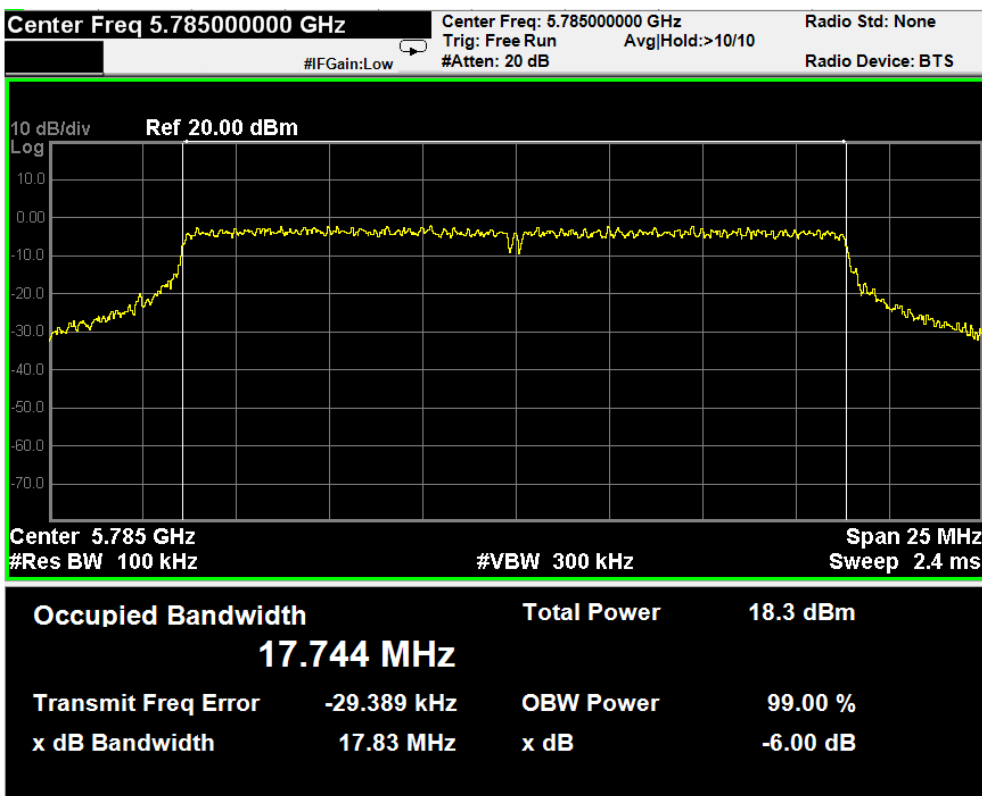
### Right antenna port 802.11a Ch 165



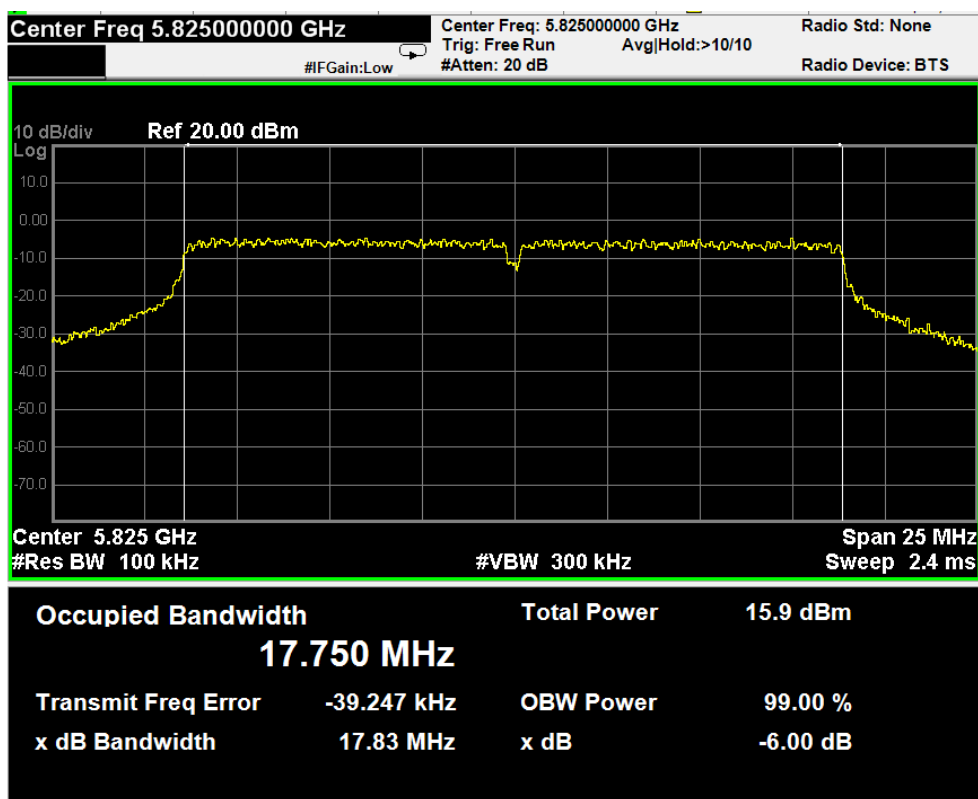
**Right antenna port 802.11n HT20 Ch 149**



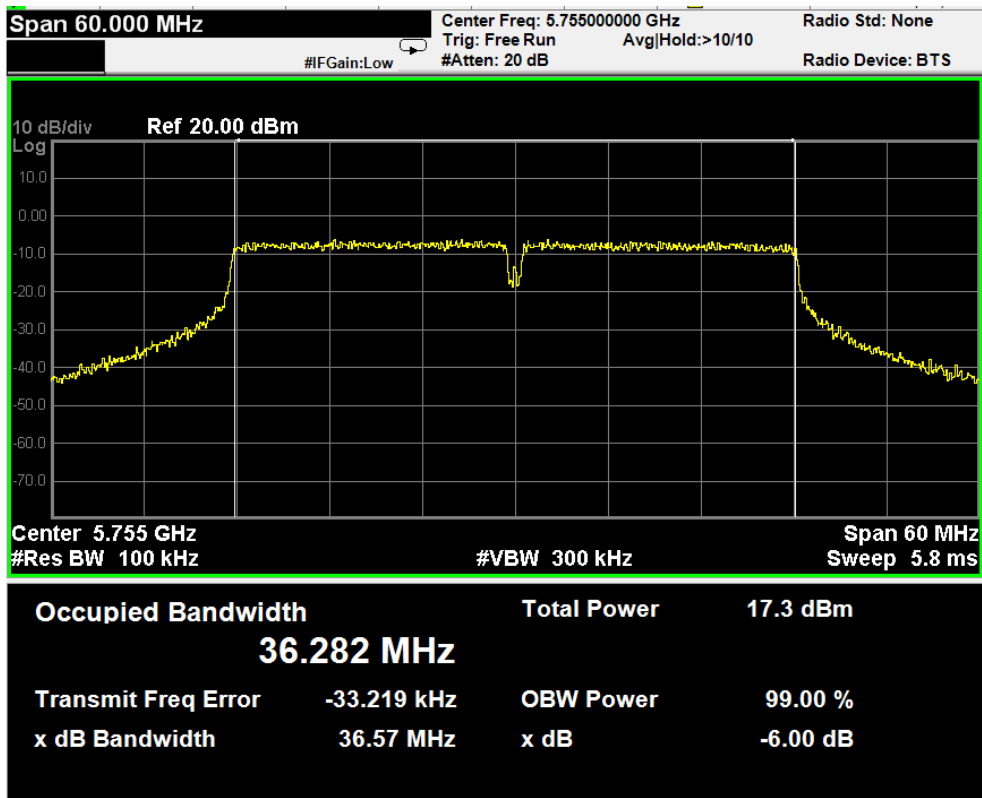
**Right antenna port 802.11n HT20 Ch 157**



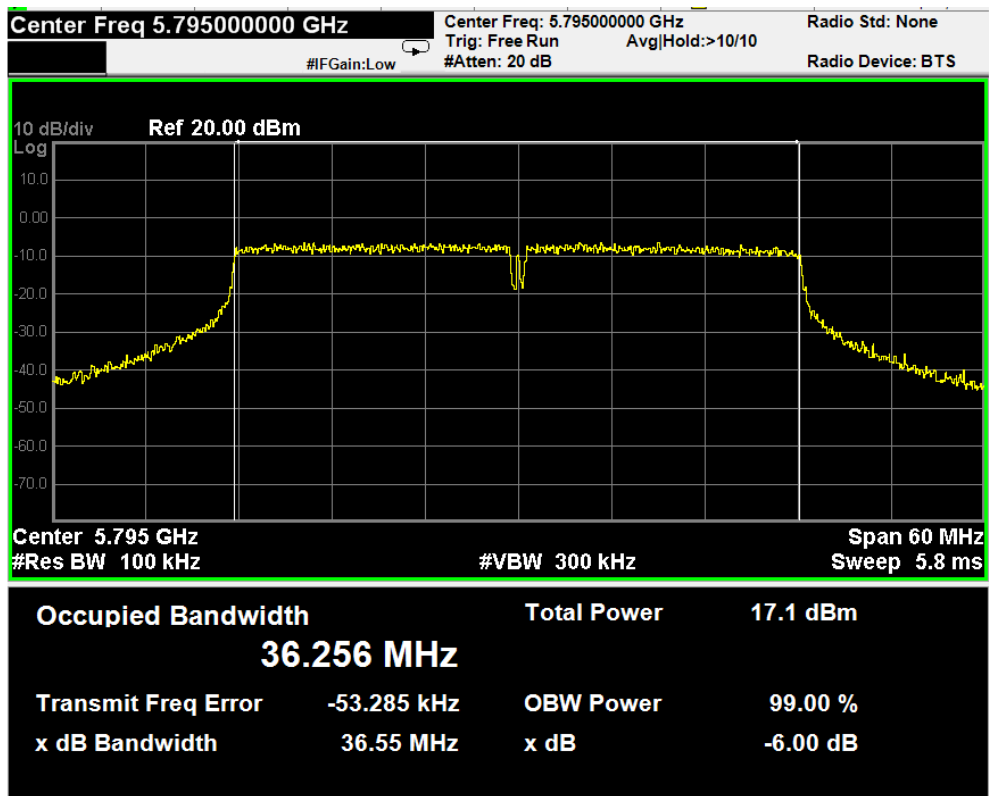
### Right antenna port 802.11n HT20 Ch 165



Right antenna port 802.11n HT40 Ch 151



Right antenna port 802.11n HT40 Ch 159



## 6 MAXIMUM CONDUCTED OUTPUT POWER

### MEASUREMENT

#### 6.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

#### 6.2 Block Diagram of Test Setup

The same as section.5.2.

#### 6.3 Specification Limits ((§15.407(a)(3))

For the 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.

#### 6.4 Operating Condition of EUT

The test program “art” was used to enable the EUT to transmit data at different channel frequency individually.

#### 6.5 Test Procedure

This is an RF conducted test.

Use a direct connection between the antenna port of the transmitter and the spectrum analyzer, through suitable attenuation. We use Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep) which defined in KDB789033 to measure the power output:

Set RBW = 1kHz, VBW ≥ 3MHz, Detector = RMS, Trace average at least 100 traces, then use the band power measurement function with band limit set equal to the occupied bandwidth.

## 6.6 Test Results

**PASSED.** All the test results are listed below.

(Test Date: Sep. 15, 2014 Temperature: 24°C Humidity: 45 %)

Note: 1W = 30 dBm

The antenna gain is 16 dBi, which is 10 dB exceeds 6 dBi.

Therefore, the limit shall be reduced by 10 dB.

For 802.11a

Channel	Frequency	Left antenna port Output Power (dBm)	Right antenna port Output Power (dBm)	Total Output Power (dBm)	Limit (dBm)
149	5745 MHz	9.595	9.951	12.79	20
157	5785 MHz	10.960	9.359	13.24	20
165	5825 MHz	10.840	9.561	13.26	20

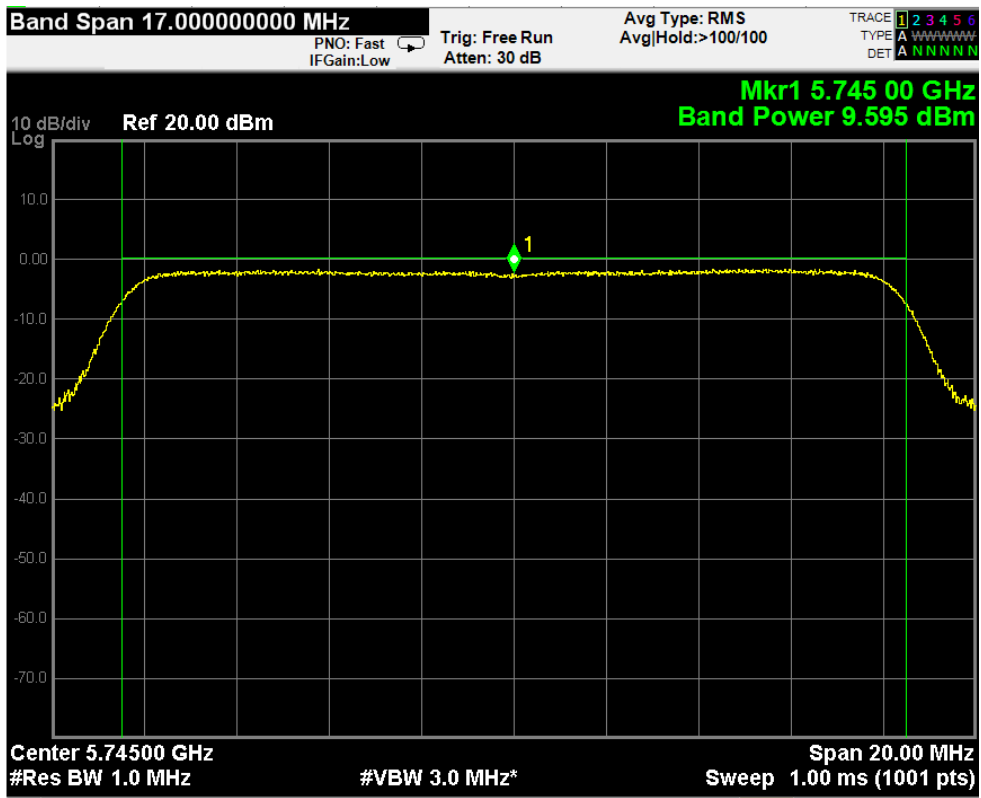
For 802.11n HT20

Channel	Frequency	Left antenna port Output Power (dBm)	Right antenna port Output Power (dBm)	Total Output Power (dBm)	Limit (dBm)
149	5745 MHz	10.918	9.130	13.13	20
157	5785 MHz	10.677	9.947	13.34	20
165	5825 MHz	10.391	9.220	12.86	20

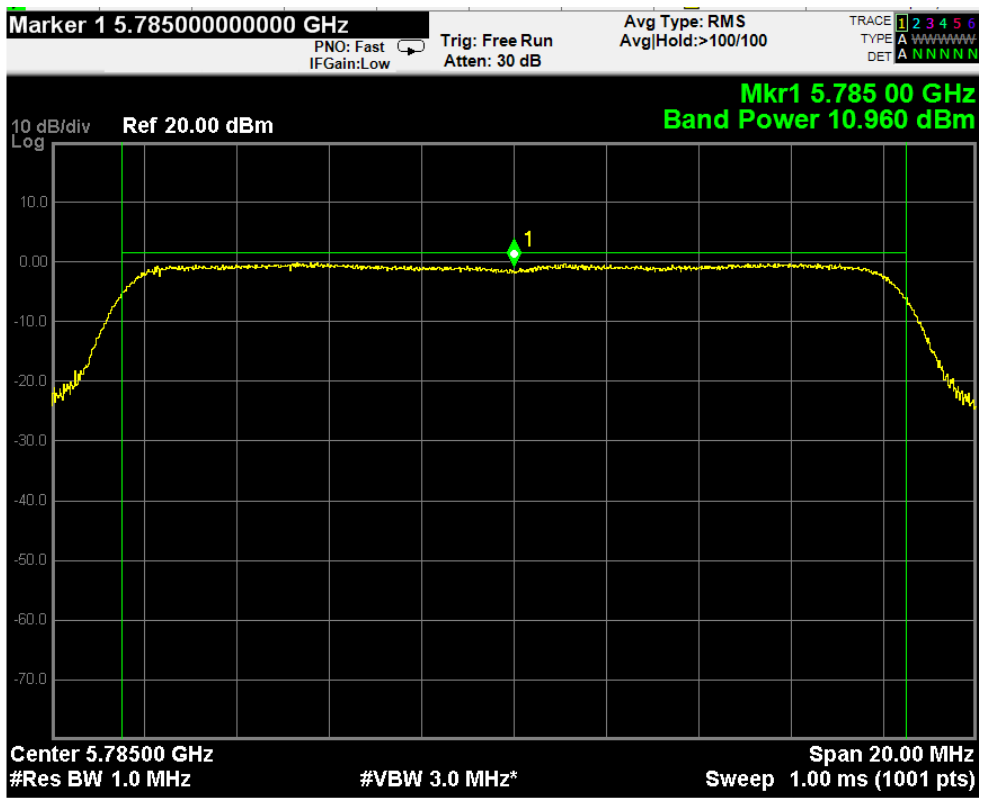
For 802.11n HT40

Channel	Frequency	Left antenna port Output Power (dBm)	Right antenna port Output Power (dBm)	Total Output Power (dBm)	Limit (dBm)
151	5755 MHz	9.088	8.255	11.70	20
159	5795 MHz	13.442	11.426	15.56	20

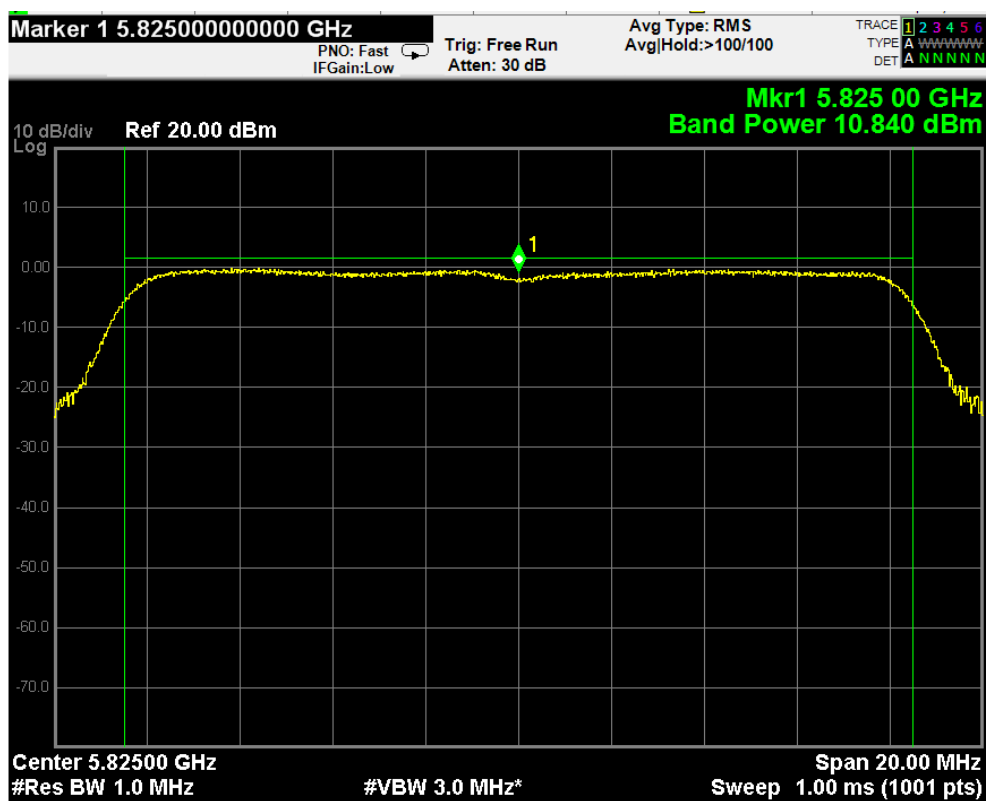
### Left antenna port 802.11a Ch 149



### Left antenna port 802.11a Ch 157

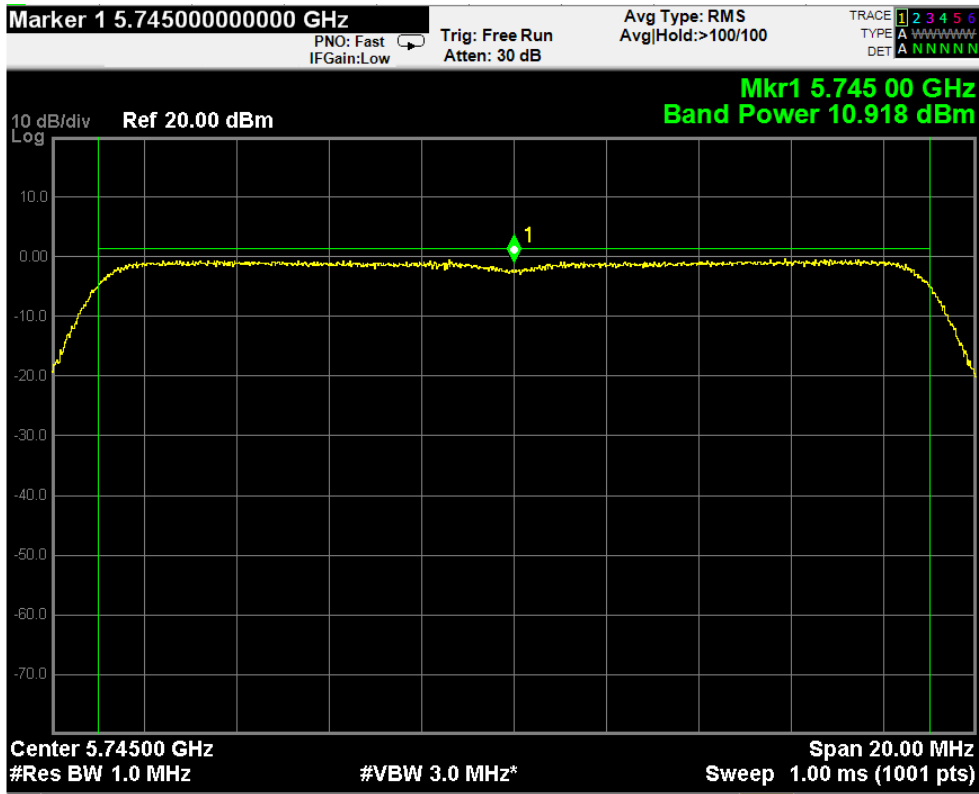


### Left antenna port 802.11a Ch 165

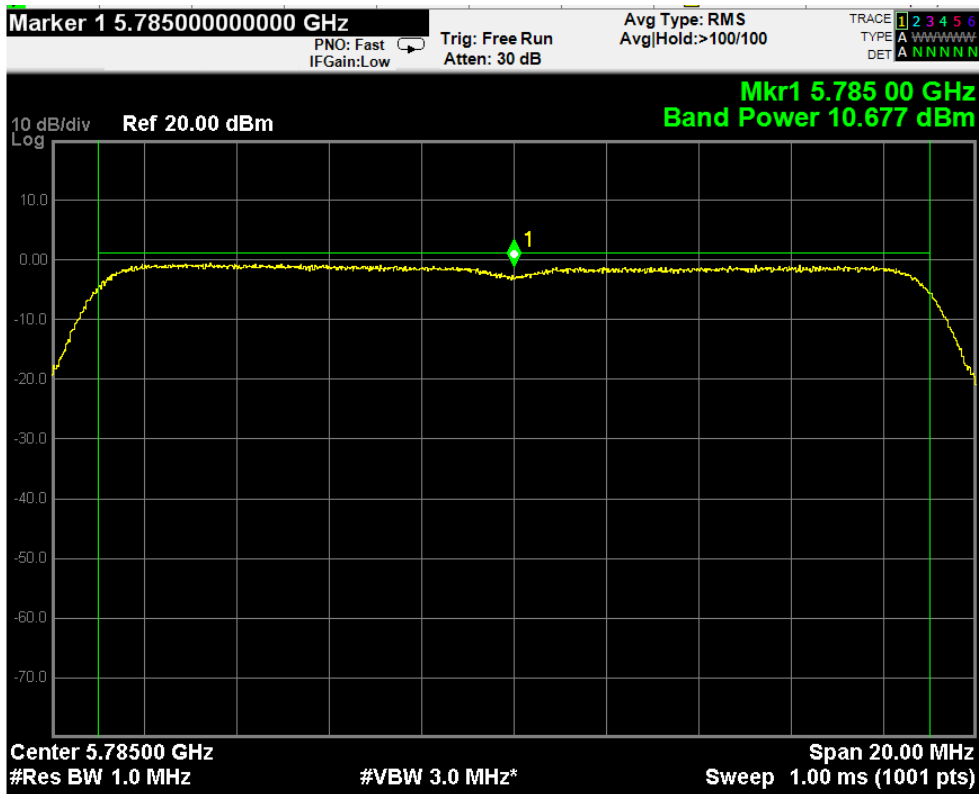




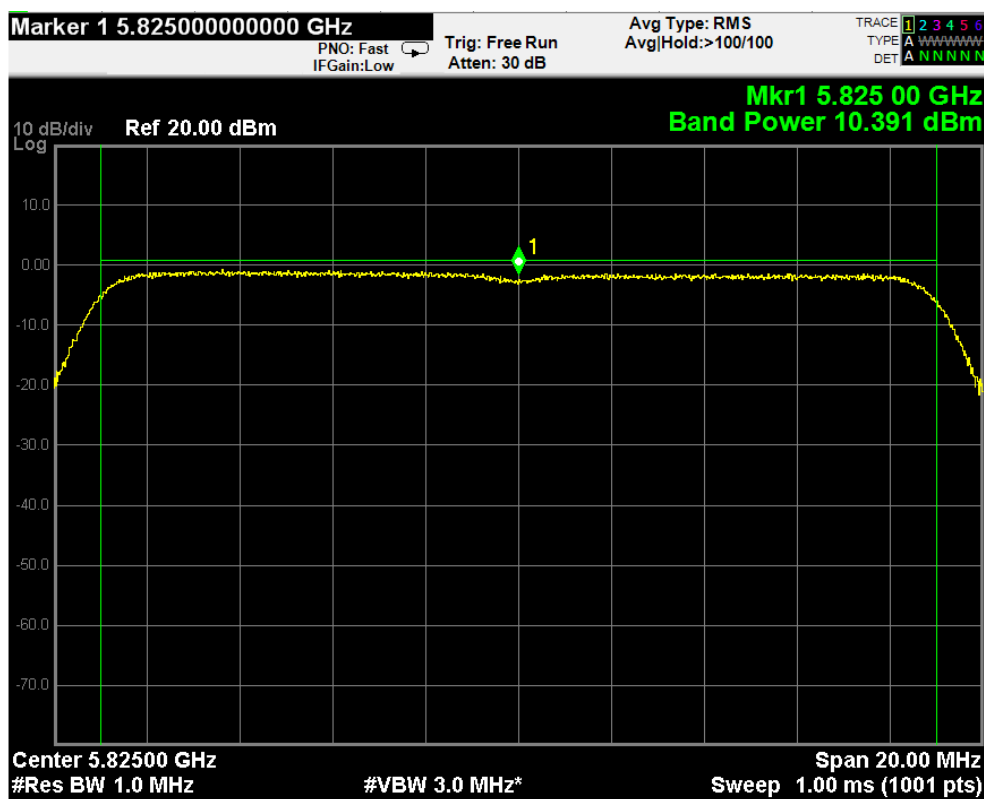
### Left antenna port 802.11n HT20 Ch 149



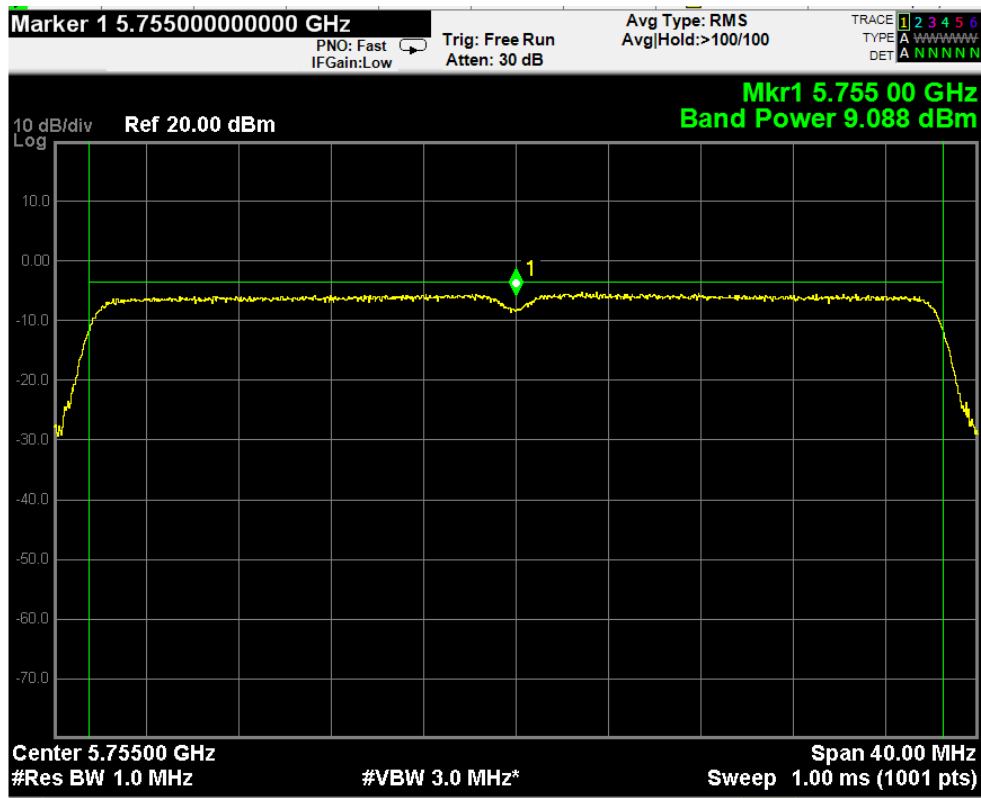
### Left antenna port 802.11n HT20 Ch 157



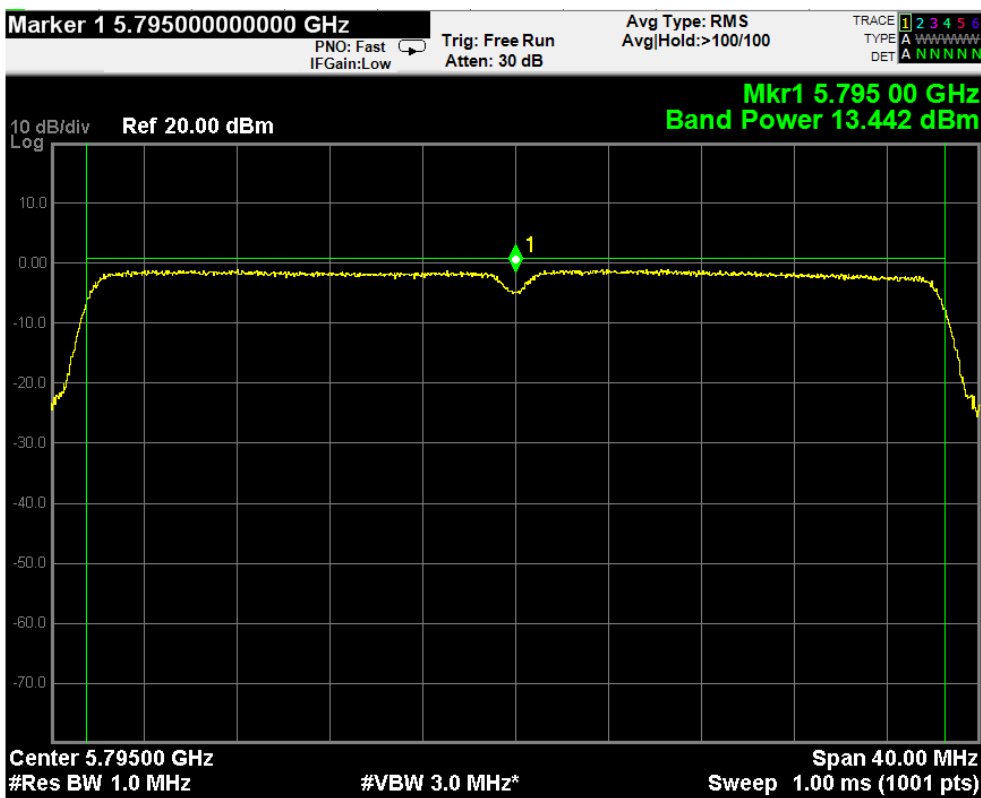
### Left antenna port 802.11n HT20 Ch 165



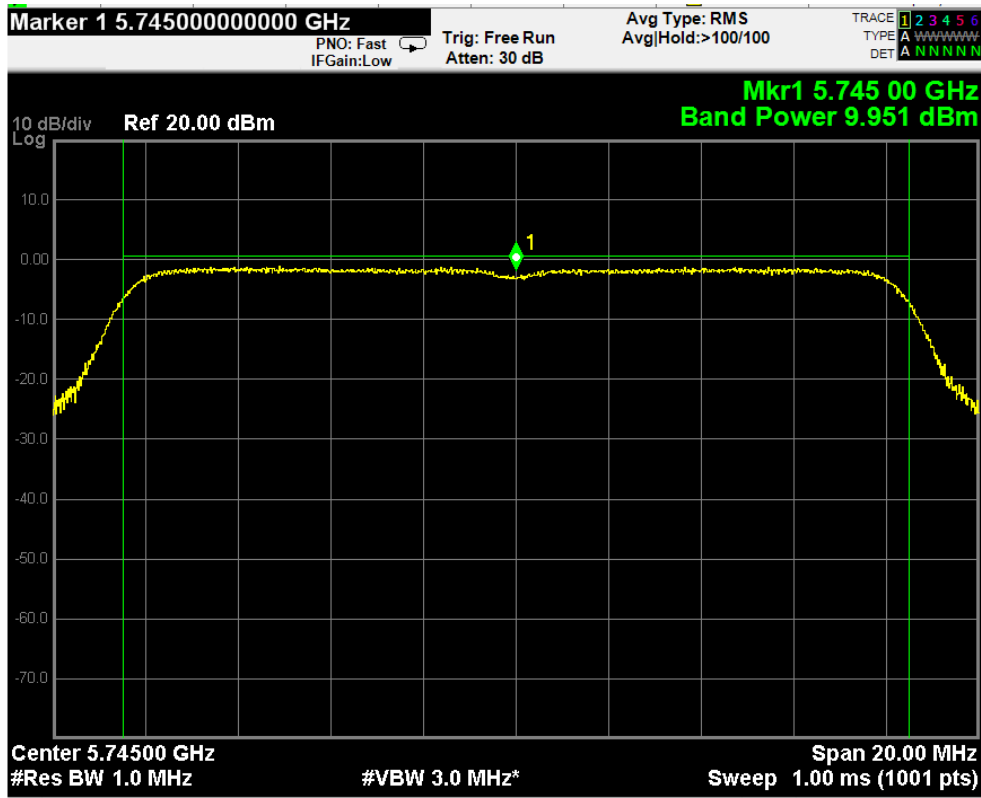
### Left antenna port 802.11n HT40 Ch 151



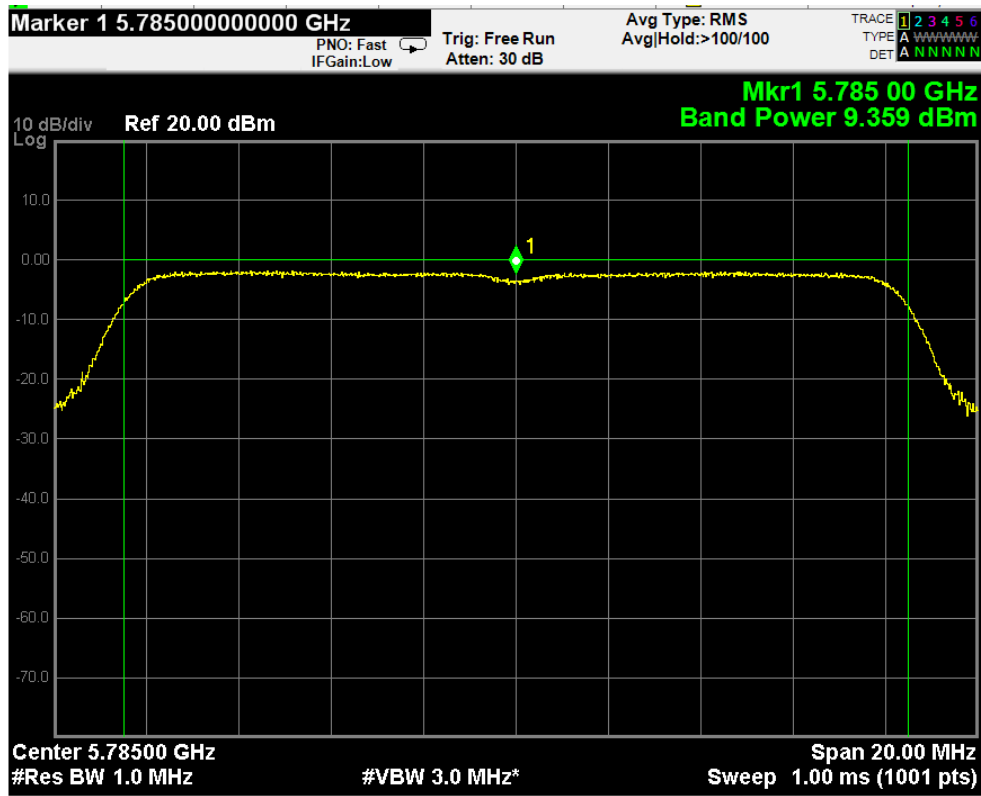
### Left antenna port 802.11n HT40 Ch 159



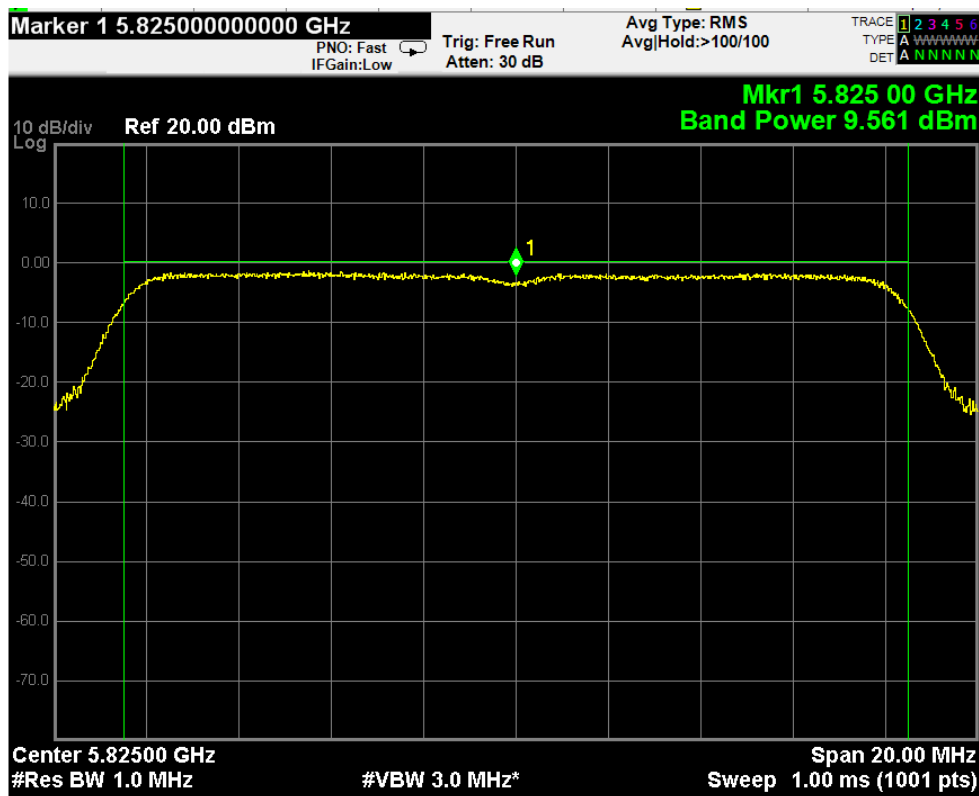
### Right antenna port 802.11a Ch 149



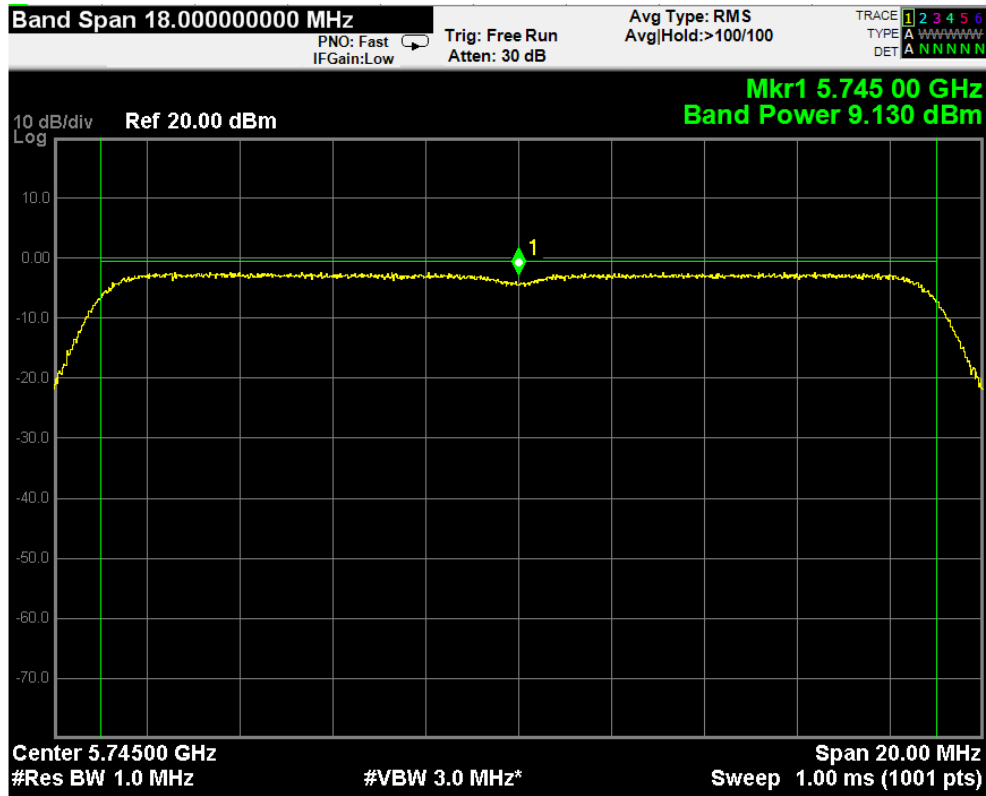
### Right antenna port 802.11a Ch 157



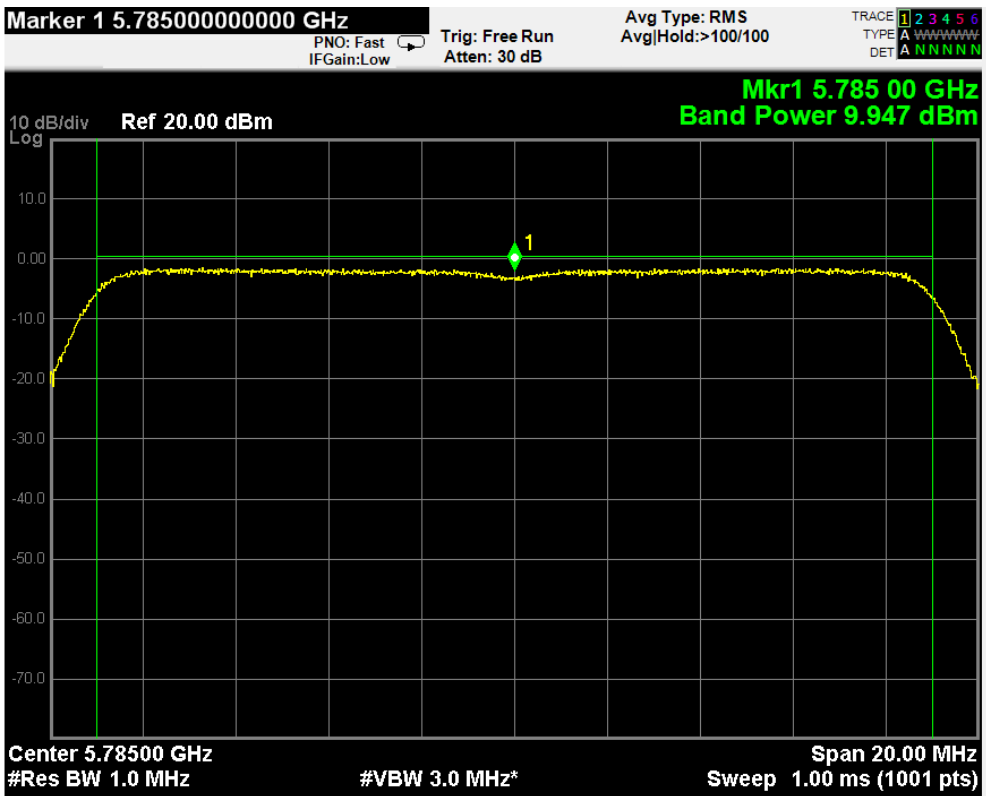
### Right antenna port 802.11a Ch 165



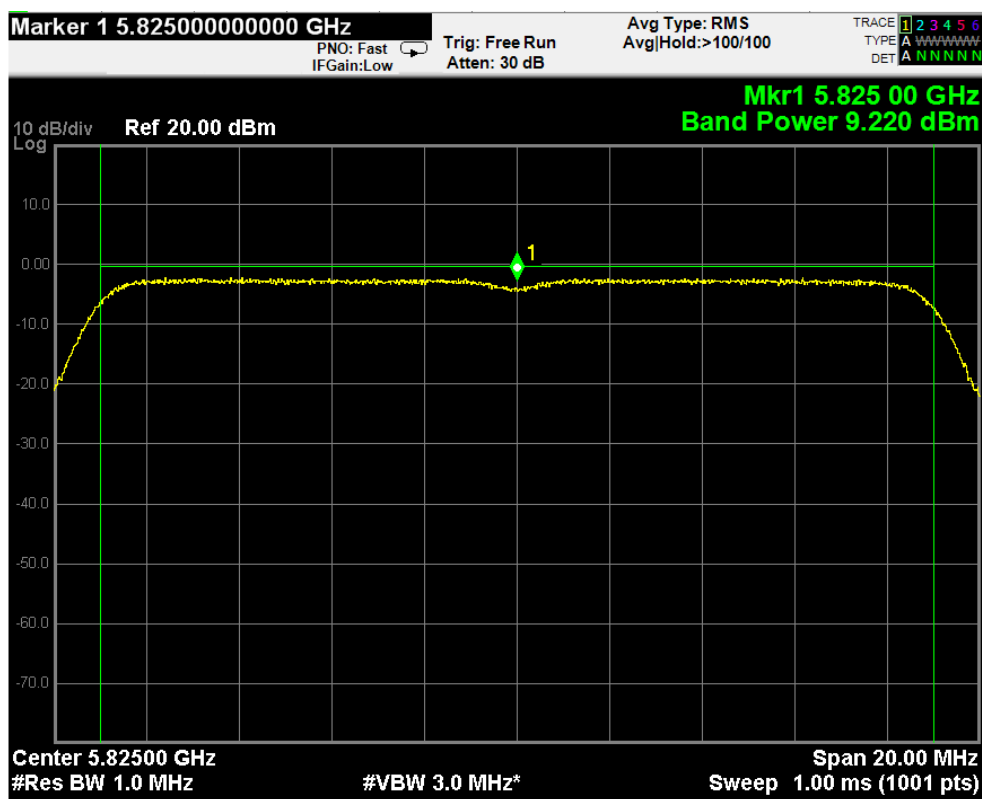
### Right antenna port 802.11n HT20 Ch 149



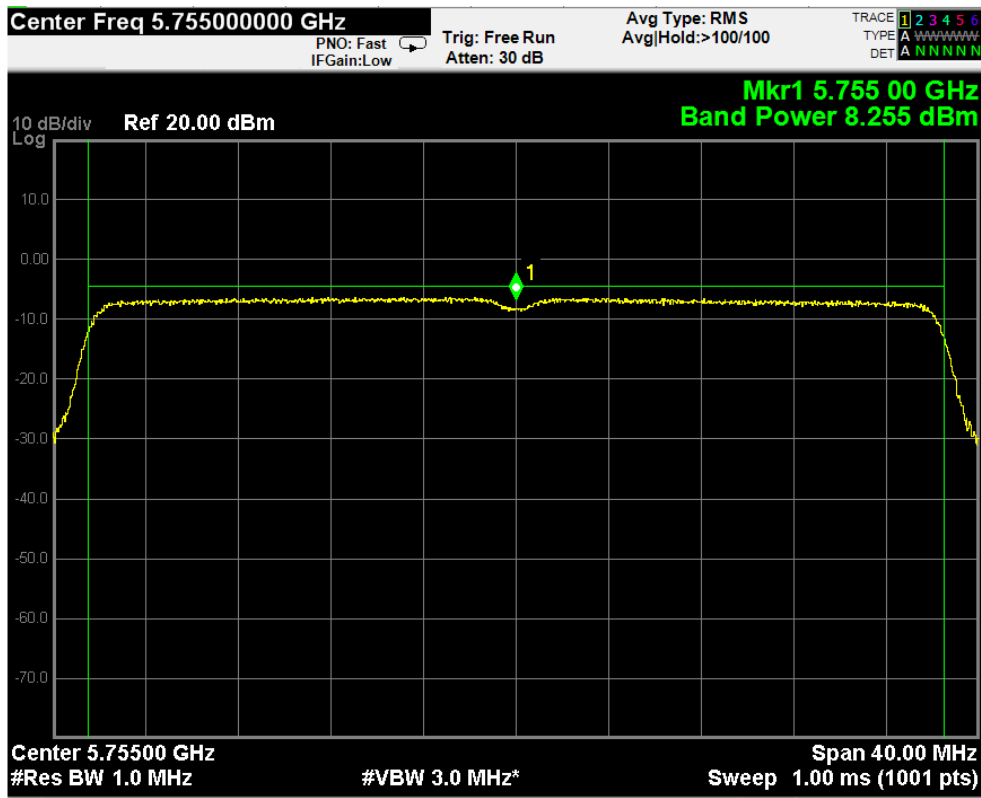
### Right antenna port 802.11n HT20 Ch 157



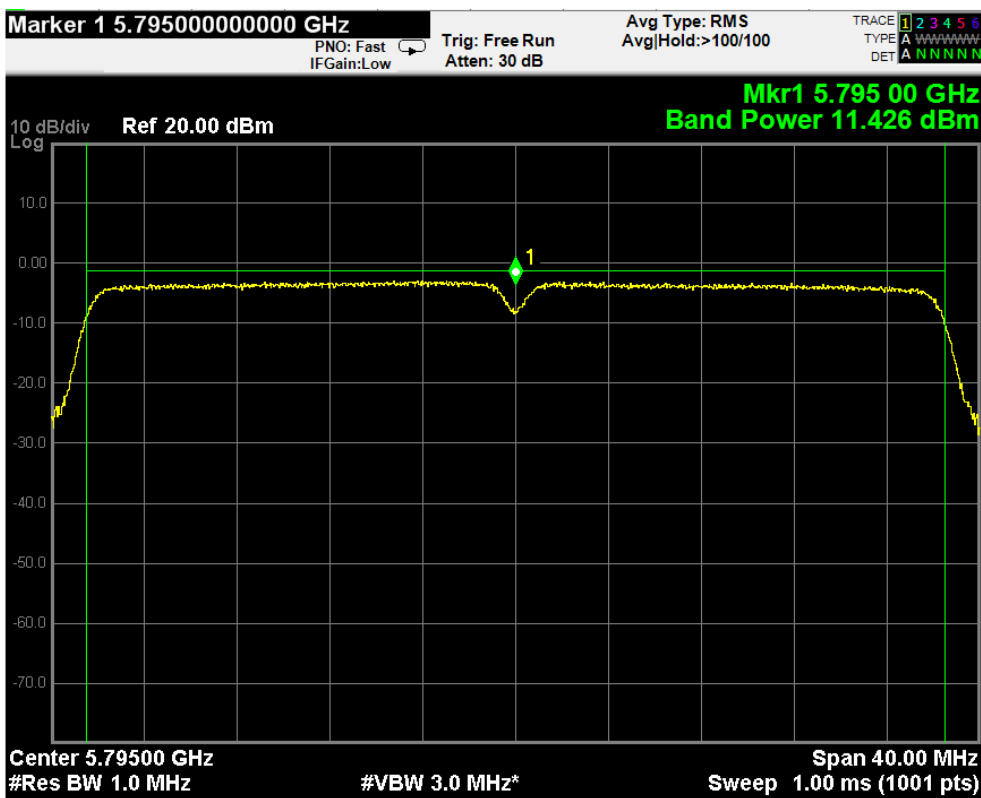
### Right antenna port 802.11n HT20 Ch 165



### Right antenna port 802.11n HT40 Ch 151



### Right antenna port 802.11n HT40 Ch 159





## 7 POWER SPECTRAL DENSITY MEASUREMENT

### 7.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

### 7.2 Block Diagram of Test Setup

The same as section.5.2.

### 7.3 Specification Limits (§15.407(a)(3))

For the 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.

### 7.4 Operating Condition of EUT

The test program “art” was used to enable the EUT to transmit data at different channel frequency individually.

### 7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The spectrum analyzer was set as RBW = 500 kHz, VBW  $\geq$  3 MHz, detector = RMS. Use the peak search function on the spectrum analyzer to find the peak of the spectrum. The result is the PSD.

The test procedure is defined in KDB789033 F) Maximum Power Spectral Density (PSD). (for step F) 1), the SA-1 test method was used).

## 7.6 Test Results

**PASSED.** All the test results are attached in next pages.

(Test Date: Sep. 11, 2014 Temperature: 24°C Humidity: 46 %)

Note: The antenna gain is 16 dBi, which is 10 dB exceeds 6 dBi.  
Therefore, the limit shall be reduced by 10 dB.

For 802.11a

Channel	Frequency	Left antenna port PSD (dBm /500kHz)	Right antenna port PSD (dBm /500kHz)	Total PSD (dBm /500kHz)	Limit (dBm /500kHz)
149	5745 MHz	5.158	4.664	7.93	20
157	5785MHz	5.120	4.666	7.91	20
165	5825 MHz	4.942	2.827	7.02	20

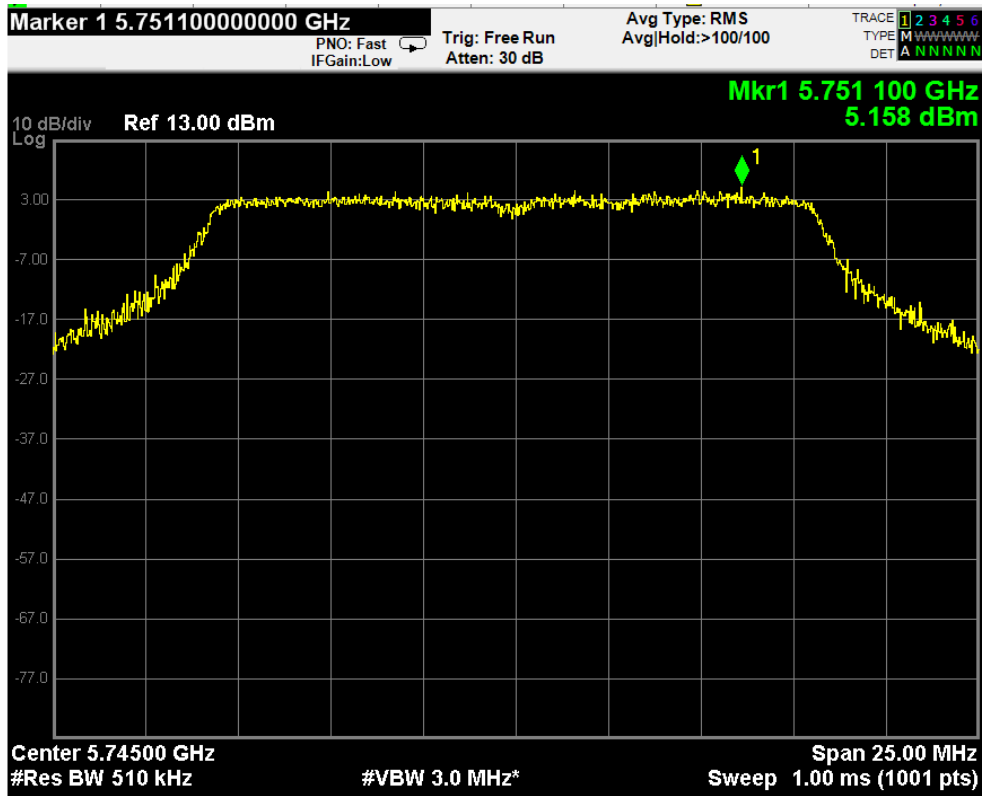
For 802.11n HT20

Channel	Frequency	Left antenna port PSD (dBm /500kHz)	Right antenna port PSD (dBm /500kHz)	Total PSD (dBm /500kHz)	Limit (dBm /500kHz)
149	5745 MHz	5.063	4.404	7.76	20
157	5785MHz	5.002	3.711	7.41	20
165	5825 MHz	4.821	2.405	6.79	20

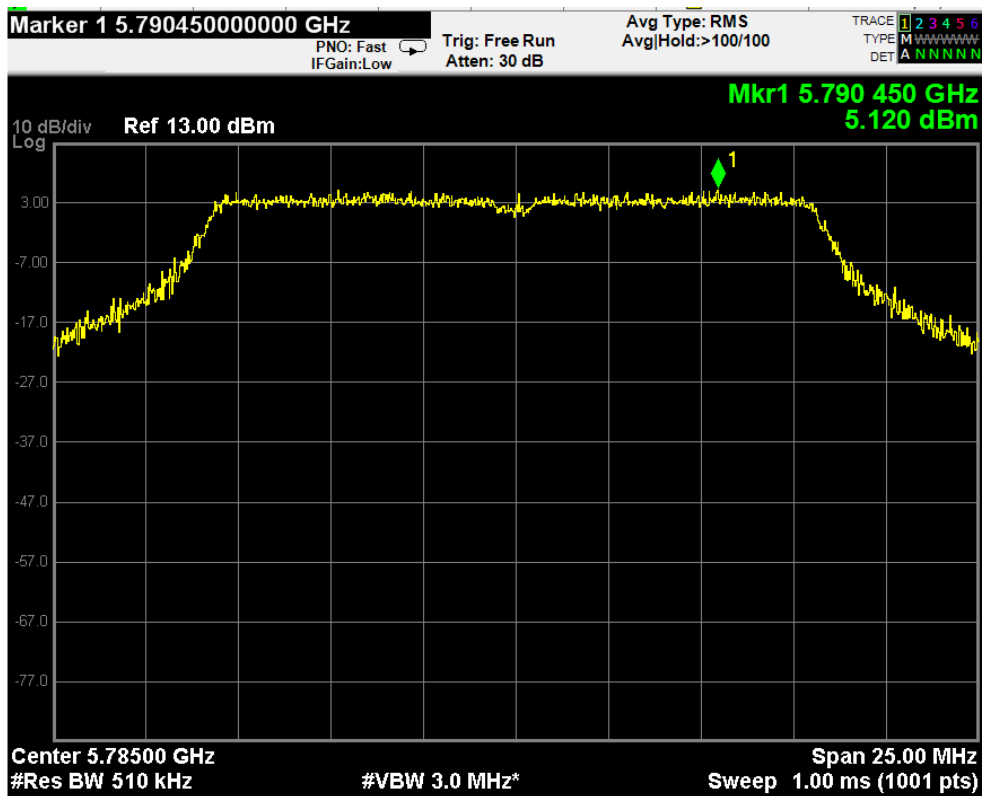
For 802.11n HT40

Channel	Frequency	Left antenna port PSD (dBm /500kHz)	Right antenna port PSD (dBm /500kHz)	Total PSD (dBm /500kHz)	Limit (dBm /500kHz)
151	5755 MHz	1.736	0.927	4.36	20
159	5795 MHz	1.974	0.659	4.38	20

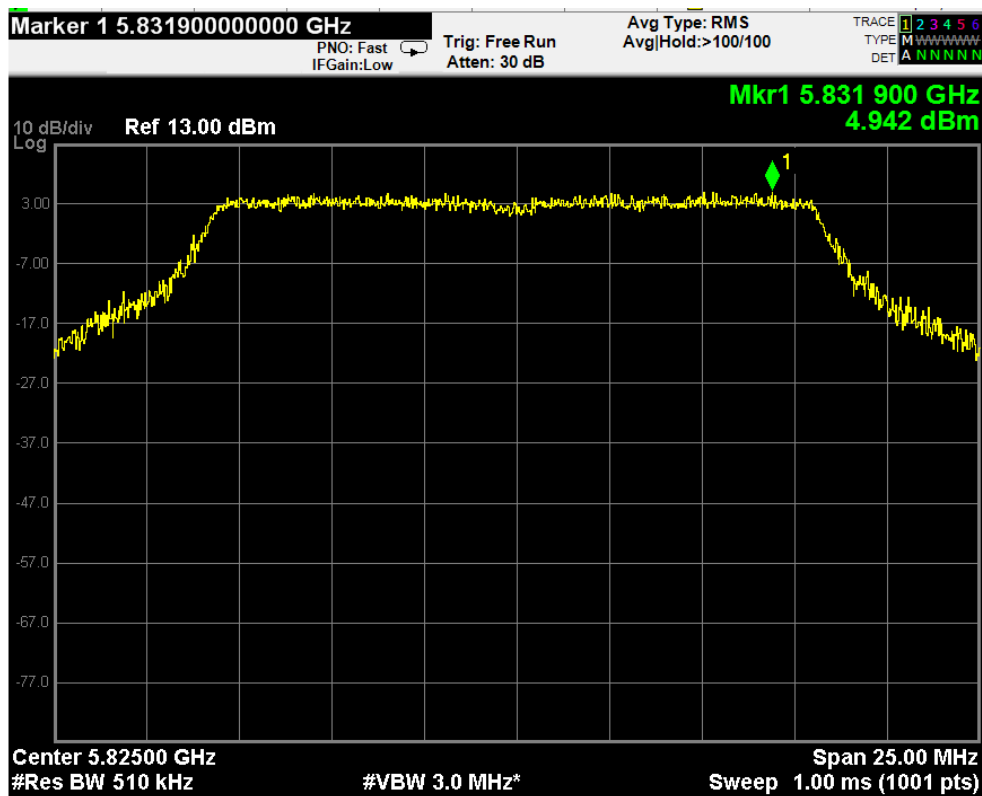
### Left antenna port 802.11a Ch 149



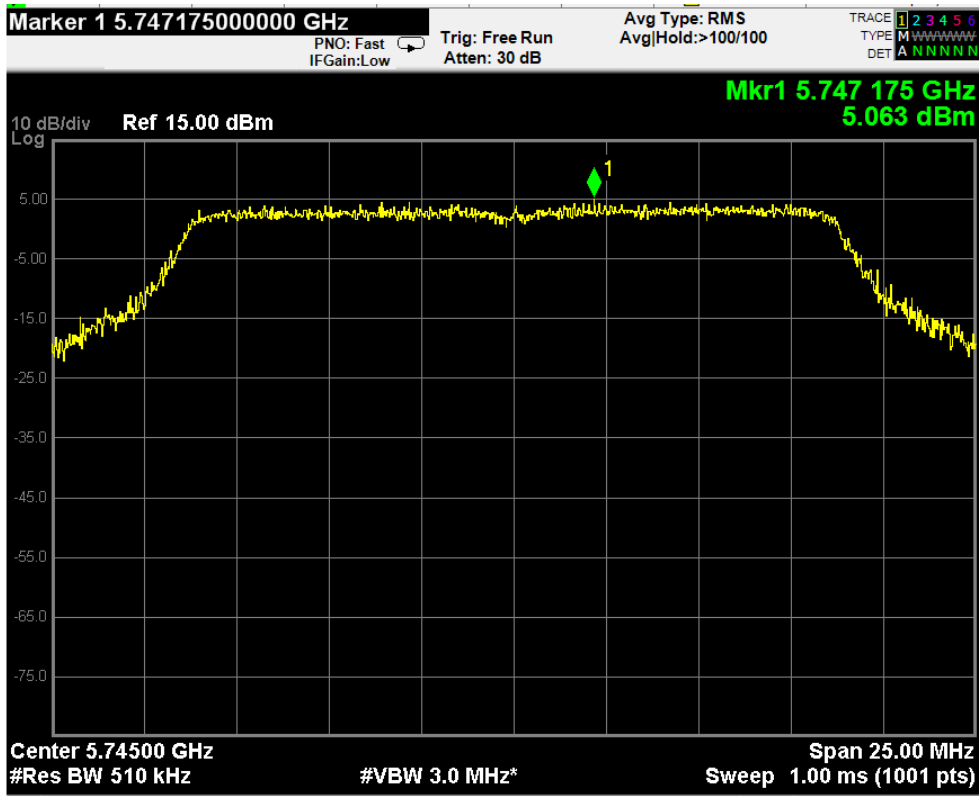
### Left antenna port 802.11a Ch 157



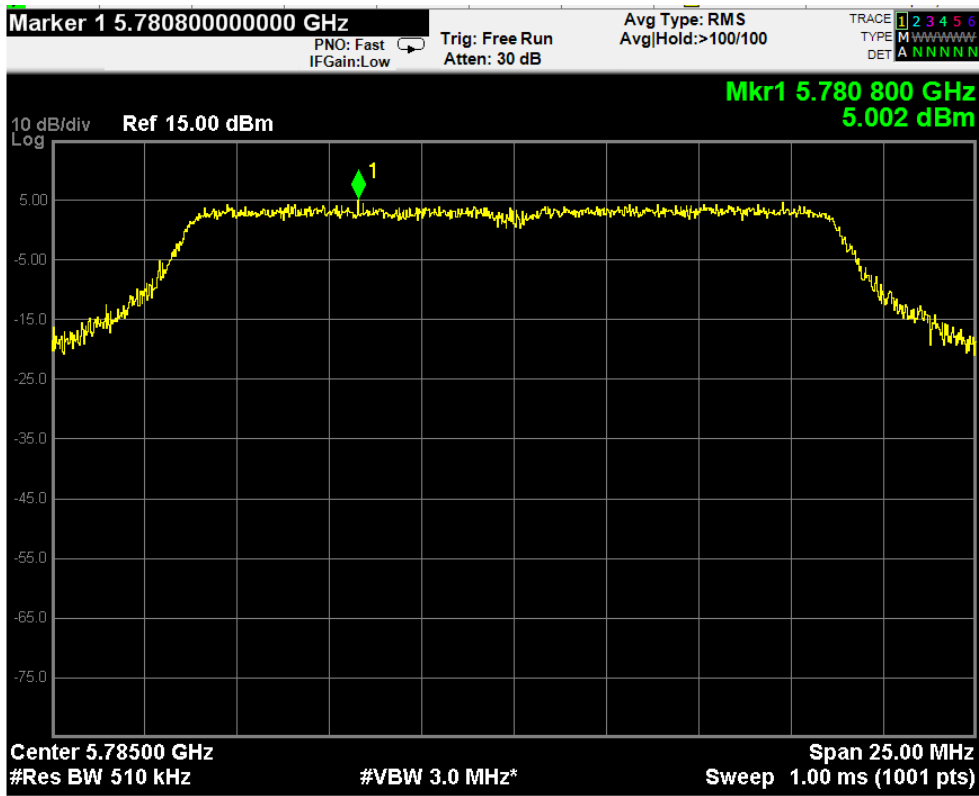
### Left antenna port 802.11a Ch 165



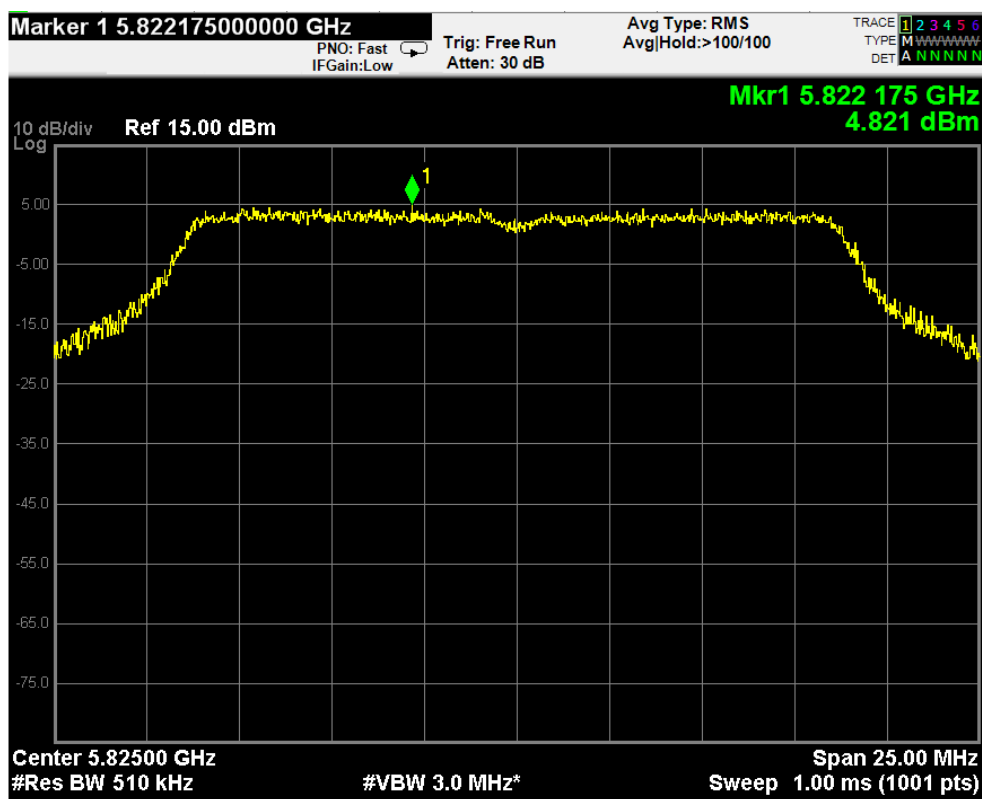
Left antenna port 802.11n HT20 Ch 149



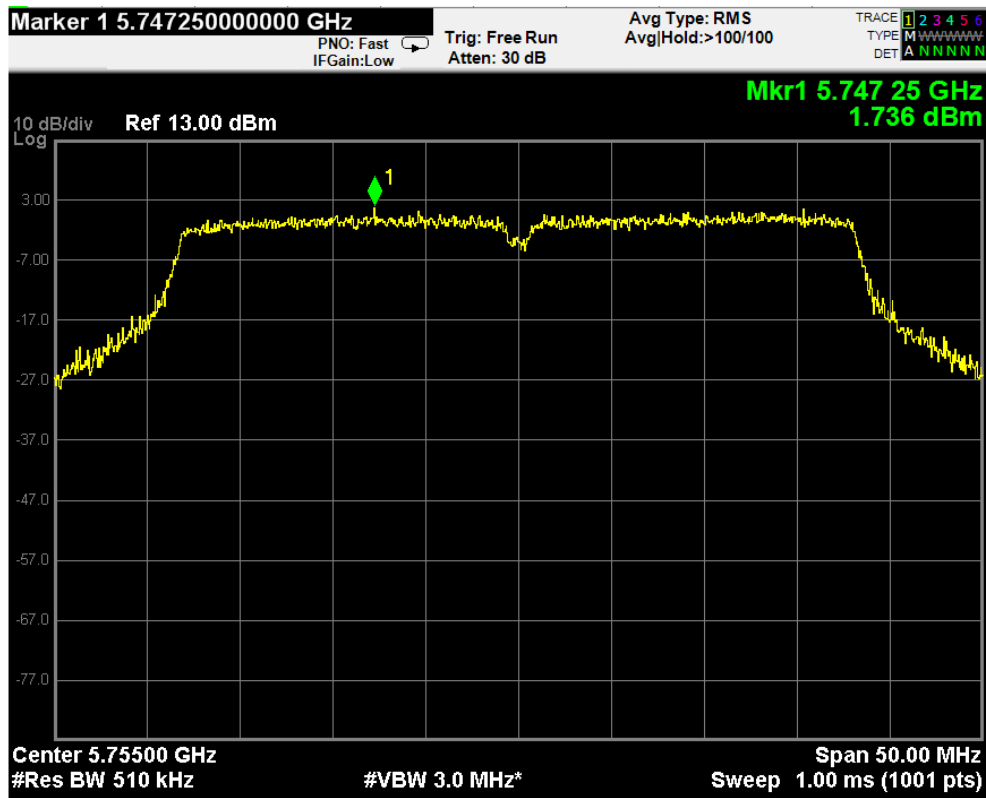
Left antenna port 802.11n HT20 Ch 157



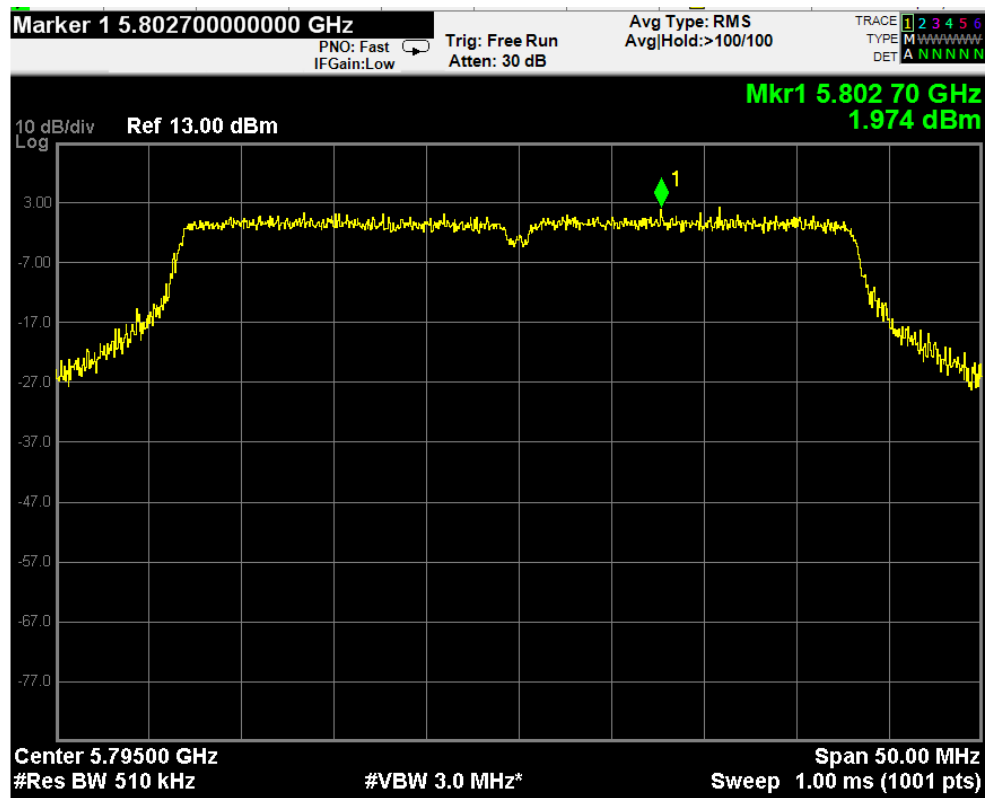
### Left antenna port 802.11n HT20 Ch 165



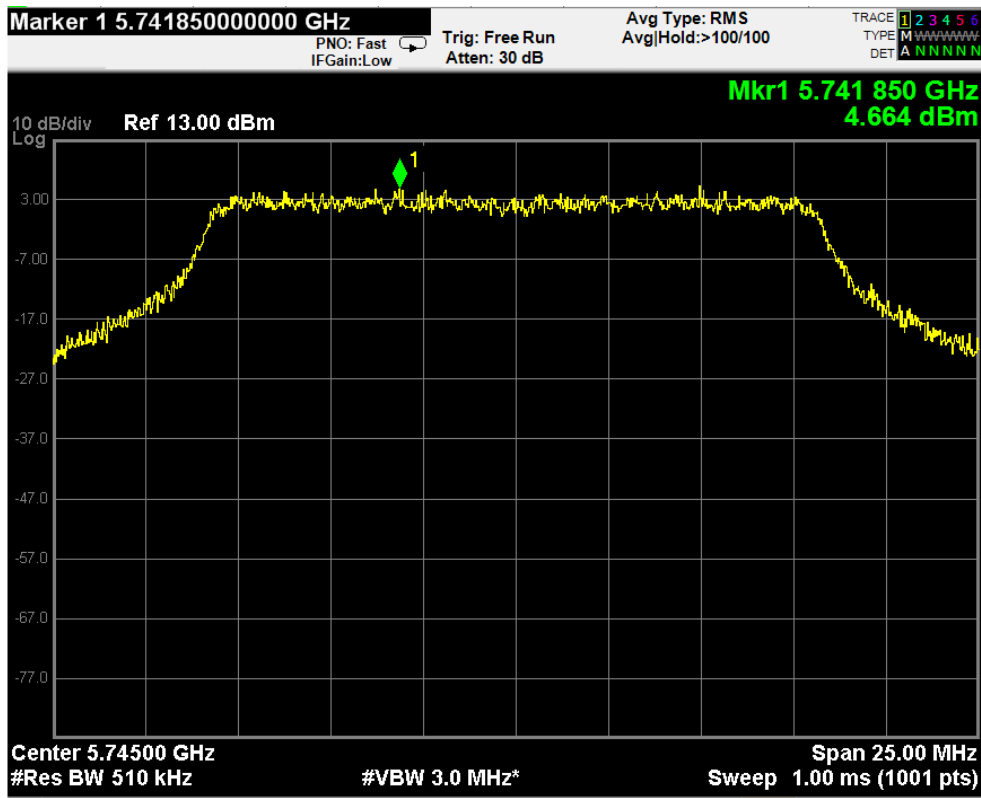
### Left antenna port 802.11n HT40 Ch 151



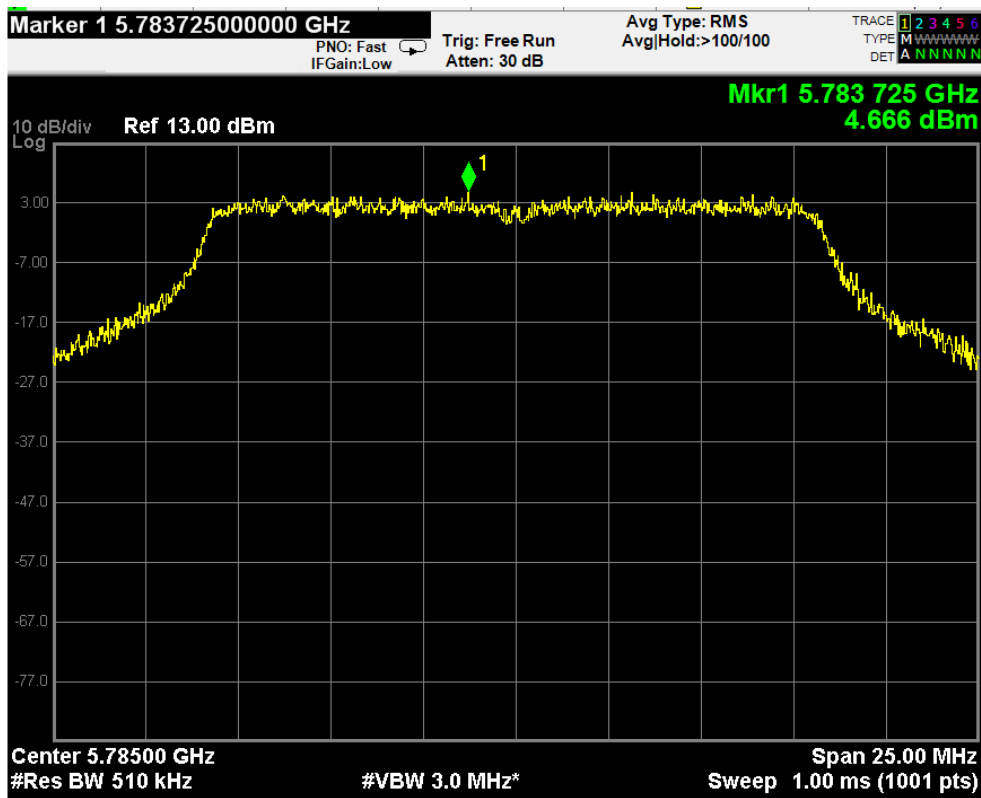
### Left antenna port 802.11n HT40 Ch 159



### Right antenna port 802.11a Ch 149

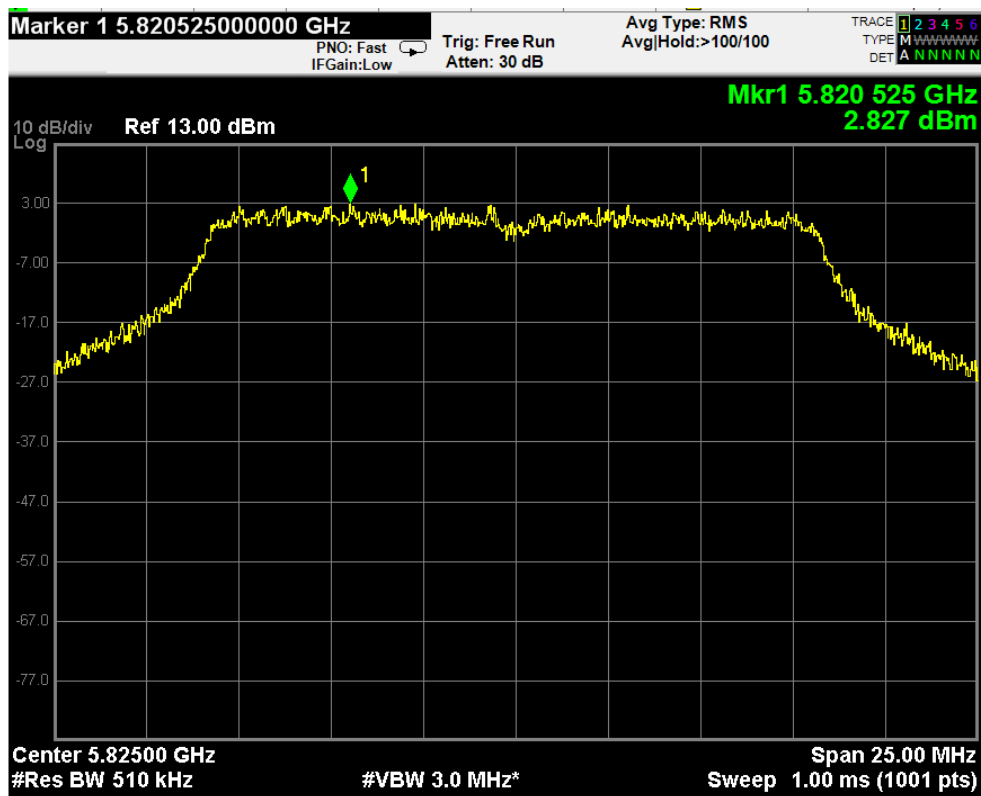


### Right antenna port 802.11a Ch 157

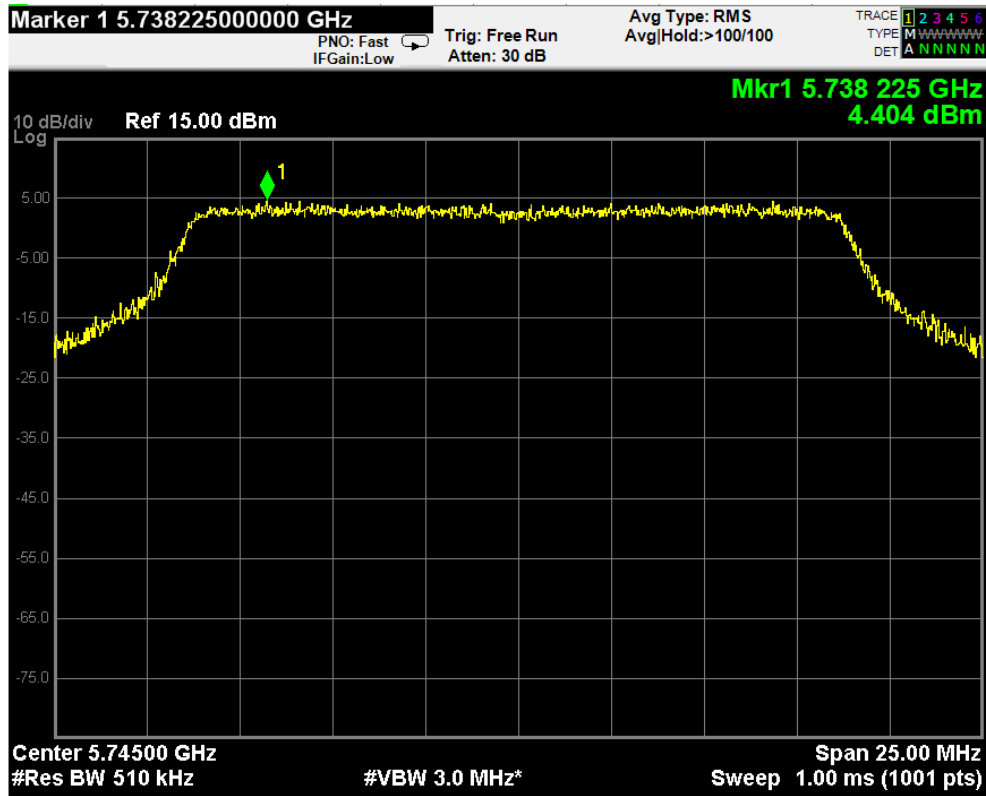




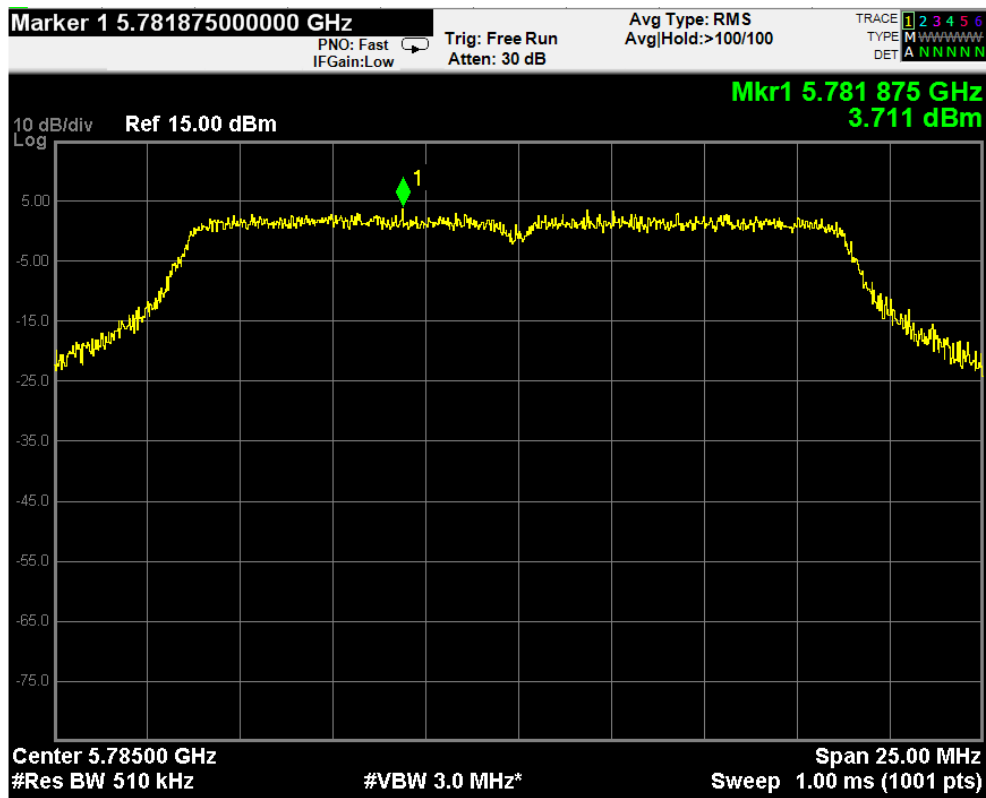
### Right antenna port 802.11a Ch 165



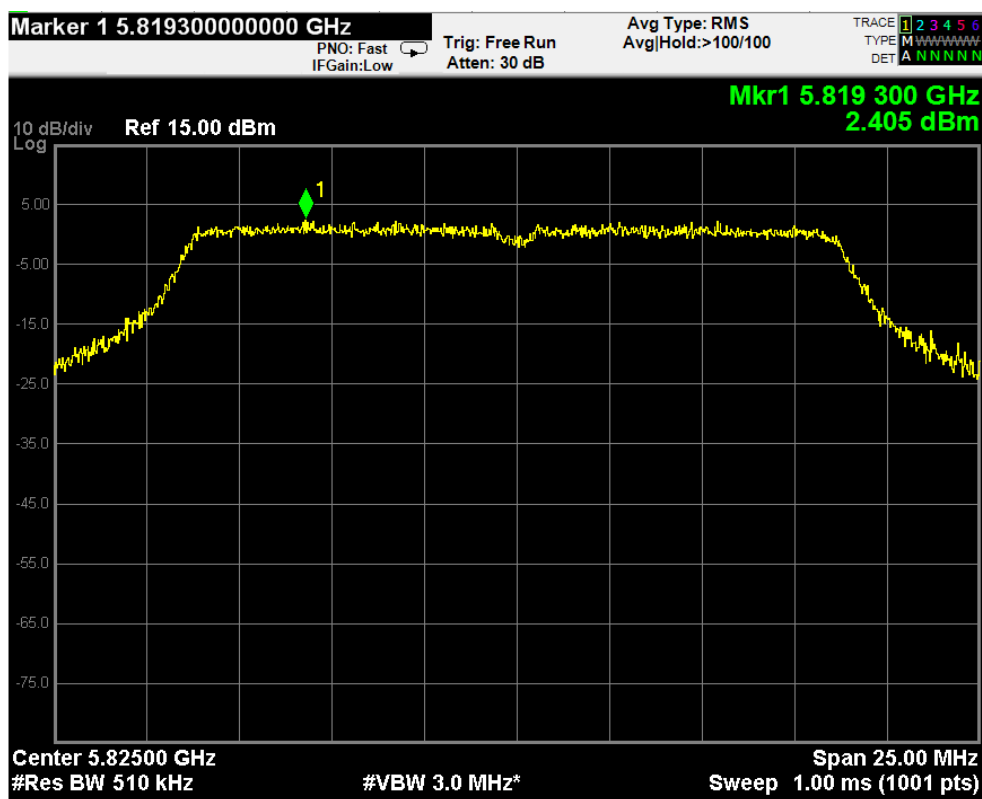
**Right antenna port 802.11n HT20 Ch 149**



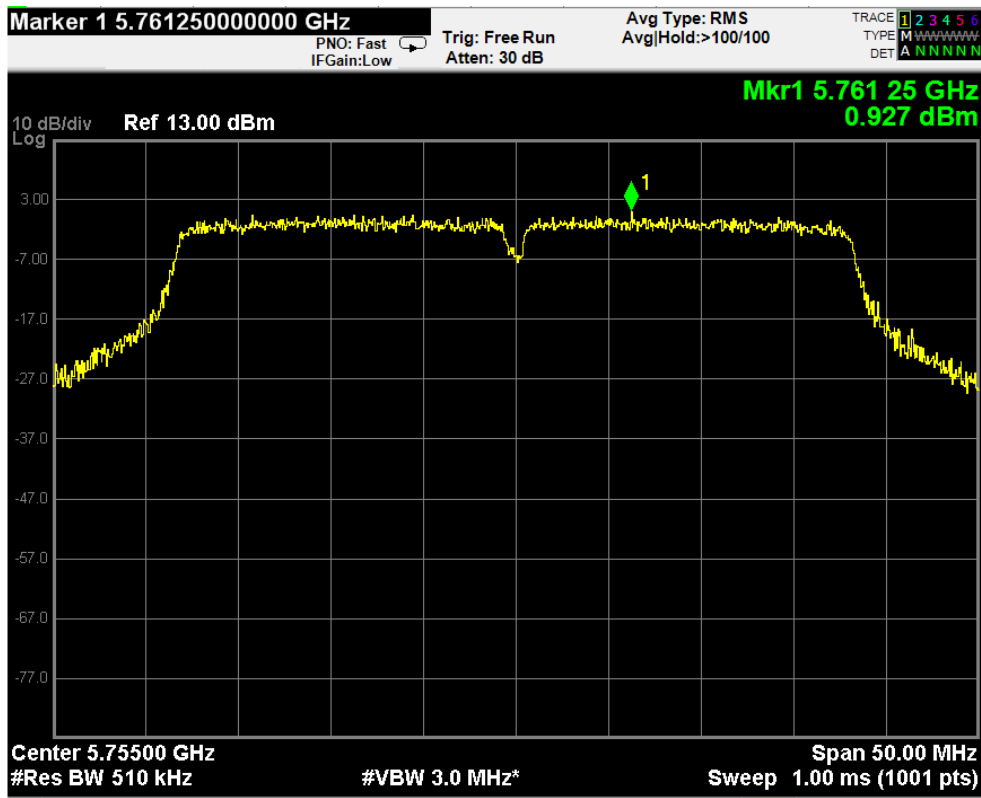
**Right antenna port 802.11n HT20 Ch 157**



### Right antenna port 802.11n HT20 Ch 165



### Right antenna port 802.11n HT40 Ch 151



### Right antenna port 802.11n HT40 Ch 159



## 8 UNDESIREABLE EMISSION

### 8.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015

### 8.2 Block Diagram of Test Setup

The same as section.5.2.

### 8.3 Specification Limits (§15.407(b)(4))

For transmitters operating in the 5.725-5.85 GHz band:

All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of  $-17$  dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

### 8.4 Operating Condition of EUT

The test program “art” was used to enable the EUT to transmit data at different channel frequency individually.

### 8.5 Test Procedure

The **antenna-port conducted measurements** was used to demonstrate compliance of the unwanted emission.

The **Cabinet emission measurements** mentioned in KDB789033 G.3.b (i) was recorded in Sec. 4.7 in the report.

The antenna-port was connected to the spectrum analyzer. The spectrum analyzer was set as RBW = 1MHz, VBW  $\geq$  3 MHz, detector = peak for measurements from 1GHz to 40GHz. For band edge measurements, the spectrum analyzer was set as RBW = 100 kHz, VBW  $\geq$  3xRBW, detector = peak and max-hold, perform a band-power integration across the 1MHz bandwidth in which the band-edge emission level is to be measured.

The test procedure is defined in KDB789033 G) 3

Note: The antenna gain is set as an offset in the spectrum analyzer.

## 8.6 Test Results

**PASSED.** All the test results are attached in next pages.

(Test Date: Sep. 12 - 19, 2014 Temperature: 24°C Humidity: 46 %)

Band-edge:

Modulation	Channel	Band-edge	Result (dBm/MHz)	Limit (dBm/MHz)
802.11a	149	5725 MHz	-20.30	-17
	165	5850 MHz	-26.88	
802.11n HT20	149	5725 MHz	-20.74	
	165	5850 MHz	-24.29	
802.11n HT40	151	5725 MHz	-17.64	
	159	5850 MHz	-27.64	

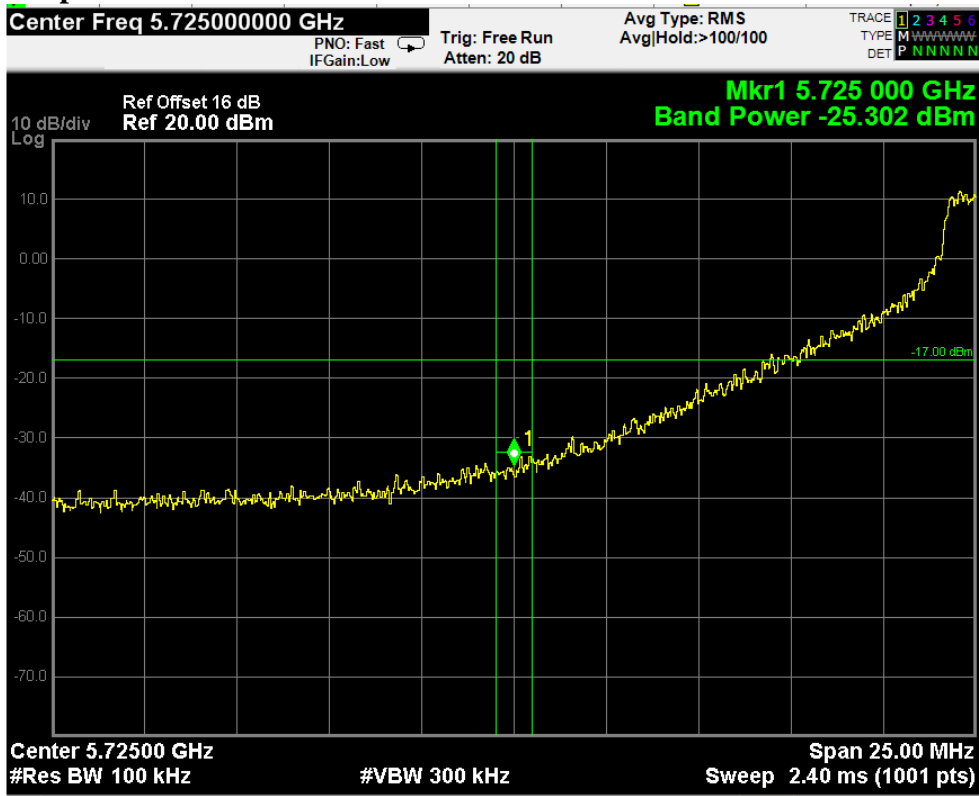
Worst Unwanted Emissions:

Modulation	Channel	Band-edge	Result (dBm/MHz)	Limit (dBm/MHz)
802.11a	149	5725 MHz	-28.38	-27
	157	5785 MHz	-28.10	
	165	5850 MHz	-27.33	
802.11n HT20	149	5725 MHz	-28.42	
	157	5785 MHz	-28.00	
	165	5850 MHz	-27.12	
802.11n HT40	151	5725 MHz	-28.08	
	159	5850 MHz	-27.55	

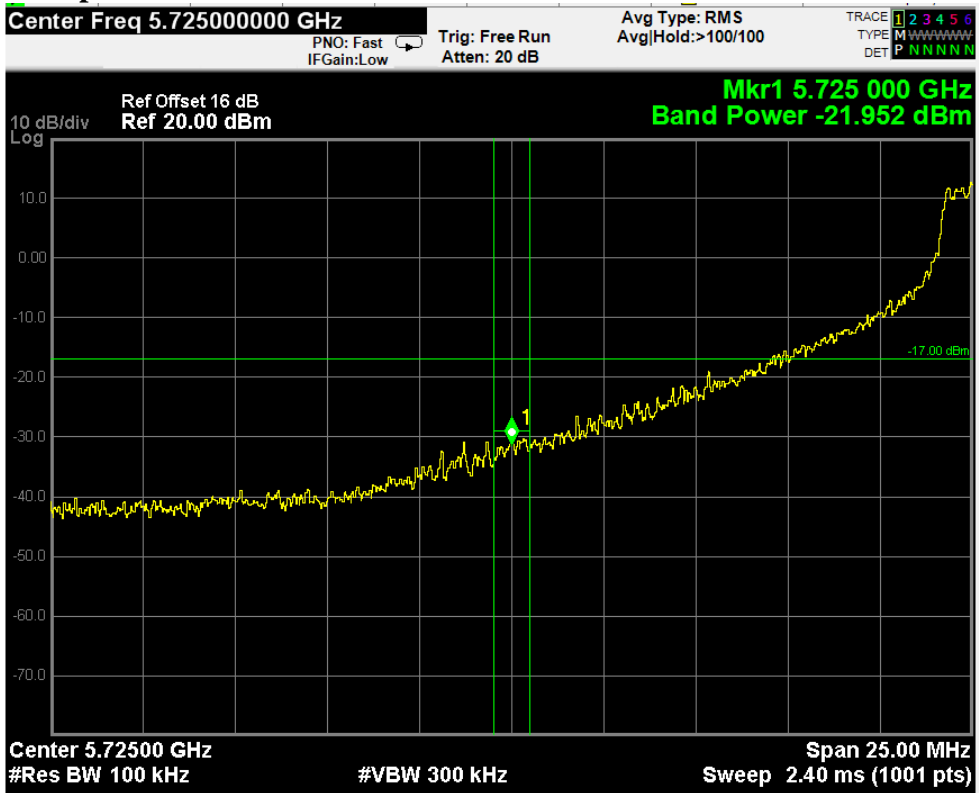
Note: The unwanted emission below 1GHz must comply with the general field strength limits set forth in FCC PART 15.209. The relevant test data refer to Sec. 4.7 in the report.

### 802.11a band-edge Ch149

Left antenna port:



Right antenna port:



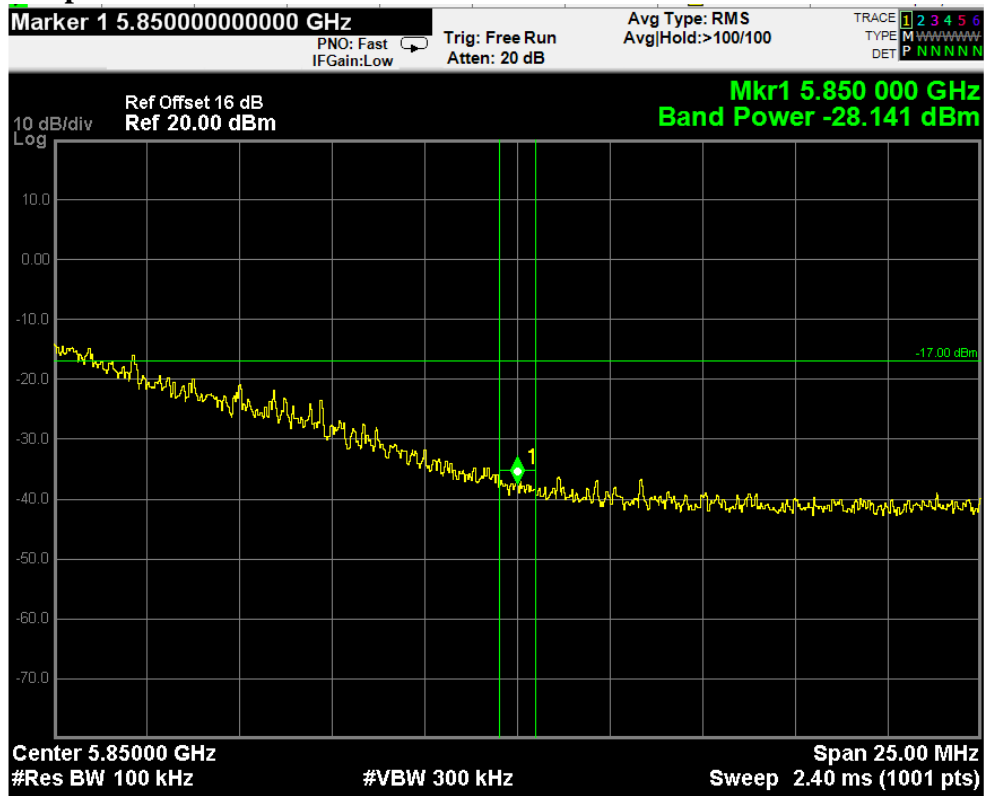
Total EIRP calculated:

Left antenna port:-25.302dBm , Right antenna port: -21.952dBm

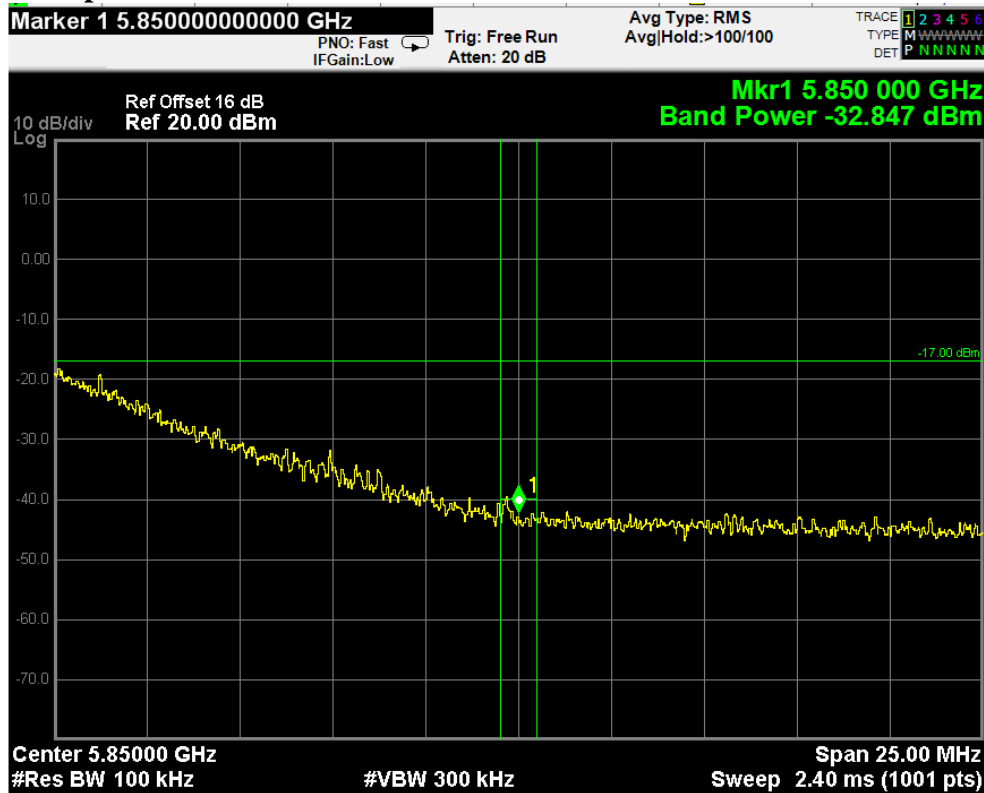
**Total: -20.30dBm**

### 802.11a band-edge Ch165

#### Left antenna port:



#### Right antenna port:



Total EIRP calculated:

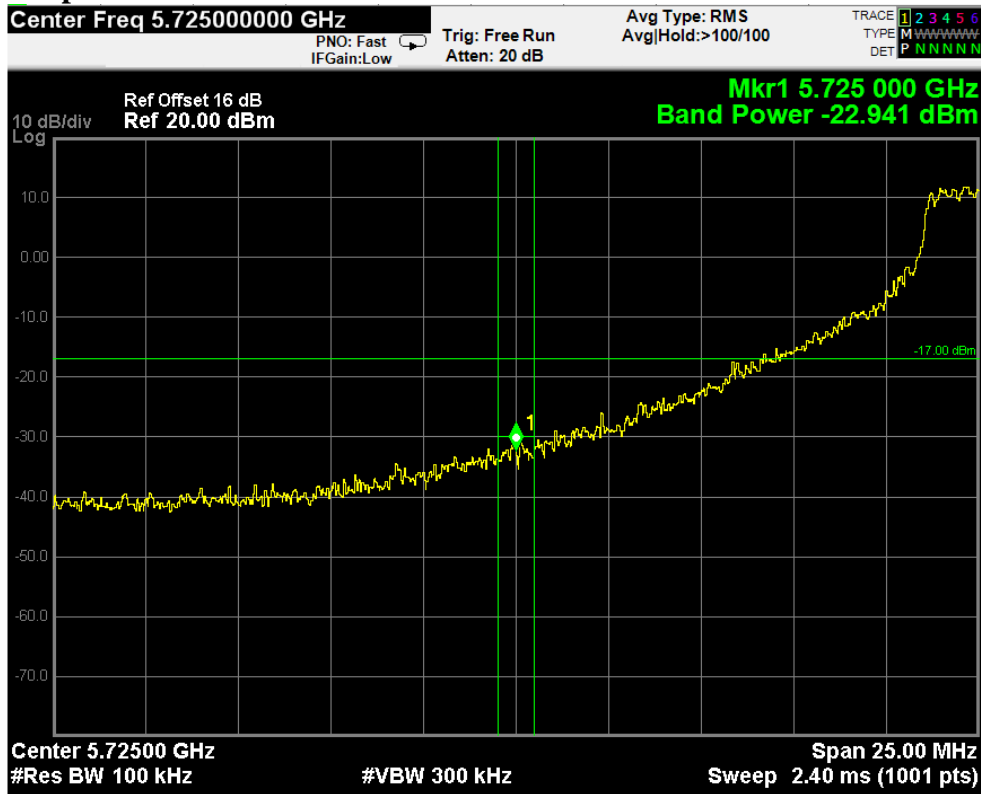
Left antenna port:-28.141dBm , Right antenna port: -32.847dBm

**Total: -26.88dBm**

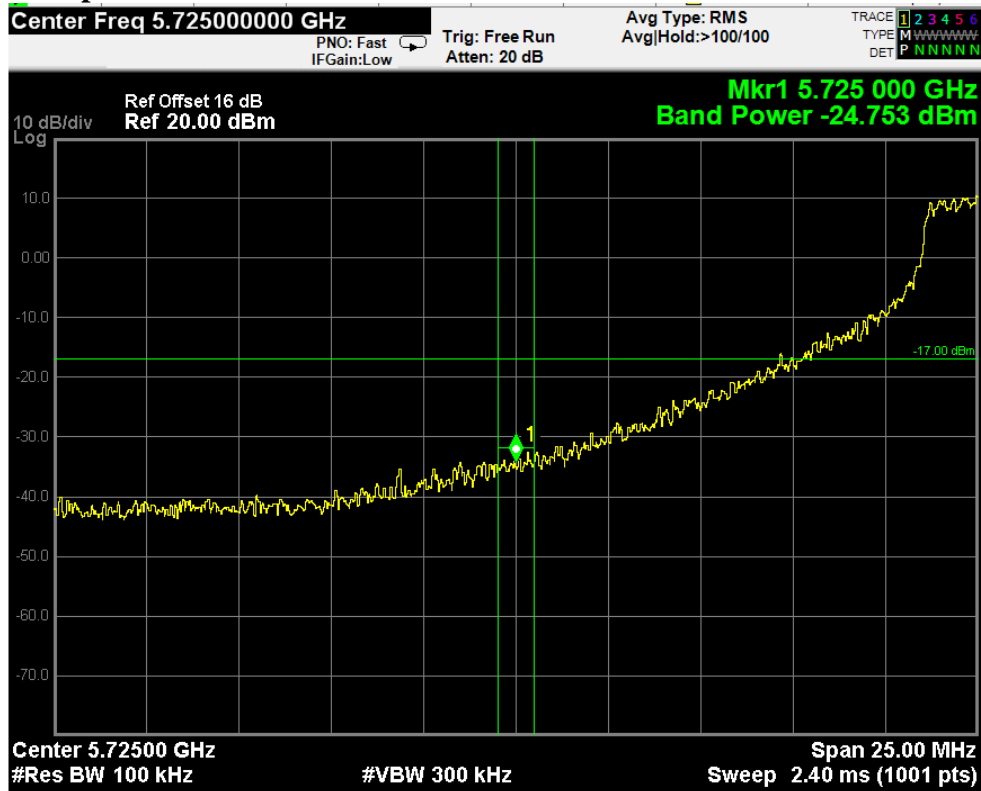


### 802.11n HT20 band-edge Ch149

#### Left antenna port:



#### Right antenna port:



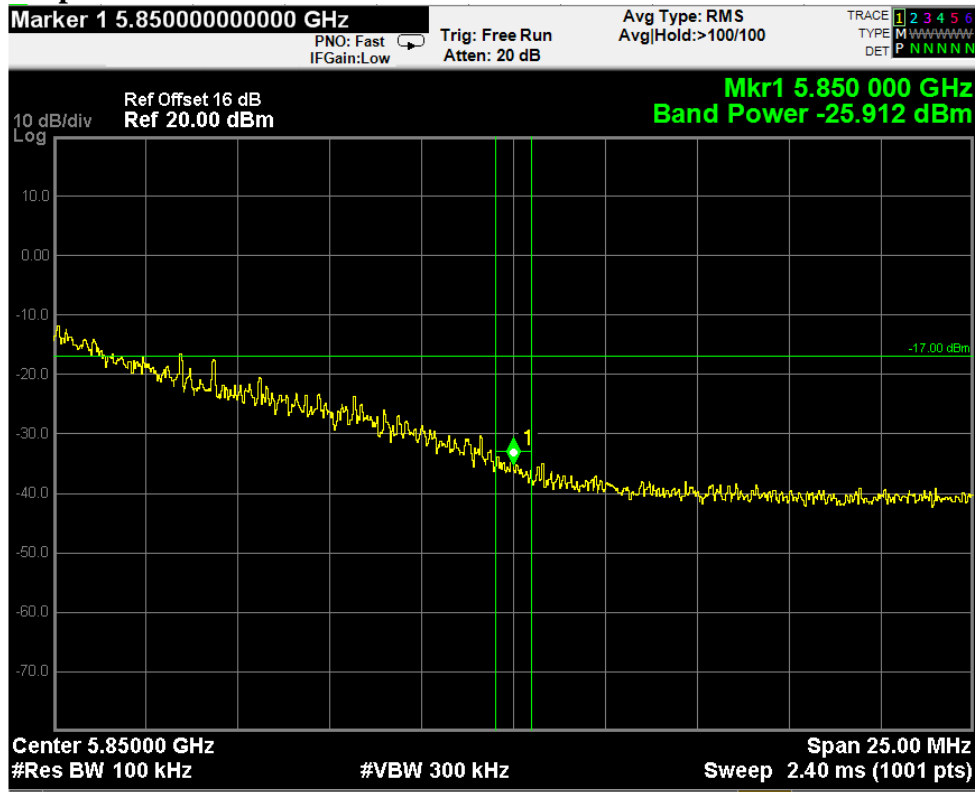
Total EIRP calculated:

Left antenna port:-22.941dBm , Right antenna port: -24.753dBm

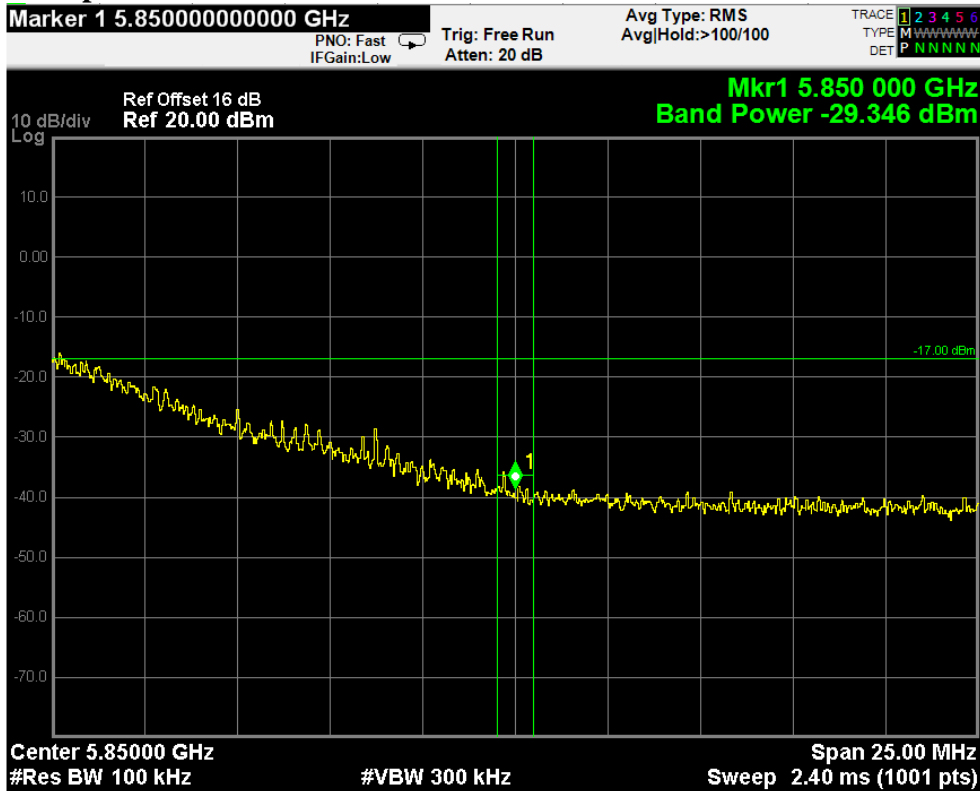
**Total: -20.74dBm**

### 802.11n HT20 band-edge Ch165

#### Left antenna port:



#### Right antenna port:



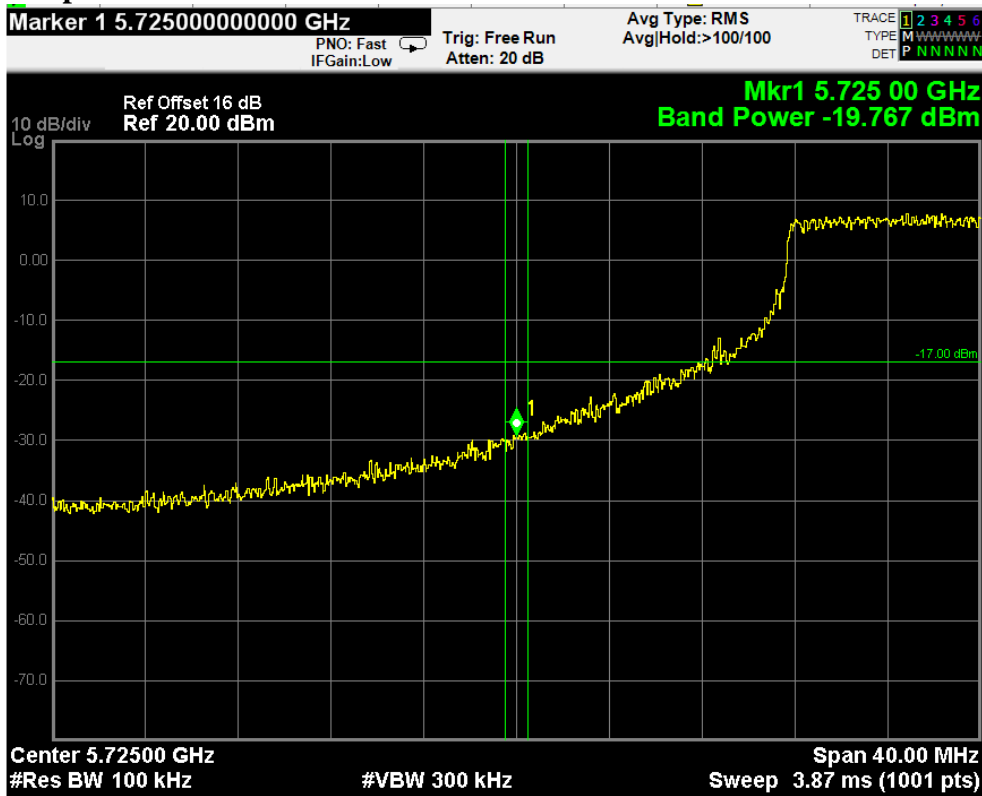
Total EIRP calculated:

Left antenna port:-25.912dBm , Right antenna port: -29.346dBm

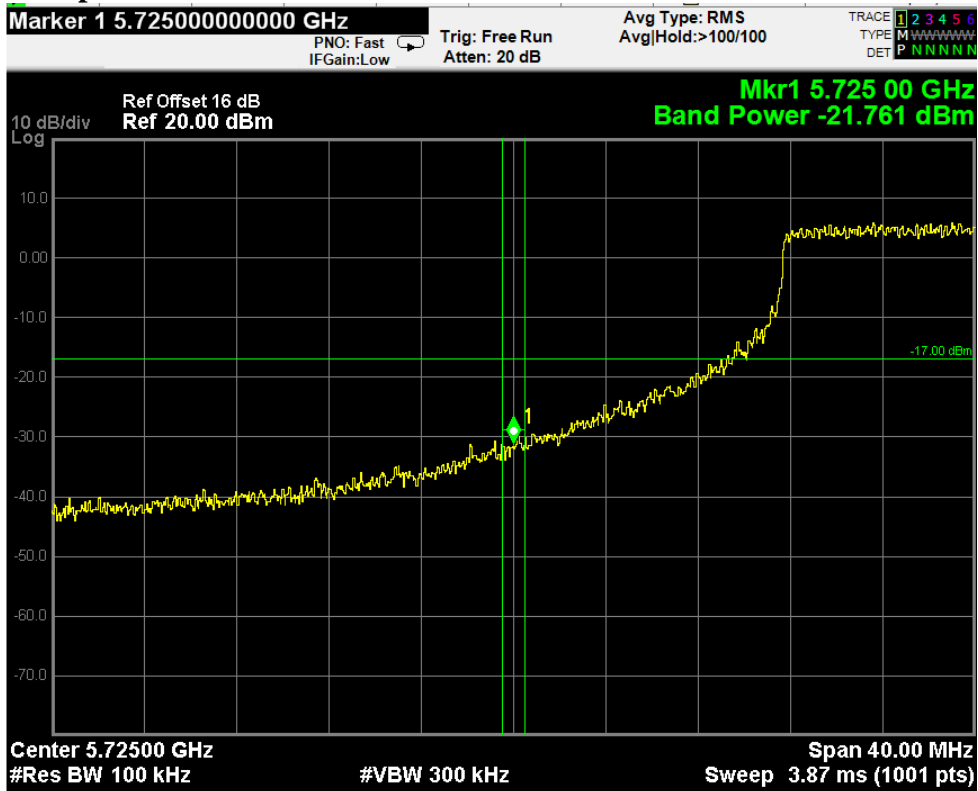
**Total: -24.29dBm**

### 802.11n HT40 band-edge Ch151

#### Left antenna port:



#### Right antenna port:



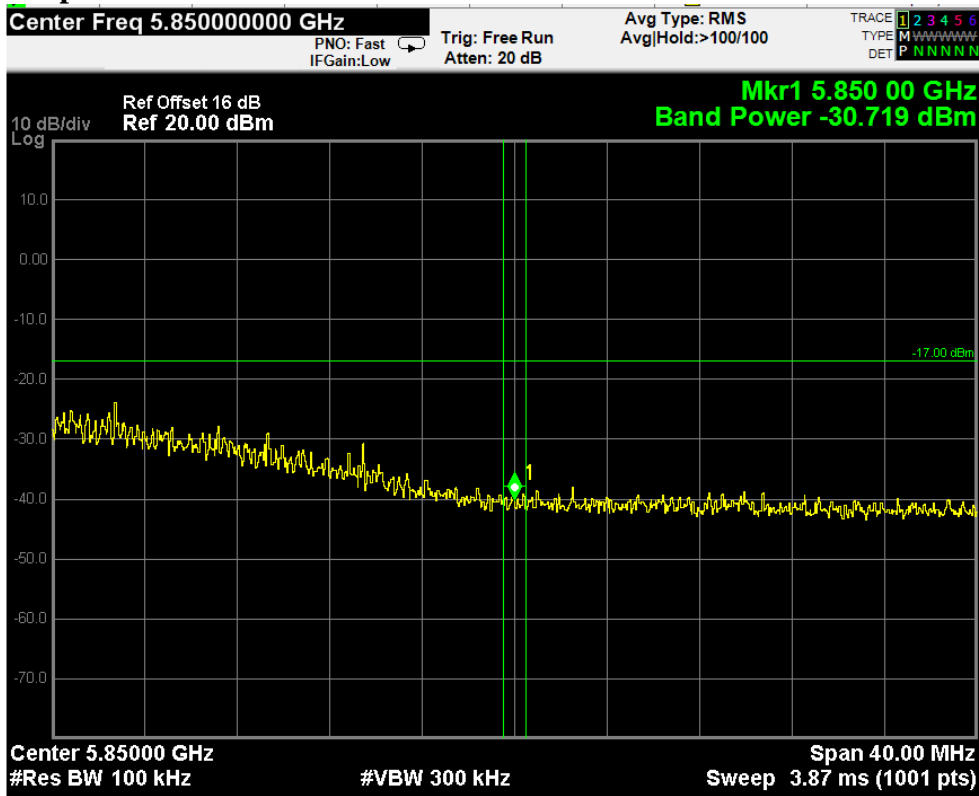
Total EIRP calculated:

Left antenna port:-19.767dBm , Right antenna port: -21.761dBm

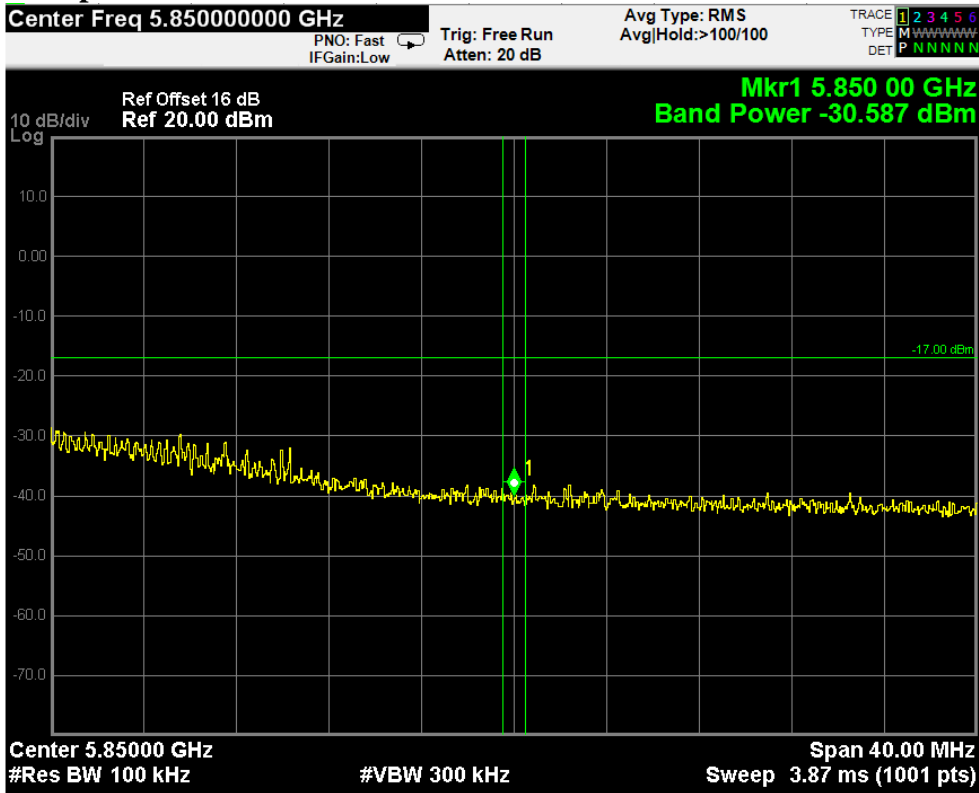
**Total: -17.64dBm**

### 802.11n HT40 band-edge Ch159

#### Left antenna port:



#### Right antenna port:



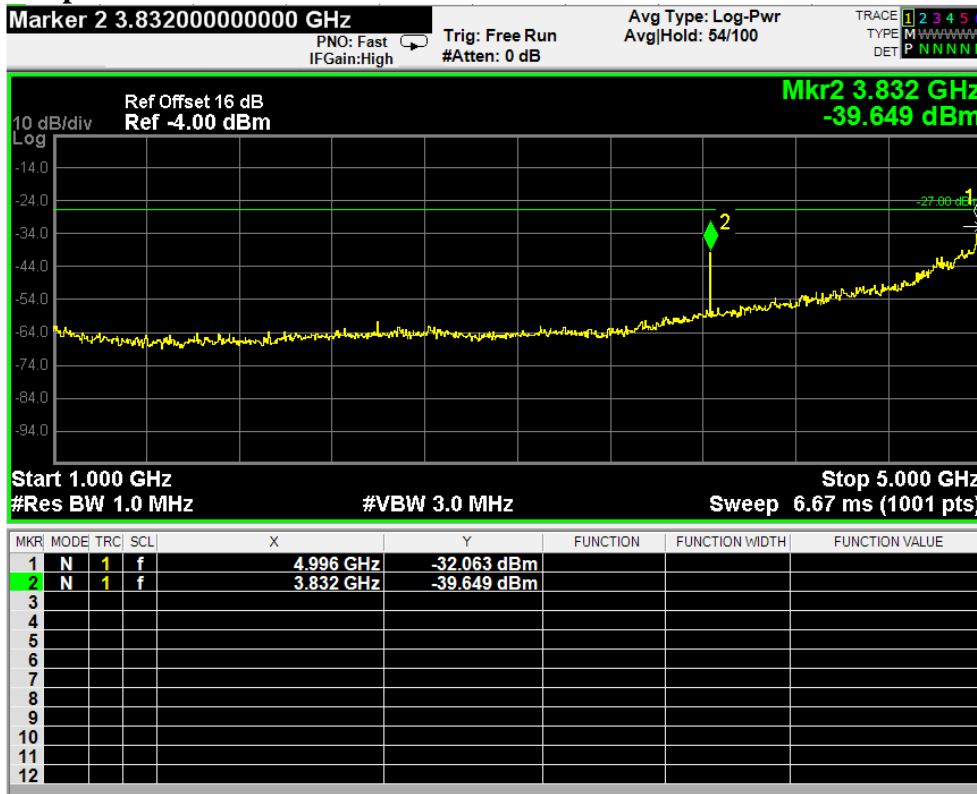
Total EIRP calculated:

Left antenna port:-30.719dBm , Right antenna port: -30.587dBm

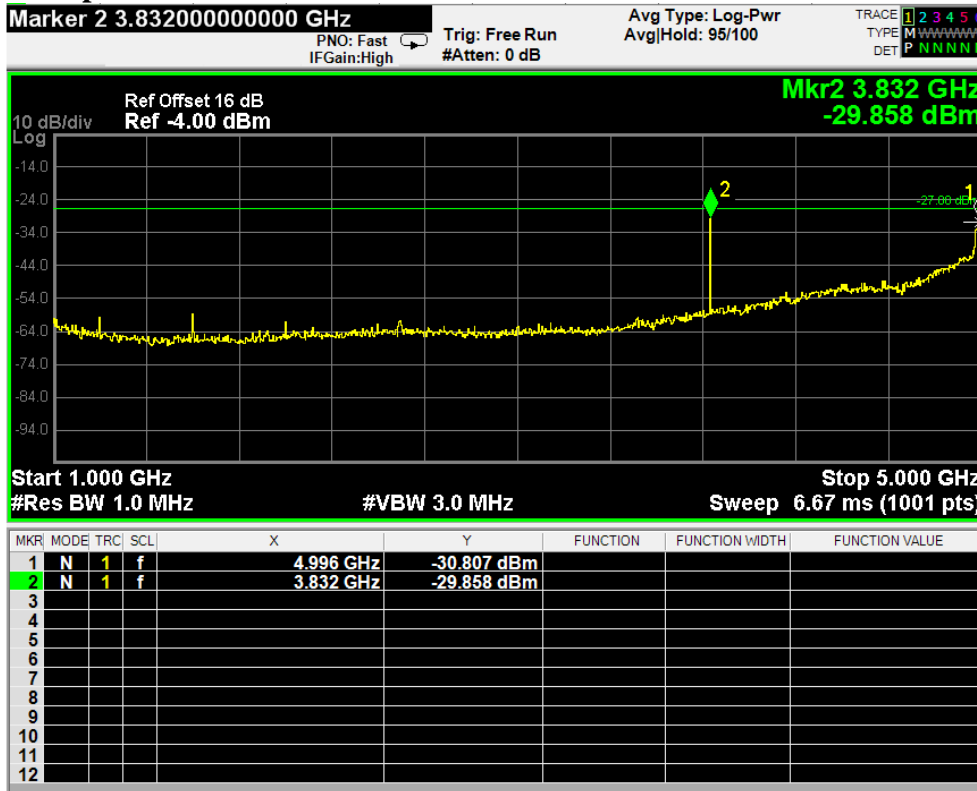
**Total: -27.64dBm**

### Unwanted Emissions 802.11a Ch 149

#### Left antenna port:



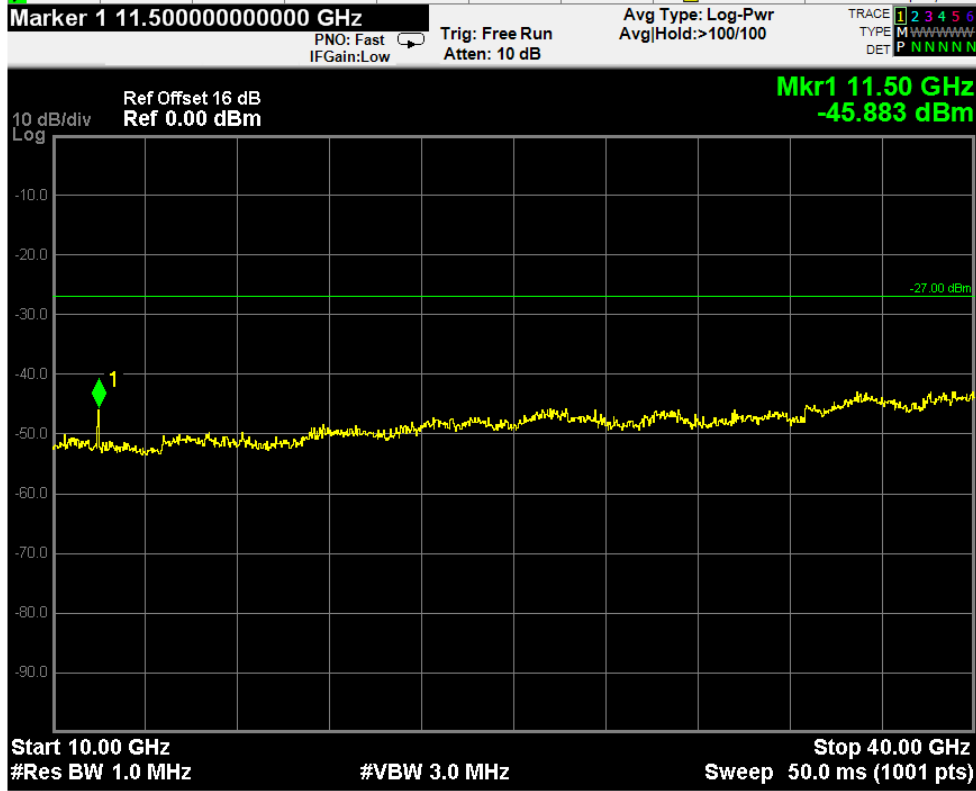
#### Right antenna port:



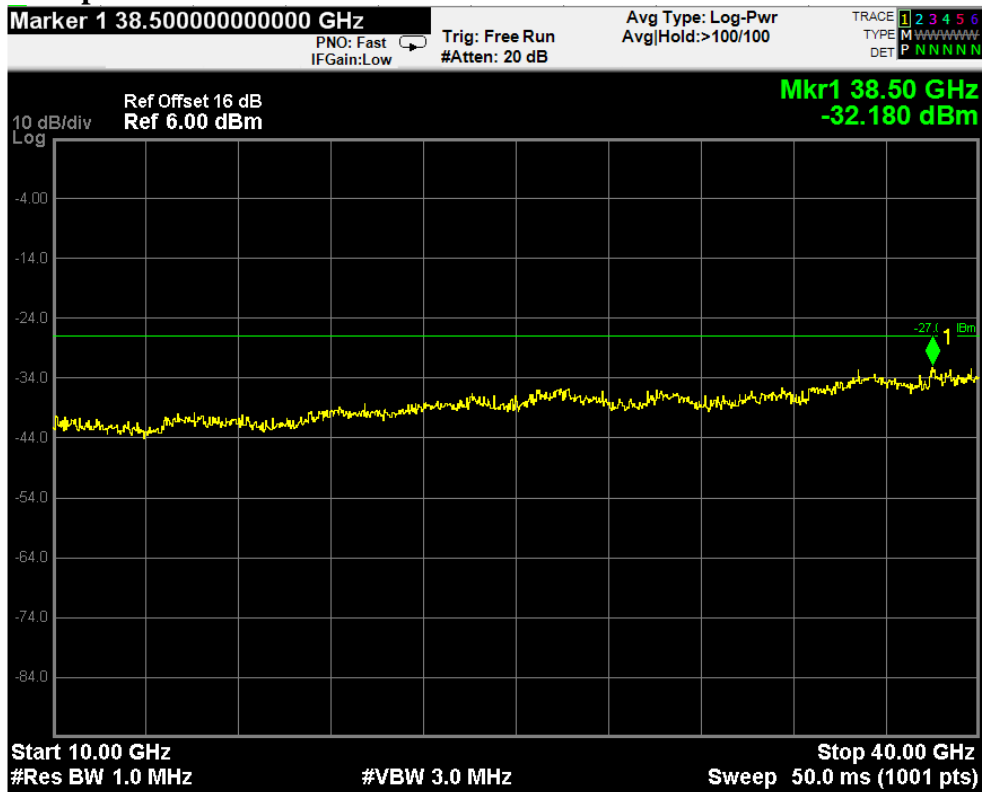
Calculated total emission @3.832GHz = -29.42 dBm  
 @ 4.996GHz = -28.38 dBm



Left antenna port:

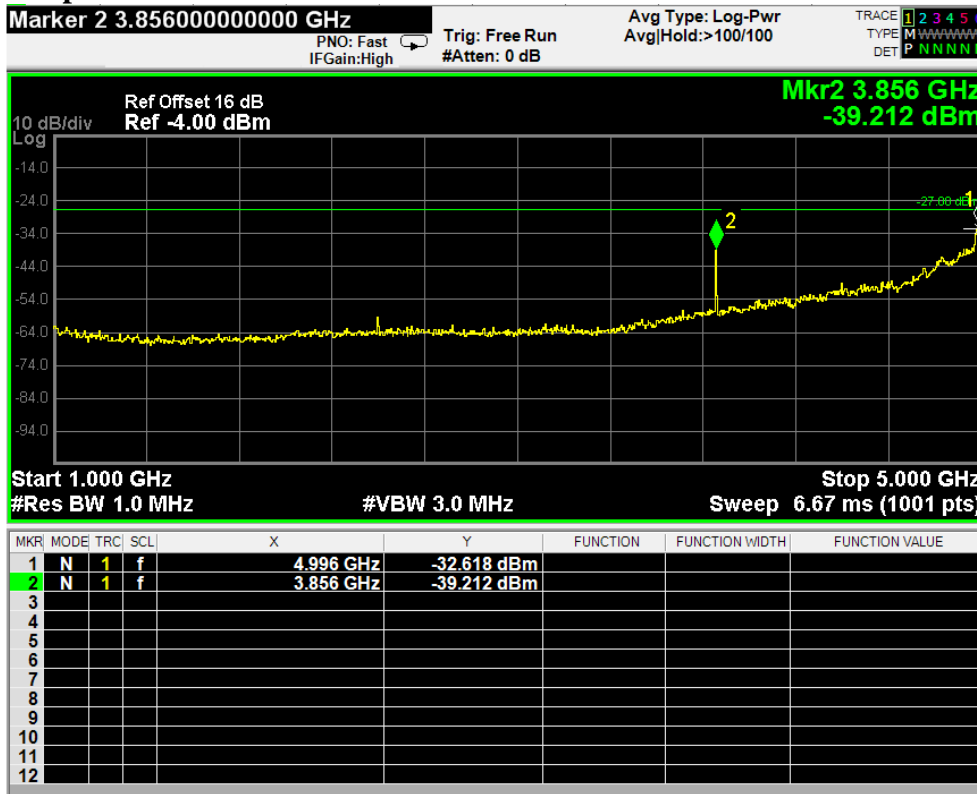


Right antenna port:

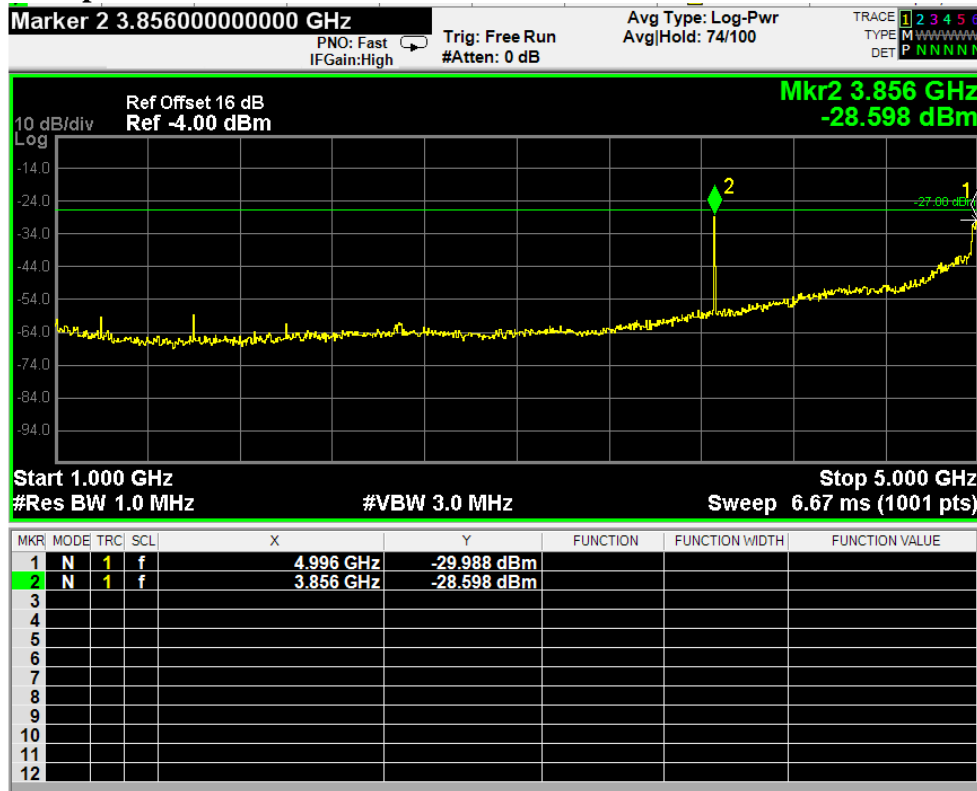


### Unwanted Emissions 802.11a Ch 157

#### Left antenna port:



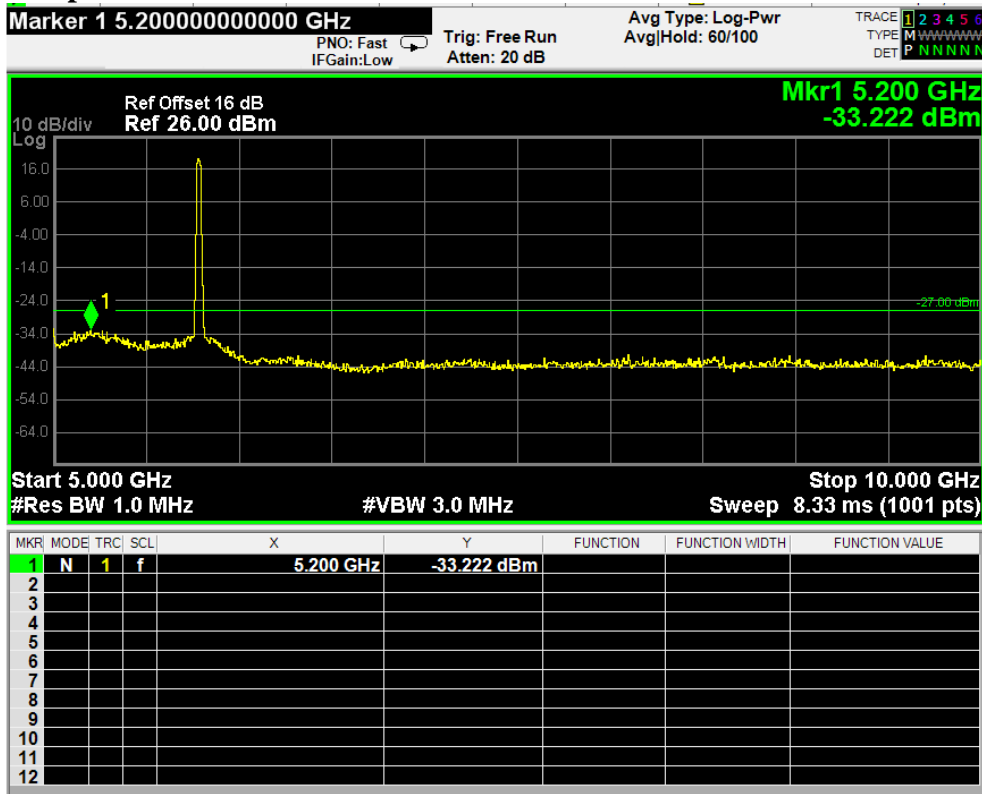
#### Right antenna port:



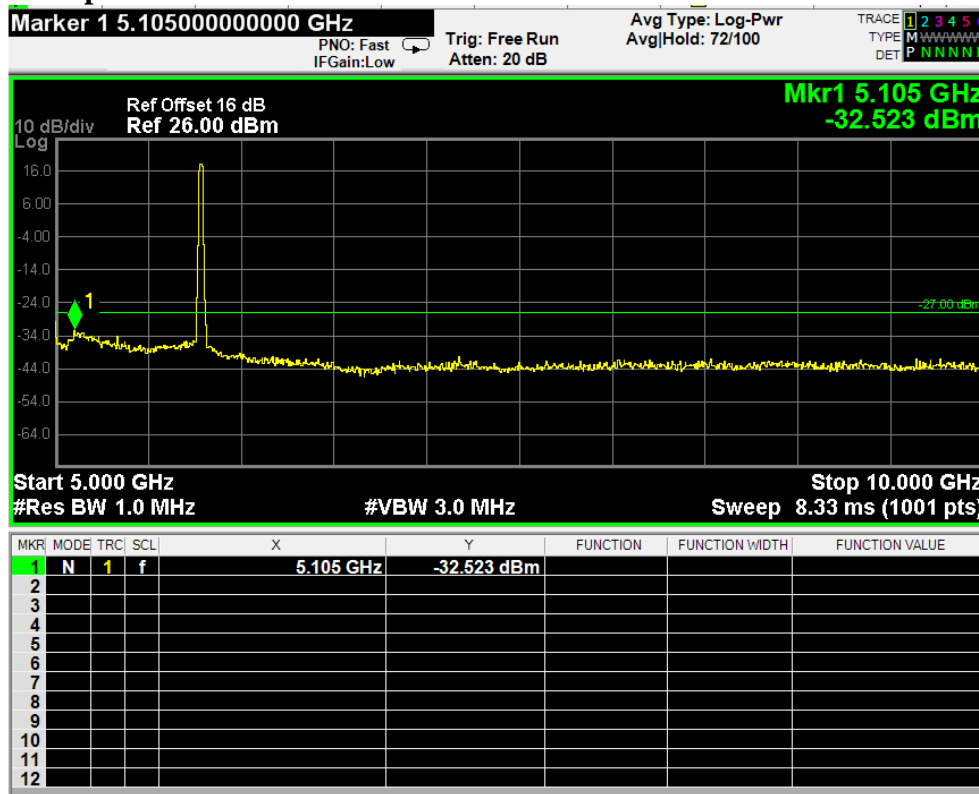
Calculated total emission @3.856GHz = -28.24 dBm  
 @ 4.996GHz = -28.10 dBm



**Left antenna port:**

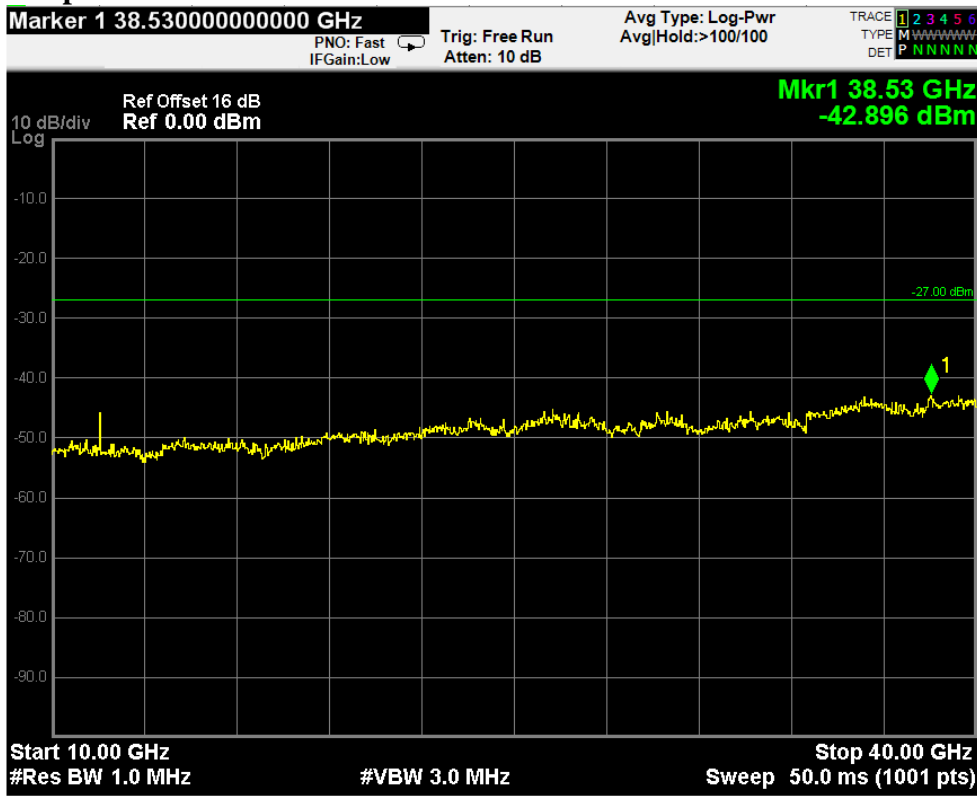


**Right antenna port:**

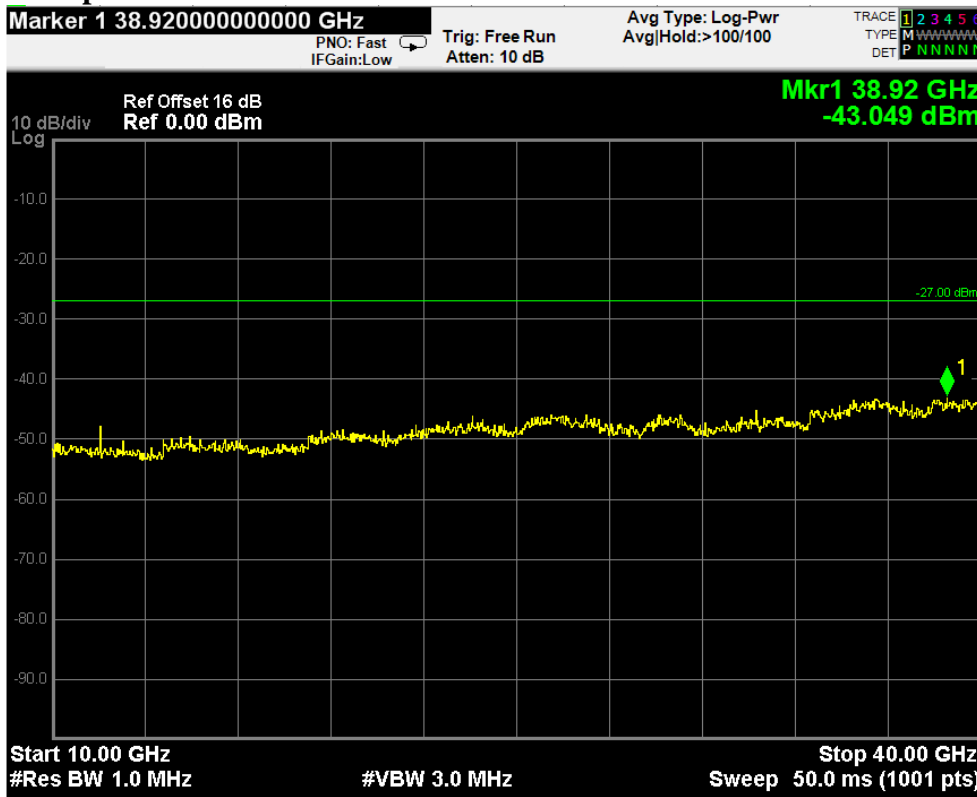


Calculated total emission = -29.85 dBm

Left antenna port:

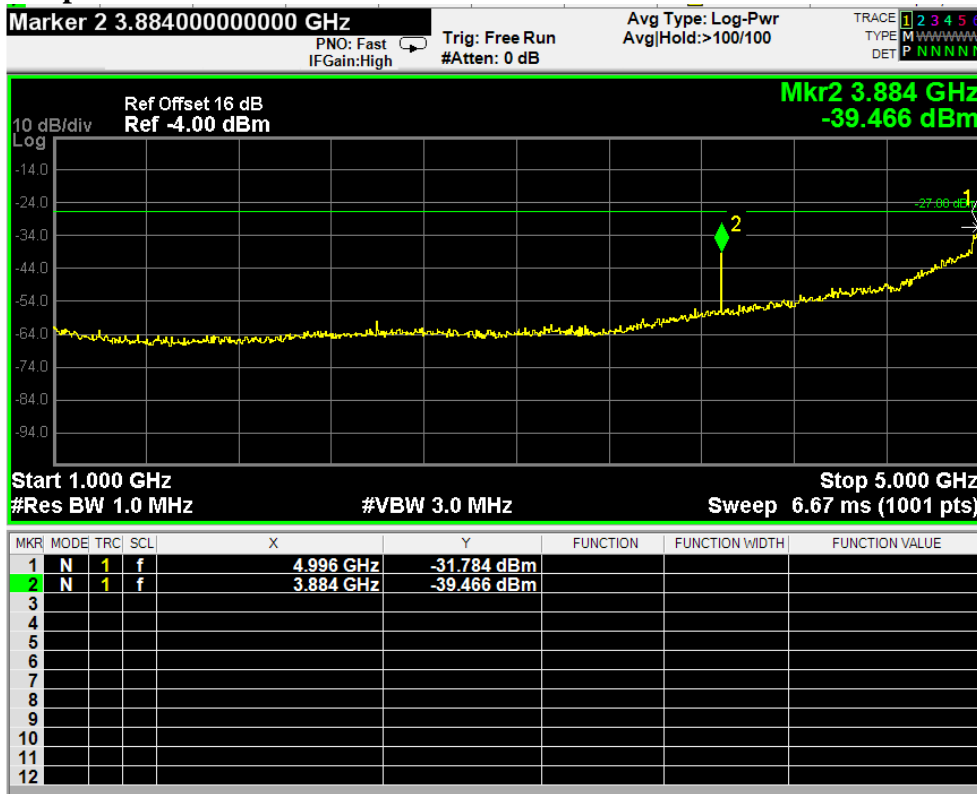


Right antenna port:

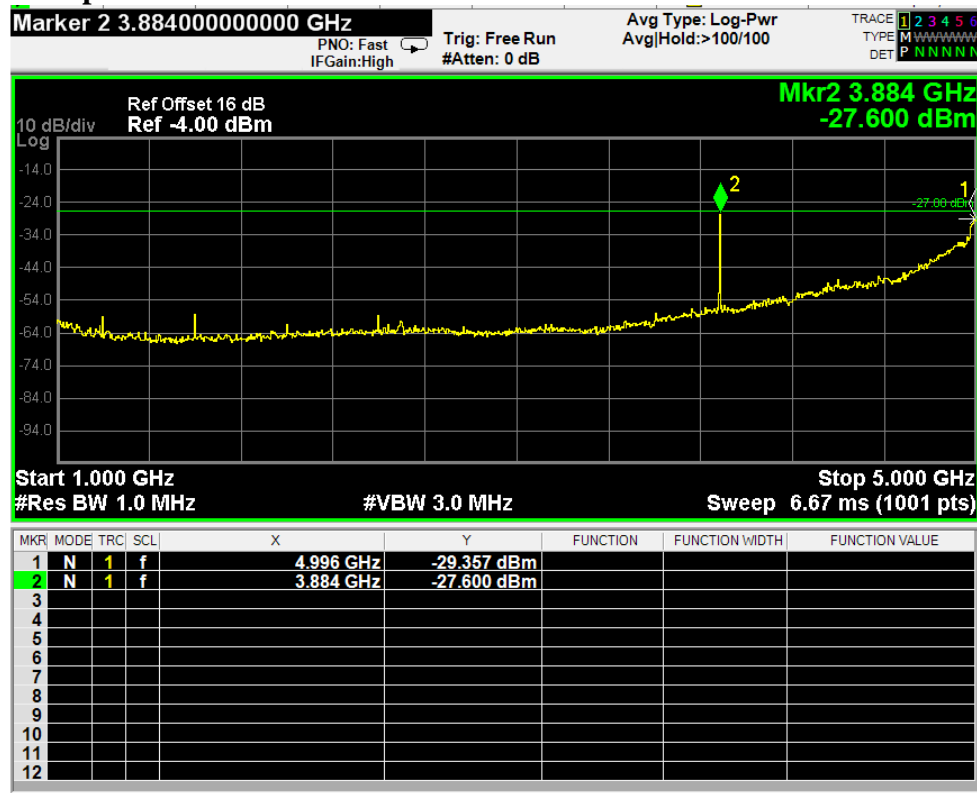


## Unwanted Emissions 802.11a Ch 165

### Left antenna port:

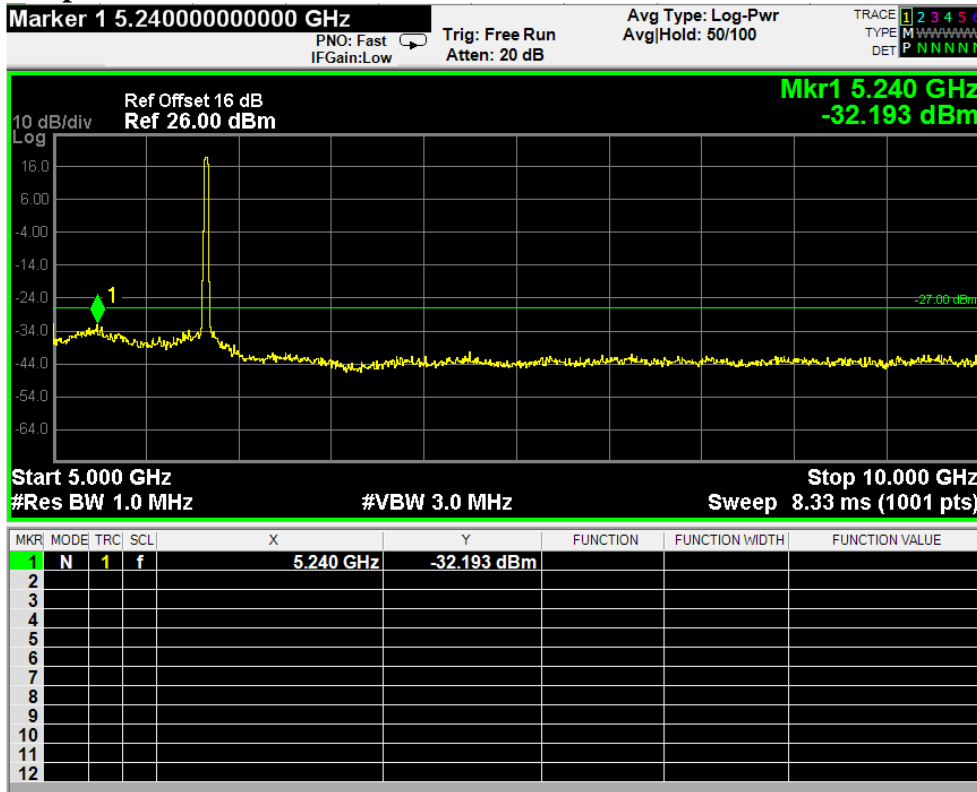


### Right antenna port:

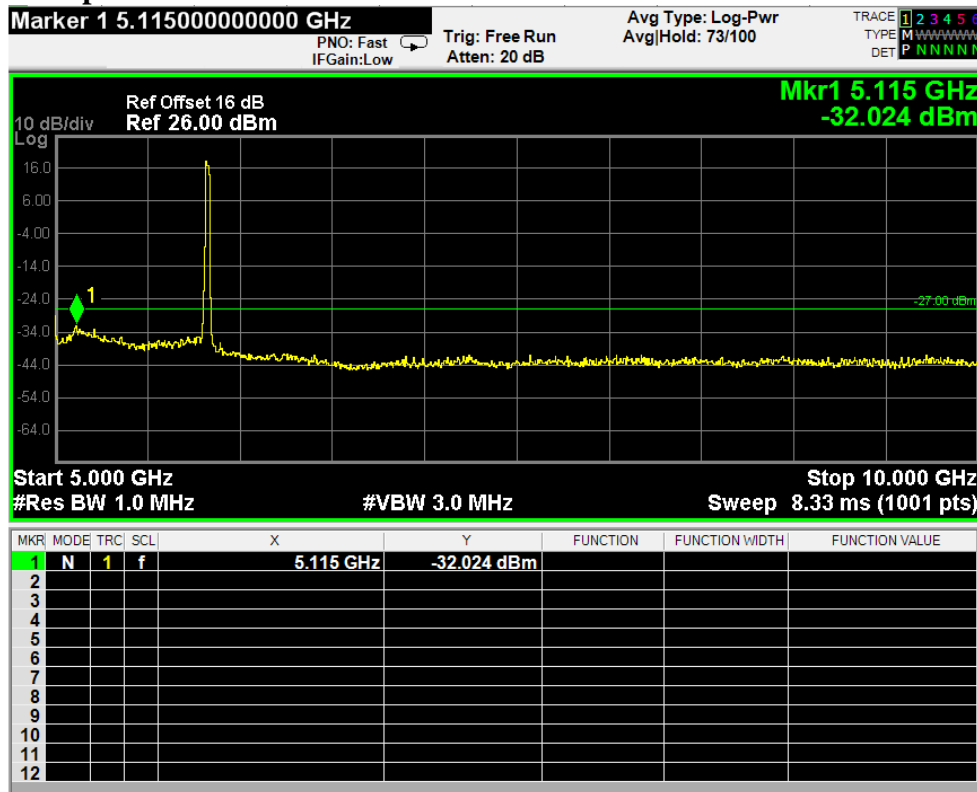


Calculated total emission @3.884GHz = -27.33 dBm  
 @ 4.996GHz = -27.39 dBm

Left antenna port:

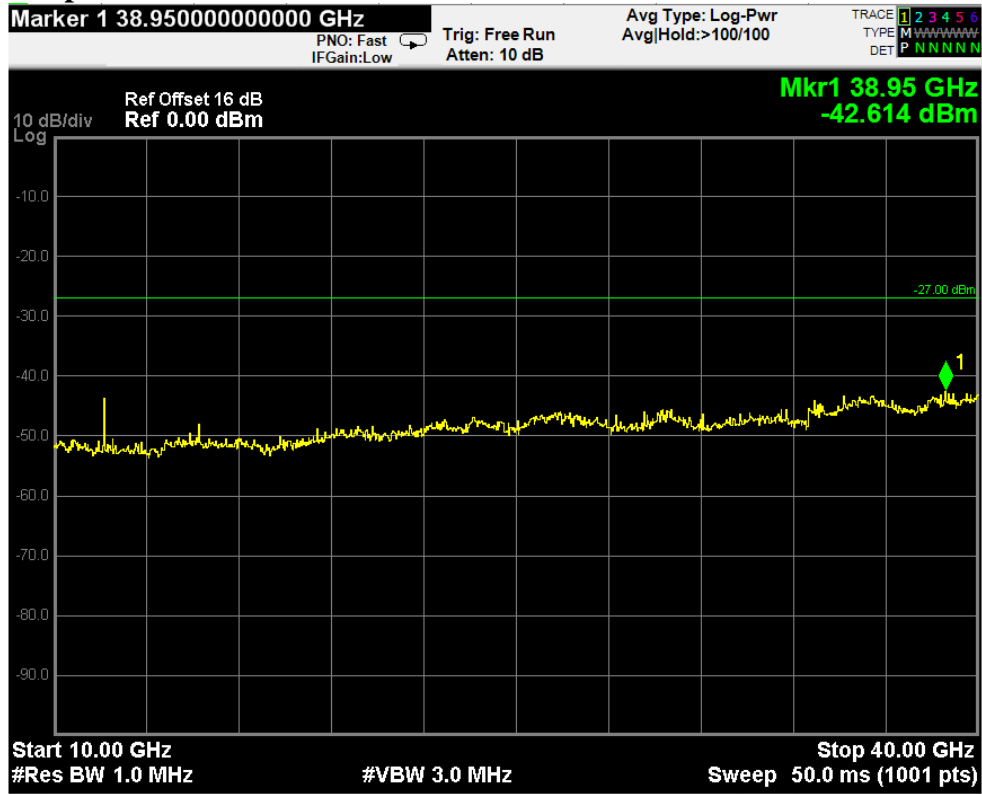


Right antenna port:

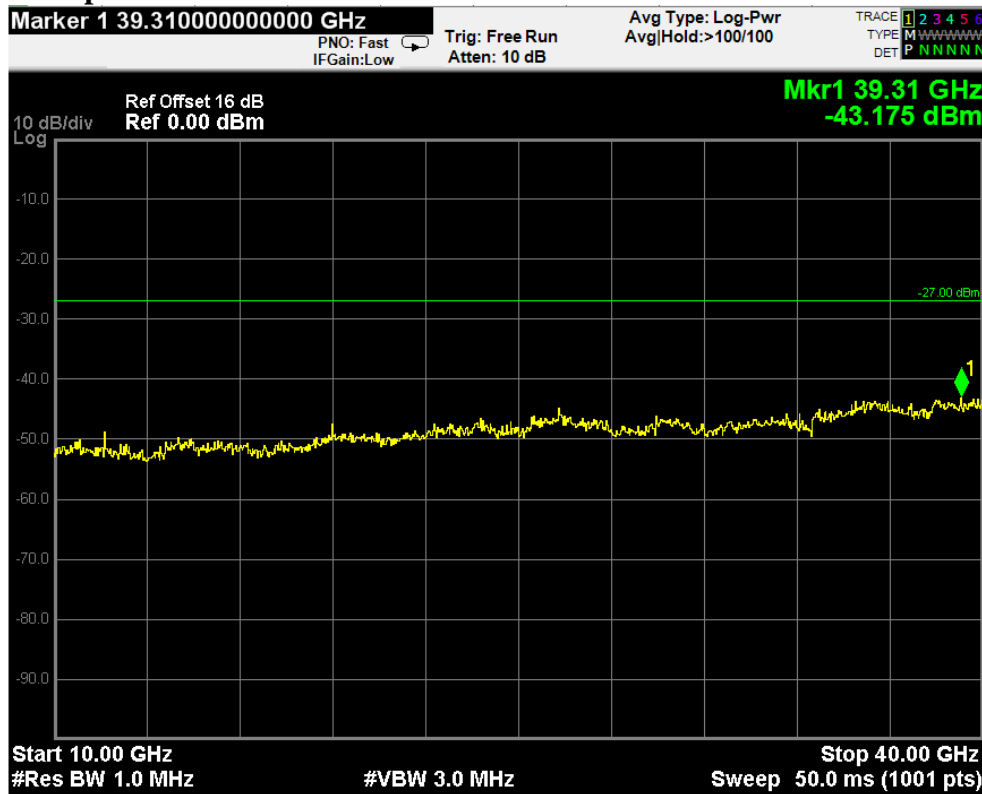


Calculated total emission = -29.10 dBm

Left antenna port:

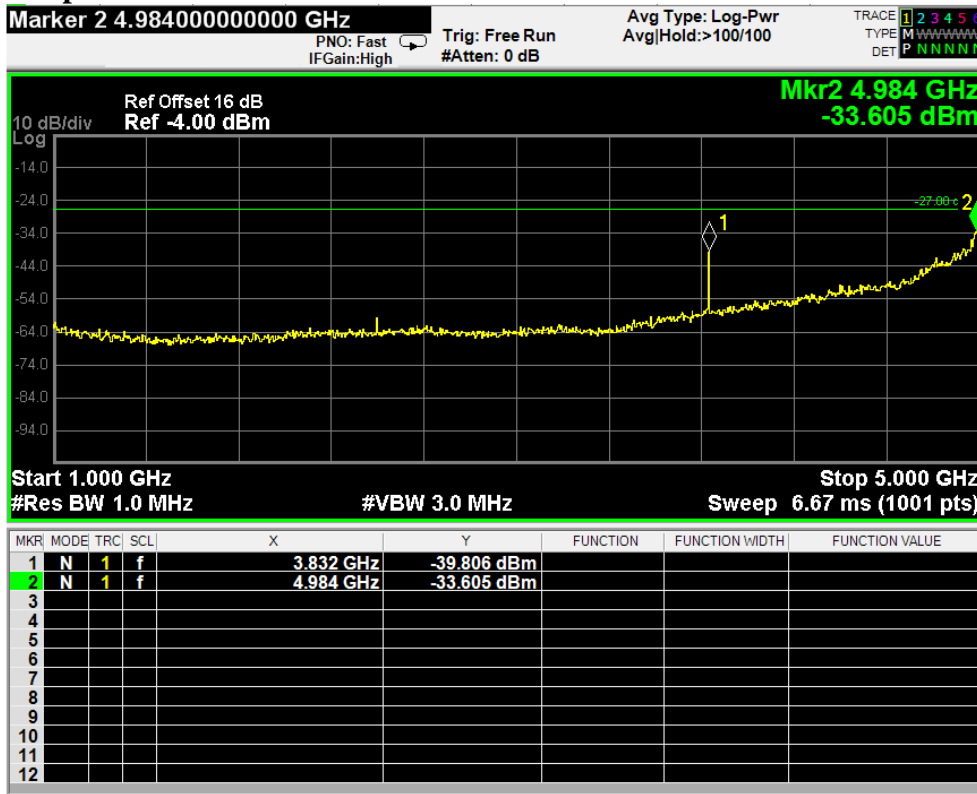


Right antenna port:

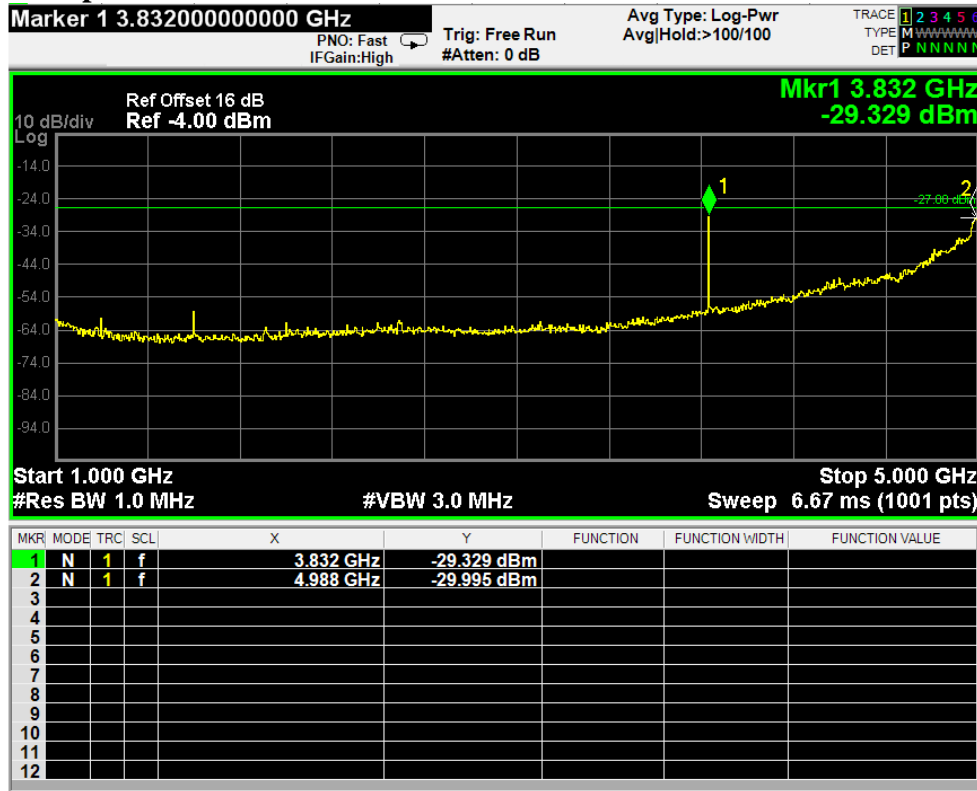


### Unwanted Emissions 802.11n HT20 Ch 149

#### Left antenna port:

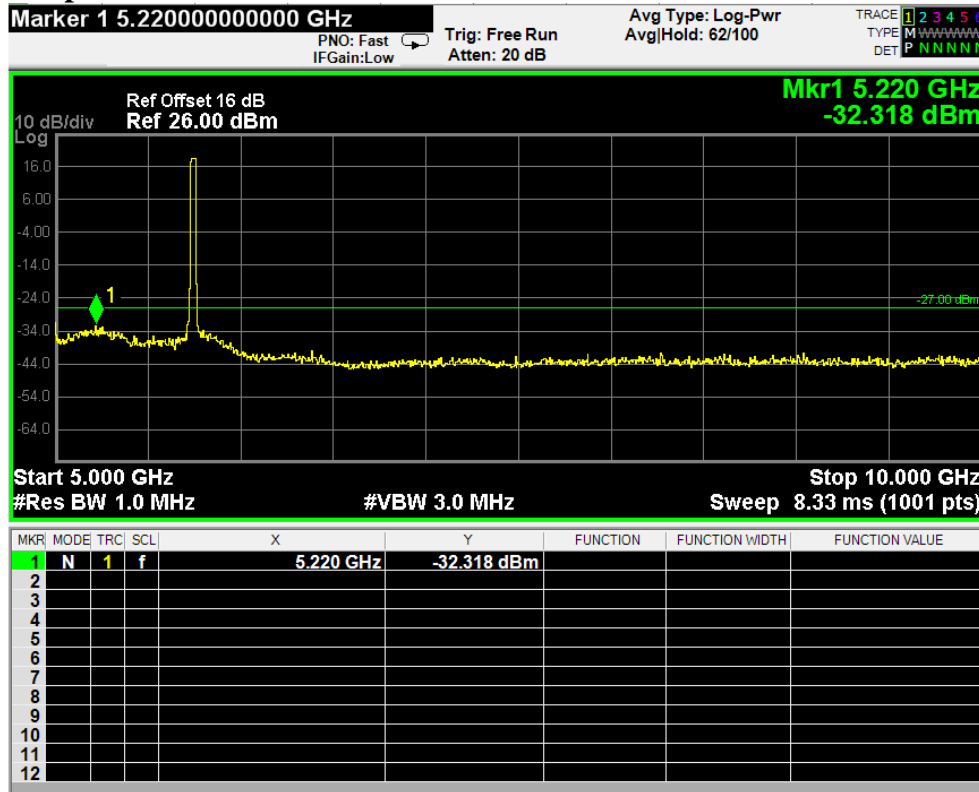


#### Right antenna port:

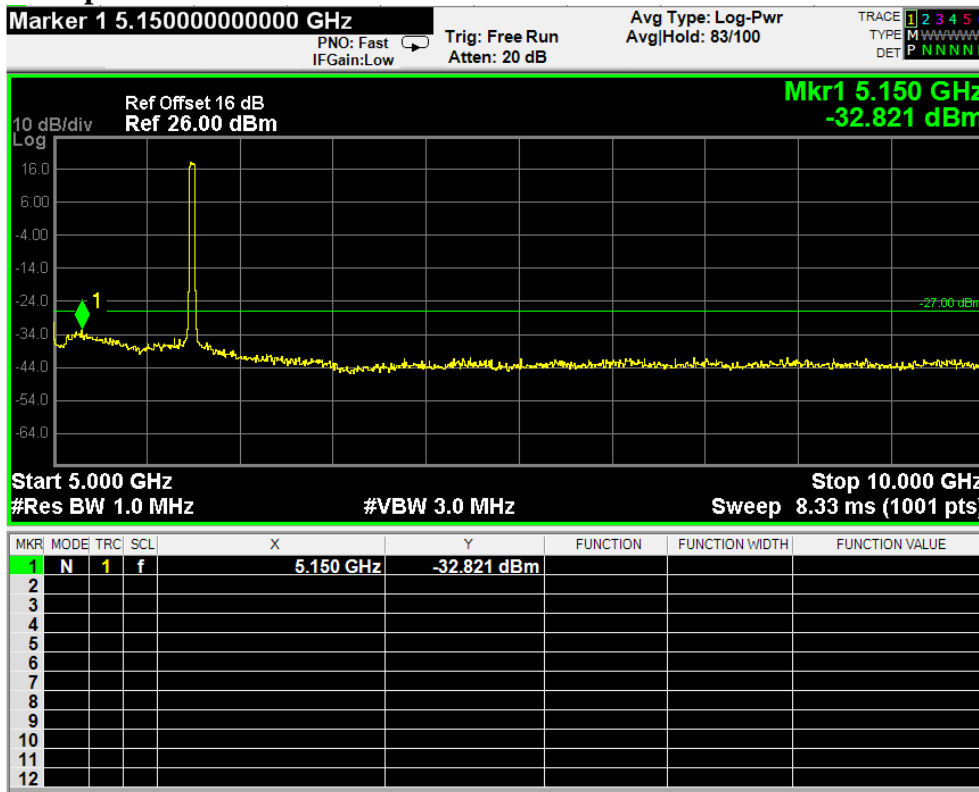


Calculated total emission @3.832GHz = -28.96 dBm  
@ 4.988GHz = -28.42 dBm

**Left antenna port:**

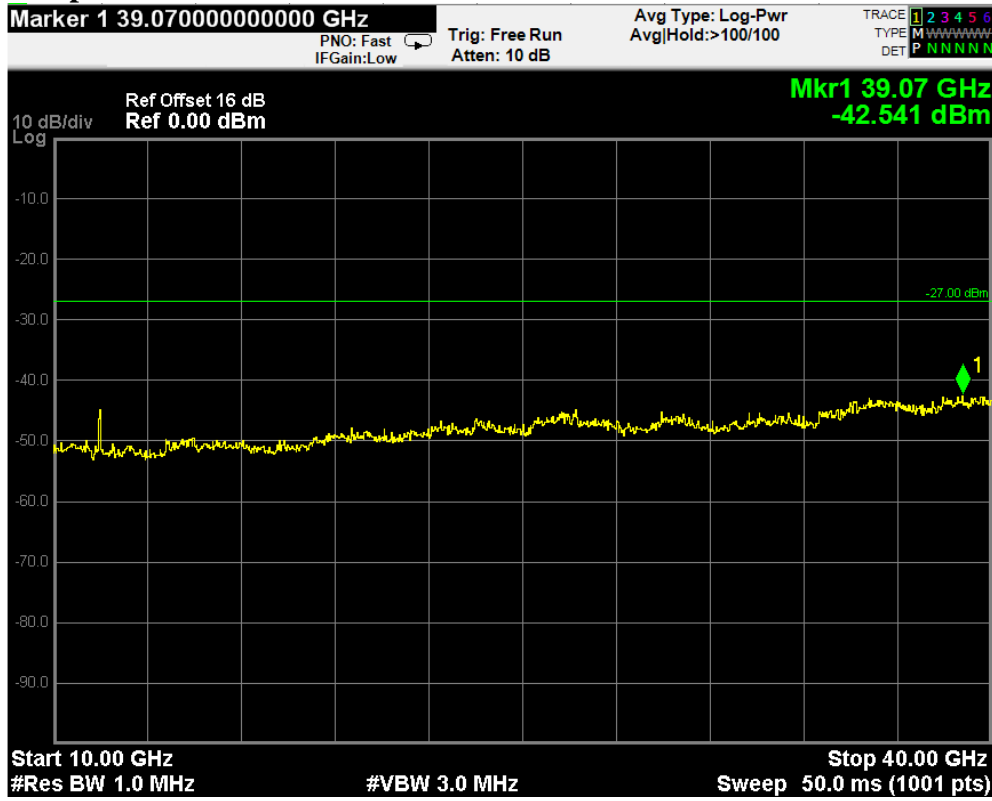


**Right antenna port:**

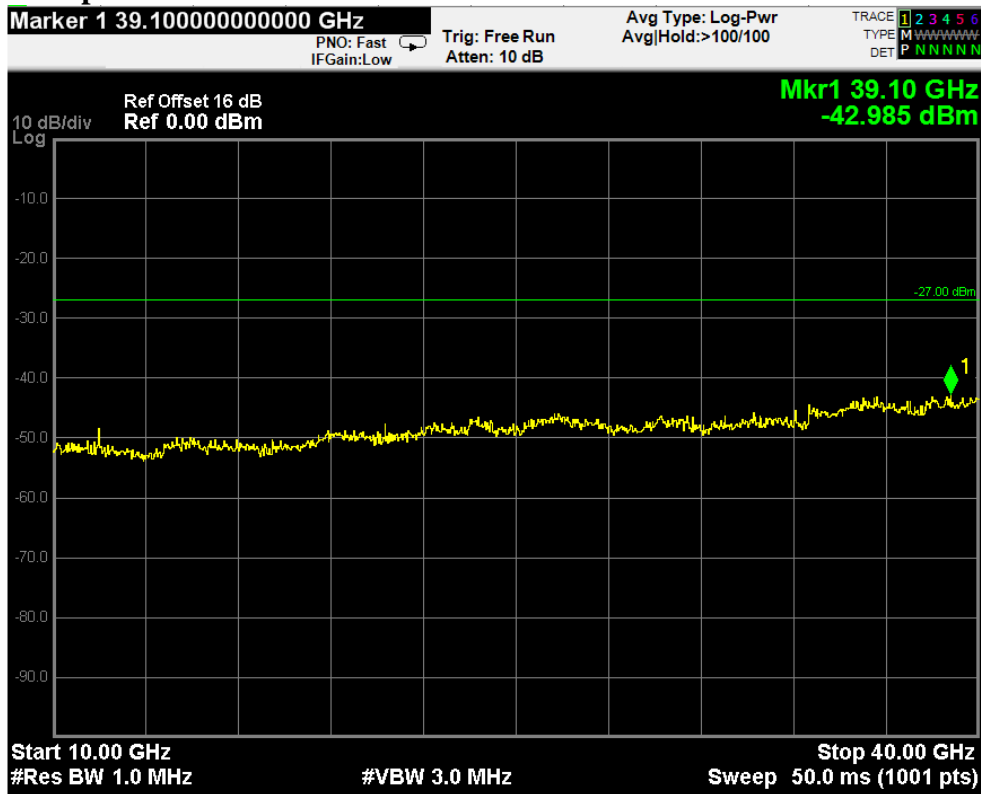


Calculated total emission = -29.55 dBm

Left antenna port:



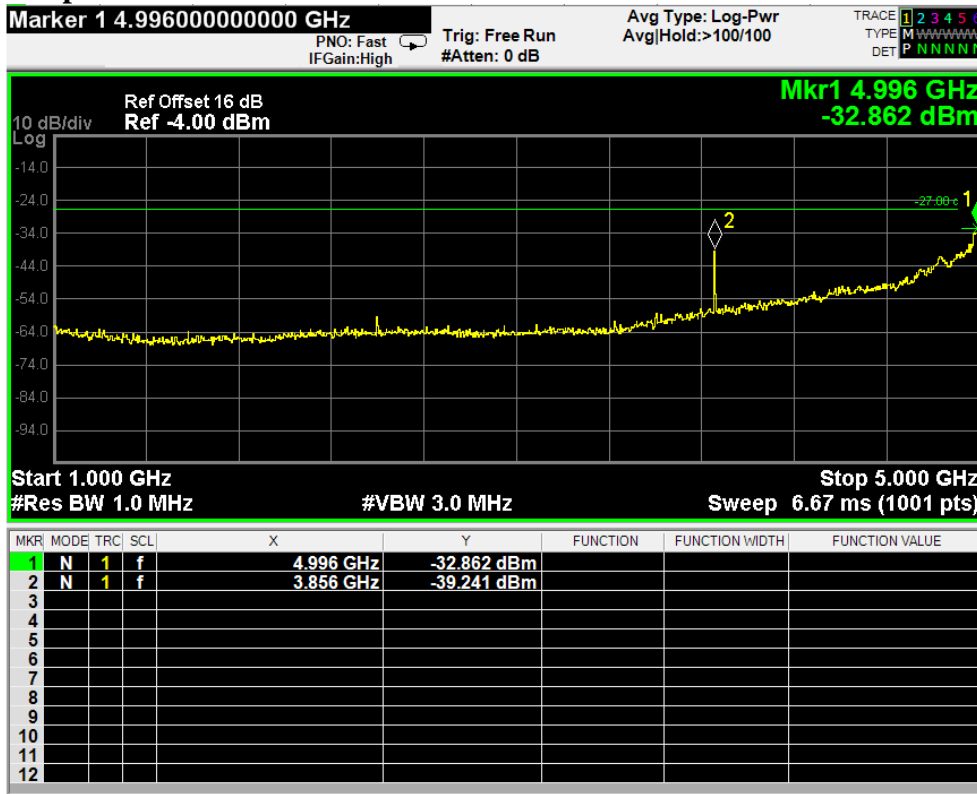
Right antenna port:



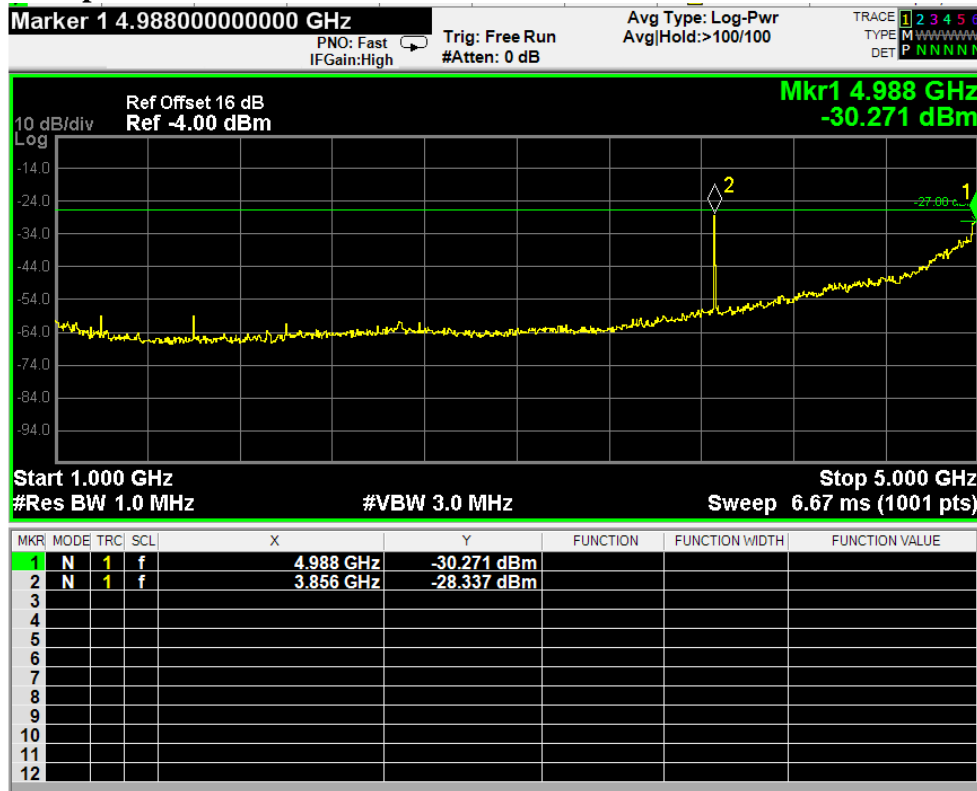


### Unwanted Emissions 802.11n HT20 Ch 157

#### Left antenna port:



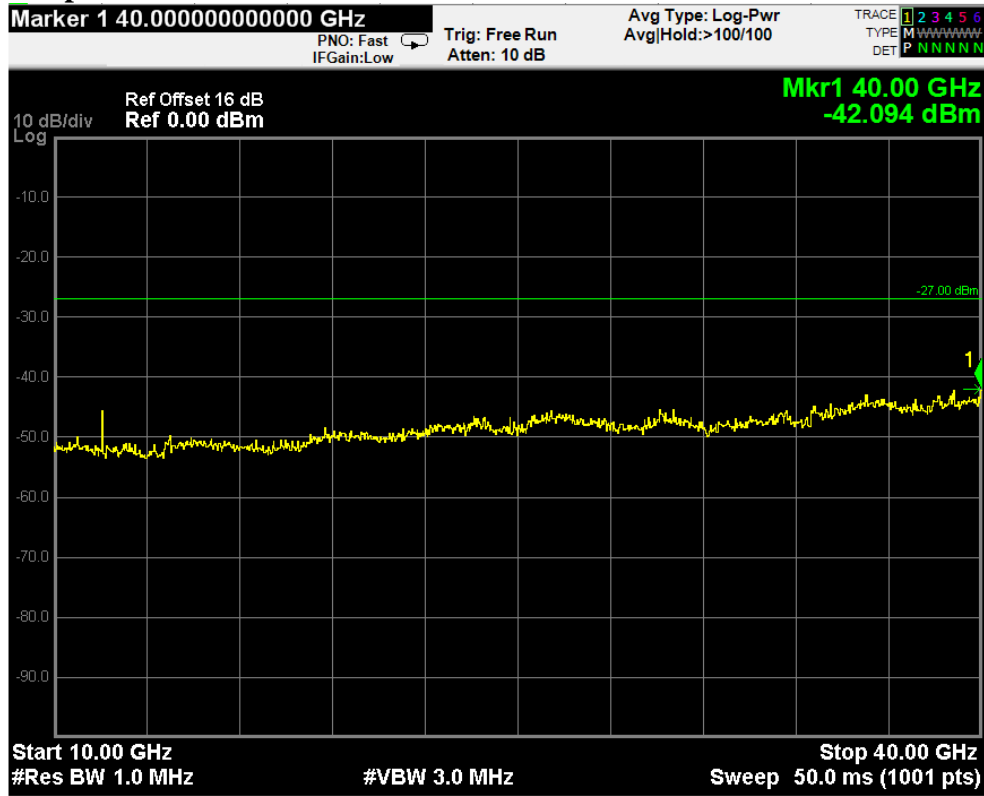
#### Right antenna port:



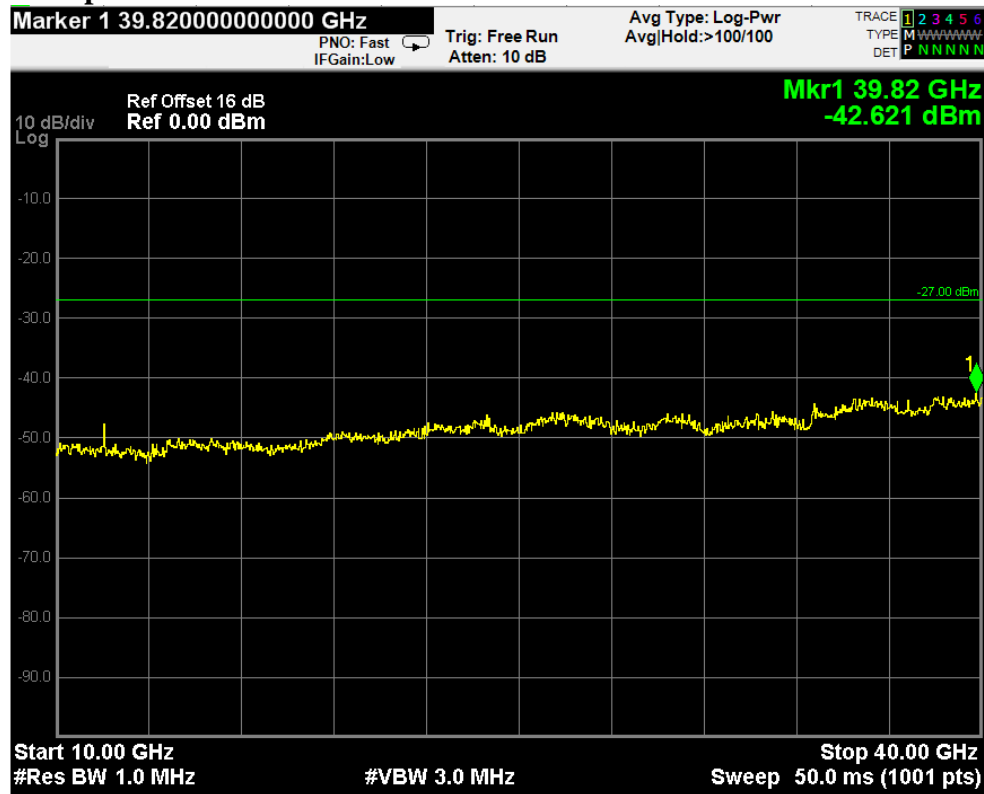
Calculated total emission @3.856GHz = -28.00 dBm  
@ 4.988GHz = -28.37 dBm



Left antenna port:

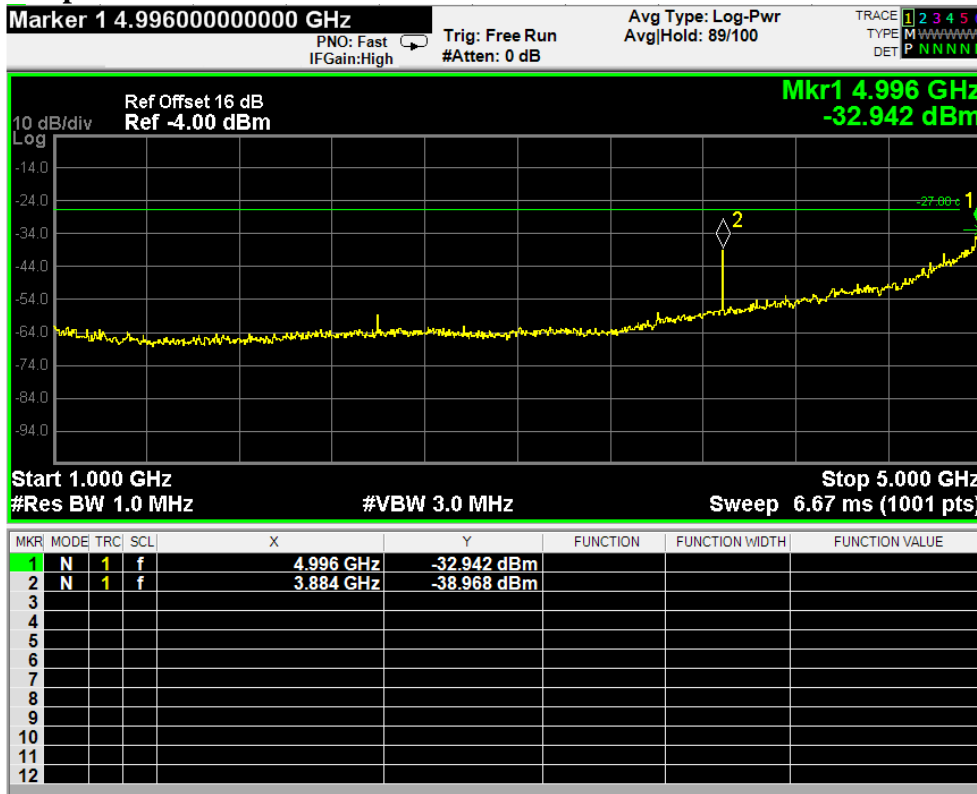


Right antenna port:

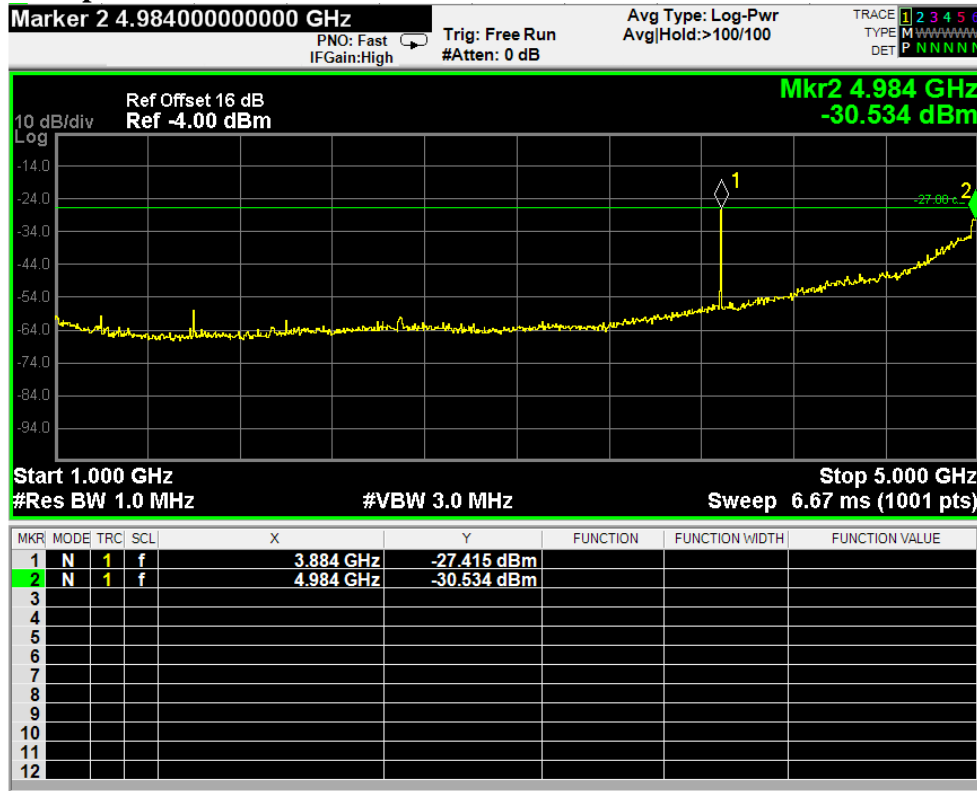


### Unwanted Emissions 802.11n HT20 Ch 165

#### Left antenna port:

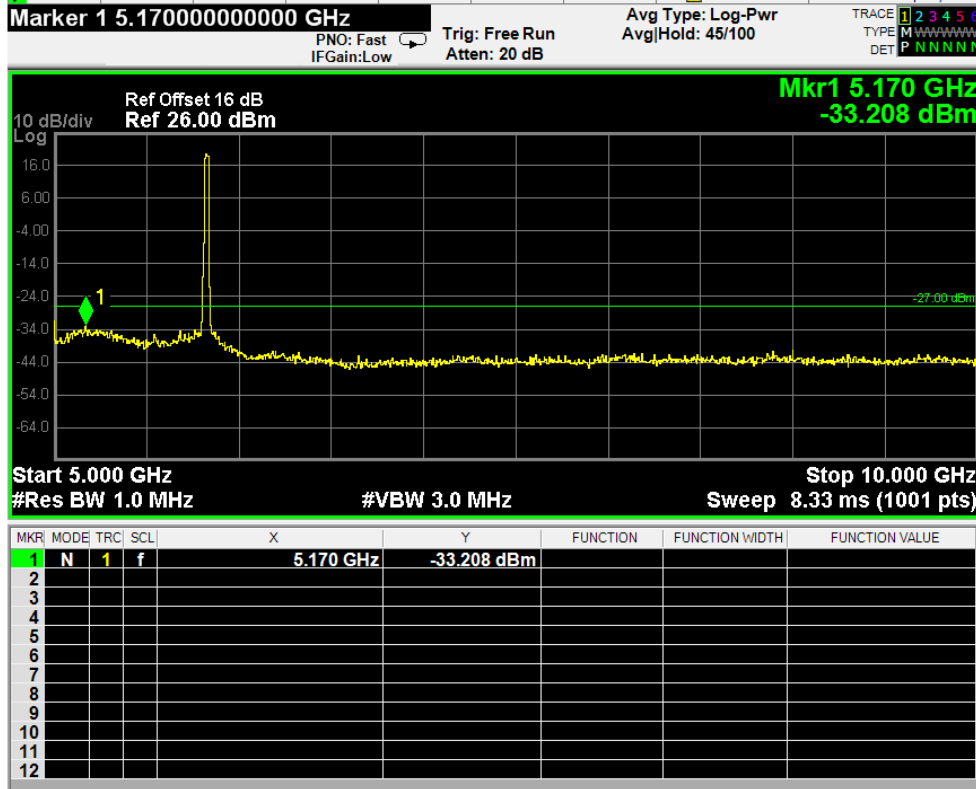


#### Right antenna port:

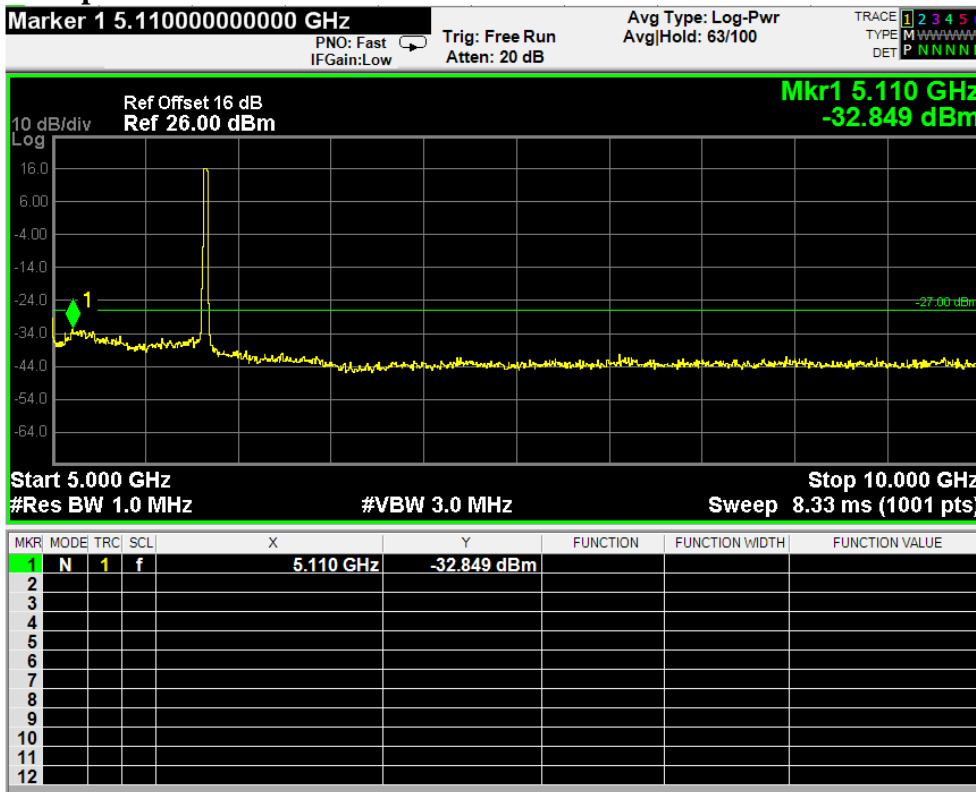


Calculated total emission @3.884GHz = -27.12 dBm  
 @ 4.984GHz = -28.56 dBm

Left antenna port:

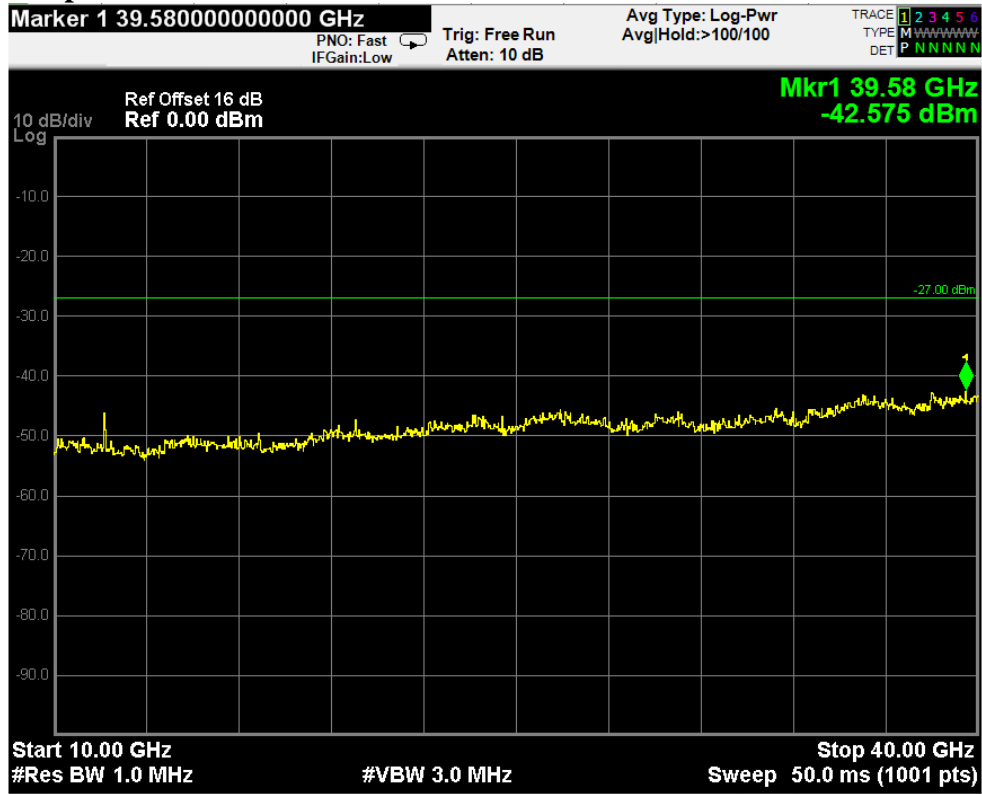


Right antenna port:

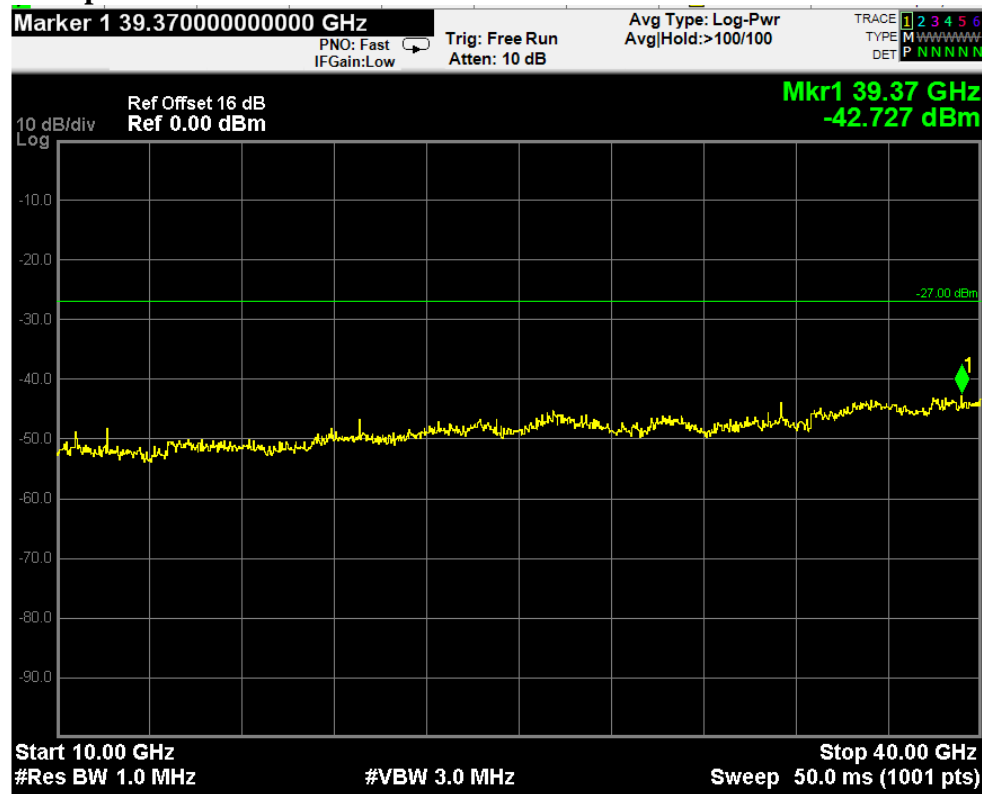


Calculated total emission = -30.01 dBm

Left antenna port:

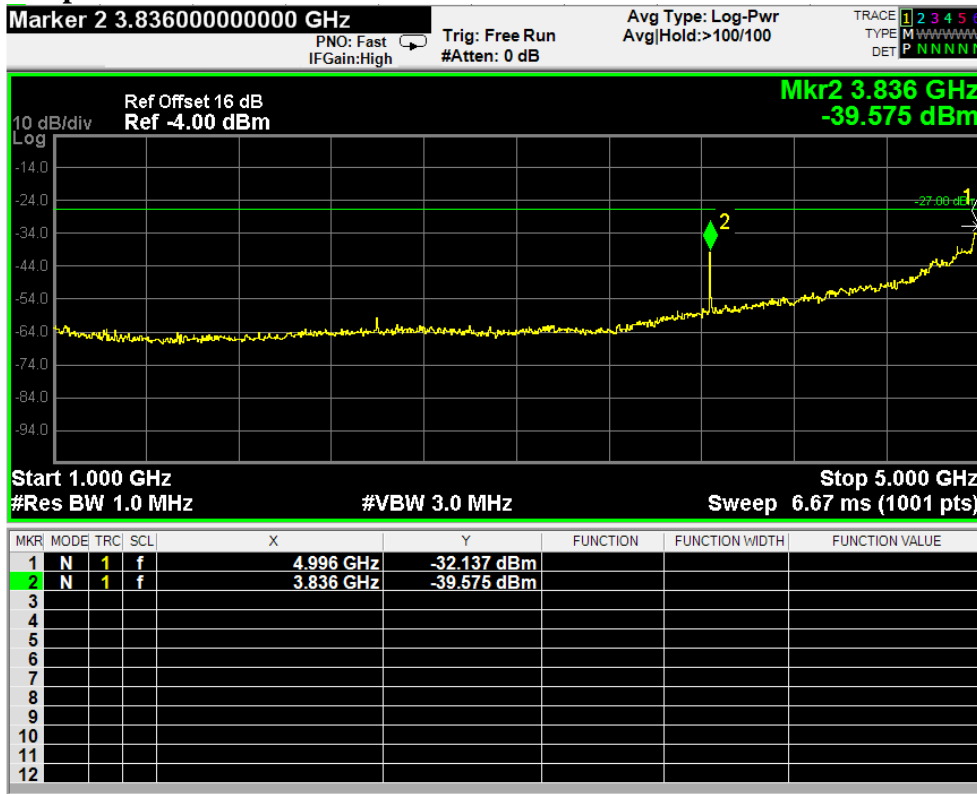


Right antenna port:

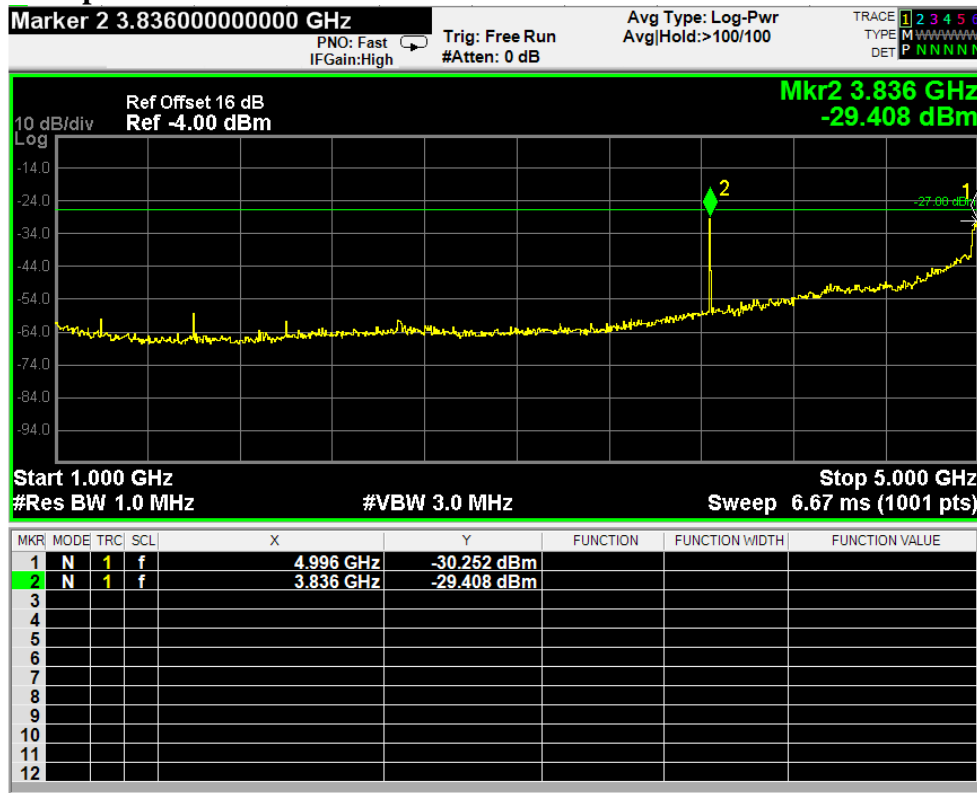


### Unwanted Emissions 802.11n HT40 Ch 151

#### Left antenna port:

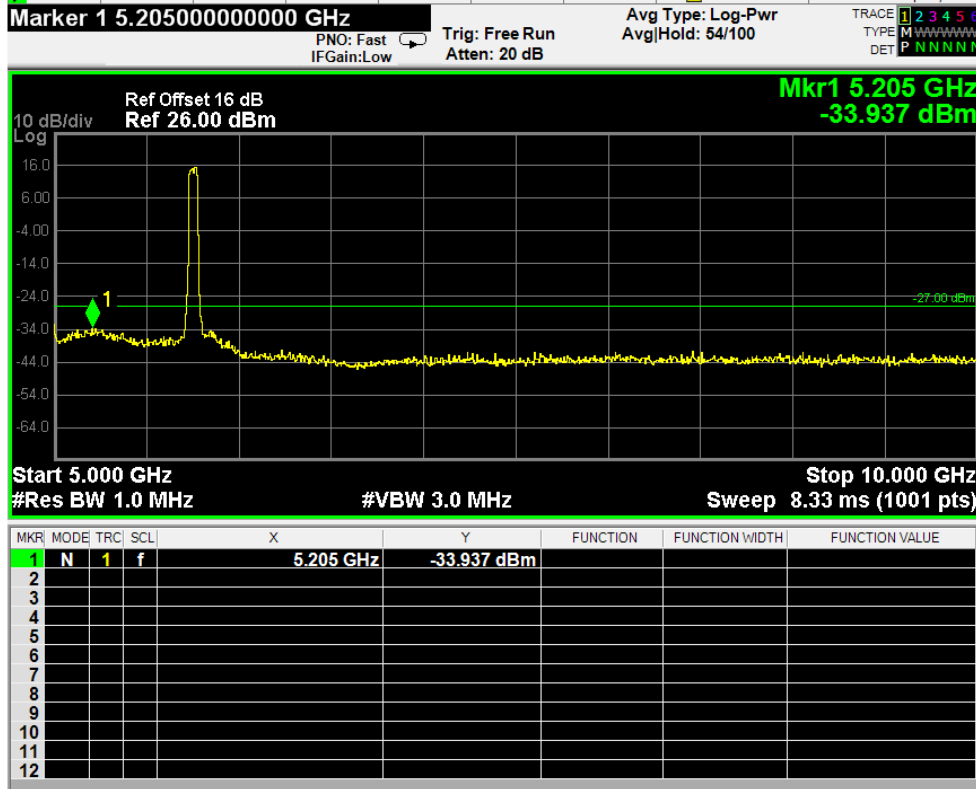


#### Right antenna port:

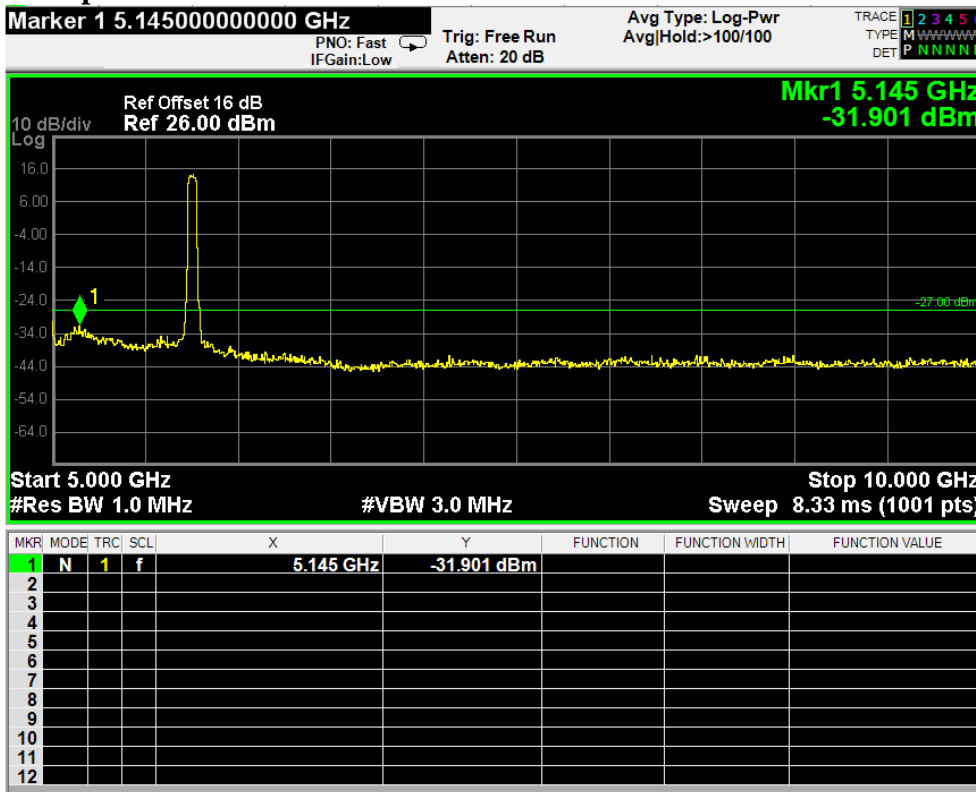


Calculated total emission @3.836GHz = -29.01 dBm  
 @4.996GHz = -28.08 dBm

**Left antenna port:**



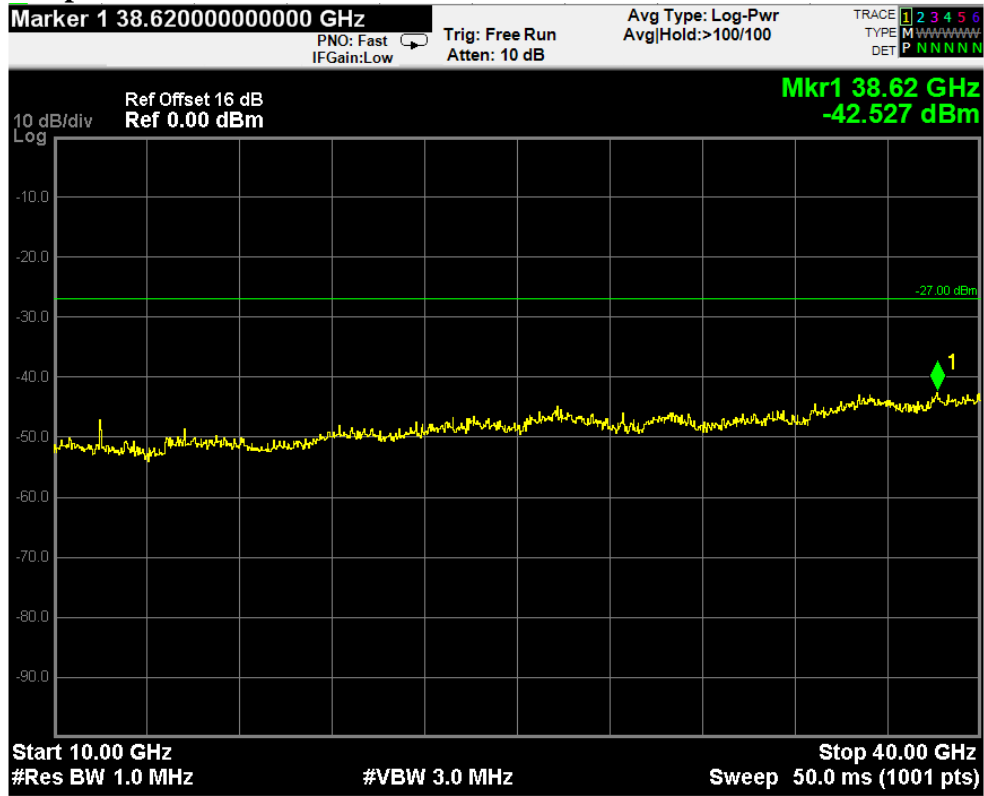
**Right antenna port:**



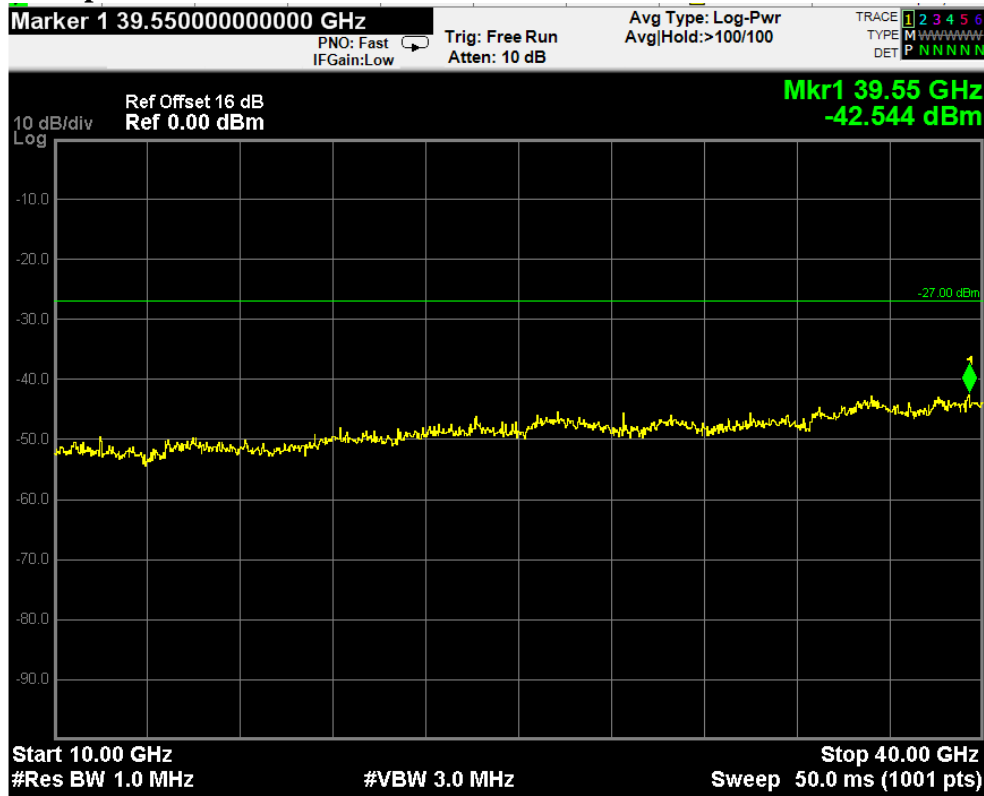
Calculated total emission = -29.79 dBm



Left antenna port:

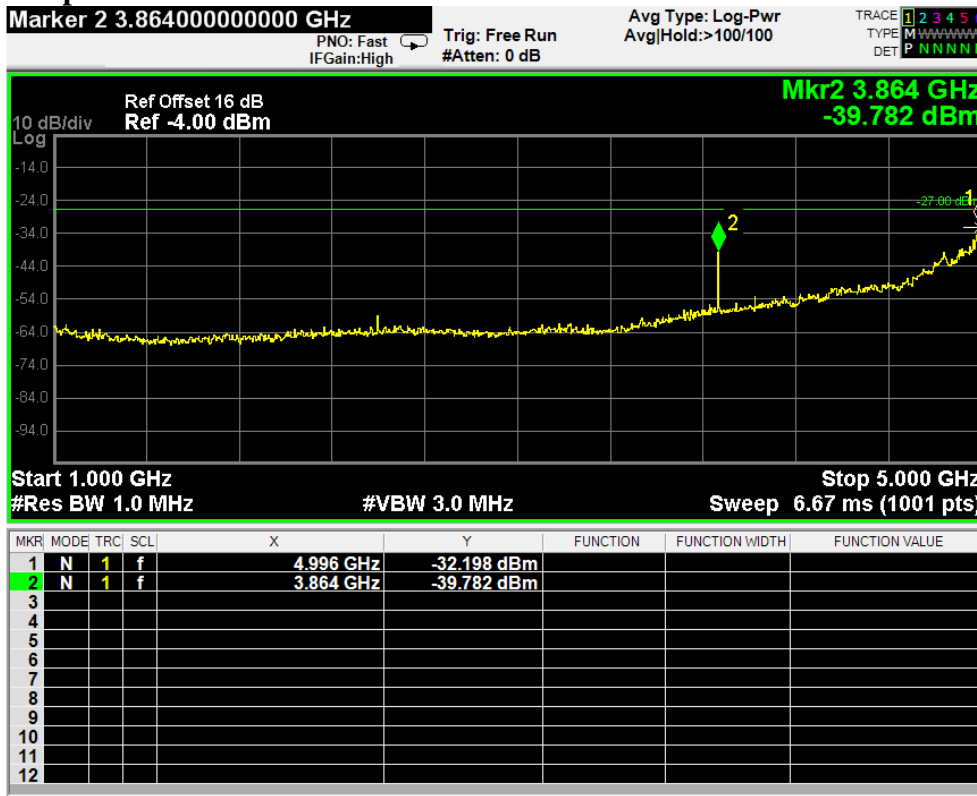


Right antenna port:

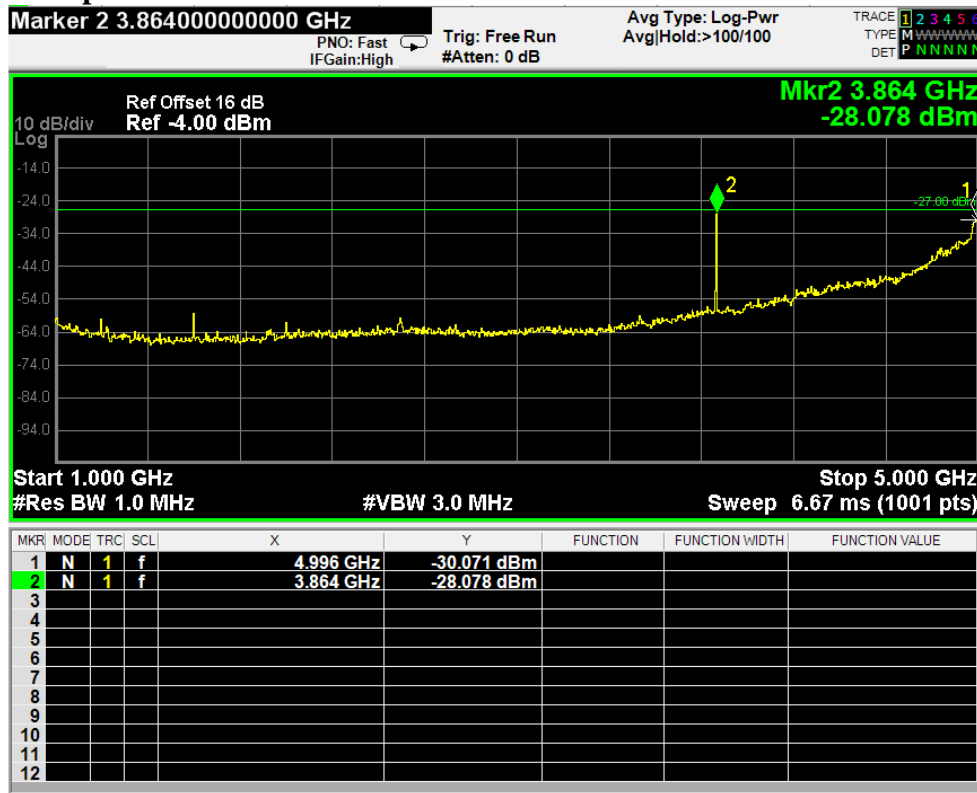


### Unwanted Emissions 802.11n HT40 Ch 159

#### Left antenna port:

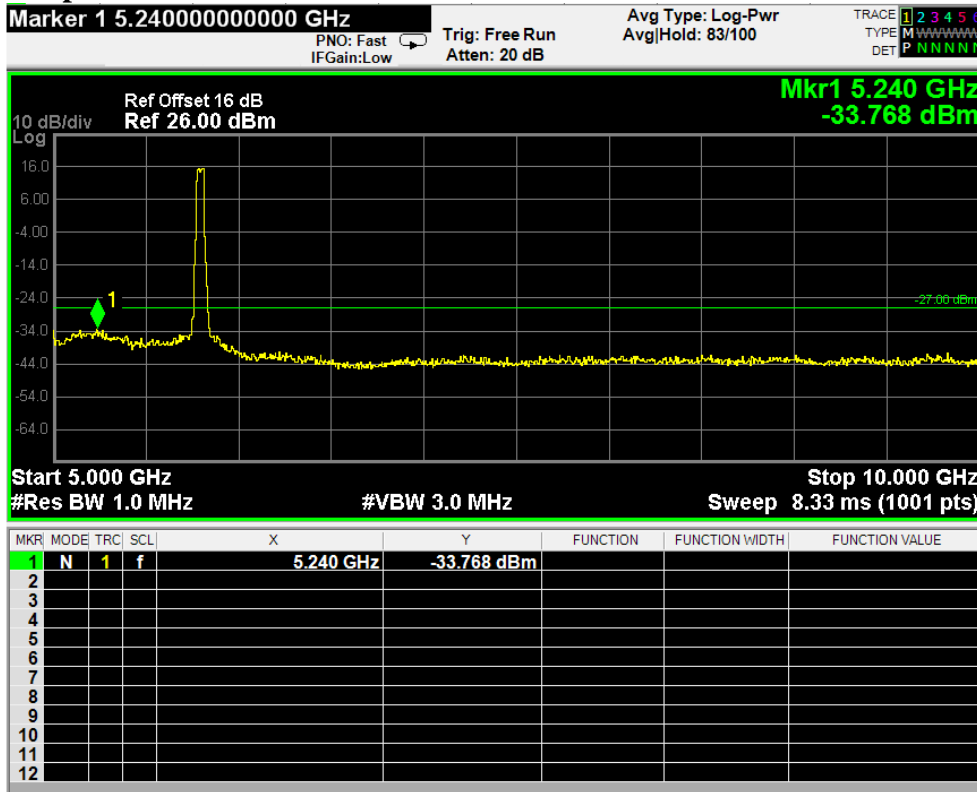


#### Right antenna port:

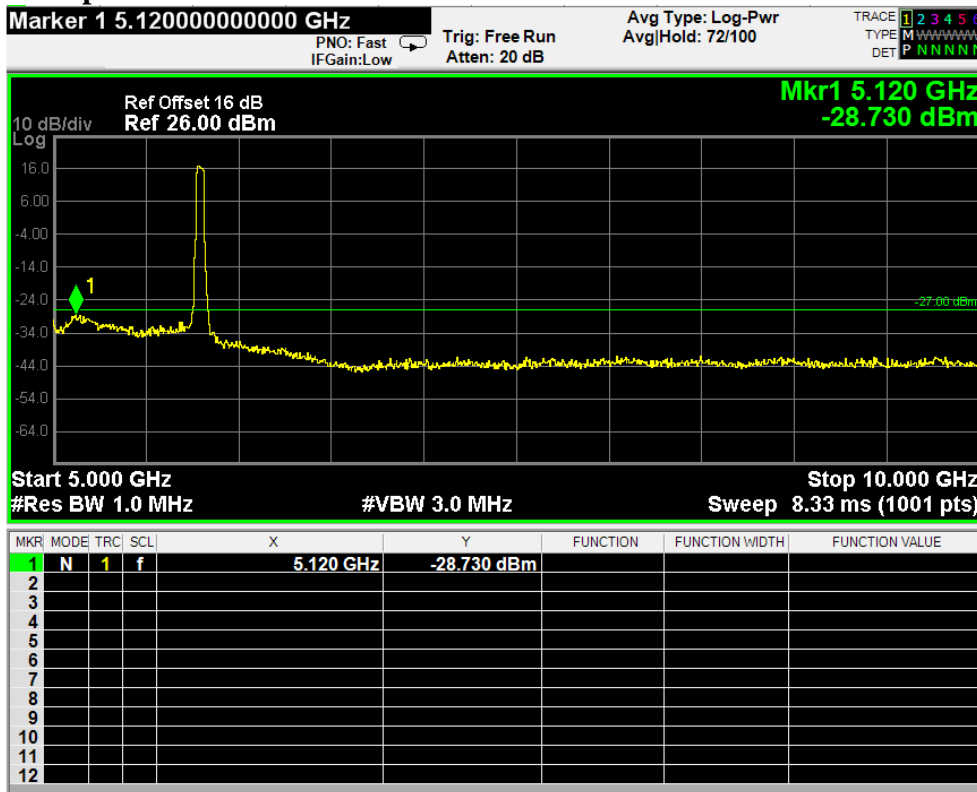


Calculated total emission @3.864GHz = -27.79 dBm  
 @4.996GHz = -28.00 dBm

**Left antenna port:**

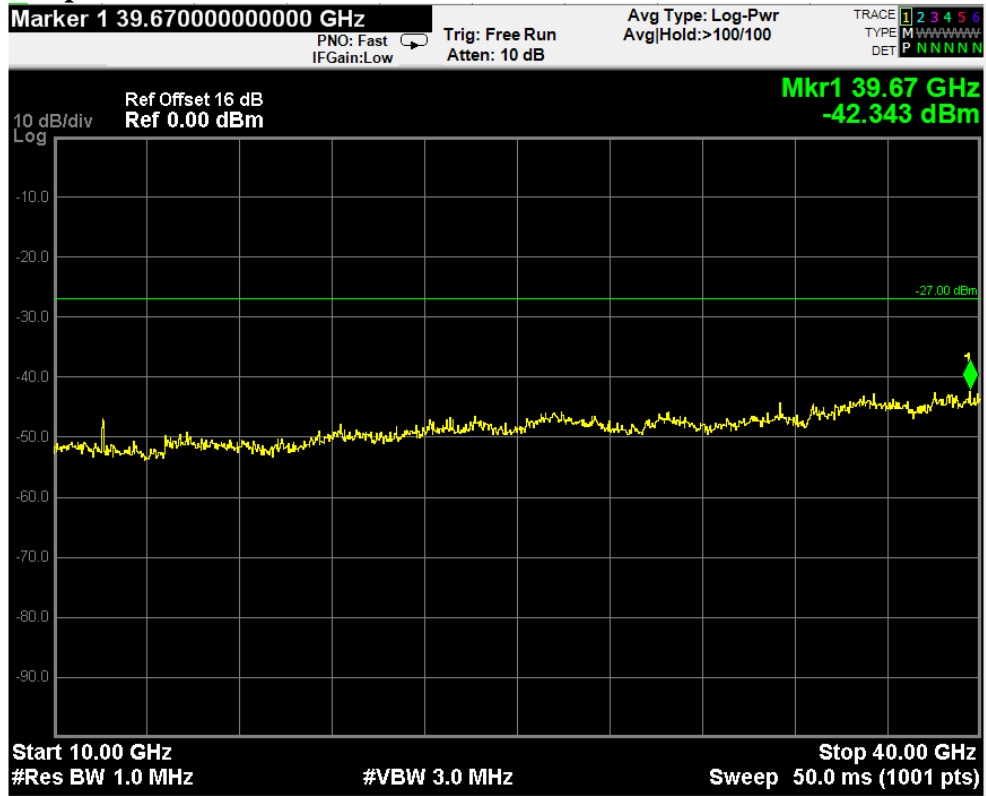


**Right antenna port:**

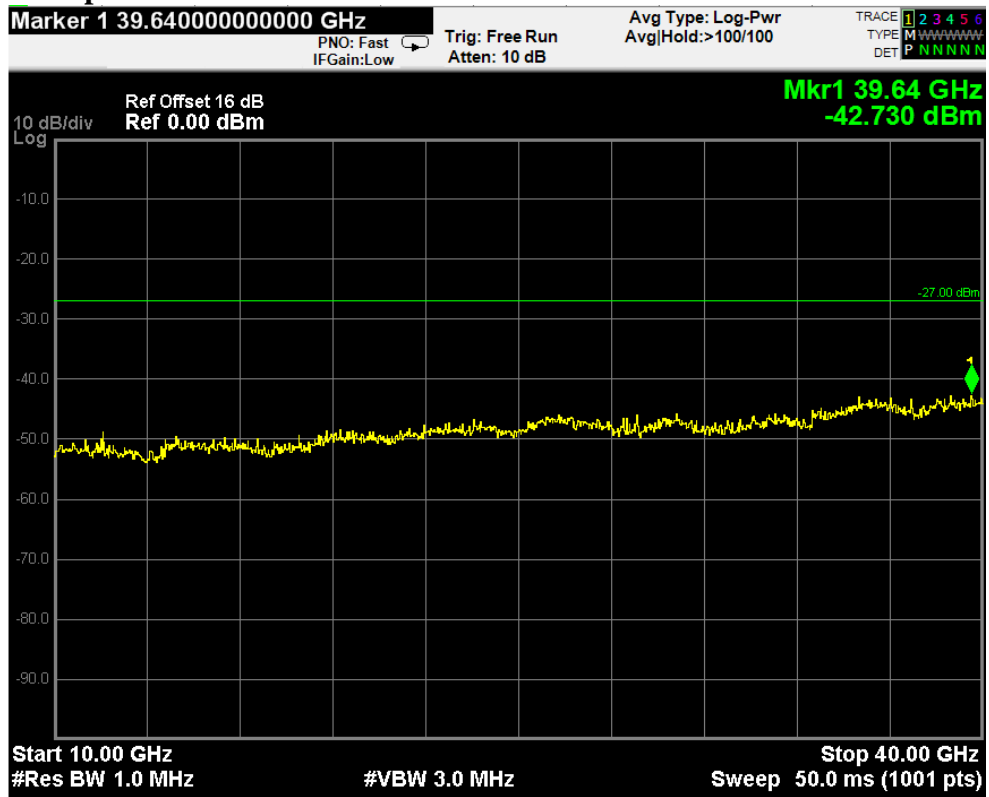


Calculated total emission = -27.55 dBm

Left antenna port:



Right antenna port:



## 9 FREQUENCY STABILITY MEASUREMENT

### 9.1 Test Equipment

The following test equipment was used during the Frequency Stability measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 14, 2014	Jun 13, 2015
2.	Temperature and Humidity Test Chamber	TECRCHY	MHU-150L	850811	Mar. 20, 2014	Mar. 20, 2015

### 9.2 Block Diagram of Test Setup

The same as section.5.2.

### 9.3 Specification Limits (§15.407(g))

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user’s manual or  $\pm 20\text{ppm}$

### 9.4 Operating Condition of EUT

The test program “art” was used to enable the EUT to transmit data at different channel frequency individually.

### 9.5 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f) / f_c \times 10^6$  ppm and the limit is less than  $\pm 20\text{ppm}$ .

The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

The test extreme temperature is  $-30^\circ\text{C} \sim 70^\circ\text{C}$  according to the user manual.

## 9.6 Test Results

### PASSED.

All the test results are attached in next pages.

(Test Date: Sep. 11, 2014 Temperature: 24°C Humidity: 45 %)

#### Frequency Stability during Voltage changing (Temp. 20°C)

Test Voltage (V)	Test Frequency (MHz)	Test Result (MHz)	Max deviation (MHz)	Max deviation (ppm)	Limit	Conclusion
102	5745	5744.965	0.035	6.09	±20ppm	PASS
120		5744.965				PASS
138		5744.965				PASS
102	5785	5784.965	0.035	6.05		PASS
120		5784.965				PASS
138		5784.965				PASS
102	5825	5824.965	0.035	6.00		PASS
120		5824.965				PASS
138		5824.965				PASS
102	5755	5754.965	0.035	6.08		PASS
120		5754.965				PASS
138		5754.965				PASS
102	5795	5794.965	0.035	6.04		PASS
120		5794.965				PASS
138		5794.965				PASS

#### Frequency Stability during Temp. changing (Voltage AC 120V/60Hz)

Temp. (°C)	Test Frequency (MHz)	Test Result (MHz)	Max deviation (MHz)	Max deviation (ppm)	Limit	Conclusion
-30	5745	5744.947	0.053	9.23	±20ppm	PASS
-20		5744.954				PASS
-10		5744.954				PASS
0		5744.956				PASS
10		5744.964				PASS
20		5744.965				PASS
40		5744.965				PASS
60		5744.972				PASS
70		5744.972				PASS

## **10 DEVIATION TO TEST SPECIFICATIONS**

None.