# FCC Test Report
# (Class II Permissive Change)

| | |
|---|---|
| Product Name | Access Point/Sensor |
| Model No | W-68 |
| FCC ID | TOR-W68 |

| | |
|---|---|
| Applicant | AirTight Networks, Inc. |
| Address | 339 N. Bernardo Avenue, Suite #200, Mountain View, California, USA |

| | |
|---|---|
| Date of Receipt | Sep. 30, 2014 |
| Issued Date | Oct. 26, 2014 |
| Report No. | 14A0075R-RFUSP05V00-A |
| Report Version | V1.0 |

Testing Laboratory
3023

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.
The test report shall not be reproduced without the written approval of QuieTek Corporation.

# Test Report

Issued Date: Oct. 26, 2014
Report No.: 14A0075R-RFUSP05V00-A

QuieTek

| | |
|---|---|
| Product Name | Access Point/Sensor |
| Applicant | AirTight Networks, Inc. |
| Address | 339 N. Bernardo Avenue, Suite #200, Mountain View, California, USA |
| Manufacturer | Lite-On Network Communication (Dongguan) Limited |
| Model No. | W-68 |
| FCC ID. | TOR-W68 |
| EUT Rated Voltage | DC 48V |
| EUT Test Voltage | DC 48V |
| Trade Name | AirTight |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart E: 2013<br>ANSI C63.10: 2009<br>KDB 789033 D01 General UNII Test Procedures v01r04 |
| Test Result | Complied |

Documented By : Joanne Lin

( Senior Adm. Specialist / Joanne Lin )

Tested By : Andy Lin

( Engineer / Andy Lin )

Approved By :

( Director / Vincent Lin )

# TABLE OF CONTENTS

Description Page


**1. GENERAL INFORMATION ..... 5**

1.1. EUT Description ..... 5
1.2. Operational Description ..... 8
1.3. Tested System Datails ..... 9
1.4. Configuration of tested System ..... 9
1.5. EUT Exercise Software ..... 10
1.6. Test Facility ..... 11

**2. Conducted Emission ..... 12**

2.1. Test Equipment ..... 12
2.2. Test Setup ..... 12
2.3. Limits ..... 13
2.4. Test Procedure ..... 13
2.5. Uncertainty ..... 13
2.6. Test Result of Conducted Emission ..... 14

**3. Maximun conducted output power ..... 18**

3.1. Test Equipment ..... 18
3.2. Test Setup ..... 18
3.3. Limits ..... 19
3.4. Test Procedur ..... 19
3.5. Uncertainty ..... 19
3.6. Test Result of Maximum conducted output power ..... 20

**4. Peak Power Spectral Density ..... 62**

4.1. Test Equipment ..... 62
4.2. Test Setup ..... 62
4.3. Limits ..... 62
4.4. Test Procedure ..... 63
4.5. Uncertainty ..... 63
4.6. Test Result of Peak Power Spectral Density ..... 64

**5. Peak Excursion ..... 91**

5.1. Test Equipment ..... 92
5.2. Test Setup ..... 92
5.3. Limits ..... 92
5.4. Test Procedure ..... 93
5.5. Uncertainty ..... 93
5.6. Test Result of Peak Excursion ..... 94

**6. Radiated Emission ..... 116**

6.1. Test Equipment ..... 116
6.2. Test Setup ..... 116
6.3. Limits ..... 117
6.4. Test Procedure ..... 118
6.5. Uncertainty ..... 118
6.6. Test Result of Radiated Emission ..... 119

**7. Band Edge ..... 151**

7.1. Test Equipment ..... 151
7.2. Test Setup ..... 152
7.3. Limits ..... 153
7.4. Test Procedure ..... 153
7.5. Uncertainty ..... 153
7.6. Test Result of Band Edge ..... 154

**8. Frequency Stability ..... 189**

8.1. Test Equipment ..... 189
8.2. Test Setup ..... 189
8.3. Limits ..... 189
8.4. Test Procedure ..... 189
8.5. Uncertainty ..... 189
8.6. Test Result of Frequency Stability ..... 190

**9. EMI Reduction Method During Compliance Testing ..... 196**

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

# 1. GENERAL INFORMATION

## 1.1. EUT Description

| | |
|---|---|
| Product Name | Access Point/Sensor |
| Trade Name | AirTight |
| FCC ID. | TOR-W68 |
| Model No. | W-68 |
| Frequency Range | 802.11a/n-20MHz: 5260-5320MHz, 5500-5700MHz<br>802.11n-40MHz: 5270-5310MHz, 5510-5670MHz<br>802.11ac-20MHz: 5720MHz, 802.11ac-40MHz: 5710MHz<br>802.11ac-80MHz: 5210-5290MHz, 5530-5690MHz |
| Number of Channels | 802.11a/n-20MHz: 12, n-40MHz: 5<br>802.11ac-20MHz: 1, 802.11ac-40MHz: 1, 802.11ac-80MHz: 3 |
| Data Rate | 802.11a/g: 6-54Mbps, 802.11n: up to 300Mbps<br>802.11ac-80MHz: up to 866.7MHz |
| Type of Modulation | 802.11a/n:OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM |
| Channel Control | Auto |
| Antenna type | PIFA / Monopole Antenna |
| Antenna Gain | Refer to the table “Antenna List” |

**Antenna List**

| No. | Manufacturer | Part No. | Antenna Type | Peak Gain |
|---|---|---|---|---|
| 1 | LITE-ON | 30100006036D (Ant2) | PIFA | 4.4 dBi For 5.25~5.35GHz |
| | | 30100006046D (Ant4) | Monopole | 4.9 dBi For 5.47~5.725GHz<br>5.0 dBi For 5.725~5.825GHz |

Note: The antenna of EUT is conform to FCC 15.203

802.11a/n-20MHz Center Working Frequency of Each Channel:

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| Channel 52: | 5260 MHz | Channel 56: | 5280 MHz | Channel 60: | 5300 MHz | Channel 64: | 5320 MHz |
| Channel 100: | 5500 MHz | Channel 104: | 5520 MHz | Channel 108: | 5540 MHz | Channel 112: | 5560 MHz |
| Channel 116: | 5580 MHz | Channel 132: | 5660 MHz | Channel 136: | 5680 MHz | Channel 140: | 5700 MHz |

802.11n-40MHz Center Working Frequency of Each Channel:

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| Channel 54: | 5270 MHz | Channel 62: | 5310 MHz | Channel 102: | 5510 MHz | Channel 110: | 5550 MHz |
| Channel 134: | 5670 MHz | | | | | | |

802.11ac-20MHz Carrier Frequency of Each Channel:

| Channel | Frequency |
|---|---|
| Channel 144: | 5720 MHz |

802.11ac-40MHz Carrier Frequency of Each Channel:

| Channel | Frequency |
|---|---|
| Channel 142: | 5710 MHz |

802.11ac-80MHz Center Working Frequency of Each Channel:

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|
| Channel 58: | 5290 MHz | Channel 106: | 5530 MHz | Channel 138: | 5690 MHz |

Note:

1. This device is an Access Point/Sensor with a built-in 802.11a/b/g/n/ac WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report. (802.11a is chain A、802.11n and 802.11ac is chain A+chain B)
4. This is requesting a Class II permissive change for FCC ID: TOR-W68. Originally granted on 10/30/2014.
   The differences are listed as below:
   - Original grant compliance band 1 and bans 3 are following new rule of UNII requirements, add the frequency band from band 2a and band 2C by software, this C2PC is following old rule of UNII requirements.
   - All other hardware is identical with original granted.
5. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps、802.11n(20M-BW) is 14.4Mbps、802.11n(40M-BW) is 30Mbps、802.11ac(20M-BW) is 14.4Mbps、802.11ac(40M-BW) is 30Mbps and 802.11ac(80M-BW) is 65Mbps)
6. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.
7. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

| | |
|---|---|
| Test Mode | Mode 1: Transmit (802.11a-6Mbps)<br>Mode 2: Transmit (802.11n-20BW 14.4Mbps)<br>Mode 3: Transmit (802.11n-40BW 30Mbps)<br>Mode 4 Transmit (802.11ac-80BW-65Mbps)<br>Mode 5 Transmit (802.11ac-20BW-65Mbps)<br>Mode 6 Transmit (802.11ac-40BW-65Mbps) |

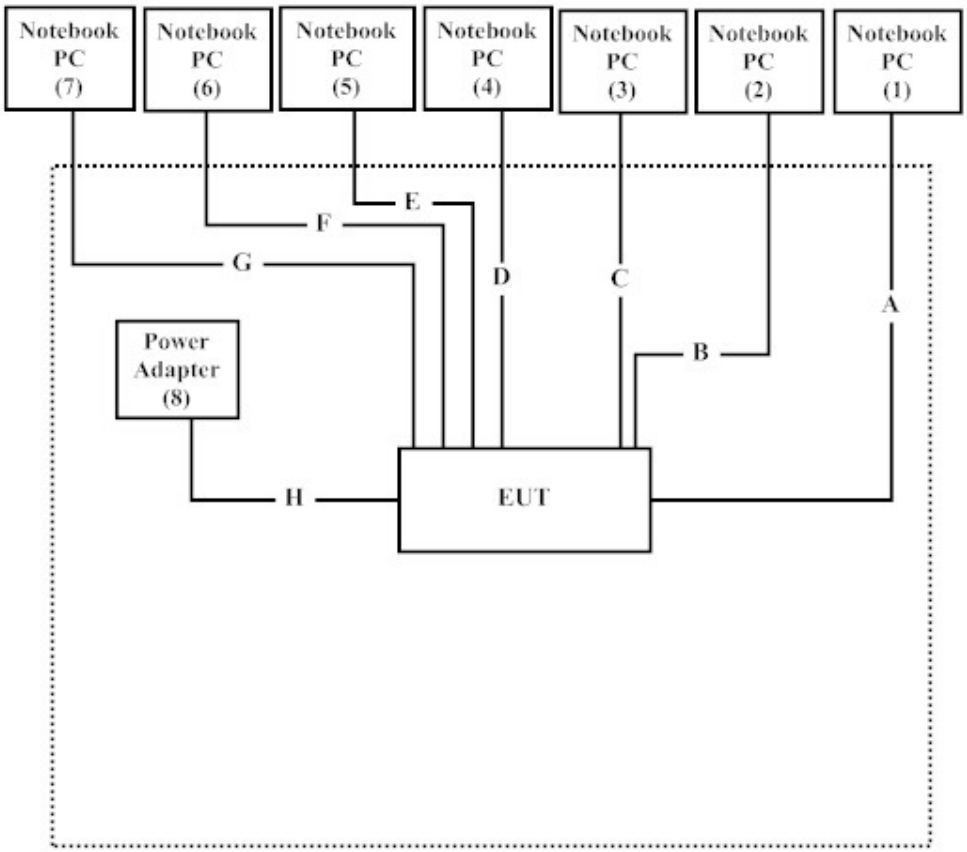
## 1.3. Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product | | Manufacturer | Model No. | Serial No. | Power Cord |
|---|---|---|---|---|---|
| 1 | Notebook PC | DELL | PPT | N/A | Non-Shielded, 0.8m |
| 2 | Notebook PC | DELL | PP18L | 36119001664 | Non-Shielded, 0.8m |
| 3 | Notebook PC | DELL | PP18L | 42649348672 | Non-Shielded, 0.8m |
| 4 | Notebook PC | DELL | PP04X | 2D2ZM1S | Non-Shielded, 0.8m |
| 5 | Notebook PC | DELL | PP04X | C8YYM1S | Non-Shielded, 0.8m |
| 6 | Notebook PC | DELL | PP04X | 7607342512 | Non-Shielded, 0.8m |
| 7 | Notebook PC | DELL | D630 | 00144-023-351-375 | Non-Shielded, 0.8m |
| 8 | Power Adapter | HOIOTO | PO25-1AD207A | N/A | N/A |

| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | LAN Cable | Non-Shielded, 3 m |
| B | LAN Cable | Non-Shielded, 3 m |
| C | LAN Cable | Non-Shielded, 3 m |
| D | LAN Cable | Non-Shielded, 3 m |
| E | LAN Cable | Non-Shielded, 3 m |
| F | LAN Cable | Non-Shielded, 3 m |
| G | LAN Cable | Non-Shielded, 3 m |
| H | Power Cable | Shielded, 1.2m, with one ferrite core bonded. |

## 1.4. Configuration of tested System




## 1.5. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4

(2) Execute software “ART2-GUI (v2.3)” on the EUT.

(3) Configure the test mode, the test channel, and the data rate.

(4) Press “OK” to start the continuous Transmit.

(5) Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

| Items | Required (IEC 68-1) | Actual |
|---|---|---|
| Temperature (°C) | 15-35 | 20-35 |
| Humidity (%RH) | 25-75 | 50-65 |
| Barometric pressure (mbar) | 860-1060 | 950-1000 |

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : http://tw.quietek.com/modules/myalbum/

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

# 2. Conducted Emission

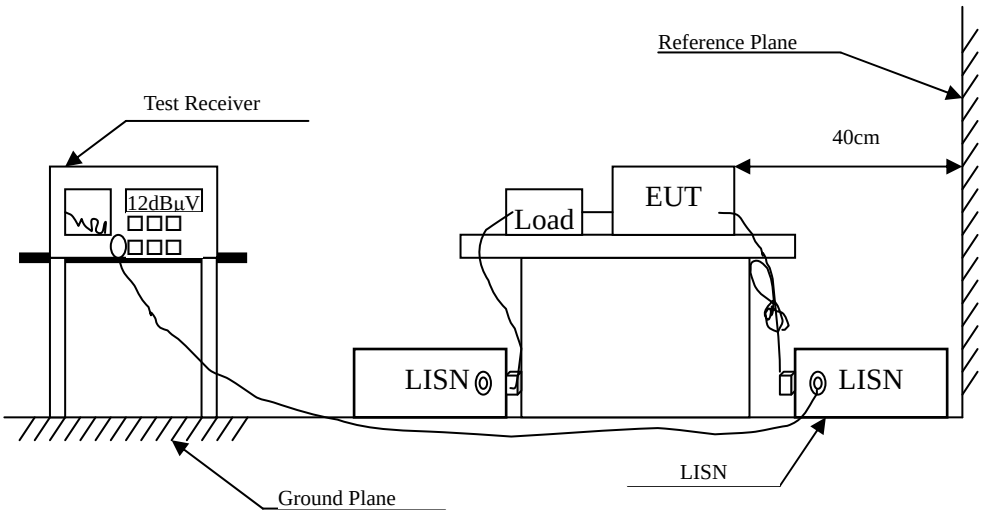
## 2.1. Test Equipment

| | Equipment | Manufacturer | Model No. / Serial No. | Last Cal. | Remark |
|---|---|---|---|---|---|
| X | Test Receiver | R & S | ESCS 30 / 825442/018 | Sep., 2014 | |
| X | Artificial Mains Network | R & S | ENV4200 / 848411/10 | Feb., 2014 | Peripherals |
| X | LISN | R & S | ESH3-Z5 / 825562/002 | Feb., 2014 | EUT |
| | DC LISN | Schwarzbeck | 8226 / 176 | Mar., 2014 | EUT |
| X | Pulse Limiter | R & S | ESH3-Z2 / 357.8810.52 | Feb., 2014 | |
| | No.1 Shielded Room | | | | |

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

## 2.2. Test Setup



## 2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBμV) Limit | | |
|---|---|---|
| Frequency MHz | Limits | |
| | QP | AV |
| 0.15 - 0.50 | 66-56 | 56-46 |
| 0.50-5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |

Remarks : In the above table, the tighter limit applies at the band edges.

## 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.10, 2009; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

## 2.5. Uncertainty

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Access Point/Sensor
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 4 Transmit (802.11ac-80BW-65Mbps) (5290MHz)

| Frequency MHz | Correct Factor dB | Reading Level dBμV | Measurement Level dBμV | Margin dB | Limit dBμV |
|---|---|---|---|---|---|
| **LINE 1** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.185 | 9.651 | 38.600 | 48.251 | -16.749 | 65.000 |
| 0.240 | 9.653 | 28.020 | 37.673 | -25.756 | 63.429 |
| 0.279 | 9.655 | 27.420 | 37.075 | -25.239 | 62.314 |
| 0.365 | 9.659 | 24.850 | 34.509 | -25.348 | 59.857 |
| 10.271 | 9.983 | 28.150 | 38.133 | -21.867 | 60.000 |
| 17.240 | 10.127 | 36.930 | 47.057 | -12.943 | 60.000 |
| **Average** | | | | | |
| 0.185 | 9.651 | 19.100 | 28.751 | -26.249 | 55.000 |
| 0.240 | 9.653 | 8.430 | 18.083 | -35.346 | 53.429 |
| 0.279 | 9.655 | 10.510 | 20.165 | -32.149 | 52.314 |
| 0.365 | 9.659 | 11.340 | 20.999 | -28.858 | 49.857 |
| 10.271 | 9.983 | 22.650 | 32.633 | -17.367 | 50.000 |
| 17.240 | 10.127 | 31.670 | 41.797 | -8.203 | 50.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Access Point/Sensor
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 4 Transmit (802.11ac-80BW-65Mbps) (5290MHz)

| Frequency MHz | Correct Factor dB | Reading Level dBμV | Measurement Level dBμV | Margin dB | Limit dBμV |
|---|---|---|---|---|---|
| **LINE 2** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.177 | 9.659 | 37.970 | 47.629 | -17.600 | 65.229 |
| 0.330 | 9.657 | 26.570 | 36.227 | -24.630 | 60.857 |
| 0.517 | 9.668 | 19.300 | 28.968 | -27.032 | 56.000 |
| 0.877 | 9.697 | 19.540 | 29.237 | -26.763 | 56.000 |
| 3.162 | 9.812 | 19.850 | 29.662 | -26.338 | 56.000 |
| 18.349 | 10.177 | 35.780 | 45.957 | -14.043 | 60.000 |
| **Average** | | | | | |
| 0.177 | 9.659 | 16.600 | 26.259 | -28.970 | 55.229 |
| 0.330 | 9.657 | 10.420 | 20.077 | -30.780 | 50.857 |
| 0.517 | 9.668 | 4.760 | 14.428 | -31.572 | 46.000 |
| 0.877 | 9.697 | 5.980 | 15.677 | -30.323 | 46.000 |
| 3.162 | 9.812 | 9.330 | 19.142 | -26.858 | 46.000 |
| 18.349 | 10.177 | 30.410 | 40.587 | -9.413 | 50.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Access Point/Sensor
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 4 Transmit (802.11ac-80BW-65Mbps) (5530MHz)

| Frequency MHz | Correct Factor dB | Reading Level dBμV | Measurement Level dBμV | Margin dB | Limit dBμV |
|---|---|---|---|---|---|
| **LINE 1** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.216 | 9.651 | 26.340 | 35.991 | -28.123 | 64.114 |
| 0.349 | 9.659 | 26.530 | 36.189 | -24.125 | 60.314 |
| 0.630 | 9.674 | 17.220 | 26.894 | -29.106 | 56.000 |
| 0.896 | 9.688 | 17.500 | 27.188 | -28.812 | 56.000 |
| 3.420 | 9.818 | 18.680 | 28.498 | -27.502 | 56.000 |
| 17.533 | 10.129 | 37.000 | 47.129 | -12.871 | 60.000 |
| **Average** | | | | | |
| 0.216 | 9.651 | 8.400 | 18.051 | -36.063 | 54.114 |
| 0.349 | 9.659 | 14.510 | 24.169 | -26.145 | 50.314 |
| 0.630 | 9.674 | 7.630 | 17.304 | -28.696 | 46.000 |
| 0.896 | 9.688 | 4.620 | 14.308 | -31.692 | 46.000 |
| 3.420 | 9.818 | 8.750 | 18.568 | -27.432 | 46.000 |
| 17.533 | 10.129 | 31.800 | 41.929 | -8.071 | 50.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Access Point/Sensor
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 4 Transmit (802.11ac-80BW-65Mbps) (5530MHz)

| Frequency MHz | Correct Factor dB | Reading Level dBμV | Measurement Level dBμV | Margin dB | Limit dBμV |
|---|---|---|---|---|---|
| **LINE 2** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.197 | 9.660 | 35.060 | 44.720 | -19.937 | 64.657 |
| 0.314 | 9.657 | 25.210 | 34.867 | -26.447 | 61.314 |
| 0.525 | 9.668 | 20.510 | 30.178 | -25.822 | 56.000 |
| 1.173 | 9.714 | 18.970 | 28.684 | -27.316 | 56.000 |
| 3.189 | 9.812 | 19.320 | 29.132 | -26.868 | 56.000 |
| 17.107 | 10.155 | 36.620 | 46.775 | -13.225 | 60.000 |
| **Average** | | | | | |
| 0.197 | 9.660 | 16.220 | 25.880 | -28.777 | 54.657 |
| 0.314 | 9.657 | 9.490 | 19.147 | -32.167 | 51.314 |
| 0.525 | 9.668 | 6.500 | 16.168 | -29.832 | 46.000 |
| 1.173 | 9.714 | 6.800 | 16.514 | -29.486 | 46.000 |
| 3.189 | 9.812 | 8.800 | 18.612 | -27.388 | 46.000 |
| 17.107 | 10.155 | 31.340 | 41.495 | -8.505 | 50.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

# 3. Maximun conducted output power

## 3.1. Test Equipment

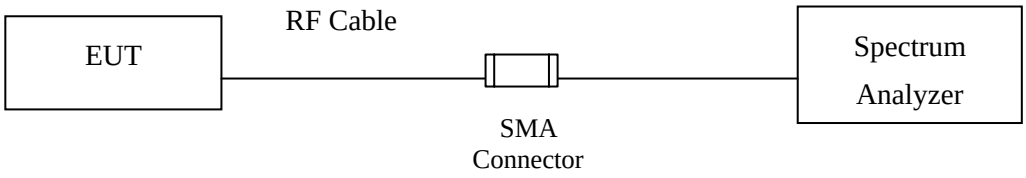
| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|---|---|---|---|
| X | Power Meter | Anritsu | ML2495A/6K00003357 | May, 2014 |
| X | Power Sensor | Anritsu | MA2411B/0738448 | Jun., 2014 |
| X | Spectrum Analyzer | Agilent | N9010A / MY48030495 | Apr., 2014 |

Note:

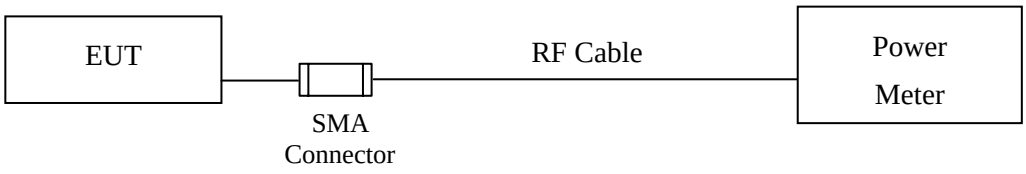
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

## 3.2. Test Setup

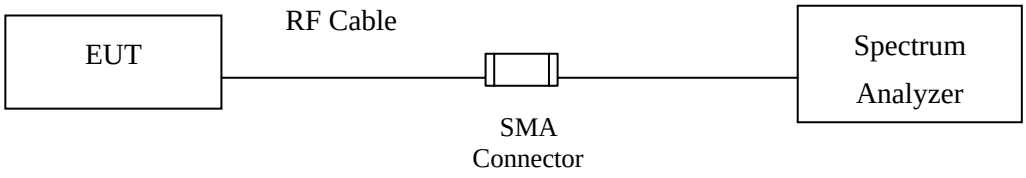
**26dBc Occupied Bandwidth**




**Conduction Power Measurement (for 802.11an)**




**Conduction Power Measurement (for 802.11ac)**



## 3.3. Limits

- For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- For the band 5.25-5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- For the band 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1W or 17 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

## 3.4. Test Procedur

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater than 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW≦40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)
*Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)*

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D01 section F) procedure is used for measurements.

## 3.5. Uncertainty

± 1.27 dB

## 3.6. Test Result of Maximum conducted output power

Product : Access Point/Sensor
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

**Chain A**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | 6 | 9 | 12 | 18 | 24 | 36 | 48 | 54 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 52 | 5260 | 19.31 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 60 | 5300 | 19.15 | 19.05 | 18.99 | 18.85 | 18.79 | 18.71 | 18.67 | 18.62 | <24dBm |
| 64 | 5320 | 19.11 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 100 | 5500 | 19.31 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 116 | 5580 | 19.13 | 19.08 | 18.93 | 18.89 | 18.71 | 18.68 | 18.61 | 18.55 | <24dBm |
| 140 | 5700 | 19.30 | -- | -- | -- | -- | -- | -- | -- | <24dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

**Chain B**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | 6 | 9 | 12 | 18 | 24 | 36 | 48 | 54 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 52 | 5260 | 19.30 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 60 | 5300 | 19.30 | 19.24 | 19.18 | 19.09 | 18.91 | 18.88 | 18.79 | 18.65 | <24dBm |
| 64 | 5320 | 19.20 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 100 | 5500 | 19.00 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 116 | 5580 | 18.90 | 18.81 | 18.71 | 18.63 | 18.59 | 18.44 | 18.39 | 18.26 | <24dBm |
| 140 | 5700 | 18.80 | -- | -- | -- | -- | -- | -- | -- | <24dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

## Maximum conducted output power Measurement:

**(Chain A+ B)**

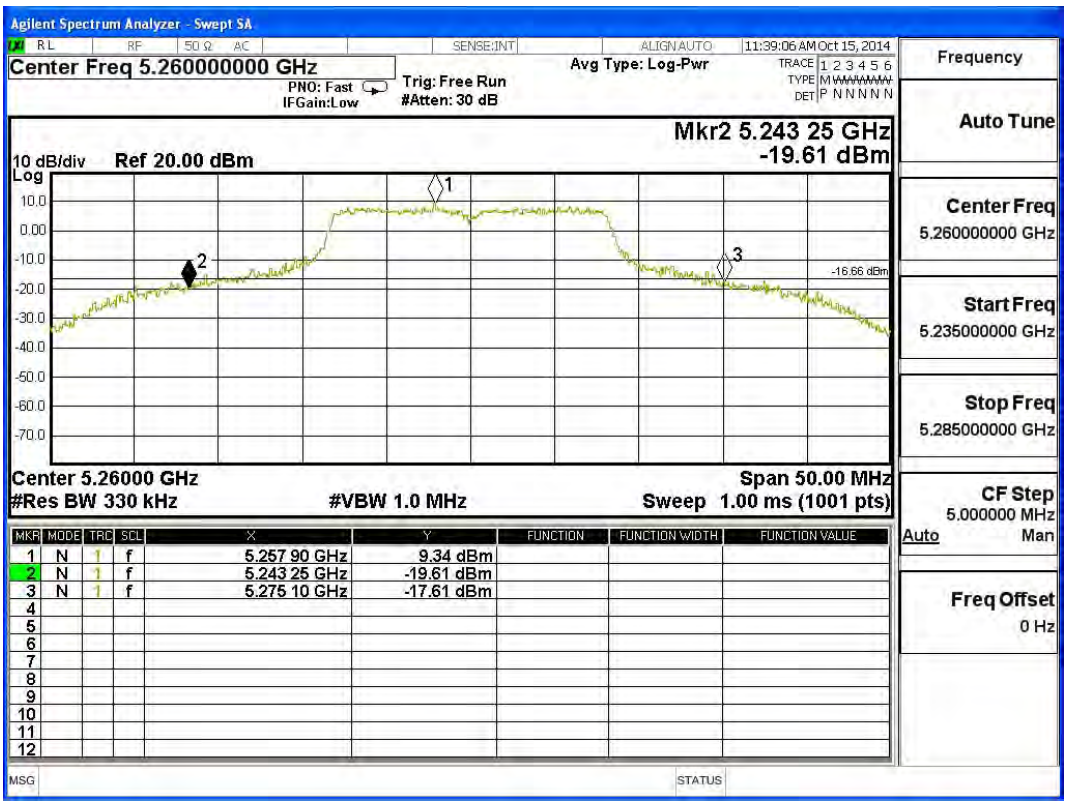
| Channel Number | Frequency | 26dB Bandwidth | Chain A Power | Chain B Power | Output Power | Output Power Limit | |
|---|---|---|---|---|---|---|---|
| | (MHz) | (MHz) | (dBm) | (dBm) | (dBm) | (dBm) | dBm+10log(BW) |
| 52 | 5260 | 27.100 | 19.31 | 19.30 | 22.32 | 24 | 25.33 |
| 60 | 5300 | 25.750 | 19.15 | 19.30 | 22.24 | 24 | 25.11 |
| 64 | 5320 | 28.500 | 19.11 | 19.20 | 22.17 | 24 | 25.55 |
| 100 | 5500 | 31.550 | 18.98 | 19.00 | 22.00 | 24 | 25.99 |
| 116 | 5580 | 25.900 | 19.13 | 18.90 | 22.03 | 24 | 25.13 |
| 140 | 5700 | 24.450 | 19.30 | 18.80 | 22.07 | 24 | 24.88 |

Note:

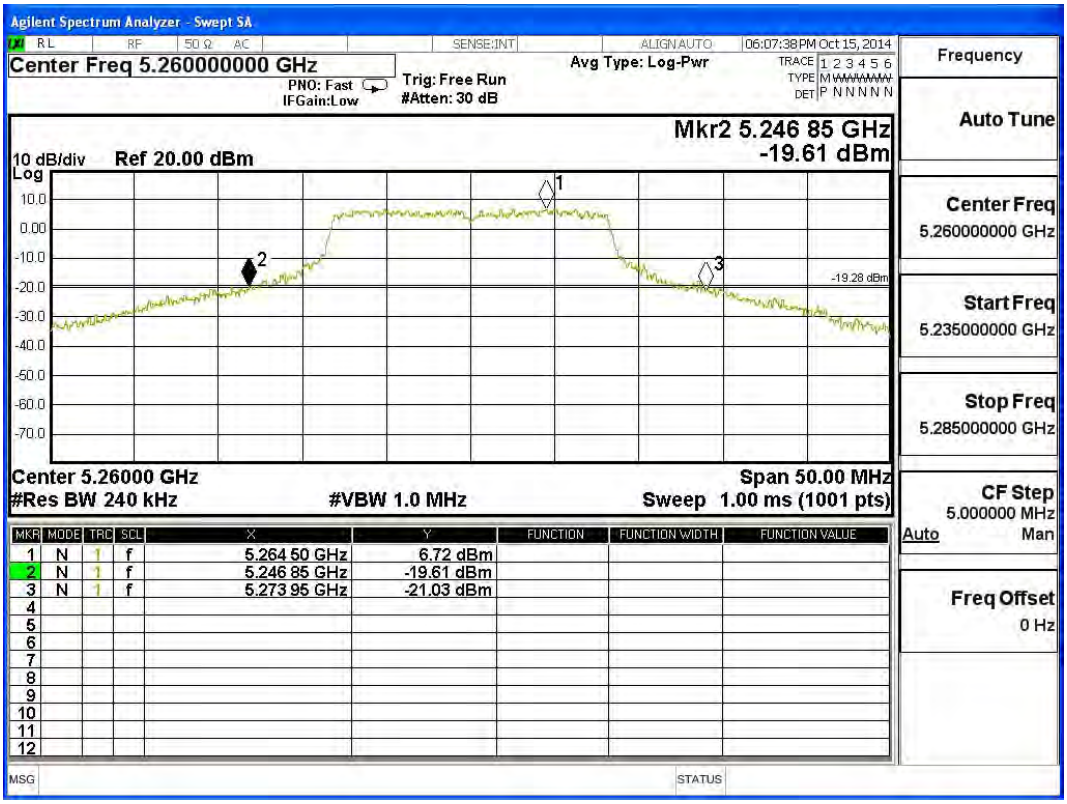
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW) + Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

## 26dBc Occupied Bandwidth:

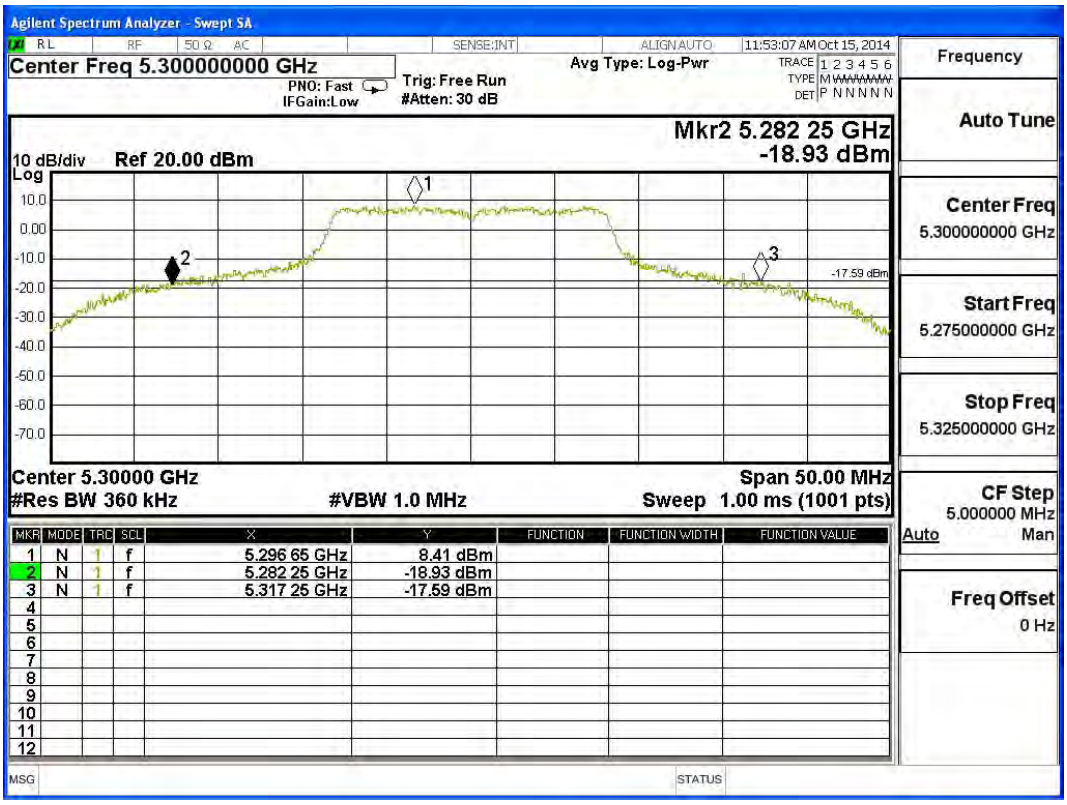
### Channel 52: Chain A



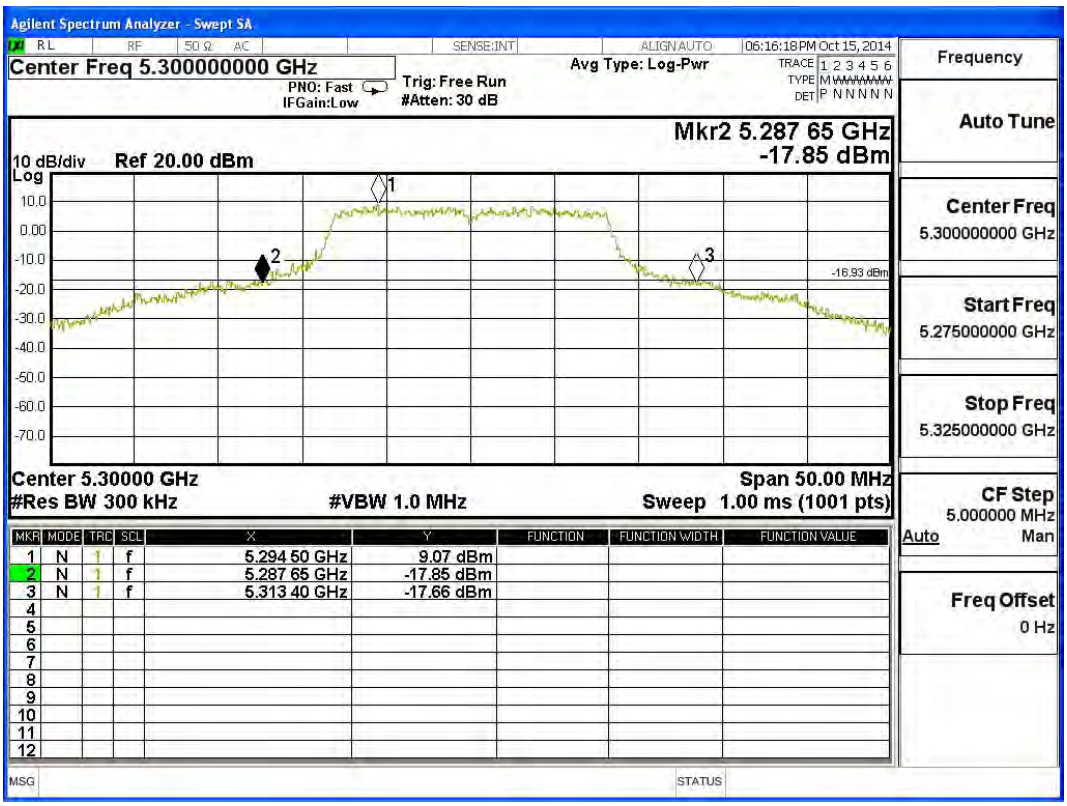

### Channel 52: Chain B



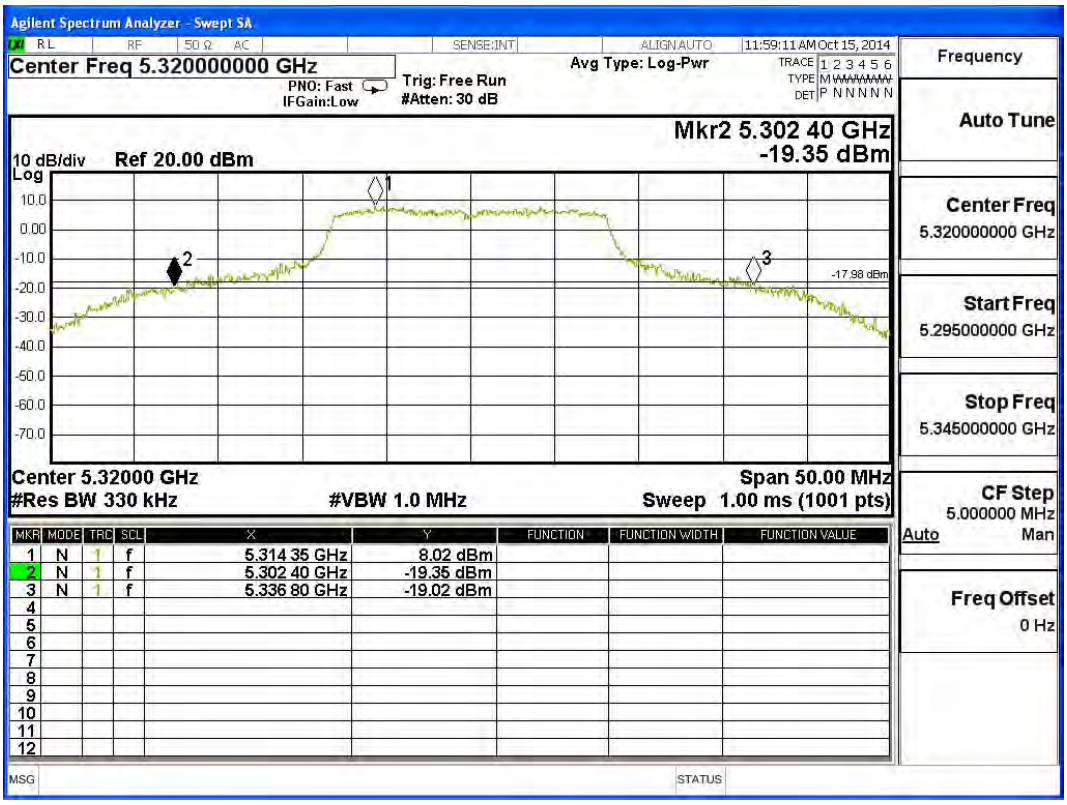
**Channel 60: Chain A**



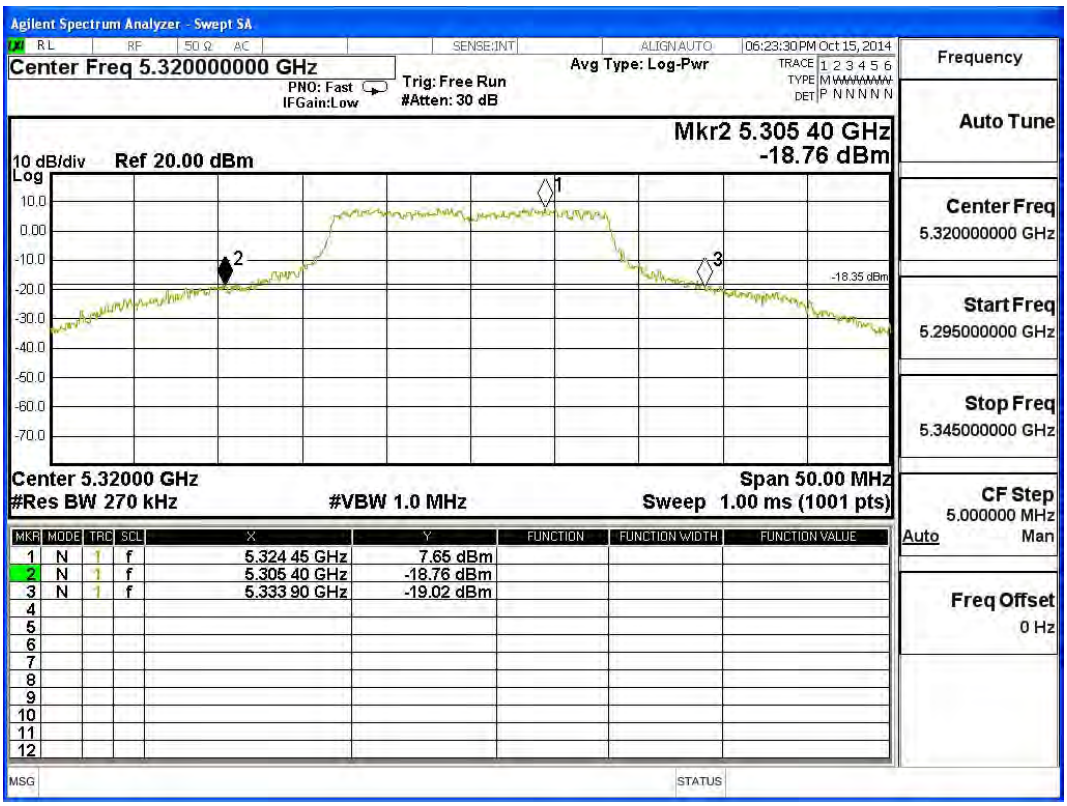

**Channel 60: Chain B**



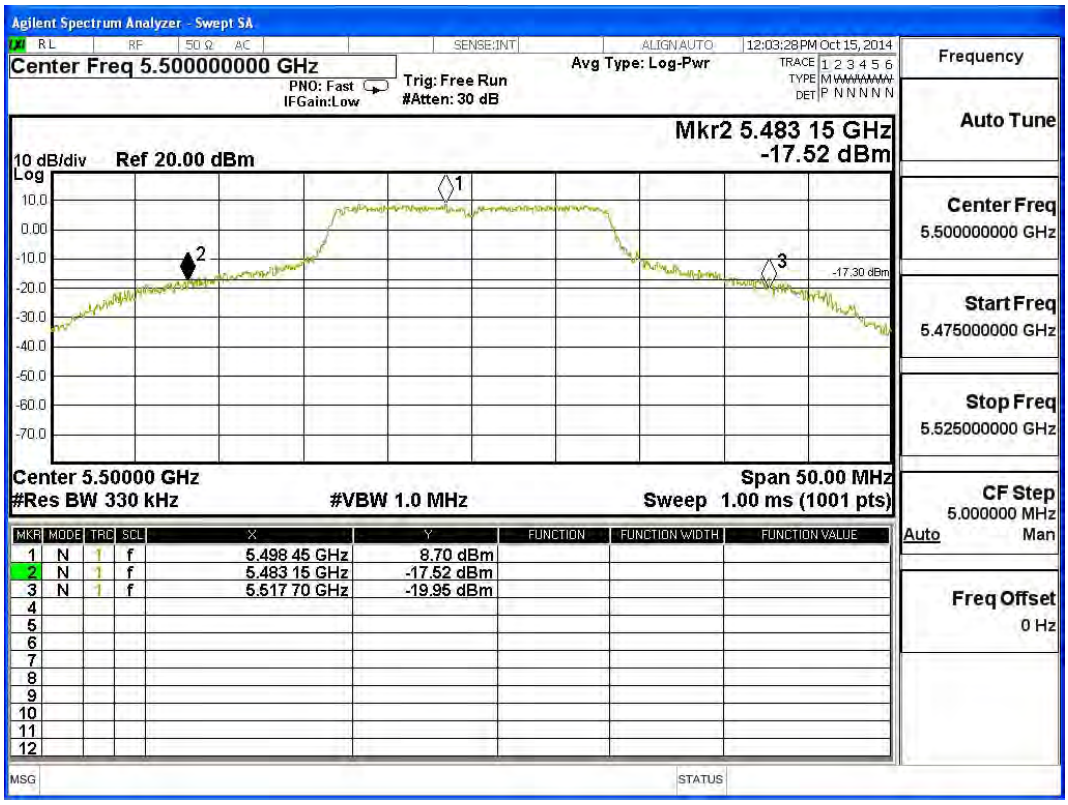
**Channel 64: Chain A**



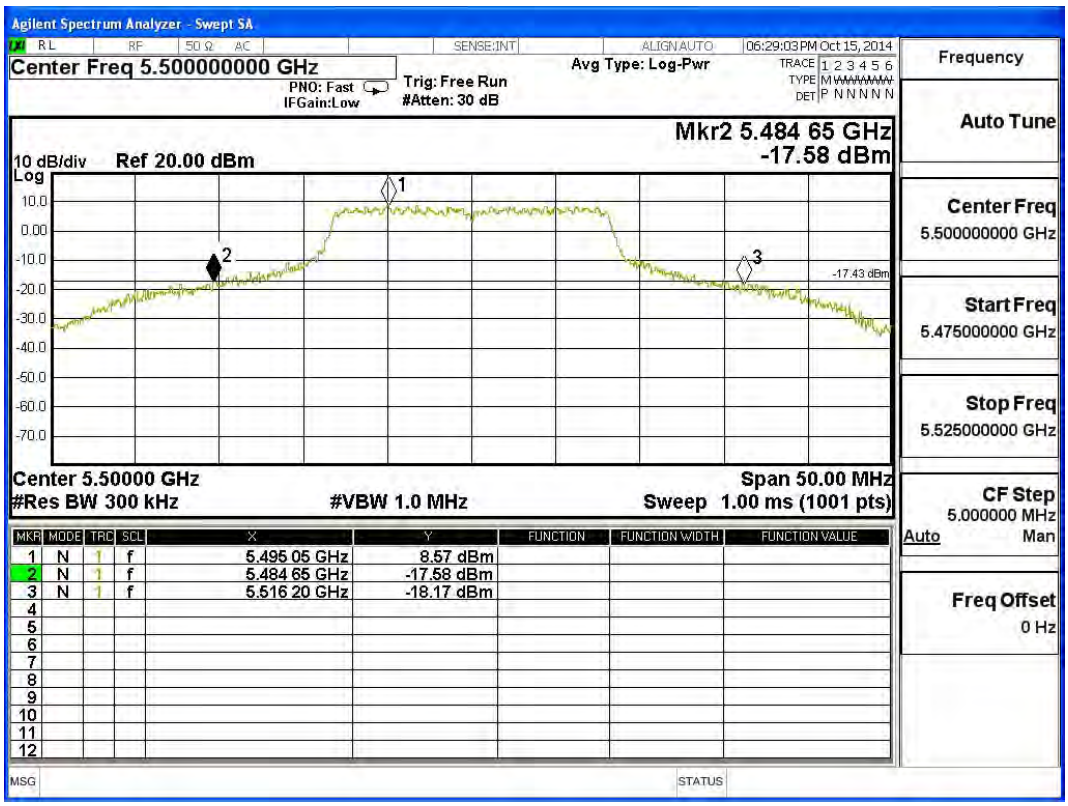

**Channel 64: Chain B**



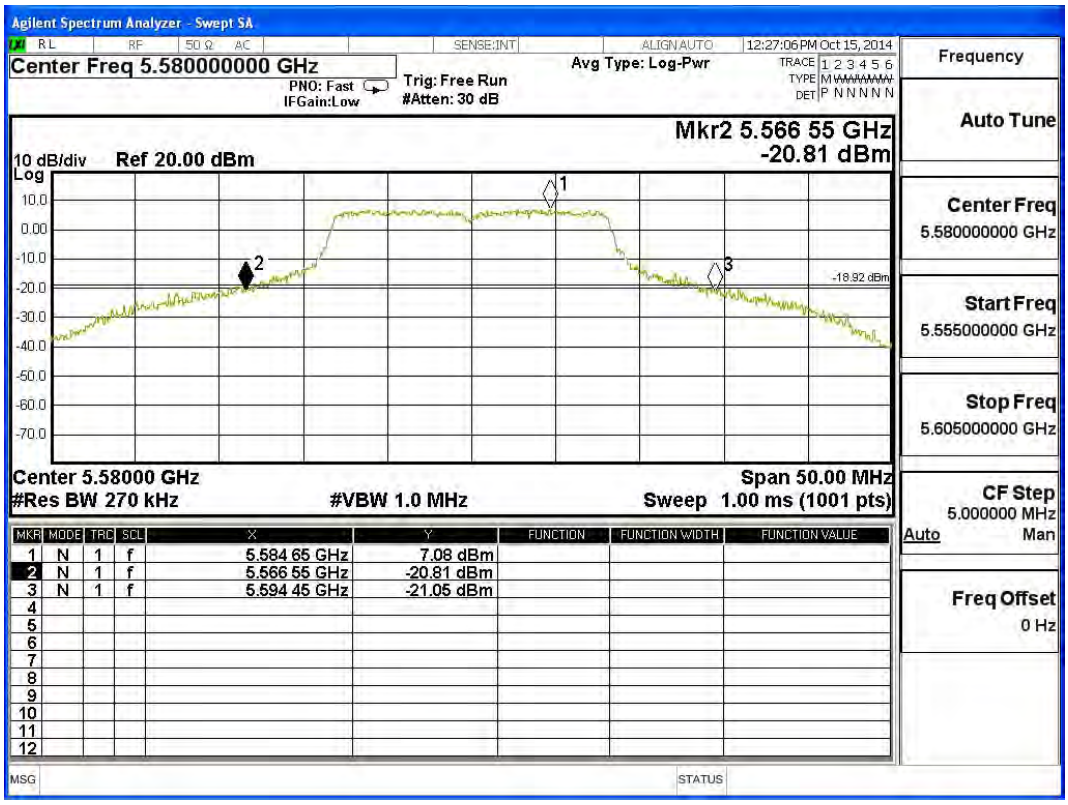
**Channel 100: Chain A**



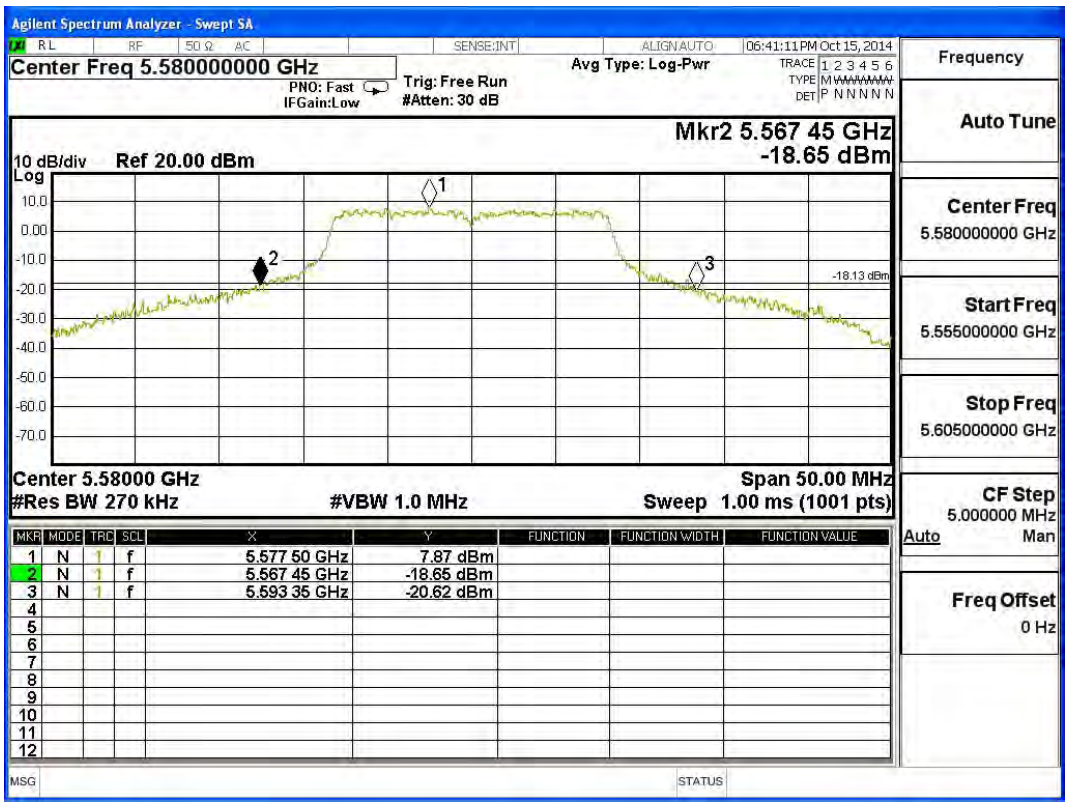

**Channel 100: Chain B**



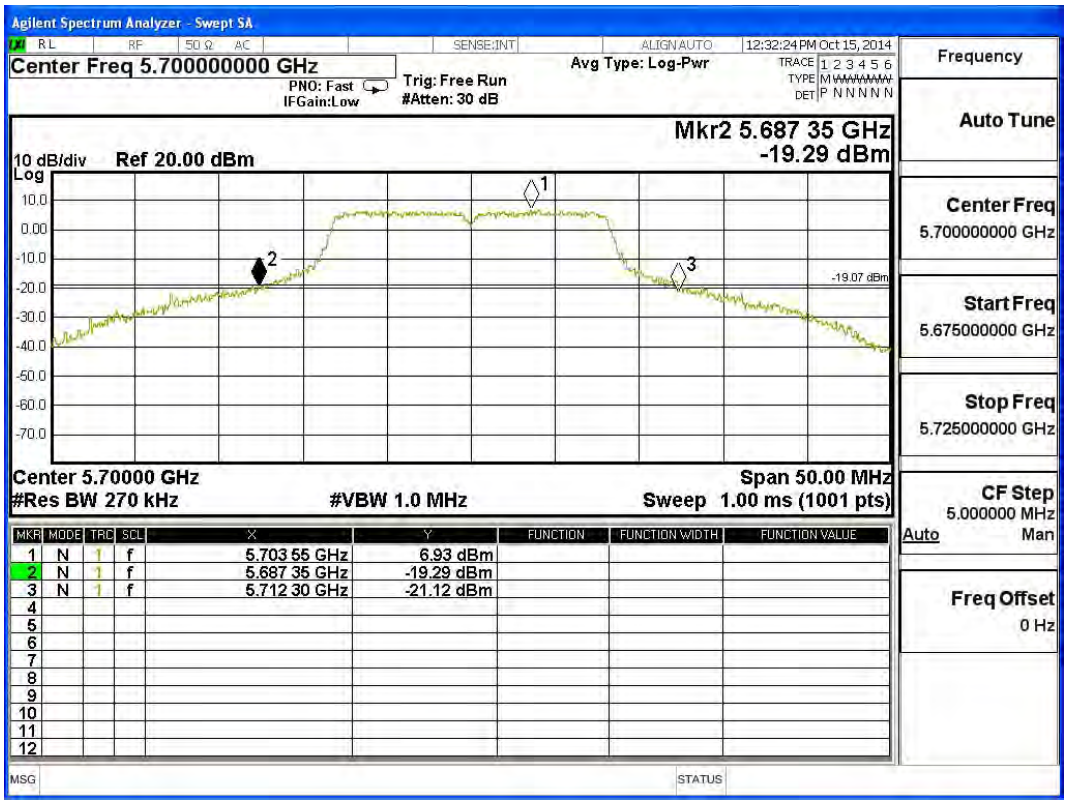
**Channel 120: Chain A**



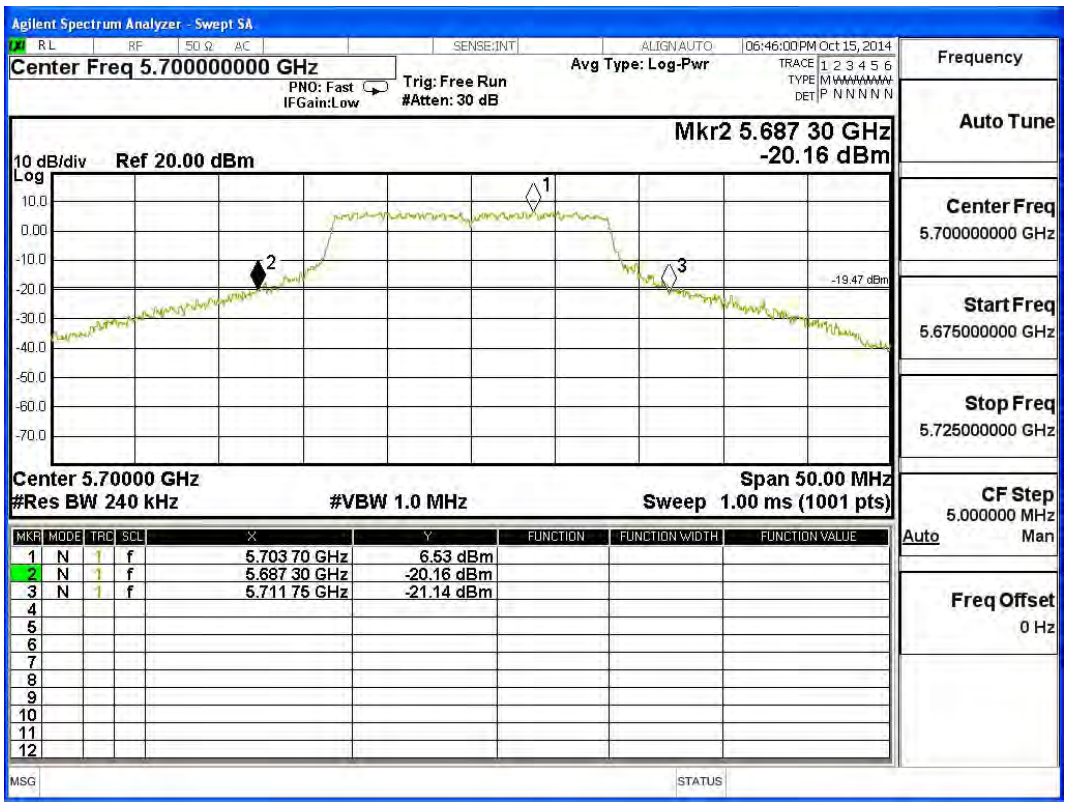

**Channel 120: Chain B**



**Channel 140: Chain A**




**Channel 140: Chain B**



Product : Access Point/Sensor
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps)

**Chain A**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | 14.4 | 28.9 | 43.3 | 57.8 | 86.7 | 115.6 | 130 | 144.4 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 52 | 5260 | 19.09 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 60 | 5300 | 19.01 | 18.98 | 18.82 | 18.79 | 18.71 | 18.65 | 18.51 | 18.47 | <24dBm |
| 64 | 5320 | 19.11 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 100 | 5500 | 19.06 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 116 | 5580 | 19.07 | 18.99 | 18.81 | 18.7 | 18.66 | 18.51 | 18.49 | 18.32 | <24dBm |
| 140 | 5700 | 19.20 | -- | -- | -- | -- | -- | -- | -- | <24dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

**Chain B**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | 14.4 | 28.9 | 43.3 | 57.8 | 86.7 | 115.6 | 130 | 144.4 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 52 | 5260 | 19.14 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 60 | 5300 | 19.14 | 19.02 | 18.9 | 18.72 | 18.65 | 18.59 | 18.51 | 18.42 | <24dBm |
| 64 | 5320 | 19.31 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 100 | 5500 | 19.22 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 116 | 5580 | 19.01 | 18.98 | 18.82 | 18.62 | 18.5 | 18.41 | 18.33 | 18.23 | <24dBm |
| 140 | 5700 | 19.11 | -- | -- | -- | -- | -- | -- | -- | <24dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

**Maximum conducted output power Measurement:**

**(Chain A+ B)**

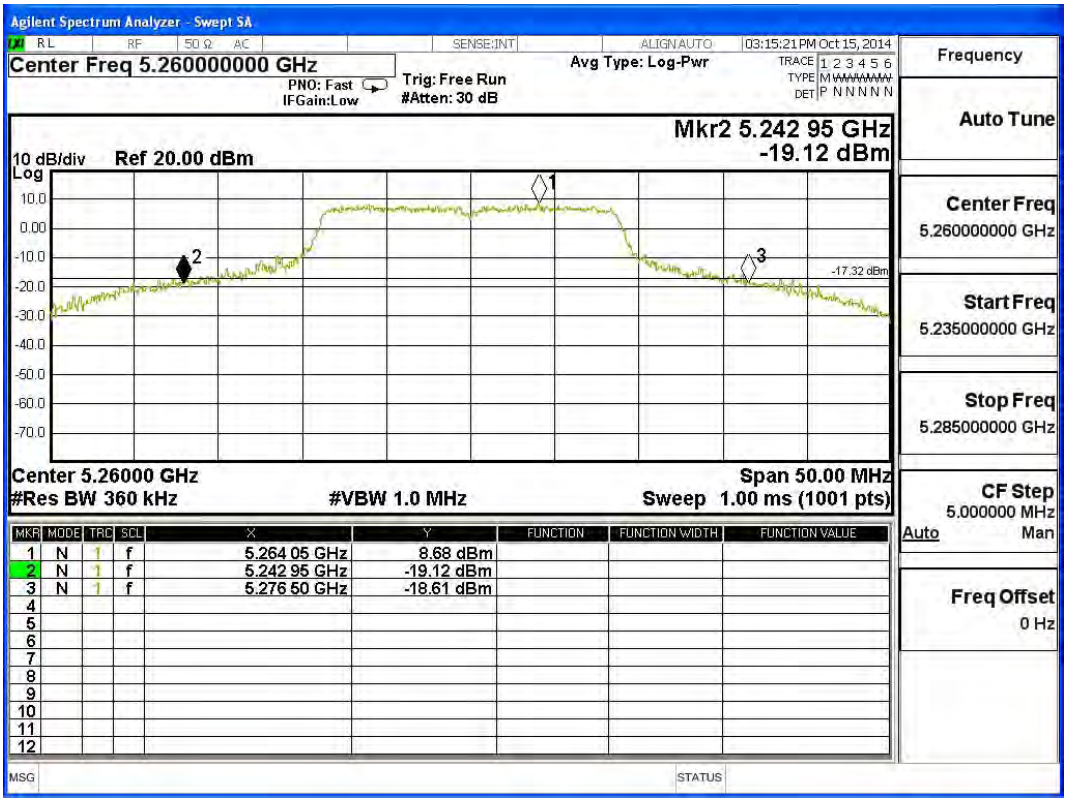
| Channel Number | Frequency | 26dB Bandwidth | Chain A Power | Chain B Power | Output Power | Output Power Limit | |
|---|---|---|---|---|---|---|---|
| | (MHz) | (MHz) | (dBm) | (dBm) | (dBm) | (dBm) | dBm+10log(BW) |
| 52 | 5260 | 27.550 | 19.09 | 19.14 | 22.13 | 24 | 25.40 |
| 60 | 5300 | 28.250 | 19.01 | 19.14 | 22.09 | 24 | 25.51 |
| 64 | 5320 | 31.100 | 19.11 | 19.31 | 22.22 | 24 | 25.93 |
| 100 | 5500 | 29.000 | 19.01 | 19.05 | 22.04 | 24 | 25.62 |
| 116 | 5580 | 24.900 | 19.07 | 19.01 | 22.05 | 24 | 24.96 |
| 140 | 5700 | 43.600 | 18.92 | 19.08 | 22.01 | 24 | 27.39 |

Note:

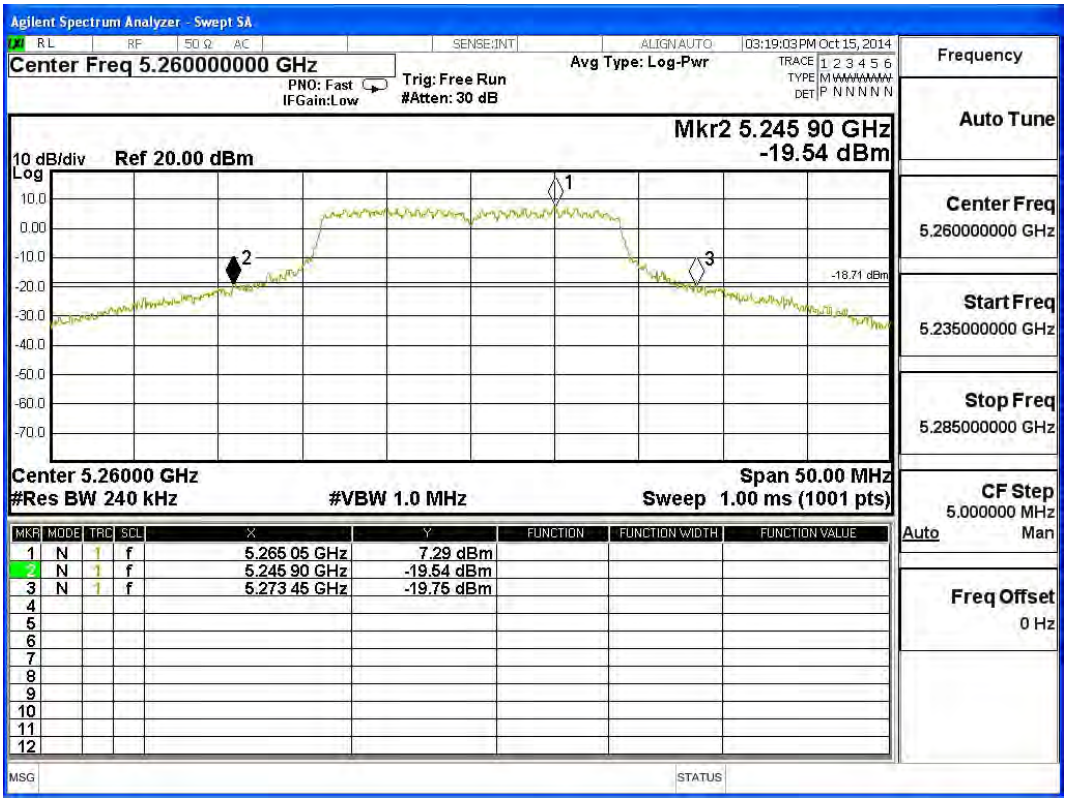
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

## 26dBc Occupied Bandwidth:

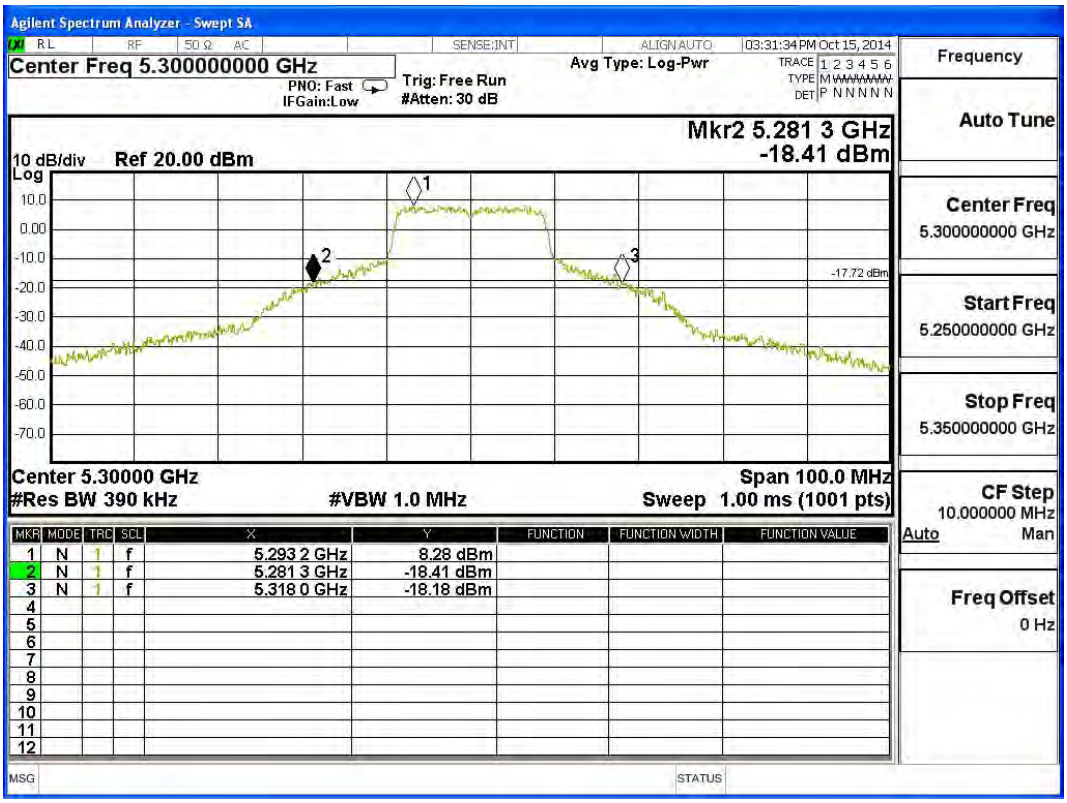
### Channel 52: Chain A



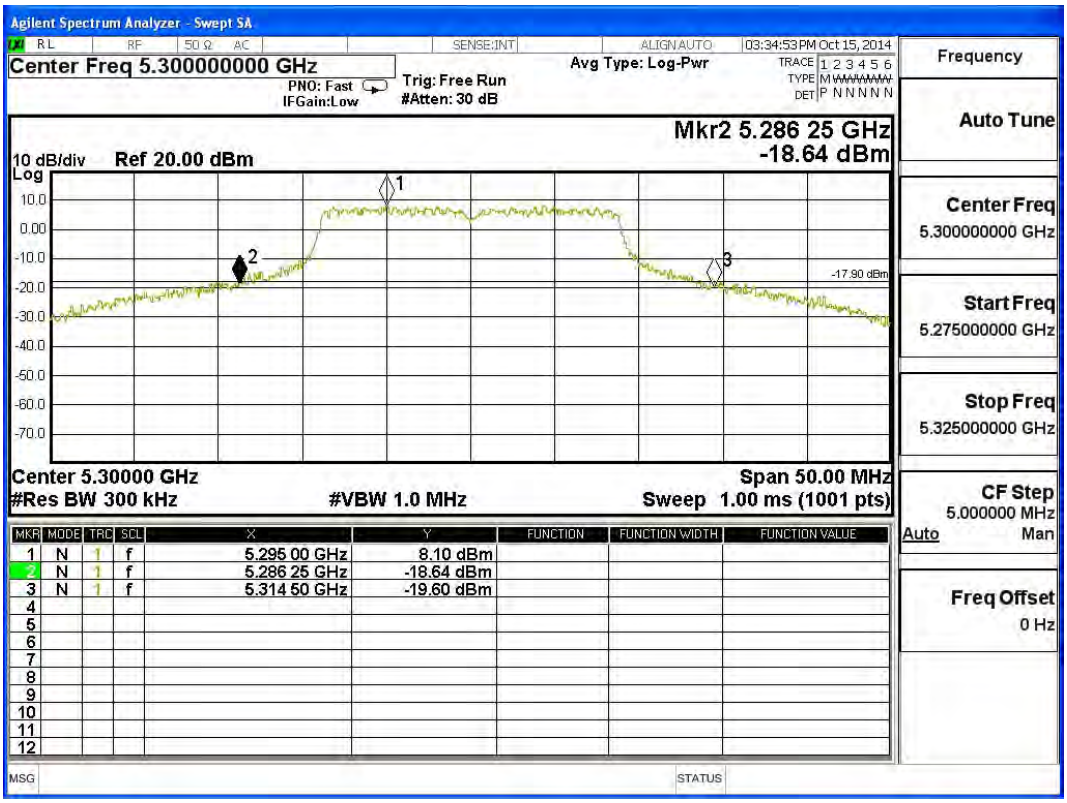

### Channel 52: Chain B



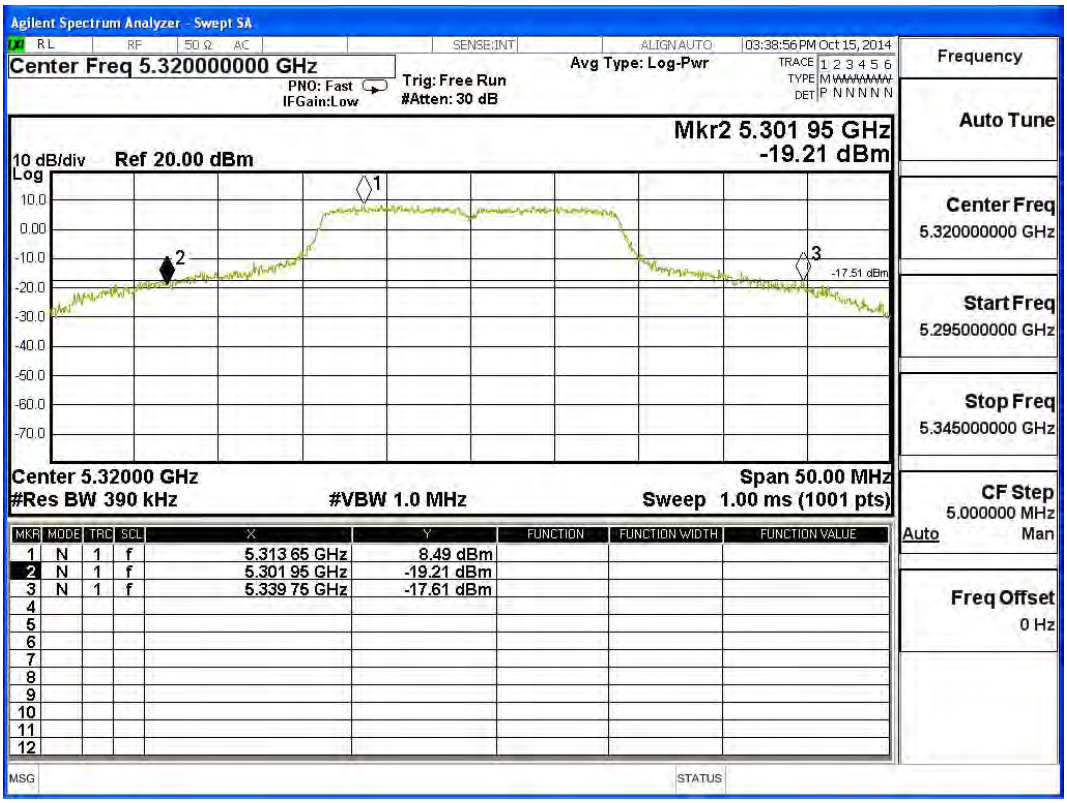
**Channel 60: Chain A**



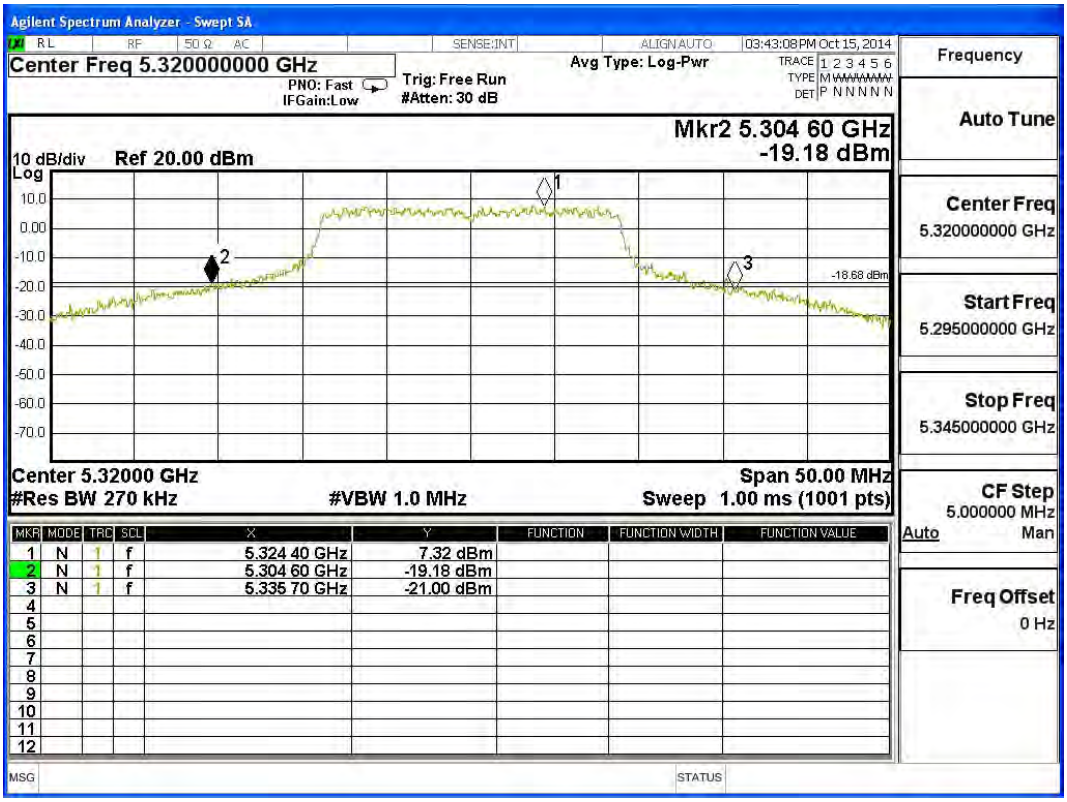

**Channel 60: Chain B**



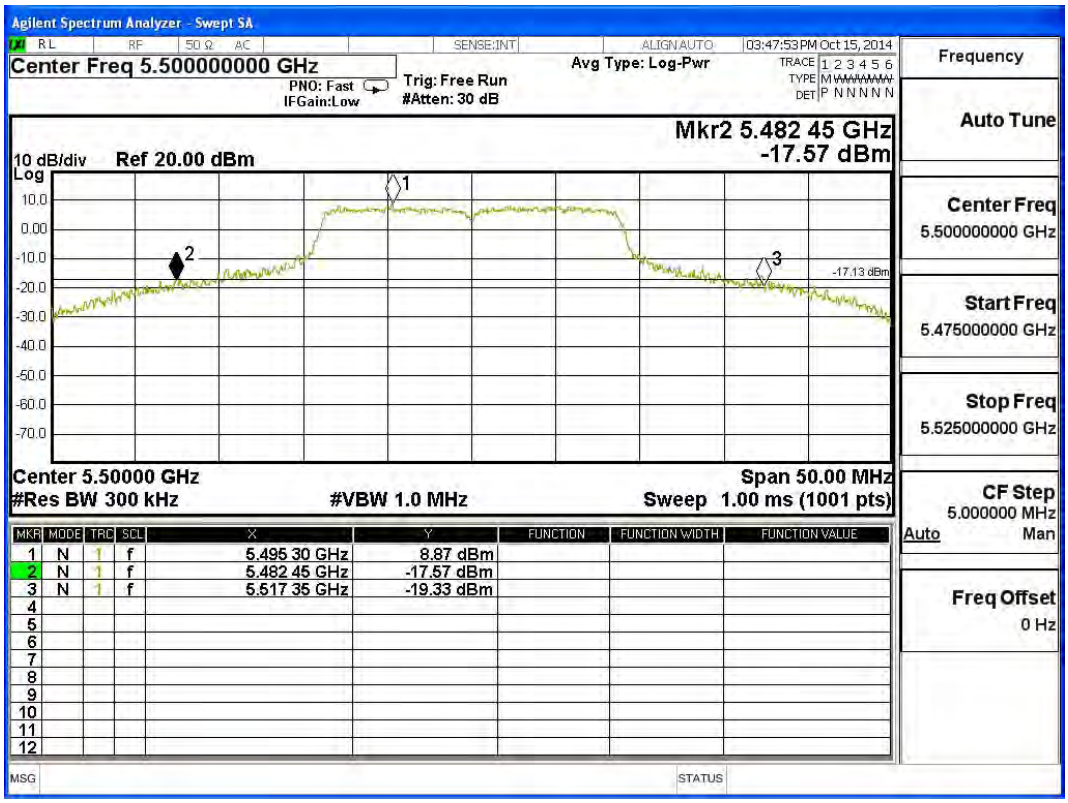
**Channel 64: Chain A**



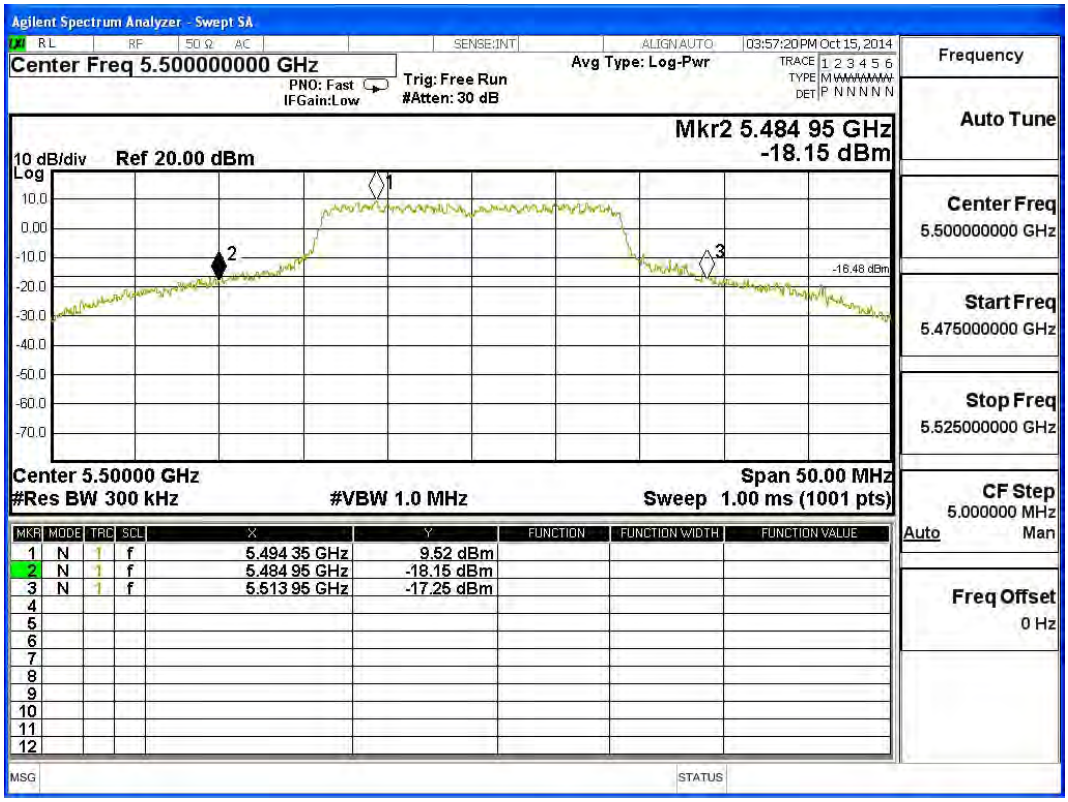

**Channel 64: Chain B**



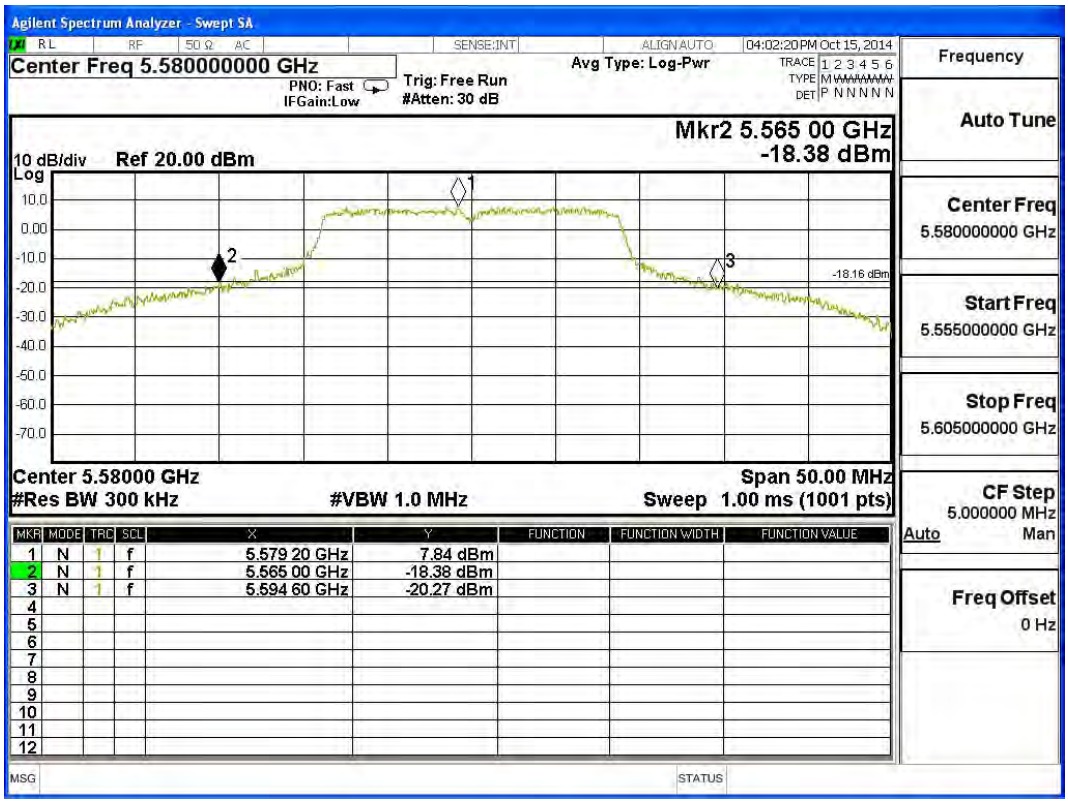
**Channel 100: Chain A**



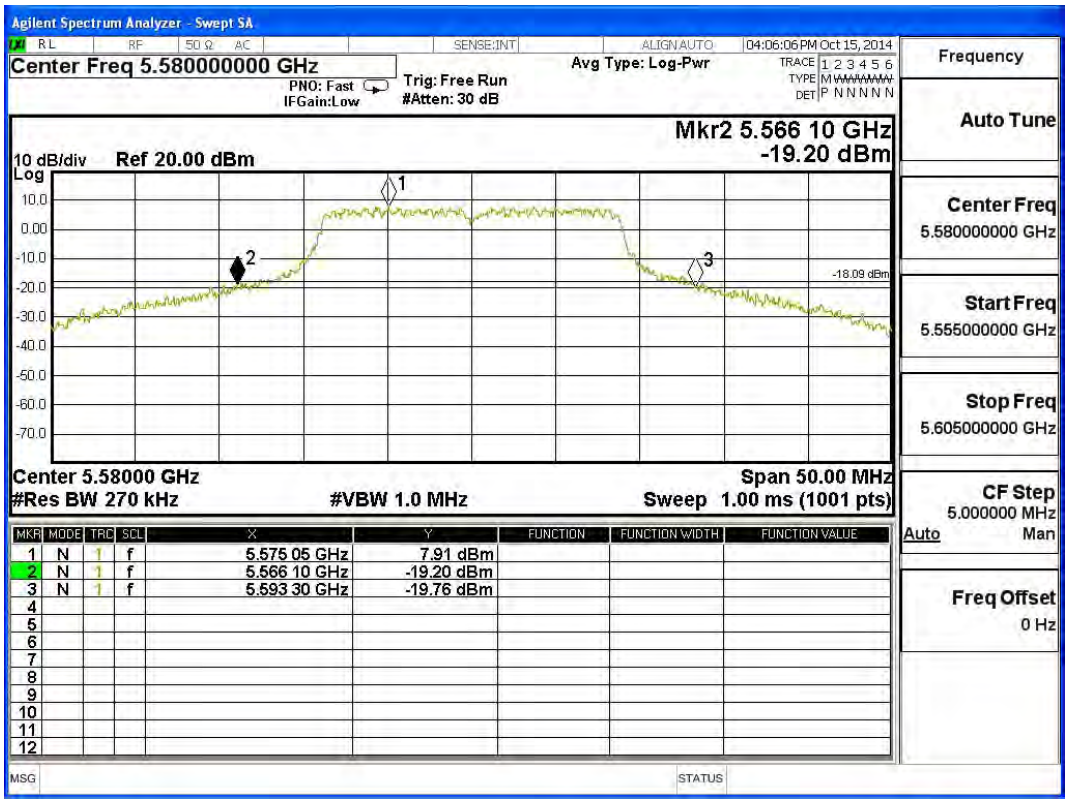

**Channel 100: Chain B**



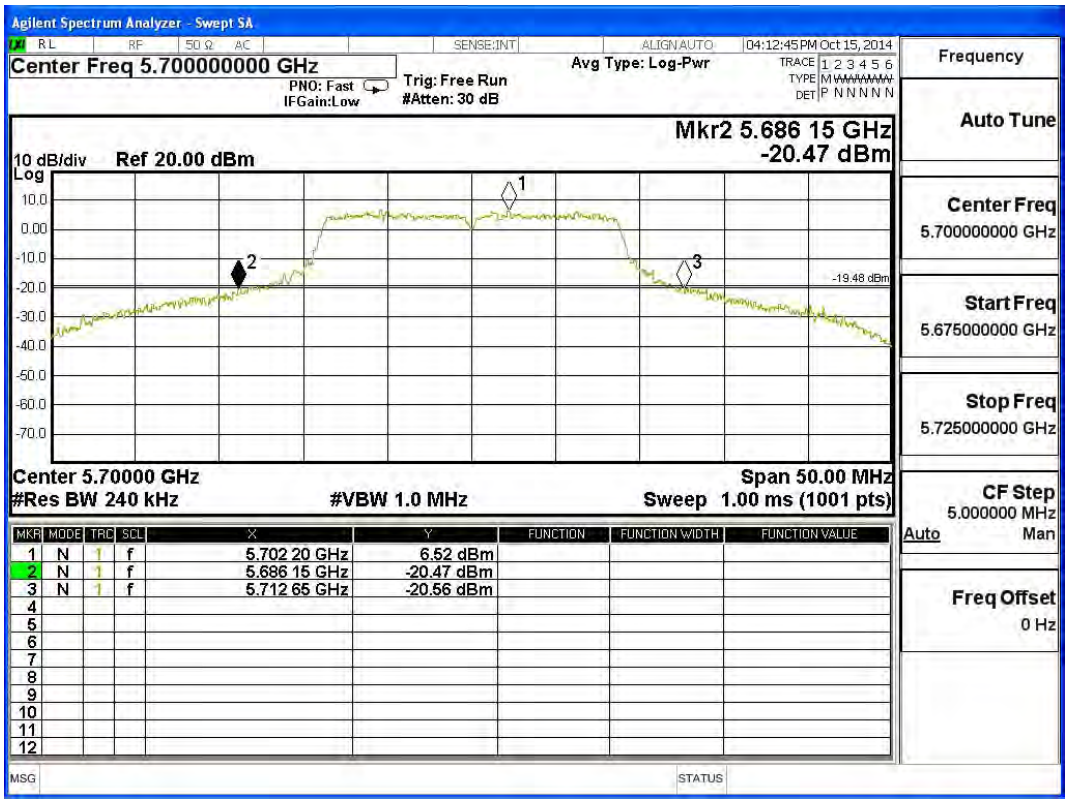
**Channel 120: Chain A**



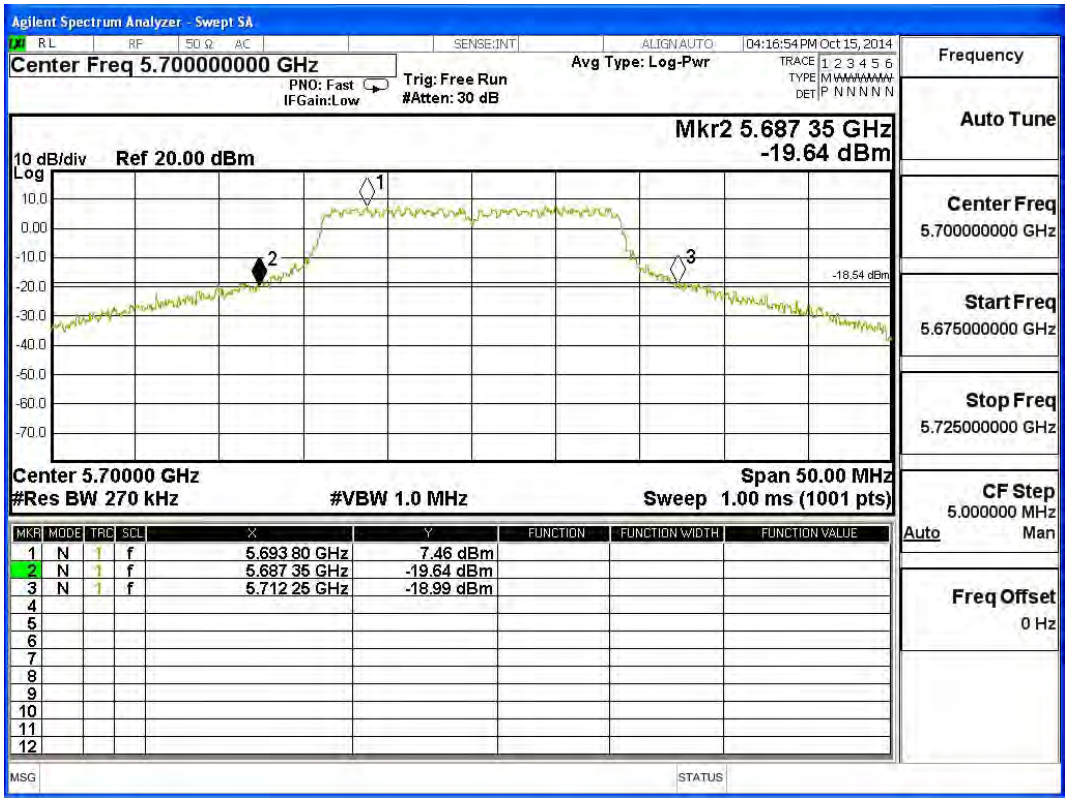

**Channel 120: Chain B**



**Channel 140: Chain A**




**Channel 140: Chain B**



Product : Access Point/Sensor
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps)

**Chain A**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | 30 | 60 | 90 | 120 | 180 | 240 | 270 | 300 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 54 | 5270 | 18.91 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 62 | 5310 | 15.83 | 15.77 | 15.66 | 15.57 | 15.49 | 15.44 | 15.39 | 15.31 | <24dBm |
| 102 | 5510 | 15.11 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 110 | 5550 | 18.89 | 18.81 | 18.75 | 18.69 | 18.66 | 18.43 | 18.36 | 18.29 | <24dBm |
| 134 | 5670 | 18.55 | -- | -- | -- | -- | -- | -- | -- | <24dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

**Chain B**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | 30 | 60 | 90 | 120 | 180 | 240 | 270 | 300 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 54 | 5270 | 19.11 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 62 | 5310 | 16.68 | 16.52 | 16.44 | 16.39 | 16.31 | 16.21 | 16.19 | 16.09 | <24dBm |
| 102 | 5510 | 15.34 | -- | -- | -- | -- | -- | -- | -- | <24dBm |
| 110 | 5550 | 19.03 | 18.92 | 18.84 | 18.76 | 18.69 | 18.59 | 18.47 | 18.39 | <24dBm |
| 134 | 5670 | 19.01 | -- | -- | -- | -- | -- | -- | -- | <24dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

## Maximum conducted output power Measurement:

**(Chain A+ B)**

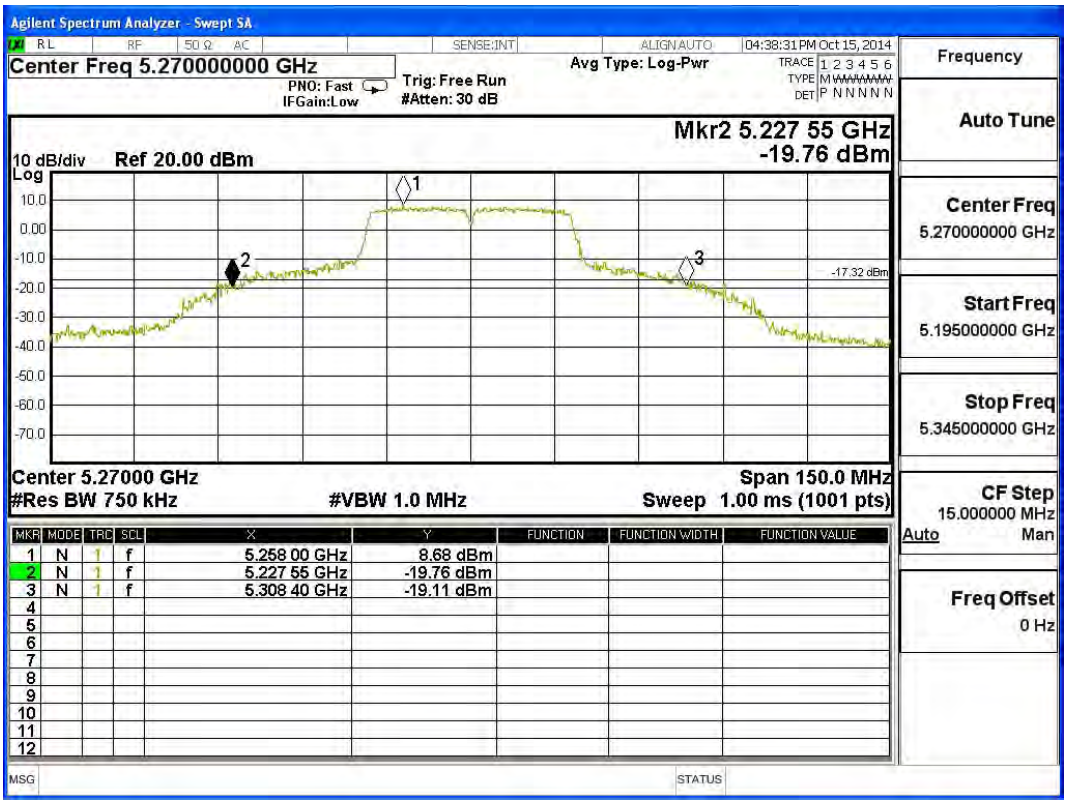
| Channel Number | Frequency | 26dB Bandwidth | Chain A Power | Chain B Power | Output Power | Output Power Limit | |
|---|---|---|---|---|---|---|---|
| | (MHz) | (MHz) | (dBm) | (dBm) | (dBm) | (dBm) | dBm+10log(BW) |
| 54 | 5270 | 62.600 | 18.91 | 19.11 | 22.02 | 24 | 28.97 |
| 62 | 5310 | 43.800 | 15.83 | 16.68 | 19.29 | 24 | 27.41 |
| 102 | 5510 | 44.800 | 15.11 | 15.34 | 18.24 | 24 | 27.51 |
| 110 | 5550 | 65.000 | 18.89 | 19.03 | 21.97 | 24 | 29.13 |
| 134 | 5670 | 45.900 | 18.55 | 19.01 | 21.80 | 24 | 27.62 |

Note:

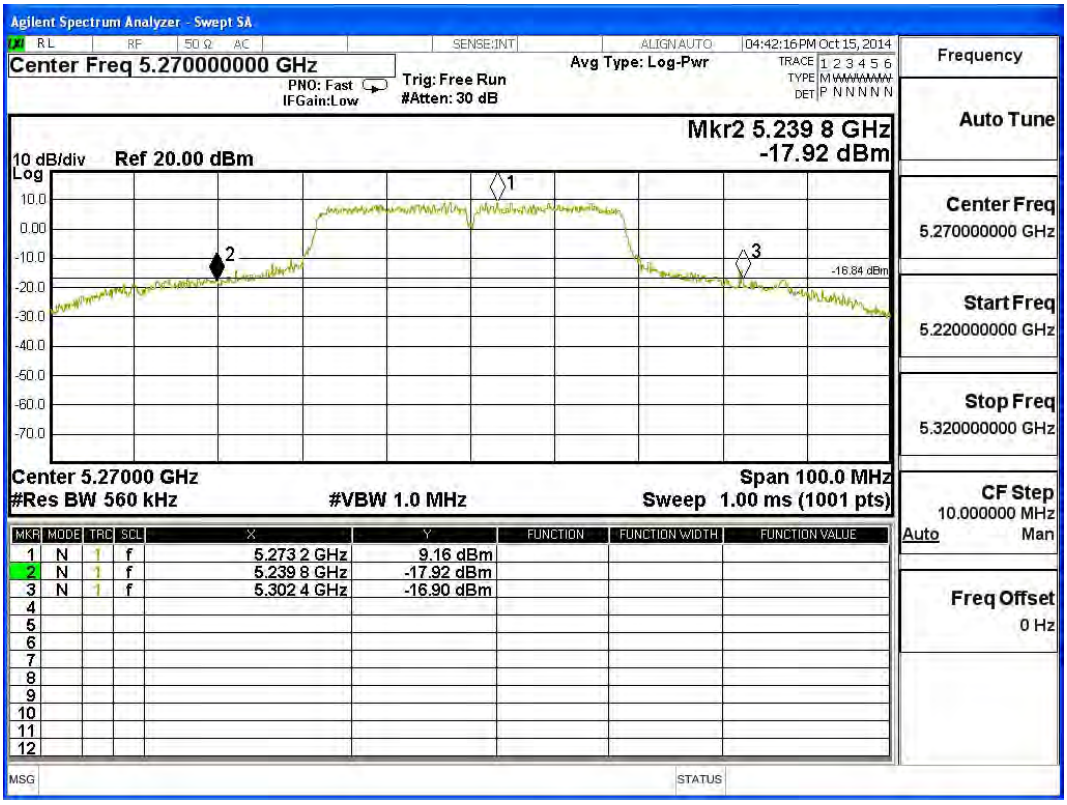
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

## 26dBc Occupied Bandwidth:

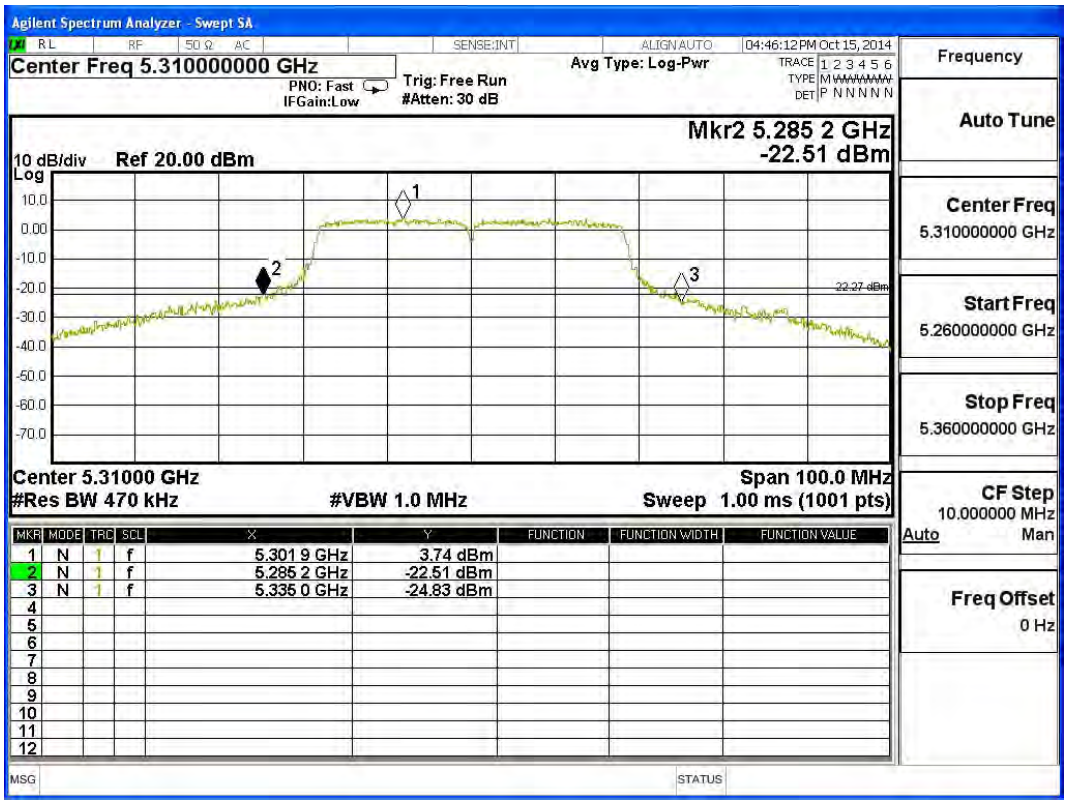
### Channel 54: Chain A



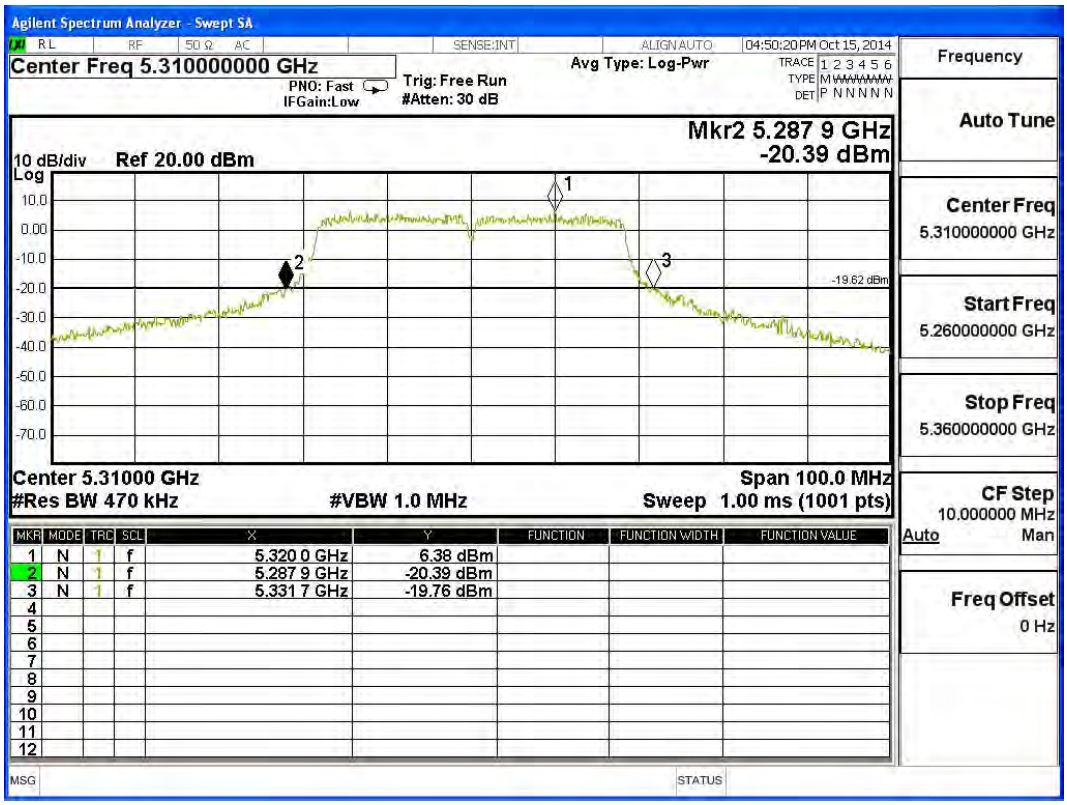

### Channel 54: Chain B



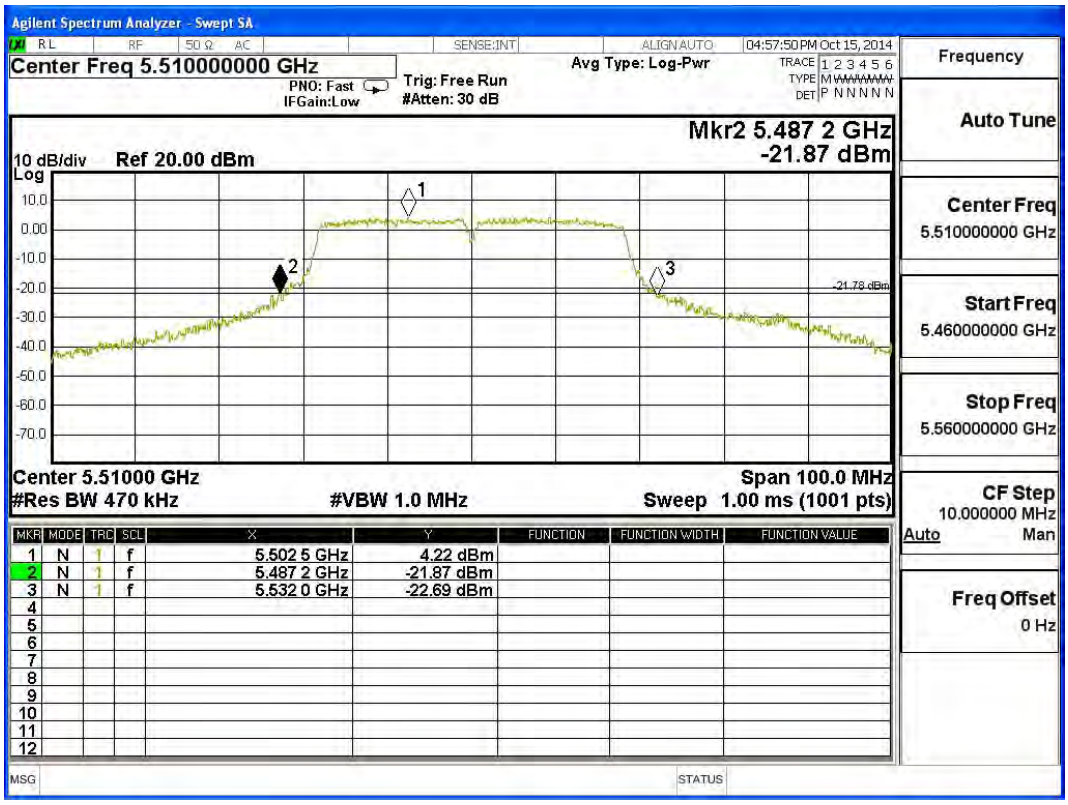
**Channel 62: Chain A**



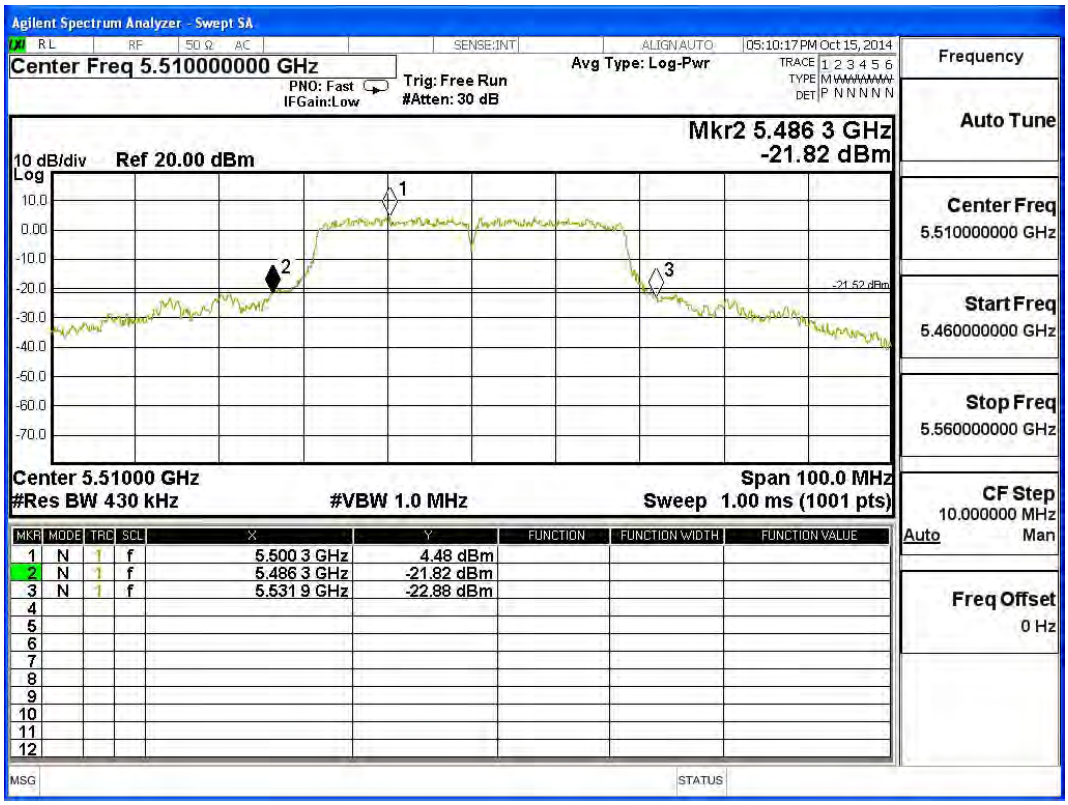

**Channel 62: Chain B**



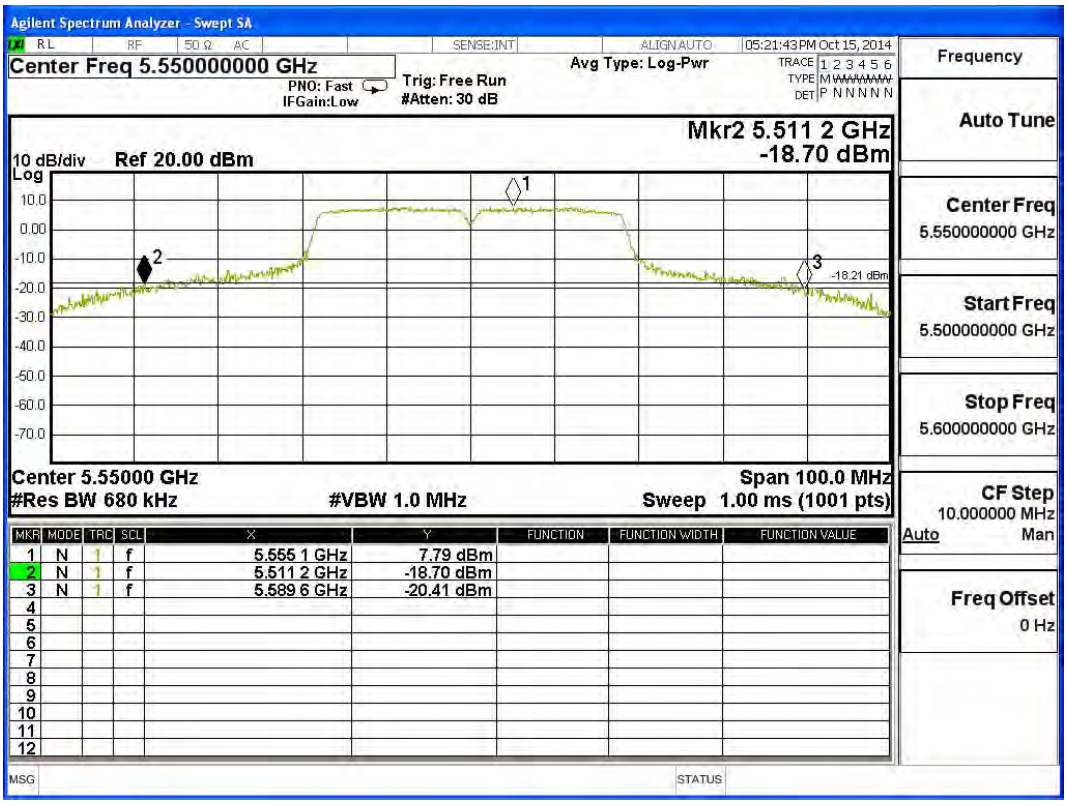
**Channel 102: Chain A**



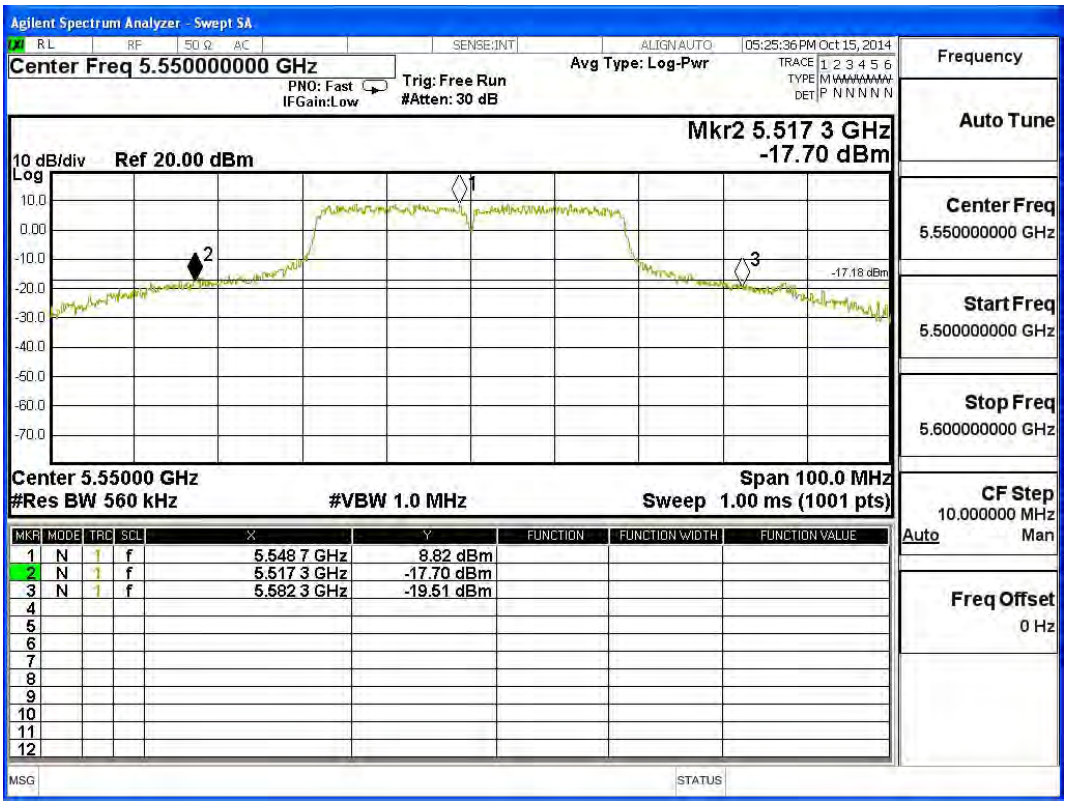

**Channel 102: Chain B**



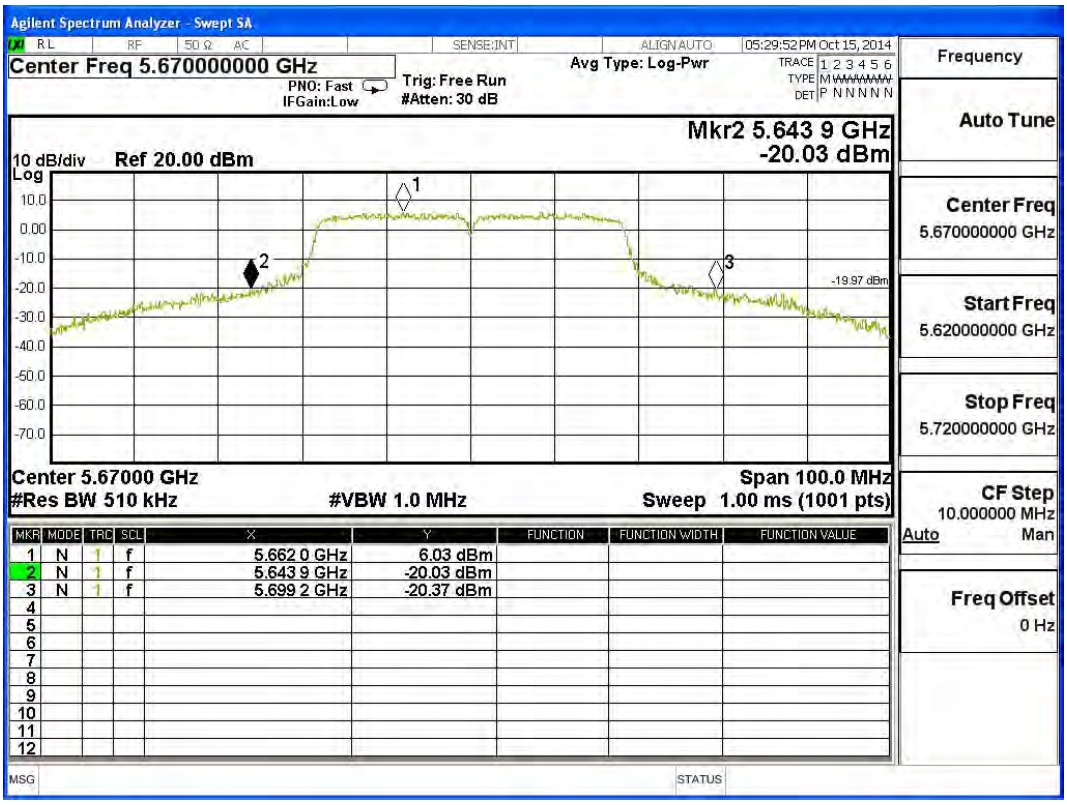
**Channel 110: Chain A**



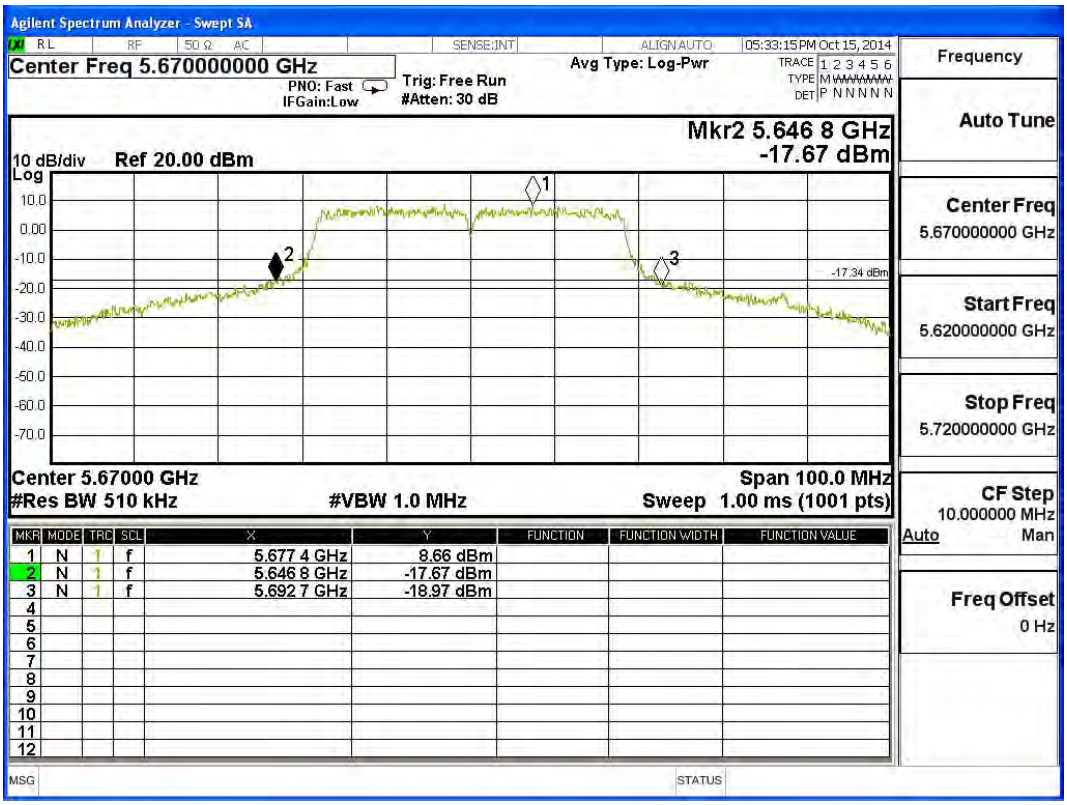

**Channel 110: Chain B**



**Channel 134: Chain A**




**Channel 134: Chain B**



Product : Access Point/Sensor
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 5 Transmit (802.11ac-20BW-65Mbps)

**Chain A**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 144 (Band3) | 5720 | 17.48 | 17.33 | 17.21 | 17.1 | 17.05 | 16.92 | 16.85 | 16.74 | <24dBm |
| 144 (Band4) | 5720 | 11.95 | 11.86 | 11.74 | 11.65 | 11.53 | 11.42 | 11.38 | 11.3 | <30dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

**Chain B**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | Required Limit |
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | |
| | | Measurement Level (dBm) | | | | | | | | |
| 144 (Band3) | 5510 | 17.78 | 17.66 | 17.57 | 17.5 | 17.43 | 17.38 | 17.29 | 17.21 | <24dBm |
| 144 (Band4) | 5550 | 12.25 | 12.18 | 12.11 | 12.06 | 11.93 | 11.88 | 11.81 | 11.75 | <30dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

## Maximum conducted output power Measurement:

**(Chain A+ B)**

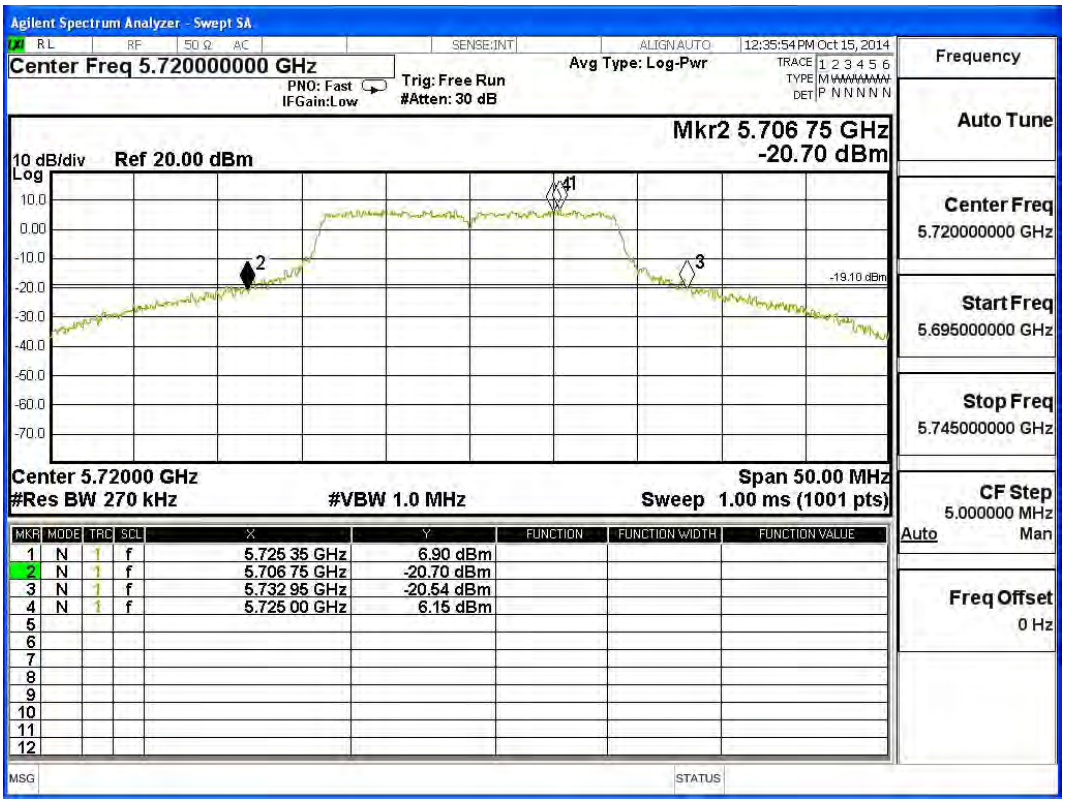
| Channel Number | Frequency | 26dB Bandwidth | Chain A Power | Chain B Power | Output Power | Output Power Limit | |
|---|---|---|---|---|---|---|---|
| | (MHz) | (MHz) | (dBm) | (dBm) | (dBm) | (dBm) | dBm+10log(BW) |
| 144 (Band3) | 5720 | 18.250 | 17.48 | 17.78 | 20.64 | 24 | 23.61 |
| 144 (Band4) | 5720 | 7.800 | 11.95 | 12.25 | 15.11 | 30 | 19.92 |

Note:

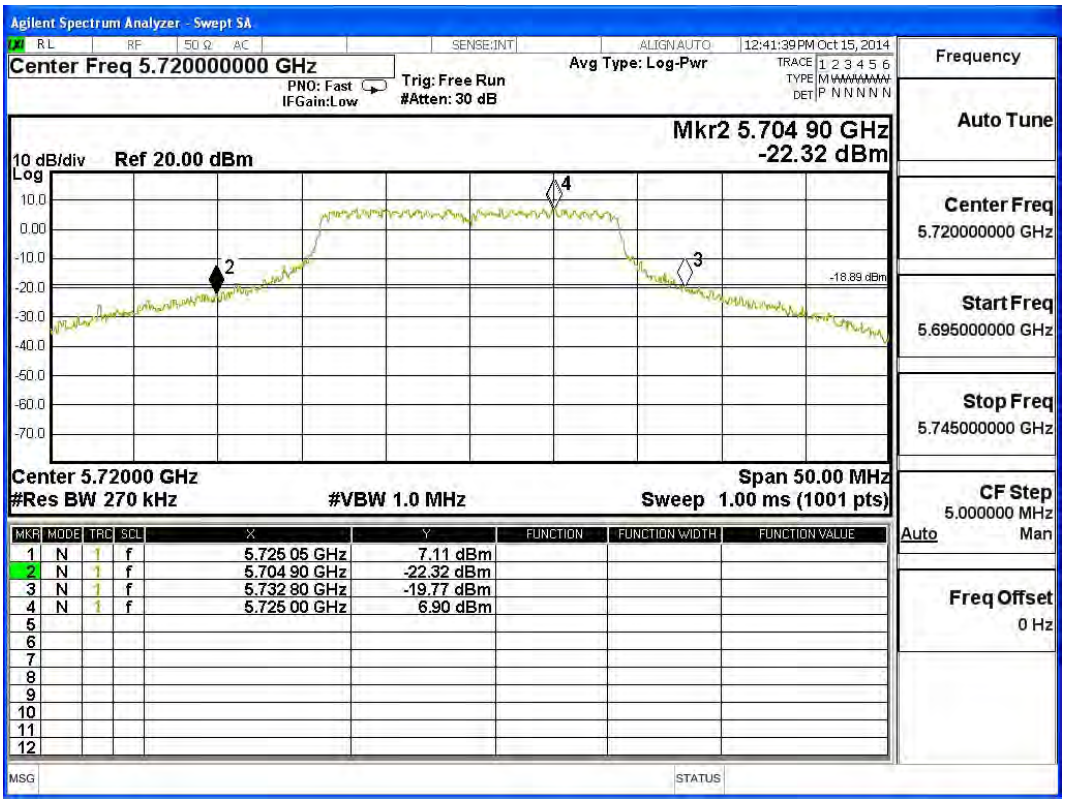
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW) + Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

## 26dBc Occupied Bandwidth:

### Channel 144: Chain A

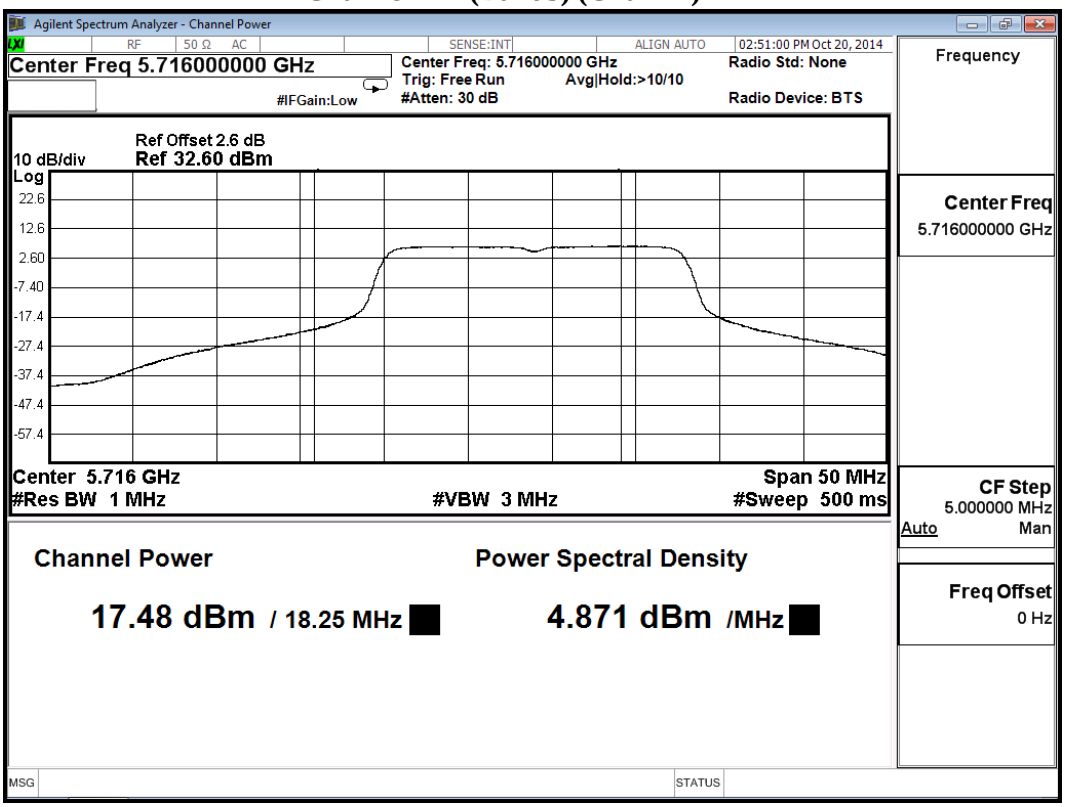



### Channel 144: Chain B

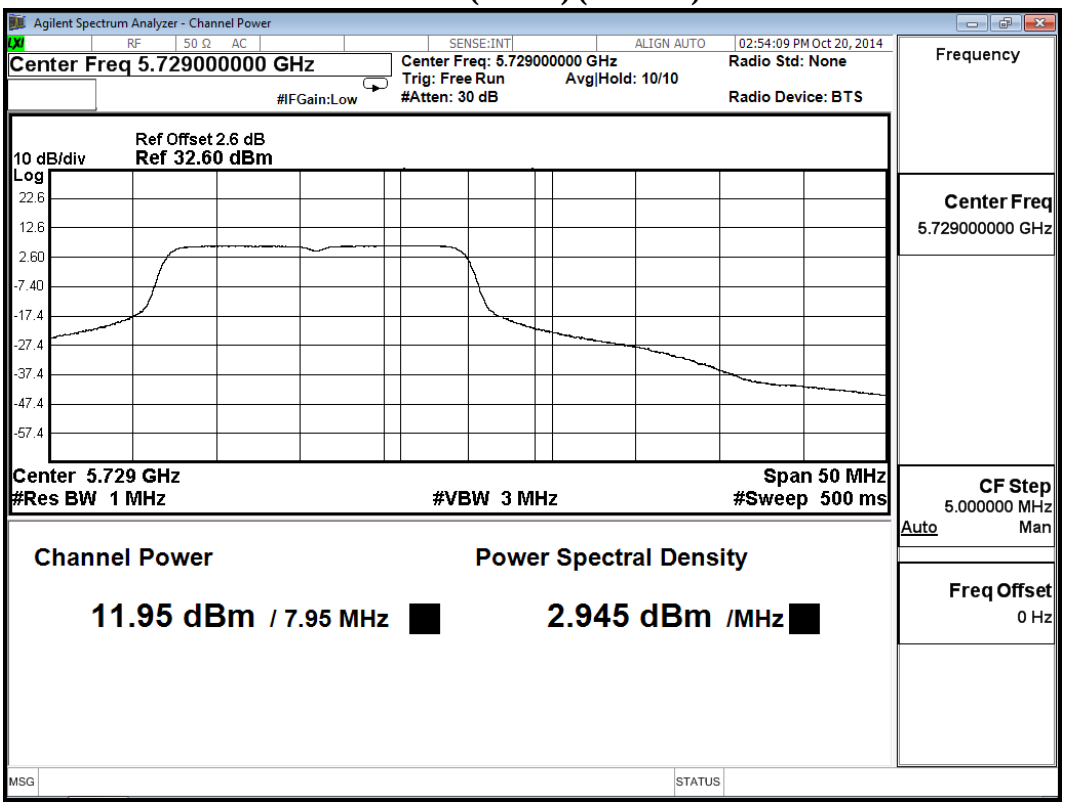


**Maximum conducted output power:**

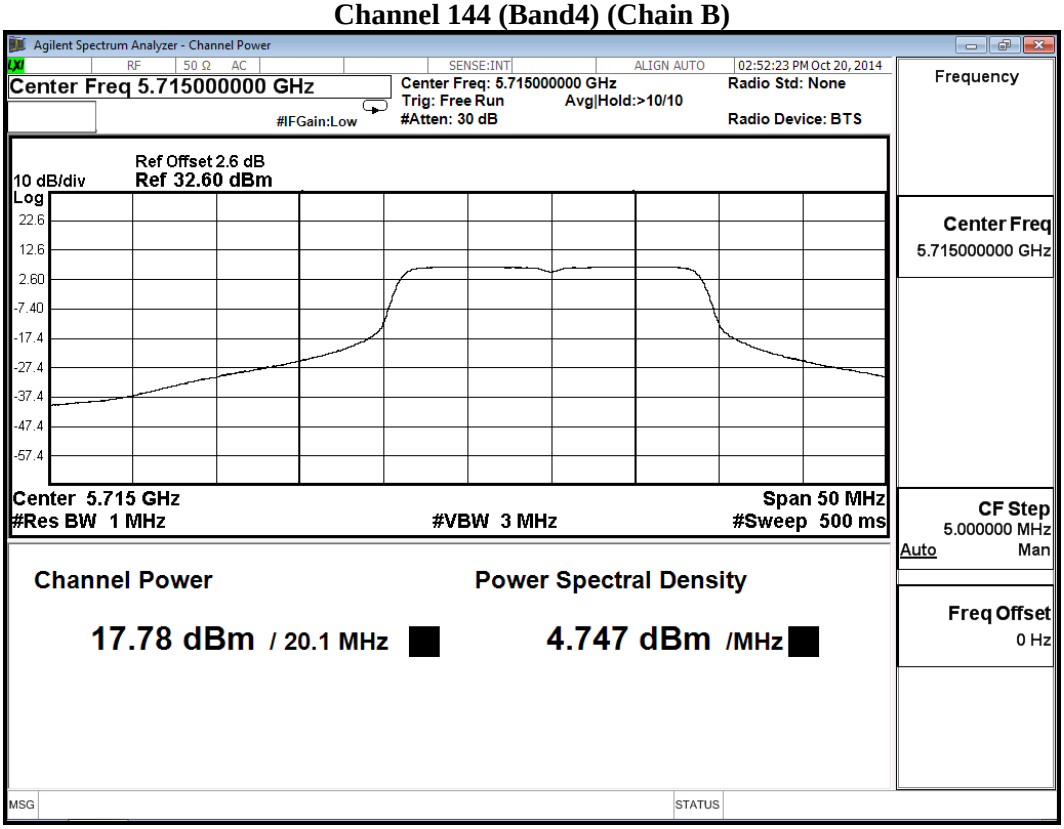
**Channel 144 (Band3) (Chain A)**



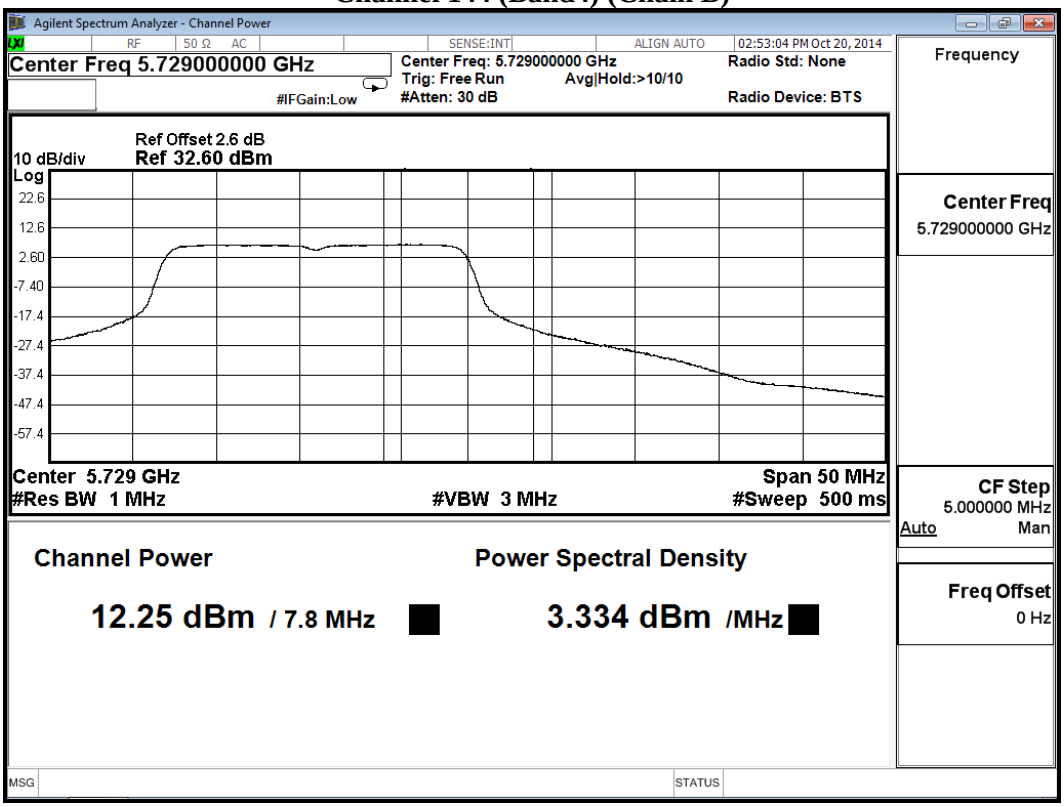

**Channel 144 (Band3) (Chain A)**



**Channel 144 (Band4) (Chain B)**




**Channel 144 (Band4) (Chain B)**



Product : Access Point/Sensor
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 6 Transmit (802.11ac-40BW-65Mbps)

**Chain A**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel No | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | | | Required Limit |
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH8 | VTH9 | |
| 142(Band3) | 5710 | 17.12 | 17.08 | 17.01 | 16.95 | 16.82 | 16.79 | 16.71 | 16.62 | 16.58 | 16.51 | <24dBm |
| 142(Band4) | 5710 | 7.51 | 7.45 | 7.41 | 7.29 | 7.13 | 7.08 | 6.92 | 6.86 | 6.77 | 6.61 | <30dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

**Chain B**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel No | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | | | Required Limit |
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH8 | VTH9 | |
| 142(Band3) | 5710 | 18.02 | 17.96 | 17.82 | 17.65 | 17.53 | 17.42 | 17.38 | 17.21 | 17.11 | 17.05 | <24dBm |
| 142(Band4) | 5710 | 8.01 | 7.9 | 7.88 | 7.79 | 7.71 | 7.62 | 7.53 | 7.48 | 7.42 | 7.33 | <30dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

## Maximum conducted output power Measurement:

**(Chain A+ B)**

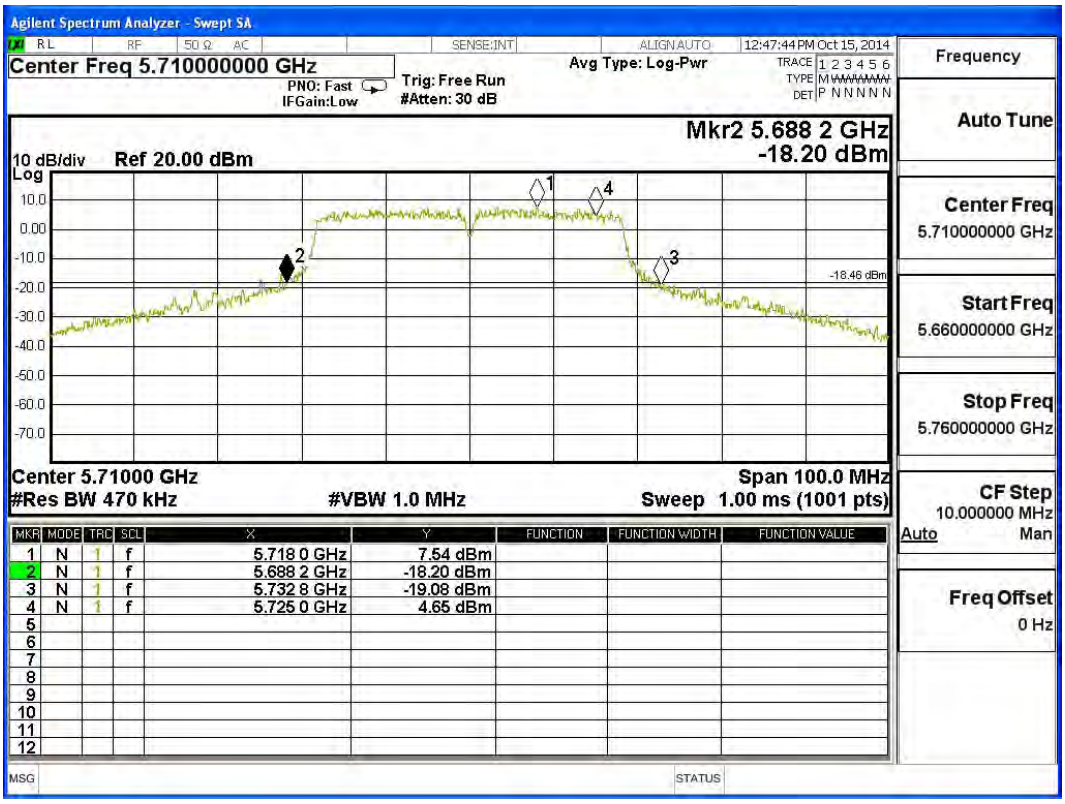
| Channel Number | Frequency | 26dB Bandwidth | Chain A Power | Chain B Power | Output Power | Output Power Limit | |
|---|---|---|---|---|---|---|---|
| | (MHz) | (MHz) | (dBm) | (dBm) | (dBm) | (dBm) | dBm+10log(BW) |
| 142(Band3) | 5710 | 36.800 | 17.12 | 18.02 | 20.60 | 24 | 26.66 |
| 142(Band4) | 5710 | 7.800 | 7.51 | 8.01 | 18.18 | 30 | 19.92 |

Note:

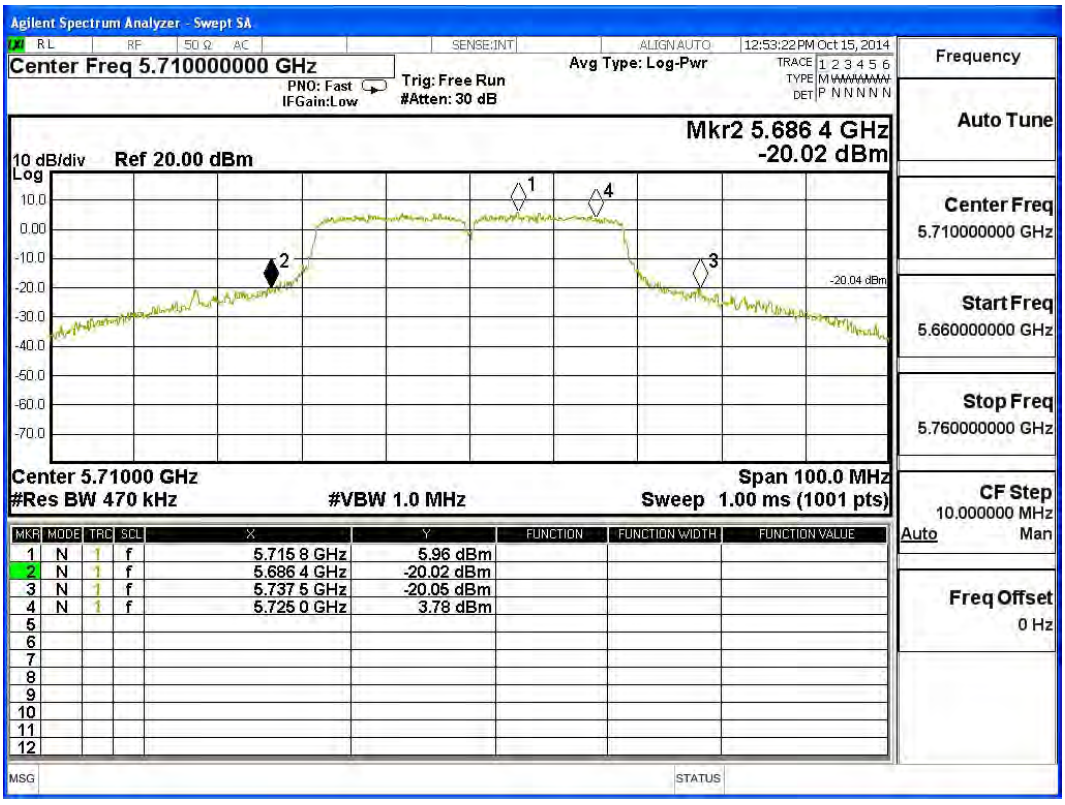
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

## 26dBc Occupied Bandwidth:

### Channel 142: Chain A

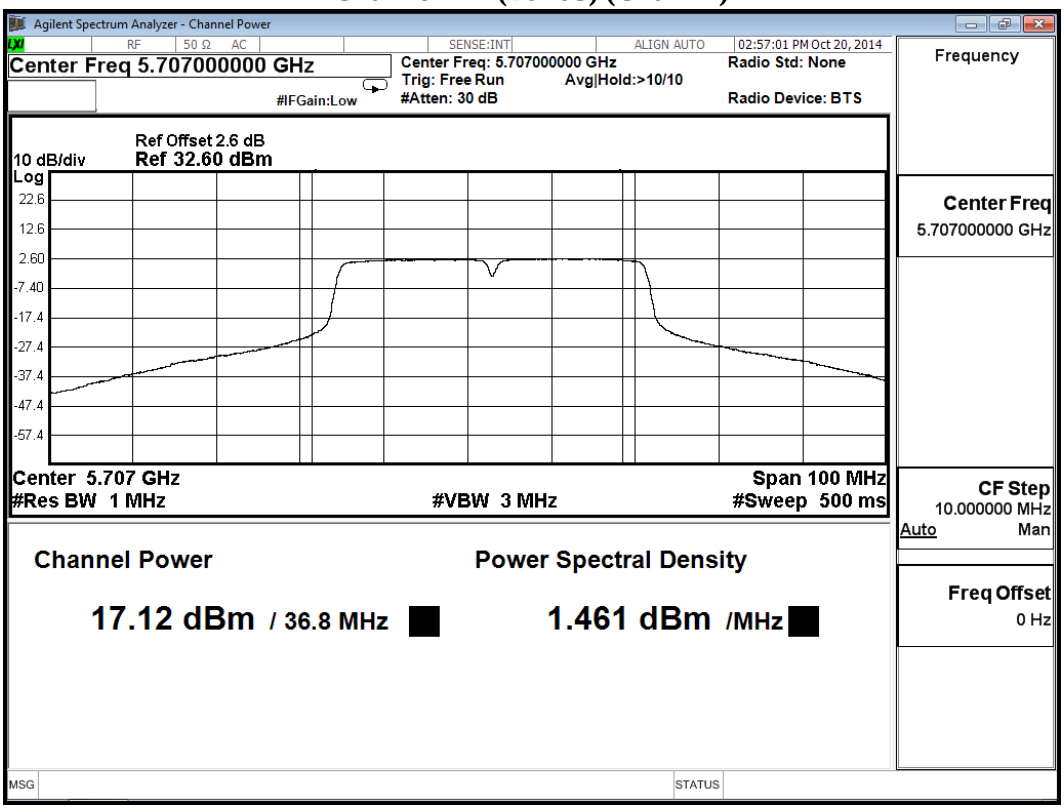



### Channel 142: Chain B

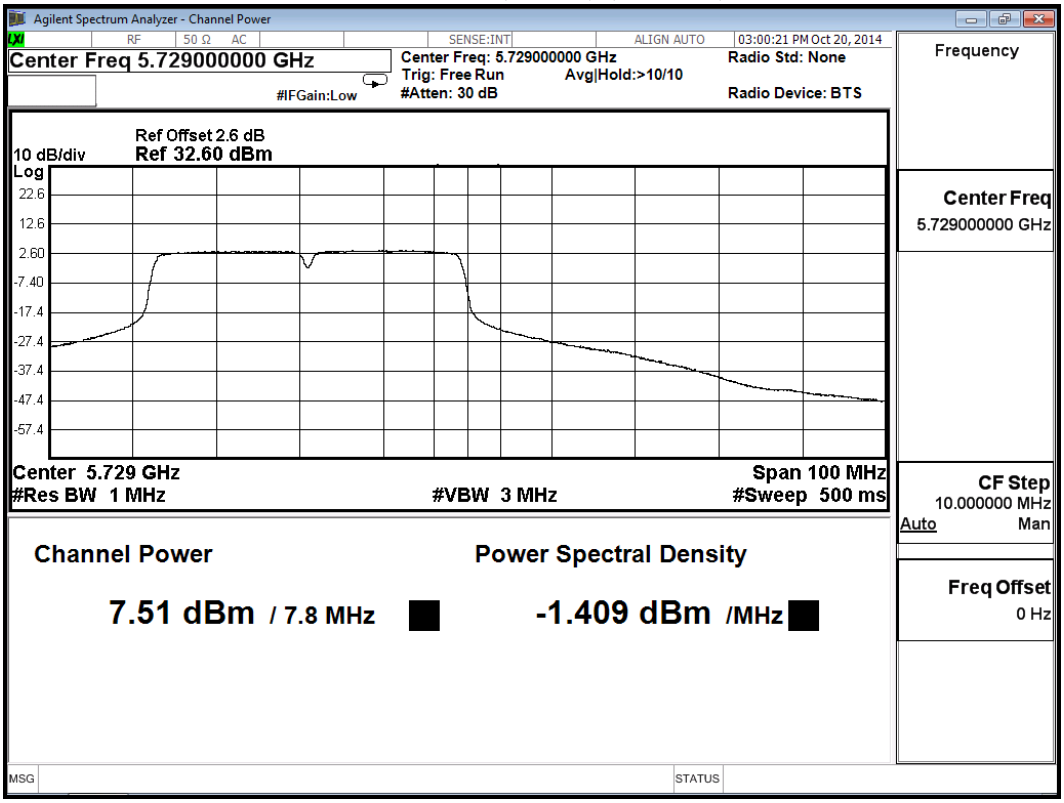


**Maximum conducted output power:**

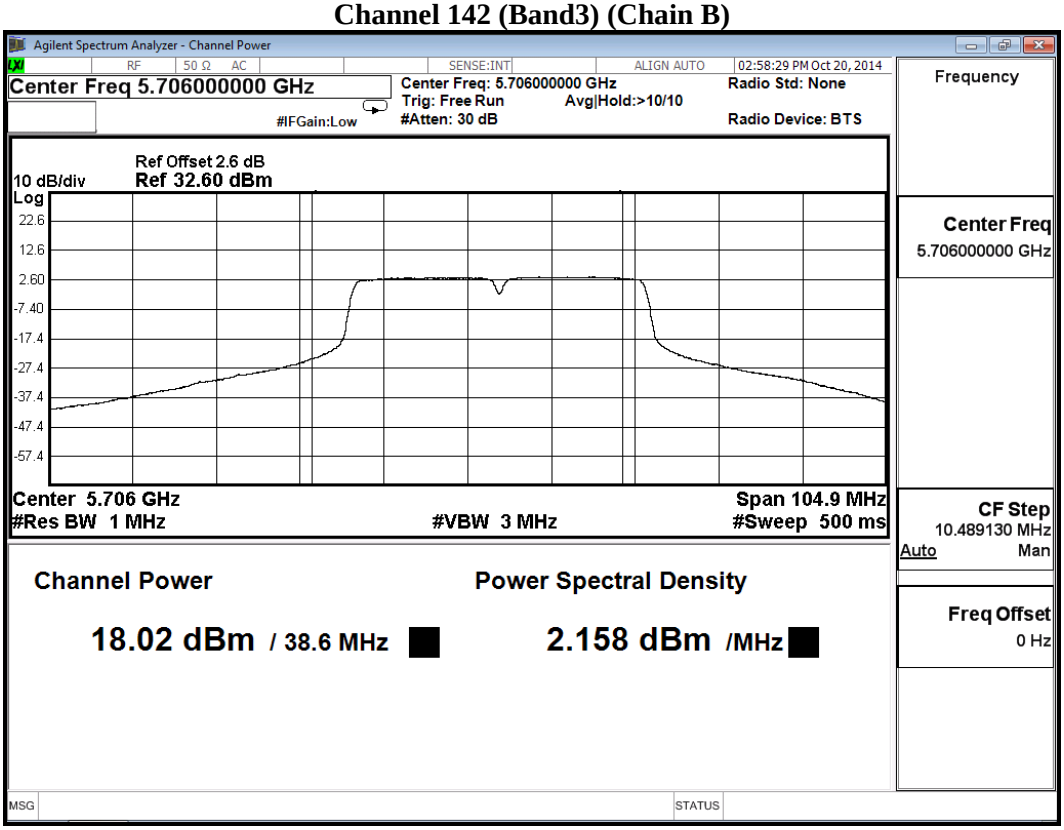
**Channel 142 (Band3) (Chain A)**



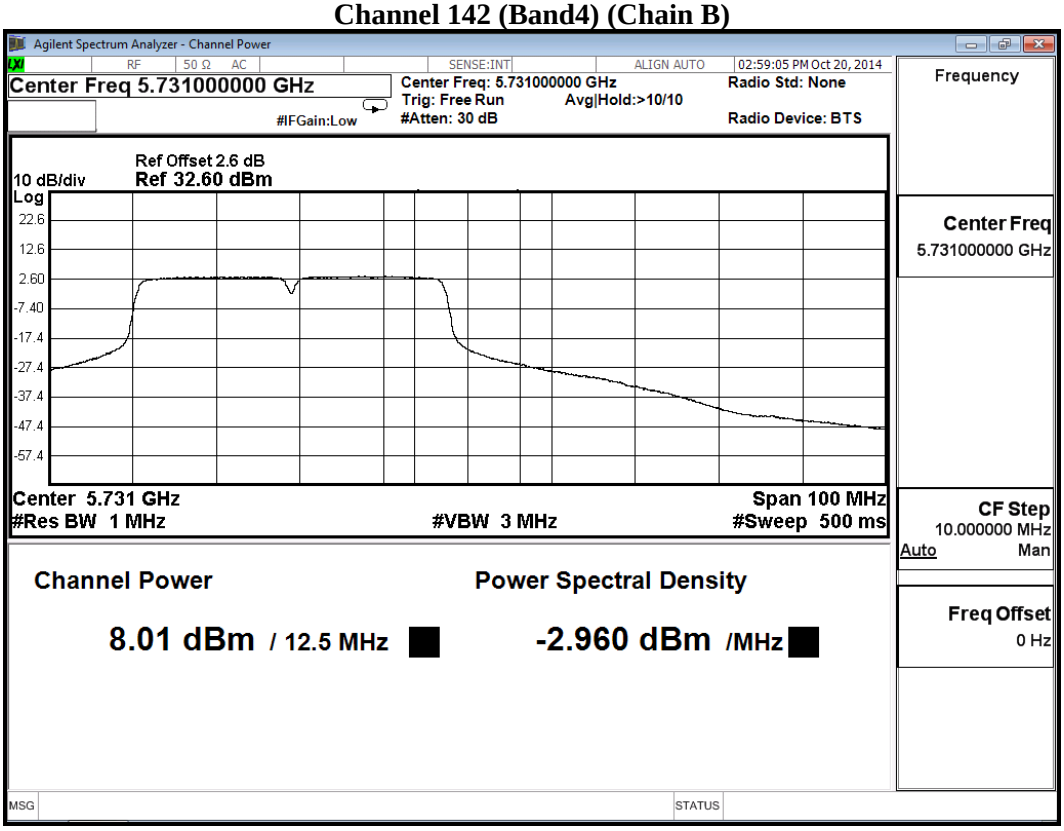

**Channel 142 (Band4) (Chain A)**



**Channel 142 (Band3) (Chain B)**




**Channel 142 (Band4) (Chain B)**



Product : Access Point/Sensor
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Mode : Mode 4 Transmit (802.11ac-80BW-65Mbps)

**Chain A**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel No | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | | | Required Limit |
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH8 | VTH9 | |
| 58 | 5290 | 13.11 | 13.05 | 12.96 | 12.88 | 12.74 | 12.63 | 12.54 | 12.47 | 12.32 | 12.29 | <17dBm |
| 106 | 5530 | 14.58 | 14.44 | 14.38 | 14.31 | 14.25 | 14.17 | 14.09 | 13.93 | 13.85 | 13.79 | <24dBm |
| 138(Band3) | 5690 | 16.7 | 16.66 | 16.59 | 16.47 | 16.34 | 16.29 | 16.18 | 16.09 | 15.99 | 15.89 | <24dBm |
| 138(Band4) | 5690 | 2.58 | 2.49 | 2.4 | 2.36 | 2.29 | 2.21 | 2.13 | 2.08 | 1.99 | 1.87 | <30dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

**Chain B**

| Cable loss=1dB | | Maximum conducted output power | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Channel No | Frequency (MHz) | Data Rate (Mbps) | | | | | | | | | | Required Limit |
| | | VTH0 | VTH1 | VTH2 | VTH3 | VTH4 | VTH5 | VTH6 | VTH7 | VTH8 | VTH9 | |
| 58 | 5290 | 13.47 | 13.39 | 13.31 | 13.22 | 13.17 | 13.05 | 12.92 | 12.87 | 12.69 | 12.57 | <17dBm |
| 106 | 5530 | 14.58 | 14.43 | 14.39 | 14.31 | 14.25 | 14.17 | 14.09 | 13.98 | 13.82 | 13.77 | <24dBm |
| 138(Band3) | 5690 | 17.42 | 17.32 | 17.28 | 17.19 | 17.11 | 17.05 | 16.89 | 16.72 | 16.68 | 16.5 | <24dBm |
| 138(Band4) | 5690 | 2.88 | 2.71 | 2.6 | 2.58 | 2.43 | 2.37 | 2.29 | 2.16 | 2.11 | 2.03 | <30dBm |

Note: 1.Maximum conducted output power Value =Reading value on average power meter + cable loss

## Maximum conducted output power Measurement:

**(Chain A+ B)**

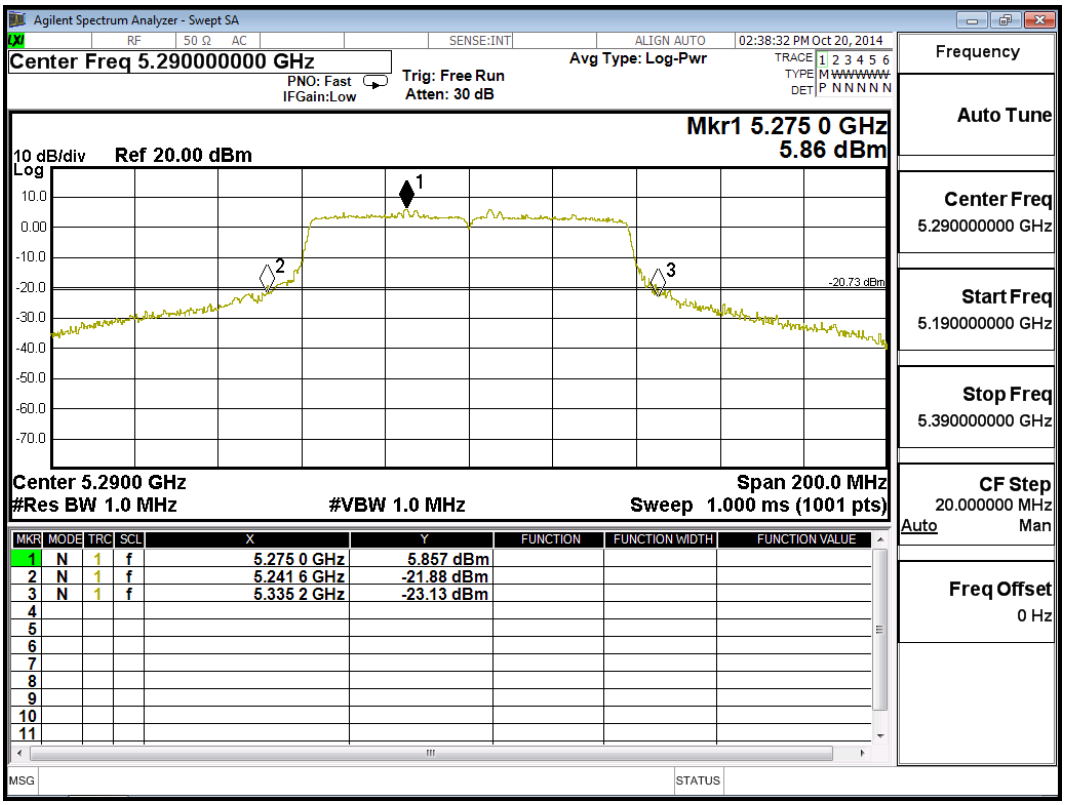
| Channel Number | Frequency | 26dB Bandwidth | Chain A Power | Chain B Power | Output Power | Output Power Limit | |
|---|---|---|---|---|---|---|---|
| | (MHz) | (MHz) | (dBm) | (dBm) | (dBm) | (dBm) | dBm+10log(BW) |
| 58 | 5290 | 92.000 | 13.11 | 13.47 | 16.30 | 17 | 30.64 |
| 106 | 5530 | 83.800 | 14.58 | 14.58 | 17.59 | 24 | 30.23 |
| 138(Band3) | 5690 | 78.200 | 16.70 | 17.42 | 20.09 | 24 | 29.93 |
| 138(Band4) | 5690 | 11.400 | 2.58 | 2.88 | 5.74 | 30 | 27.57 |

Note:

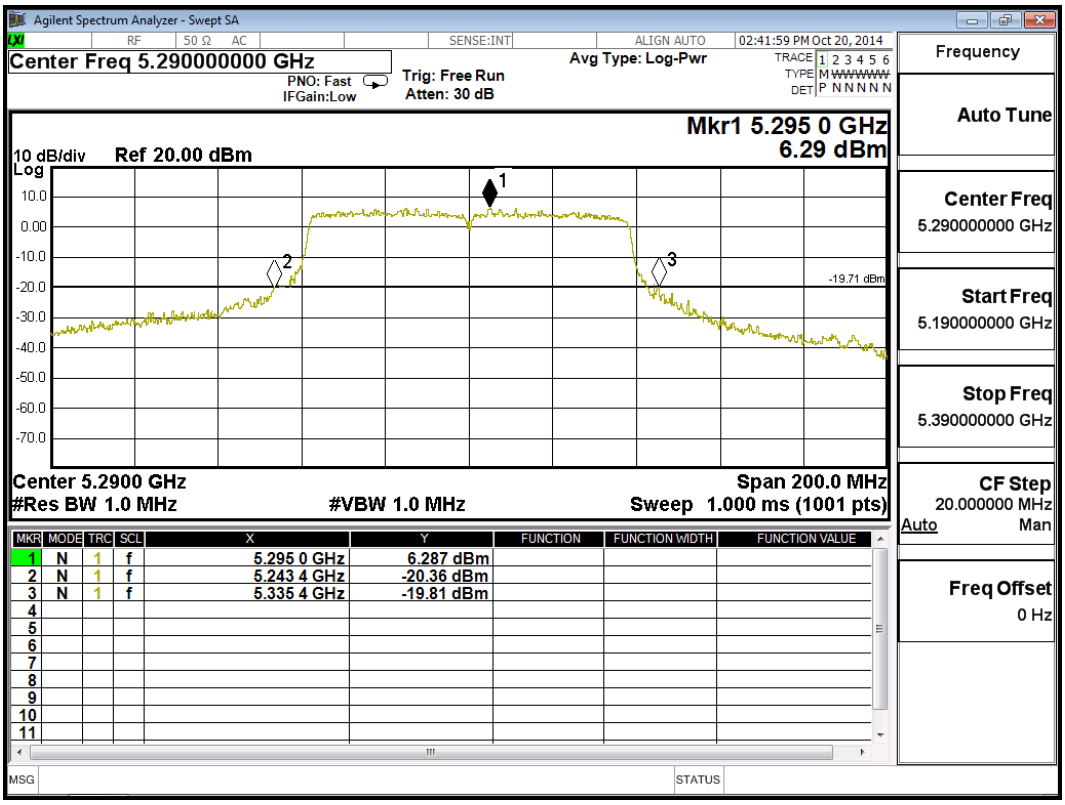
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW) + Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

## 26dBc Occupied Bandwidth:

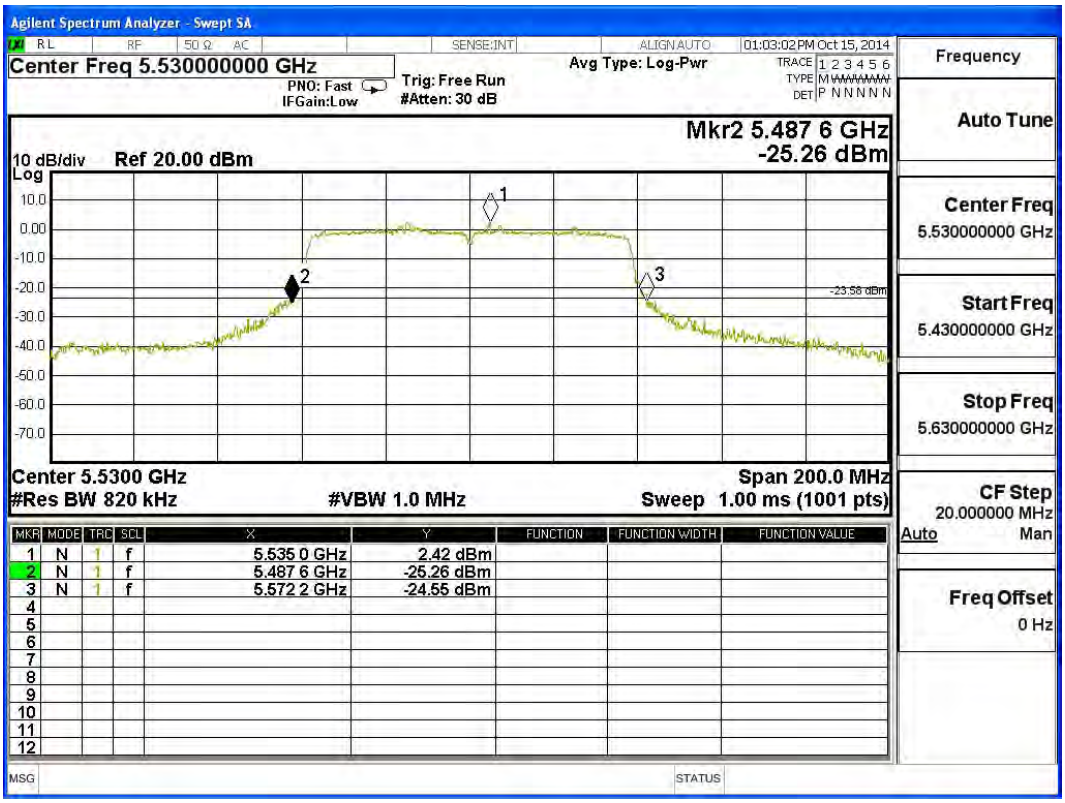
### Channel 58: Chain A



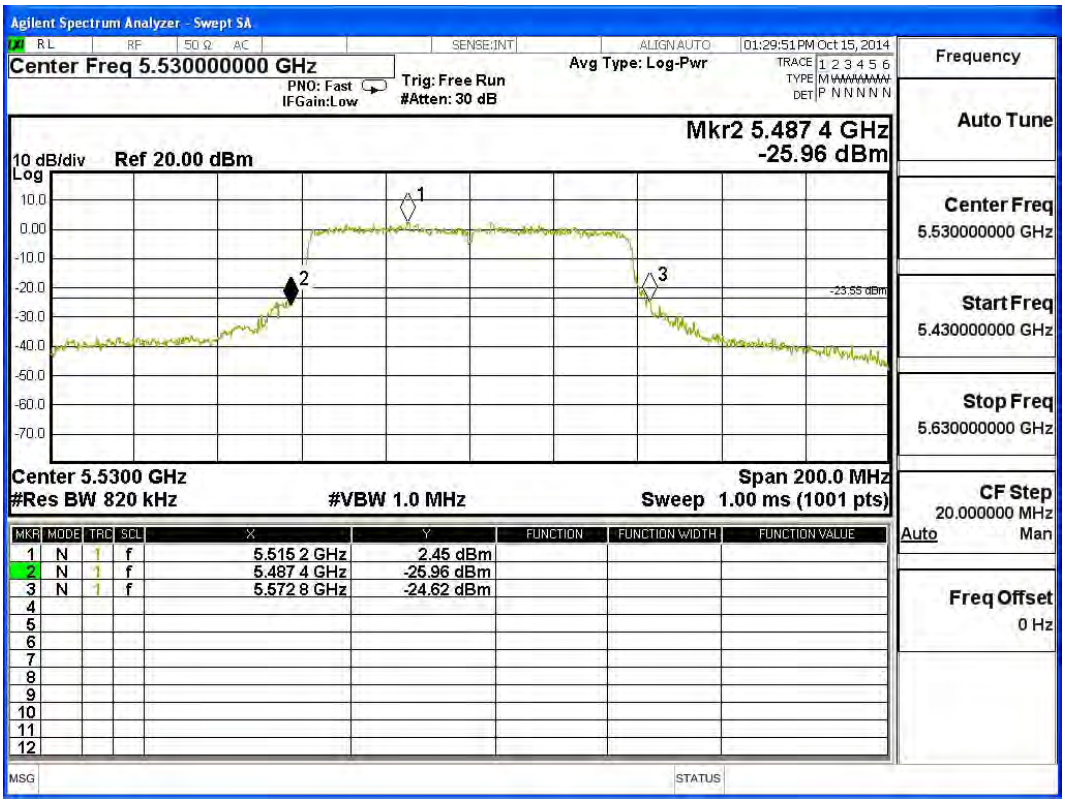

### Channel 58: Chain B



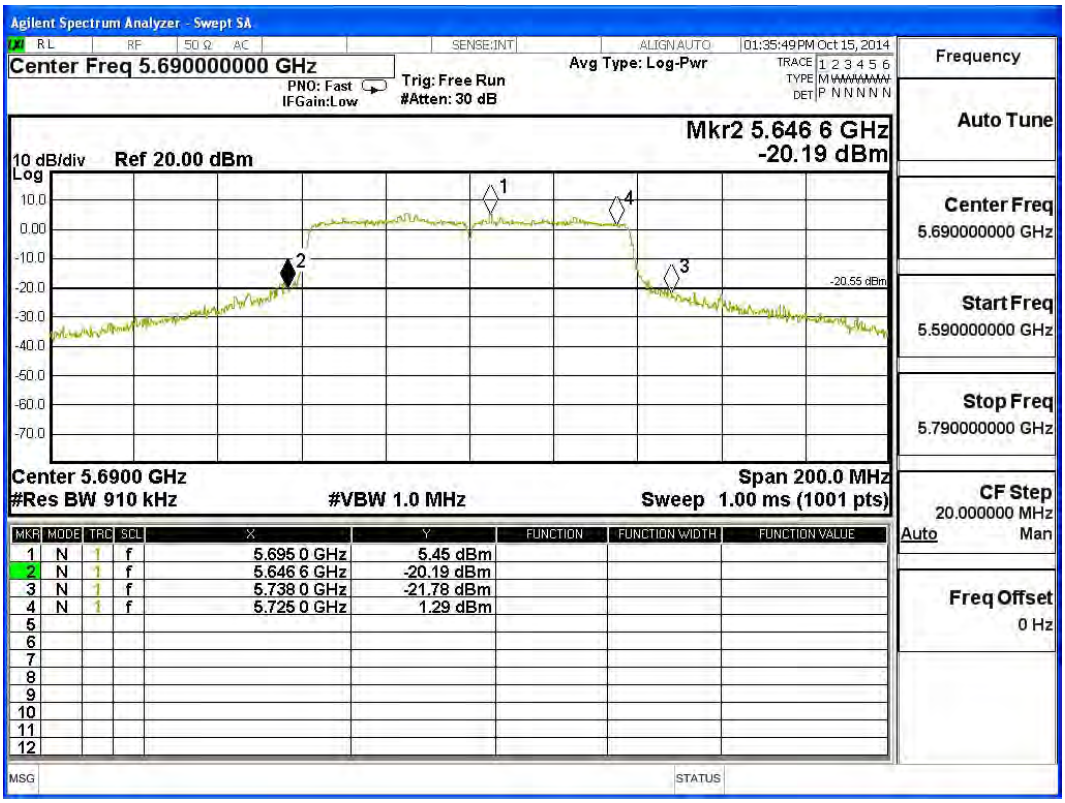
**Channel 106: Chain A**



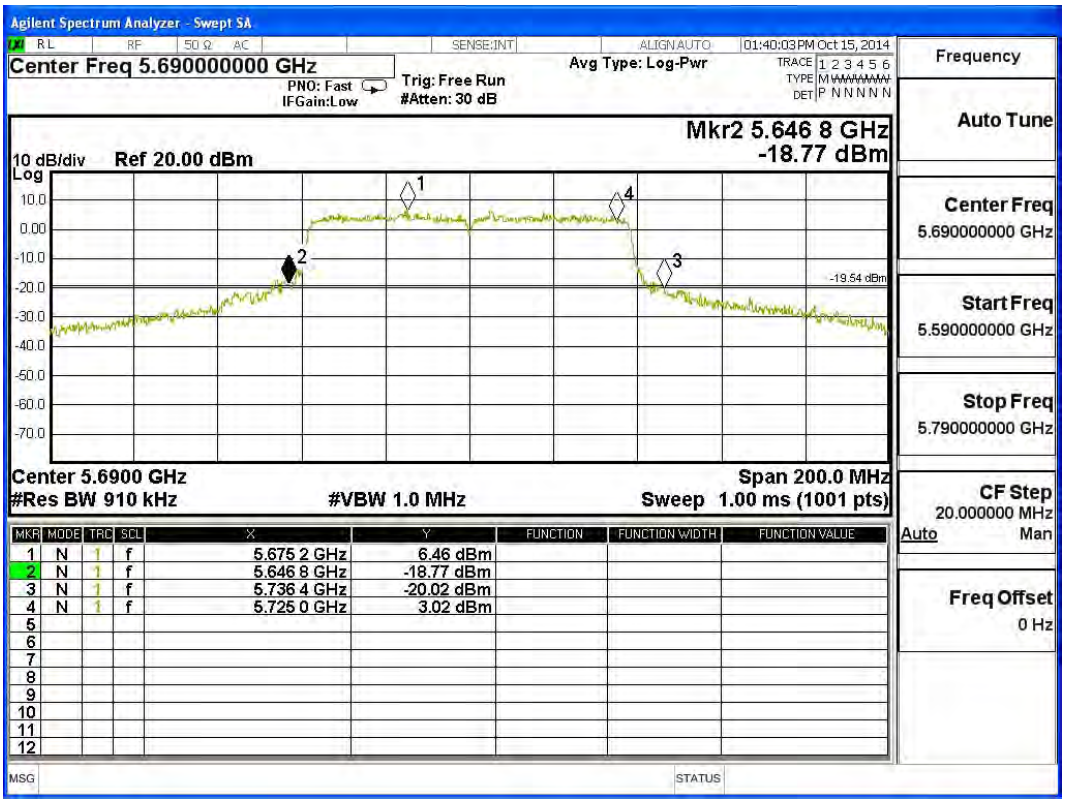

**Channel 106: Chain B**



**Channel 138: Chain A**

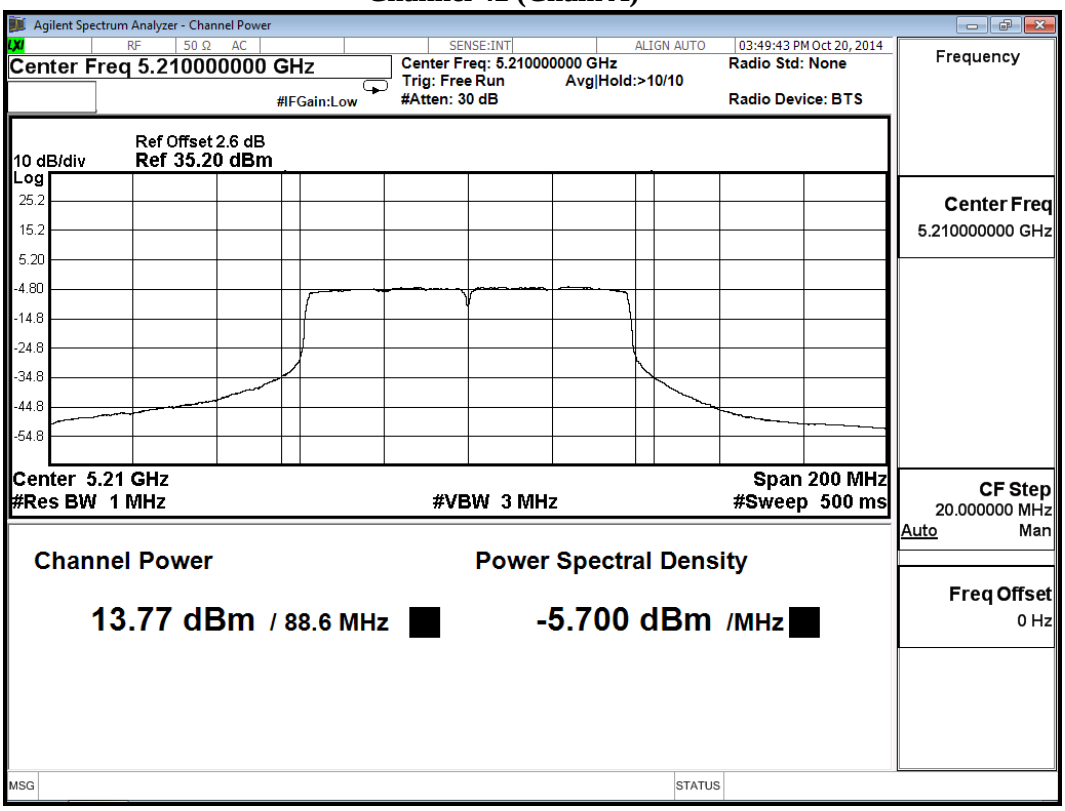



**Channel 138: Chain B**

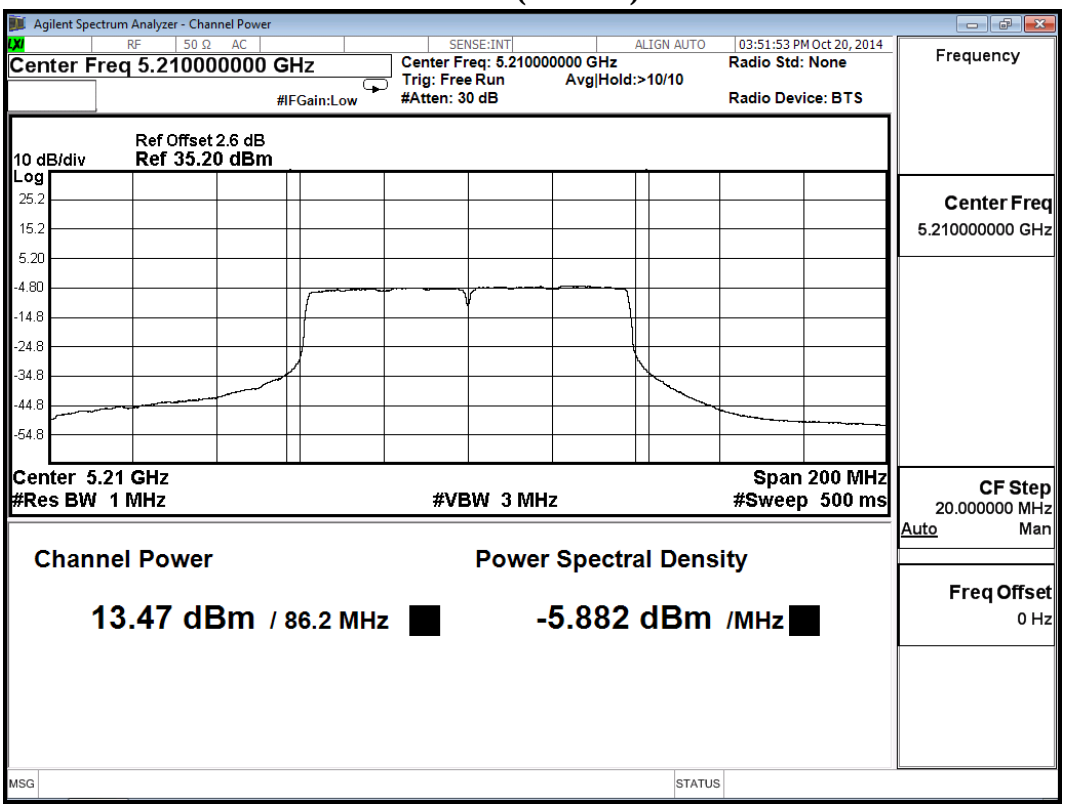


**Maximum conducted output power:**

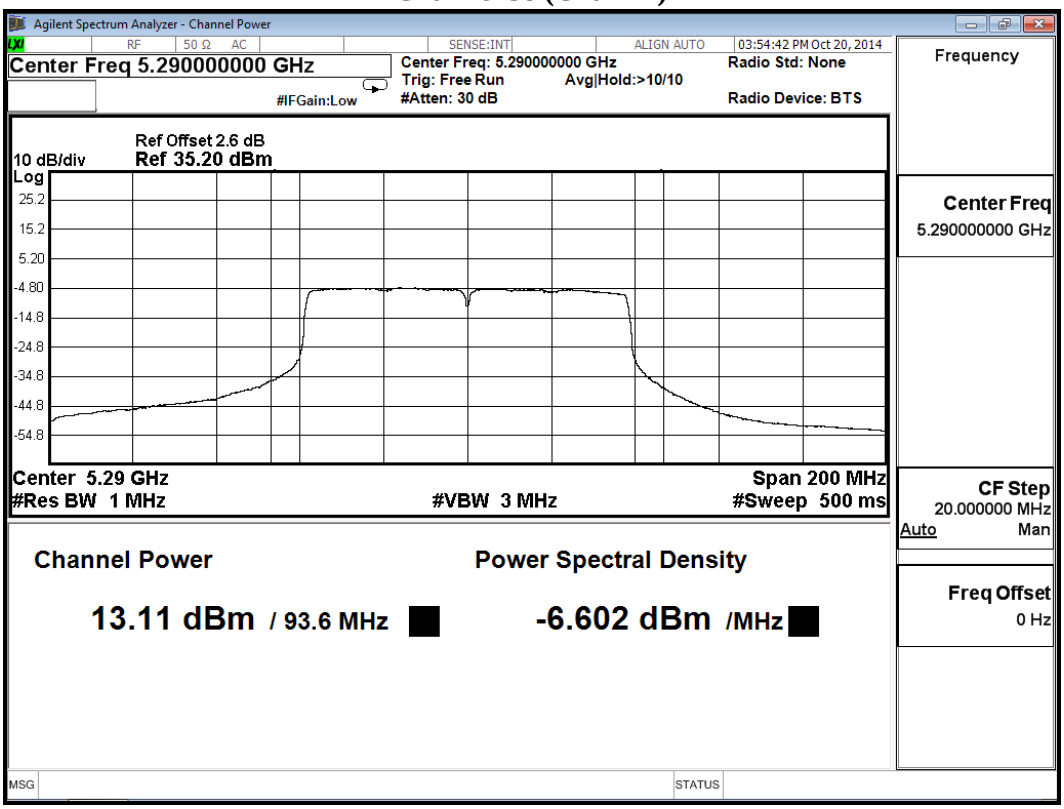
**Channel 42 (Chain A)**



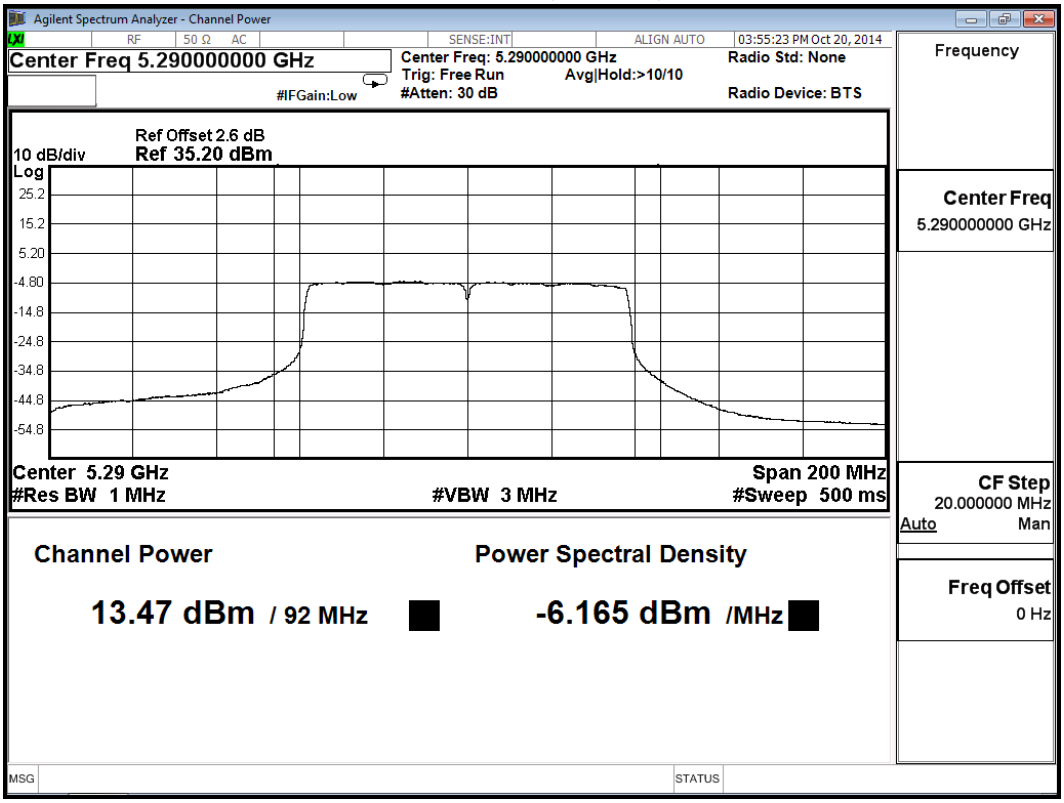

**Channel 42 (Chain B)**



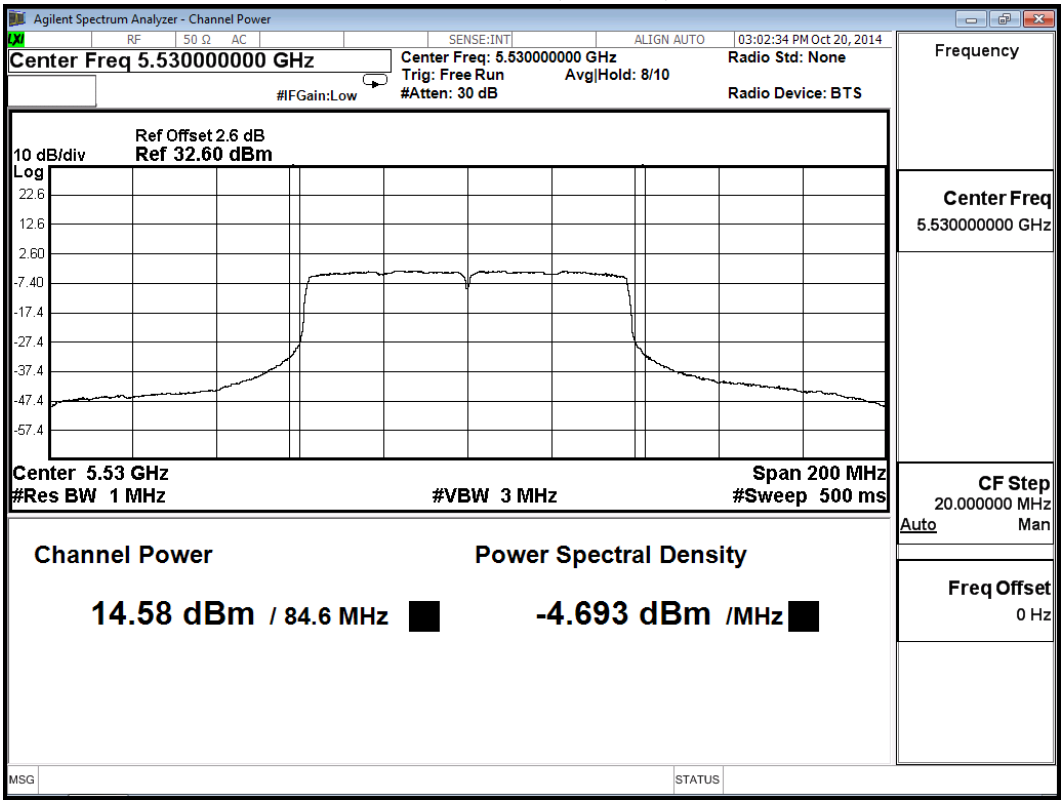
**Channel 58 (Chain A)**



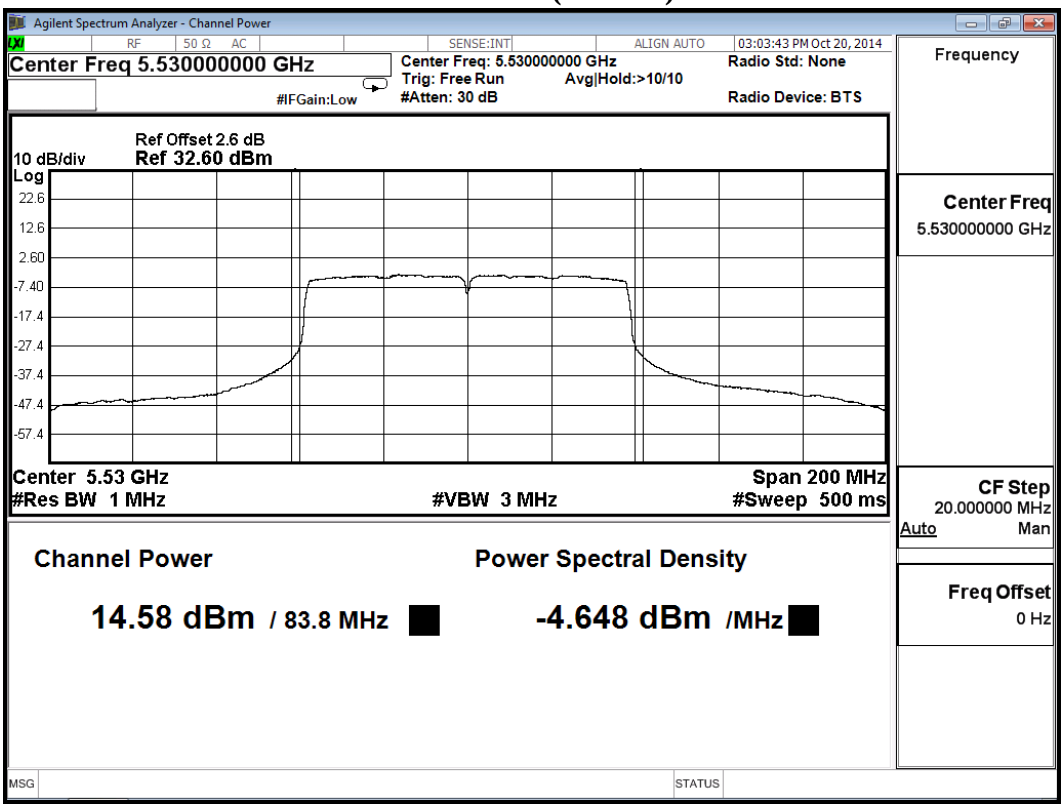

**Channel 58 (Chain B)**



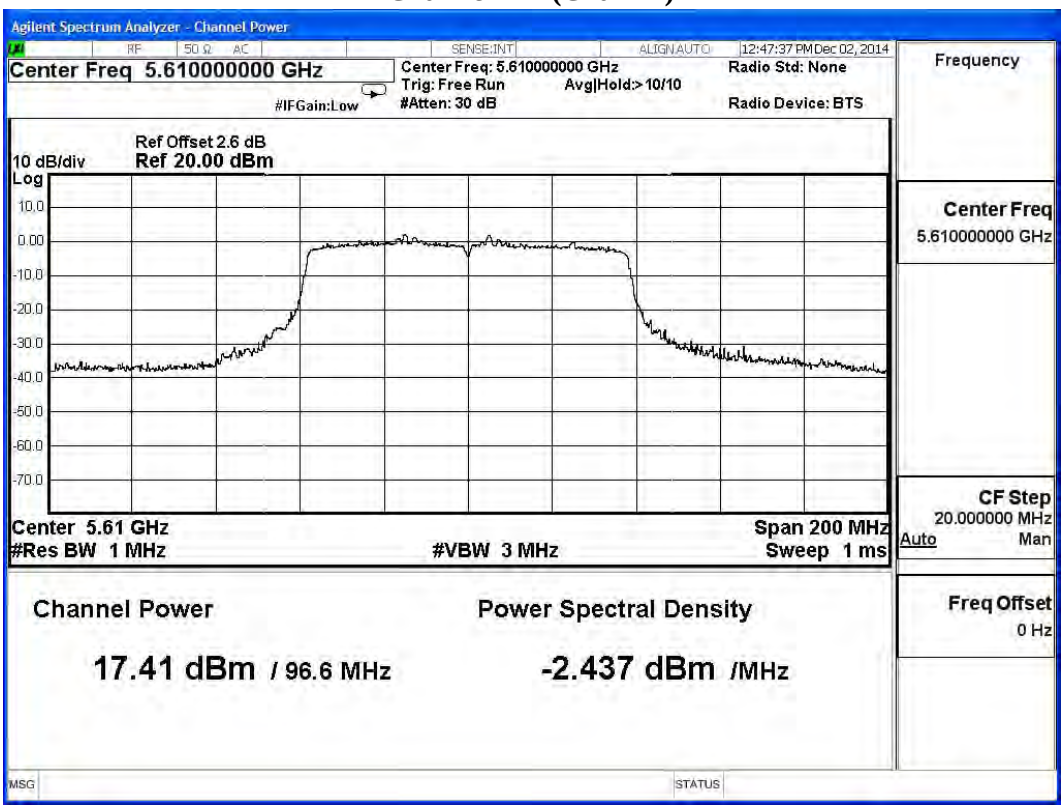
**Channel 106 (Chain A)**



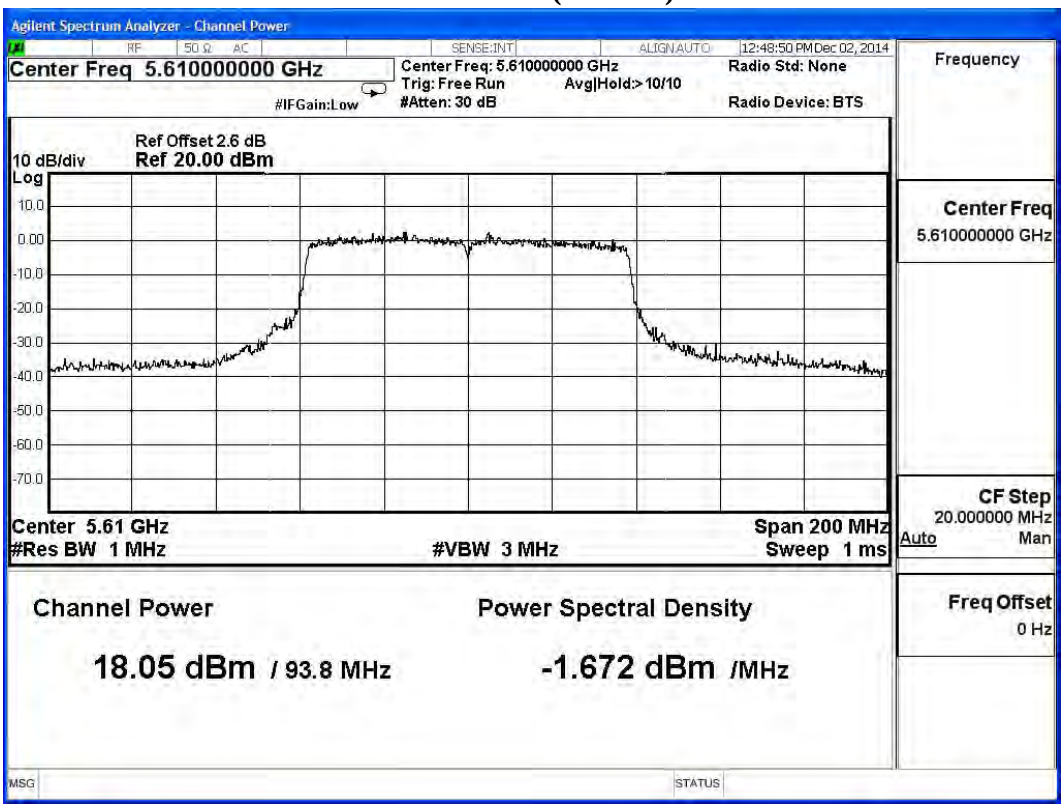

**Channel 106 (Chain B)**



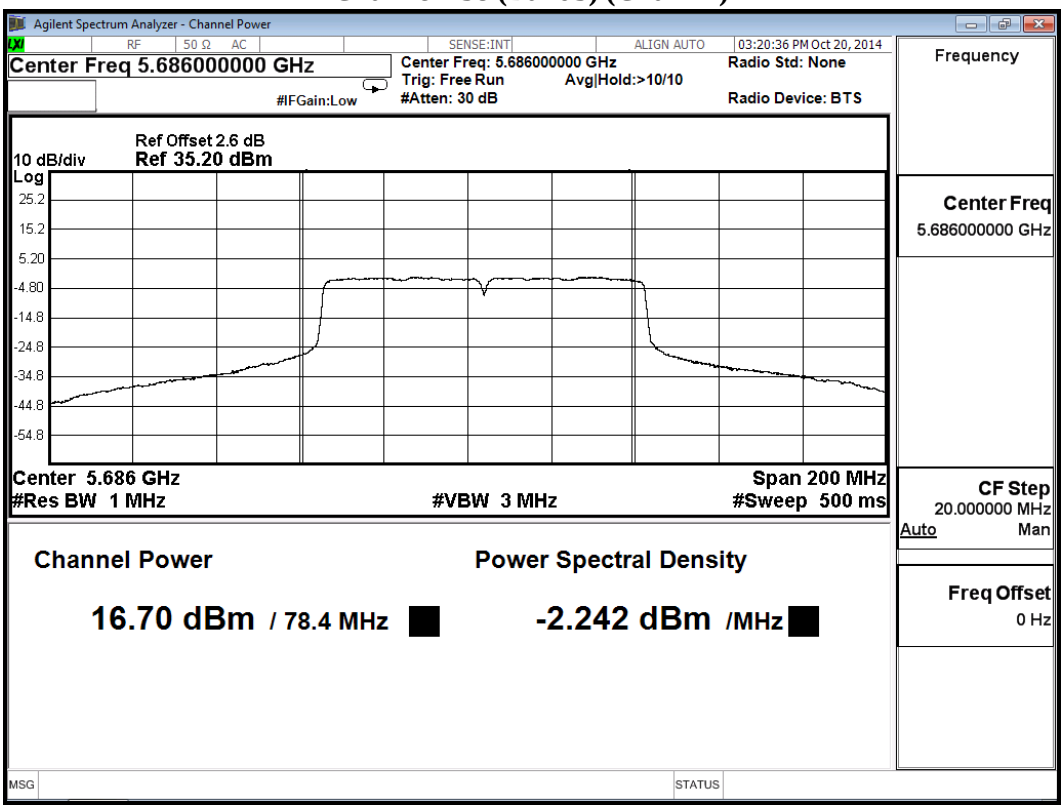
**Channel 122 (Chain A)**



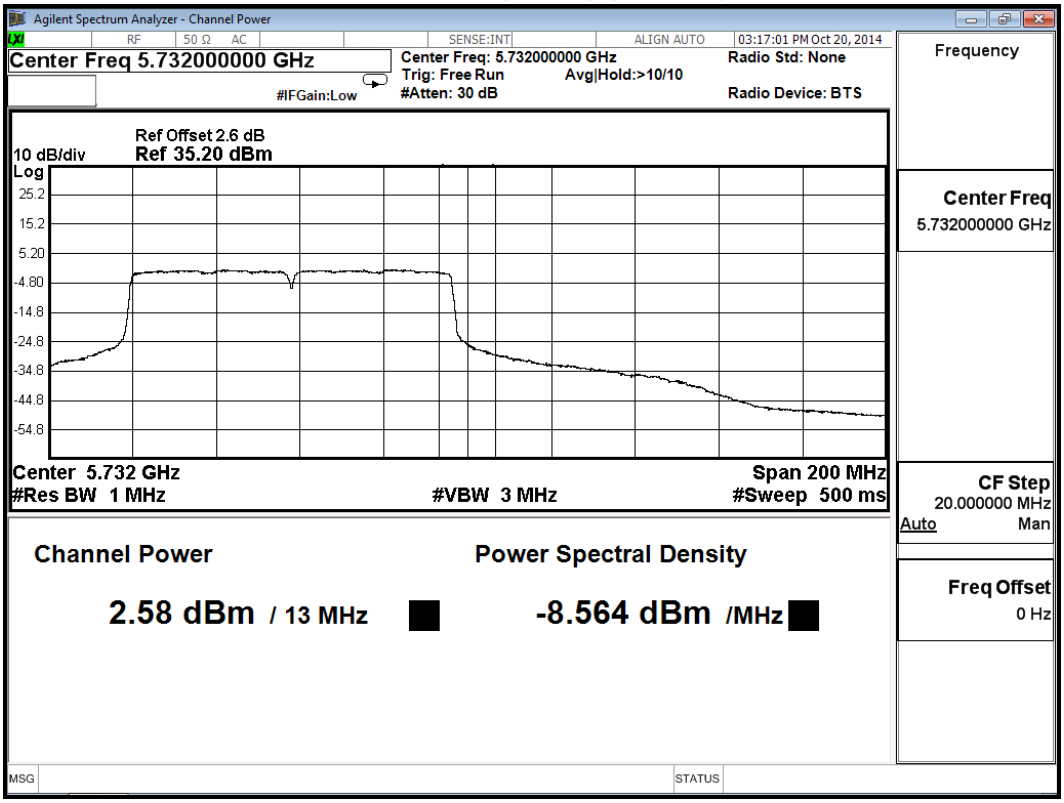

**Channel 122 (Chain B)**



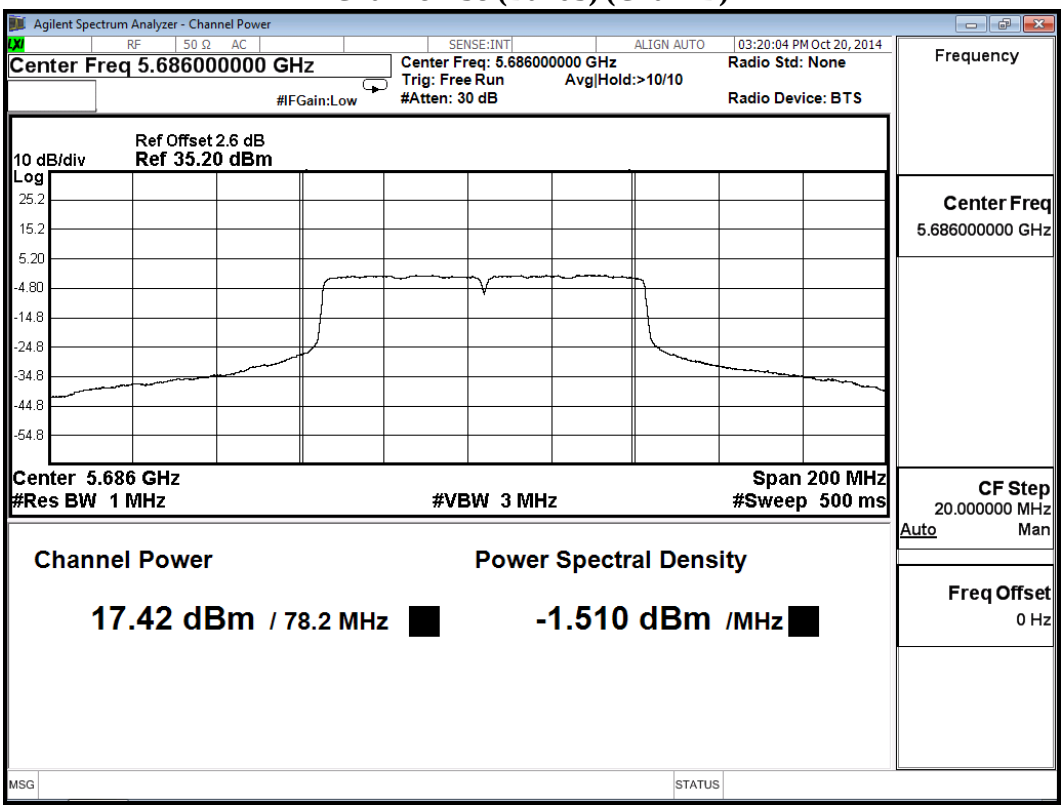
**Channel 138 (Band3) (Chain A)**



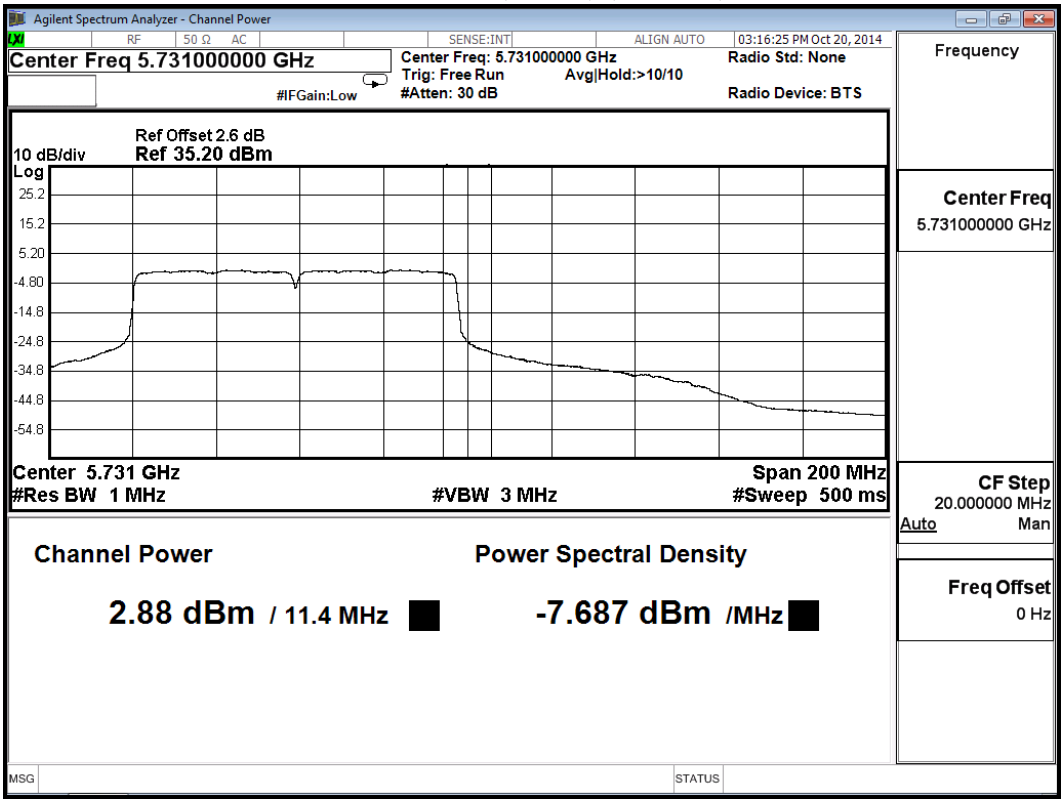

**Channel 138 (Band4) (Chain A)**



**Channel 138 (Band3) (Chain B)**




**Channel 138 (Band4) (Chain B)**



# 4. Peak Power Spectral Density

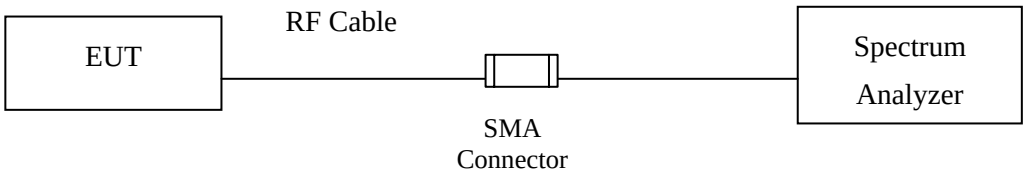
## 4.1. Test Equipment

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|---|---|---|---|
| | Spectrum Analyzer | R&S | FSP40 / 100170 | Jun., 2014 |
| | Spectrum Analyzer | Agilent | E4407B / US39440758 | Jun., 2014 |
| X | Spectrum Analyzer | Agilent | N9010A / MY48030495 | Apr., 2014 |

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

## 4.2. Test Setup




## 4.3. Limits

- For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

## 4.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.
The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.
SA-1 method is selected to run the test.

## 4.5. Uncertainty

± 1.27 dB

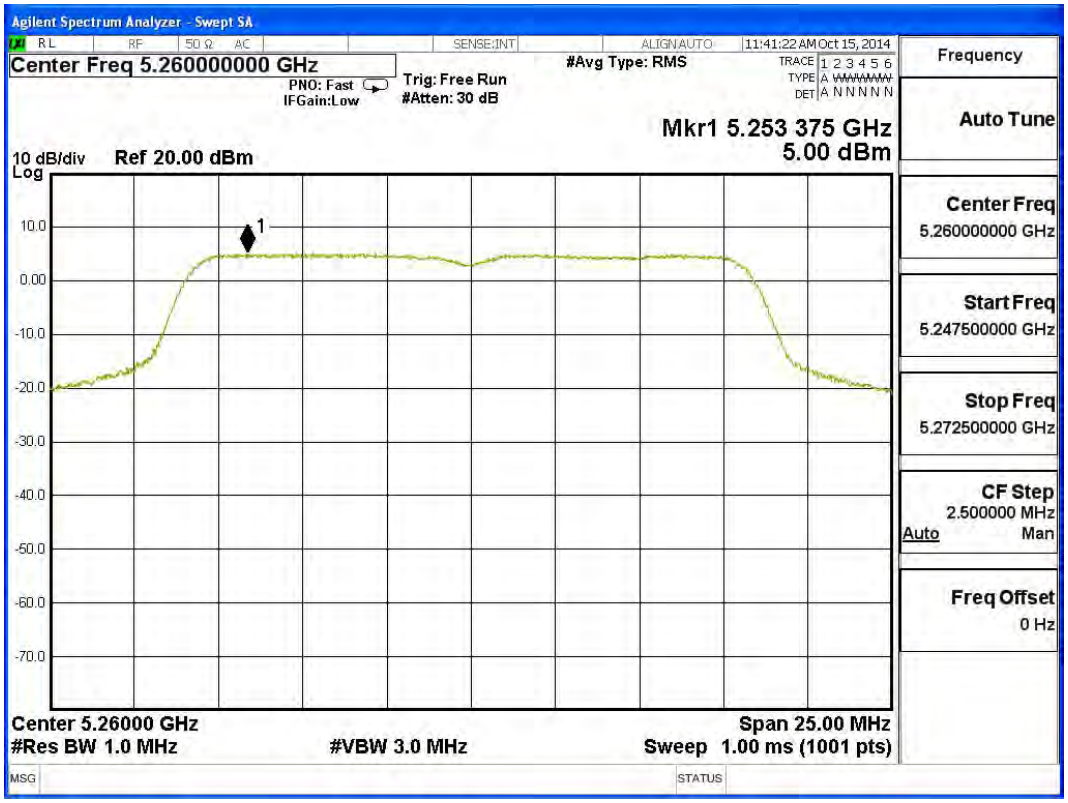
## 4.6. Test Result of Peak Power Spectral Density

Product : Access Point/Sensor
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

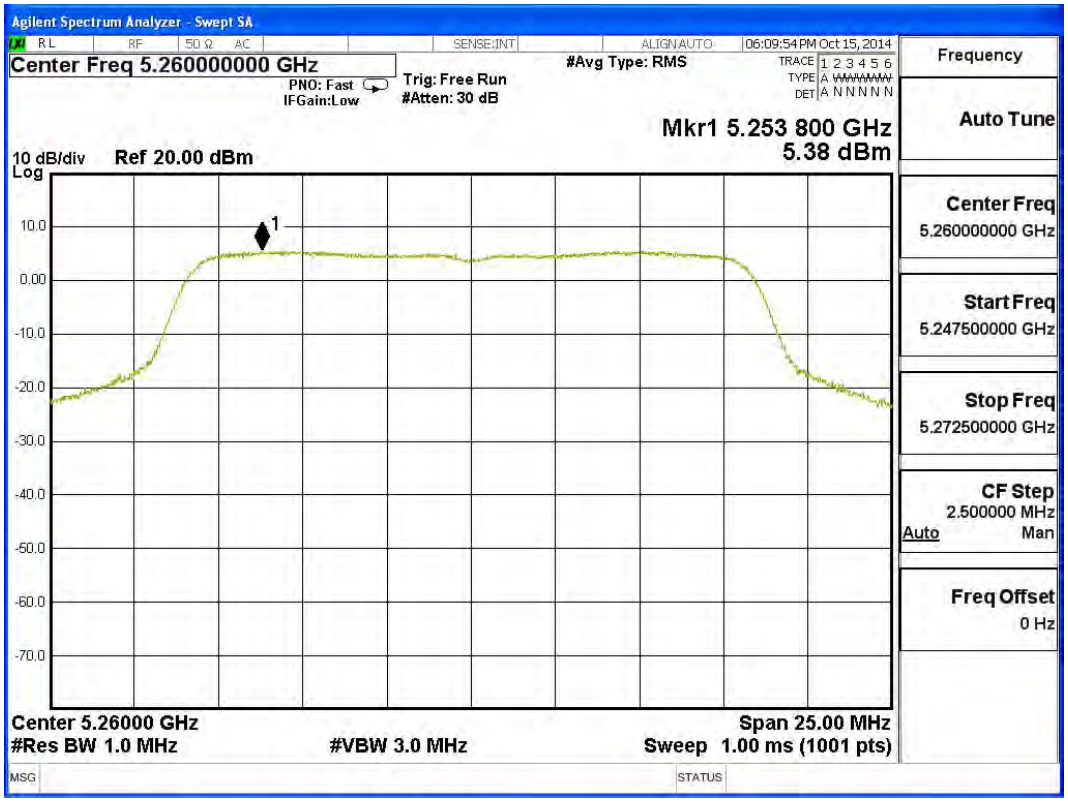
| Channel Number | Frequency (MHz) | Chain | PPSD/MHz (dBm) | Total PPSD/MHz (dBm)[1] | Required Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 52 | 5260 | A | 5.000 | 8.010 | <11 | Pass |
| | | B | 5.380 | 8.390 | <11 | Pass |
| 60 | 5300 | A | 4.660 | 7.670 | <11 | Pass |
| | | B | 5.770 | 8.780 | <11 | Pass |
| 64 | 5320 | A | 4.630 | 7.640 | <11 | Pass |
| | | B | 5.830 | 8.840 | <11 | Pass |
| 100 | 5500 | A | 5.900 | 8.910 | <11 | Pass |
| | | B | 6.110 | 9.120 | <11 | Pass |
| 116 | 5580 | A | 5.490 | 8.500 | <11 | Pass |
| | | B | 5.140 | 8.150 | <11 | Pass |
| 140 | 5700 | A | 5.000 | 8.010 | <11 | Pass |
| | | B | 5.430 | 8.440 | <11 | Pass |

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

**Channel 52: Chain A**

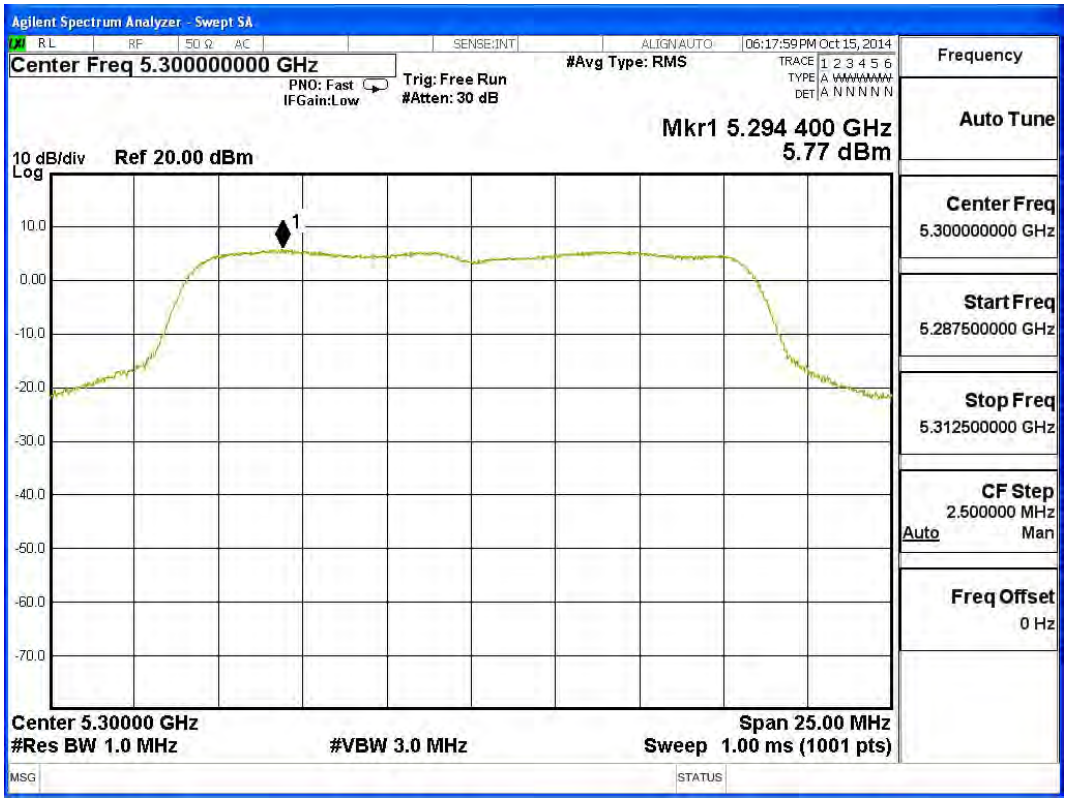



**Channel 52: Chain B**

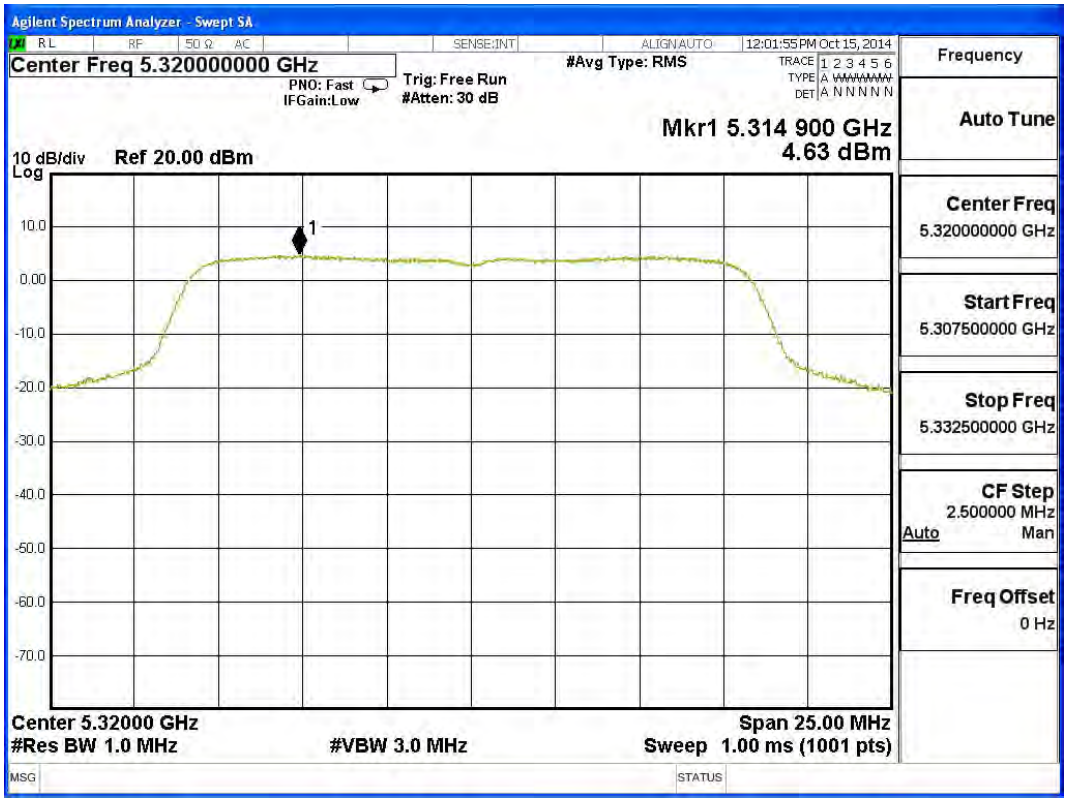


**Channel 60: Chain A**

**Channel 60: Chain B**



**Channel 64: Chain A**

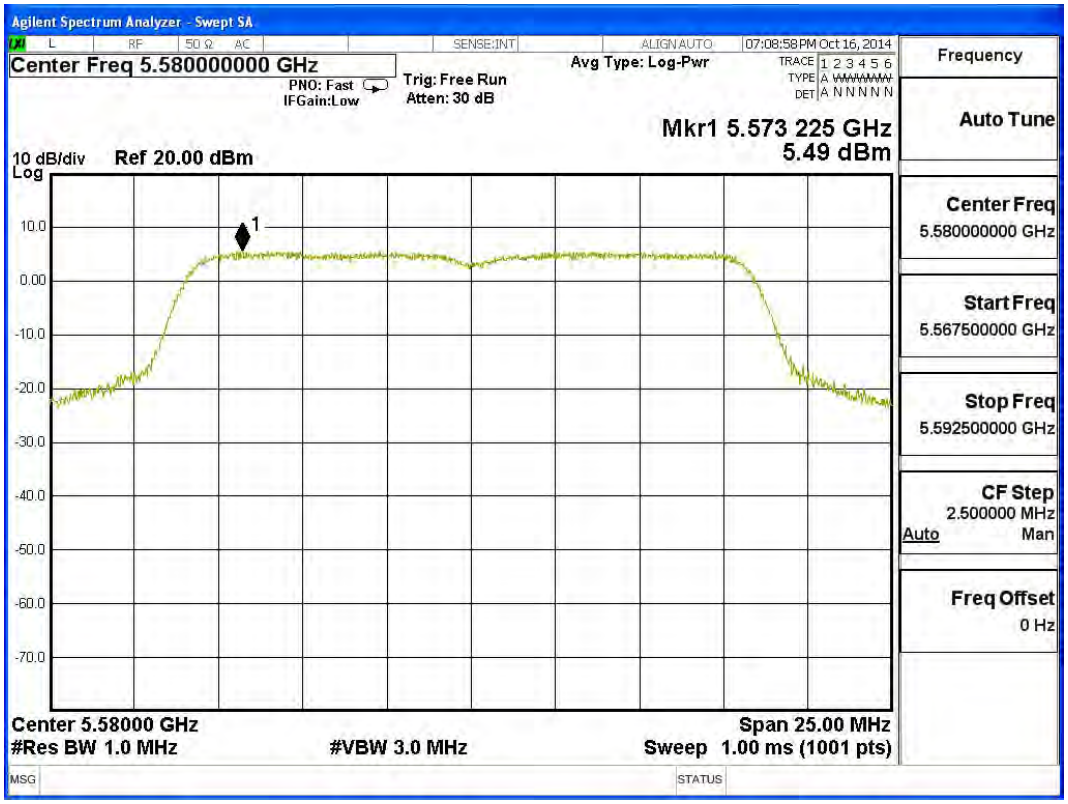



**Channel 64: Chain B**

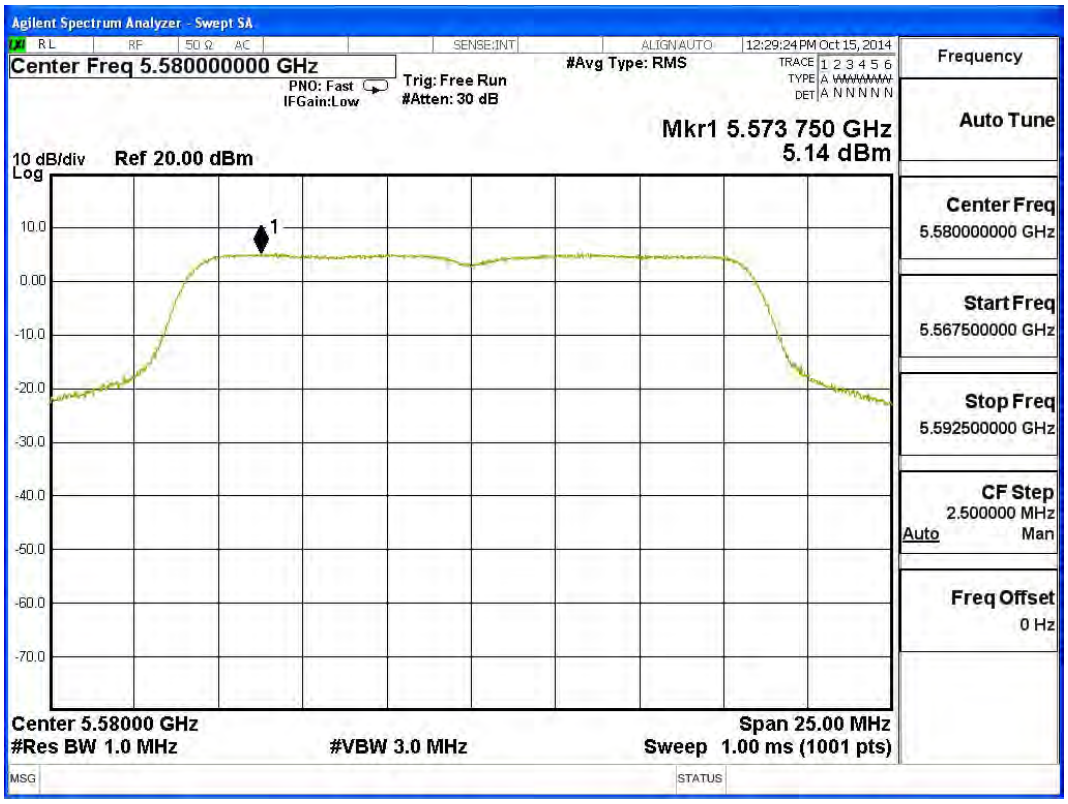
**Channel 100: Chain A**

**Channel 100: Chain B**

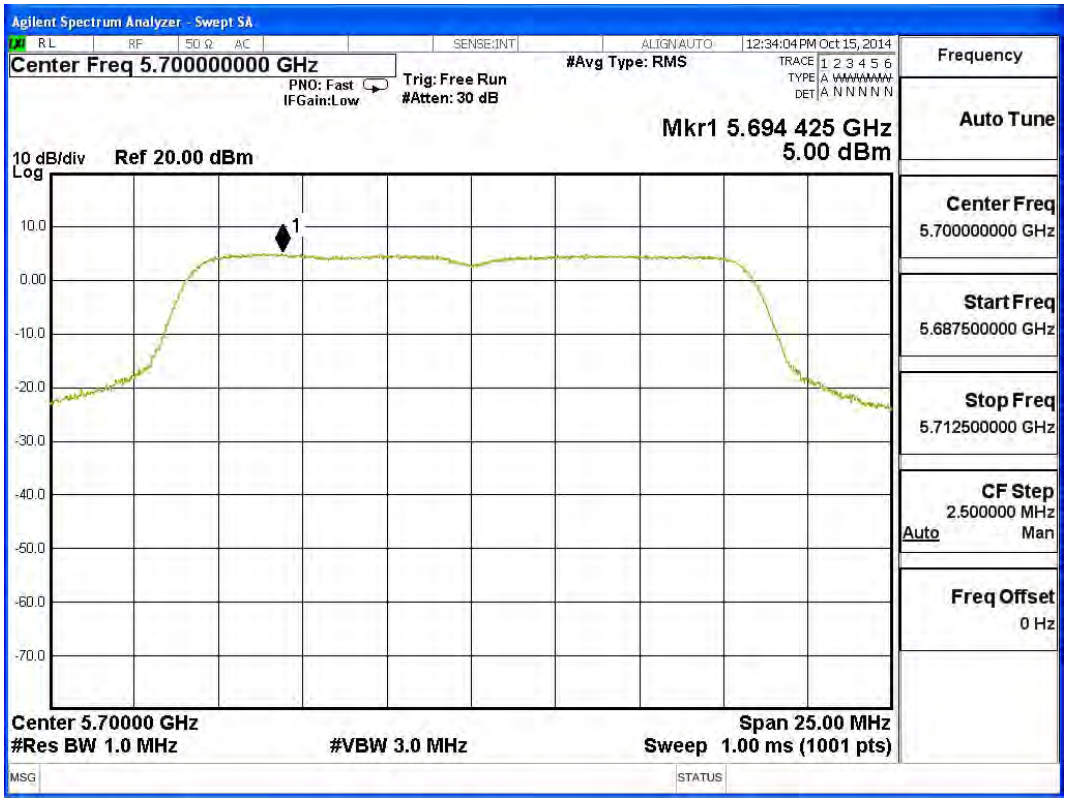
**Channel 120: Chain A**



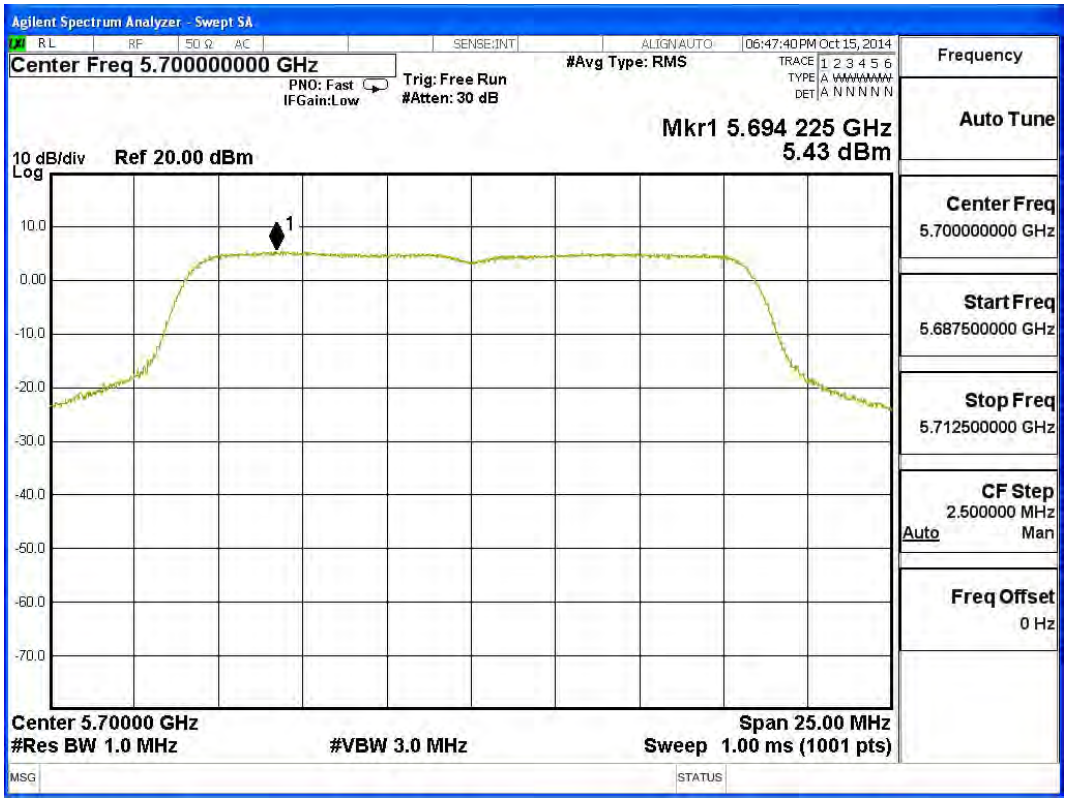

**Channel 120: Chain B**



**Channel 140: Chain A**




**Channel 140: Chain B**

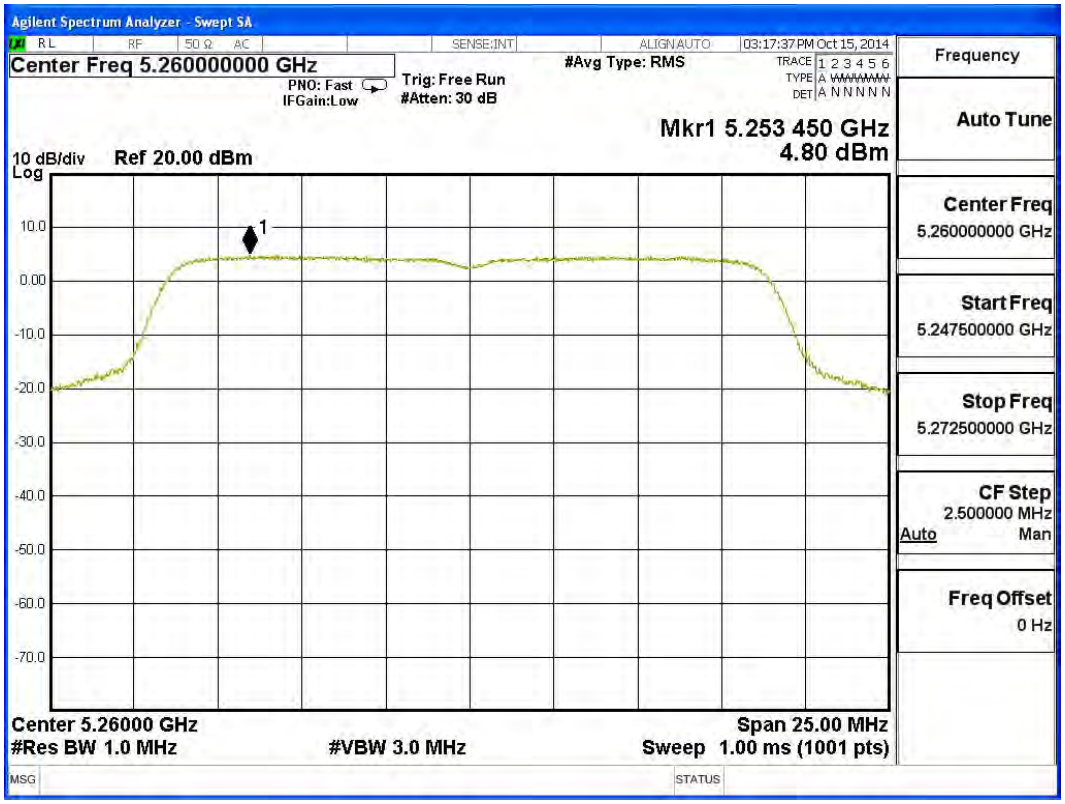


Product : Access Point/Sensor
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps)

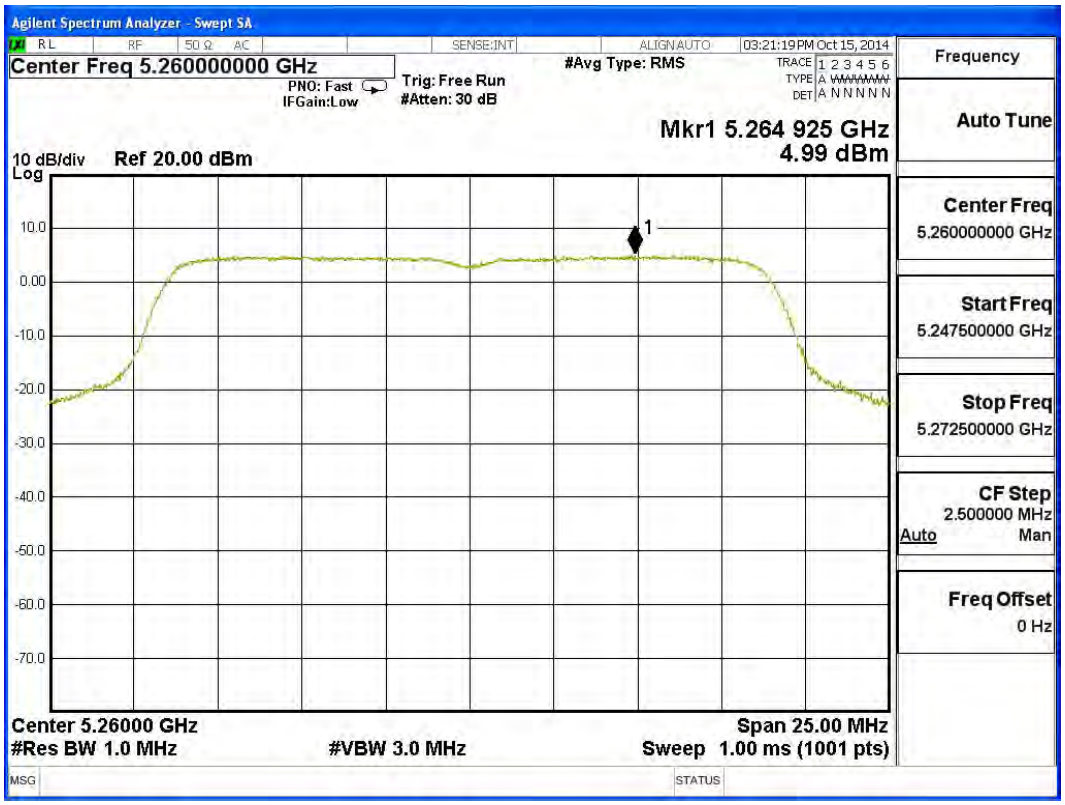
| Channel Number | Frequency (MHz) | Chain | PPSD/MHz (dBm) | Total PPSD/MHz (dBm)[1] | Required Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 52 | 5260 | A | 4.800 | 7.810 | <11 | Pass |
| | | B | 4.990 | 8.000 | <11 | Pass |
| 60 | 5300 | A | 4.360 | 7.370 | <11 | Pass |
| | | B | 5.080 | 8.090 | <11 | Pass |
| 64 | 5320 | A | 4.340 | 7.350 | <11 | Pass |
| | | B | 4.930 | 7.940 | <11 | Pass |
| 100 | 5500 | A | 5.520 | 8.530 | <11 | Pass |
| | | B | 5.710 | 8.720 | <11 | Pass |
| 116 | 5580 | A | 4.800 | 7.810 | <11 | Pass |
| | | B | 5.410 | 8.420 | <11 | Pass |
| 140 | 5700 | A | 4.290 | 7.300 | <11 | Pass |
| | | B | 4.950 | 7.960 | <11 | Pass |

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

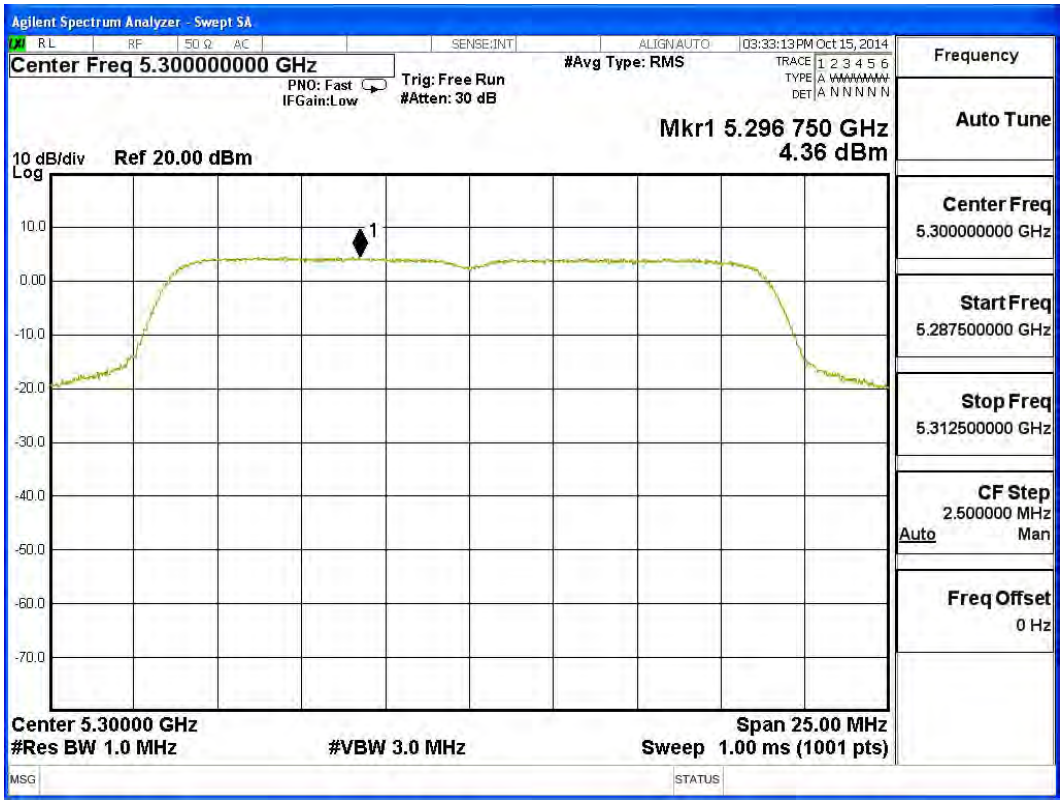
**Channel 52: Chain A**



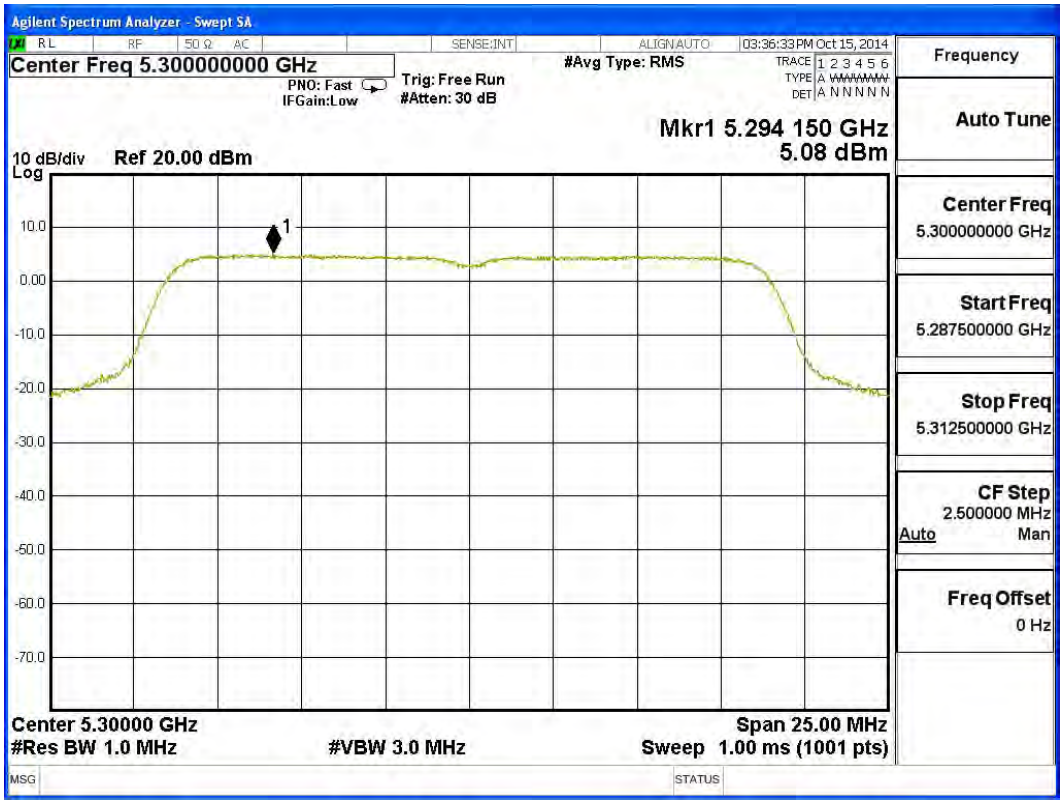

**Channel 52: Chain B**



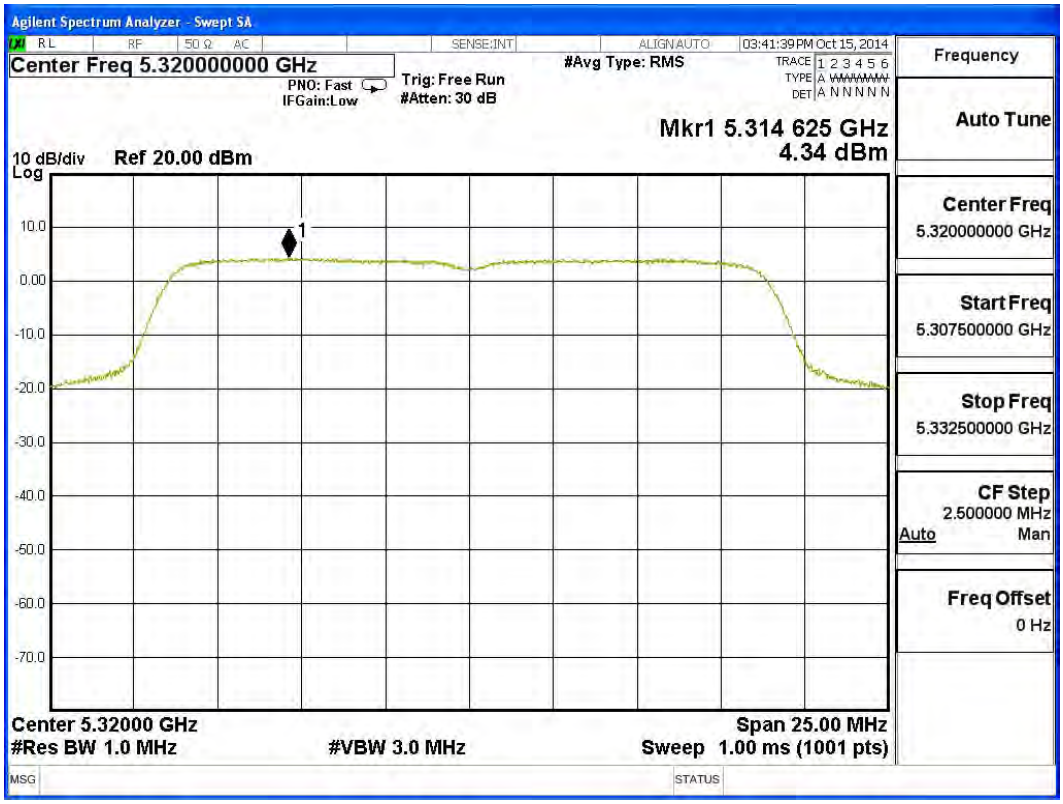
**Channel 60: Chain A**



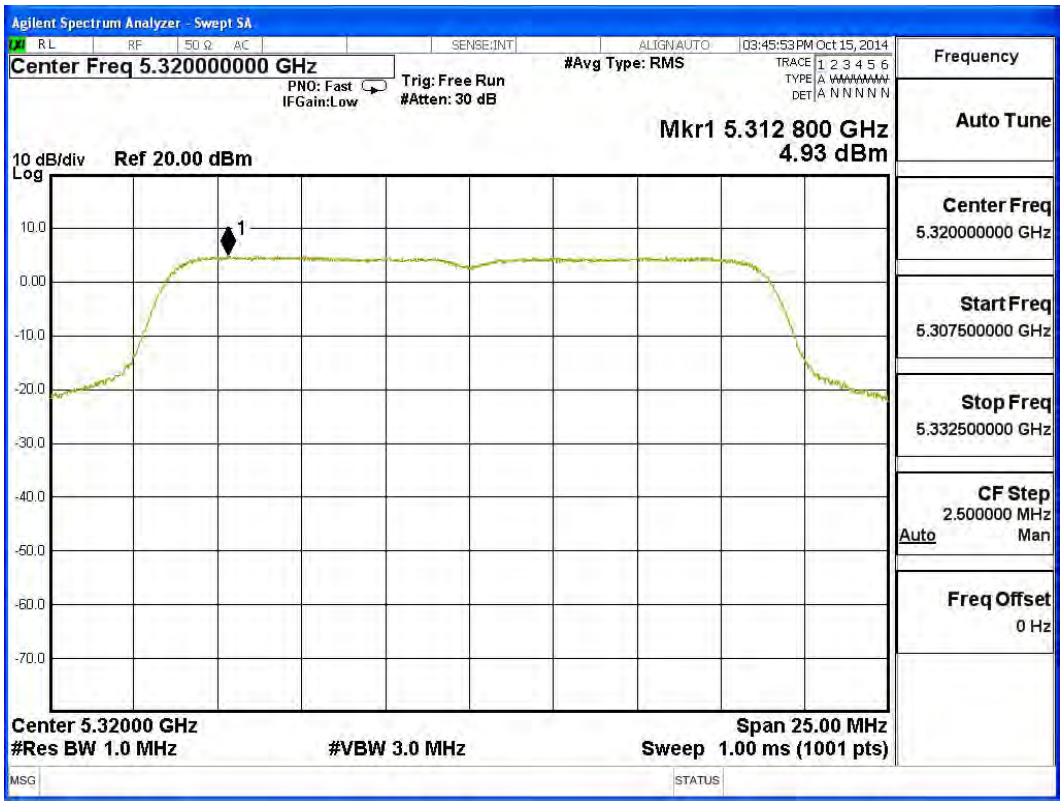

**Channel 60: Chain B**



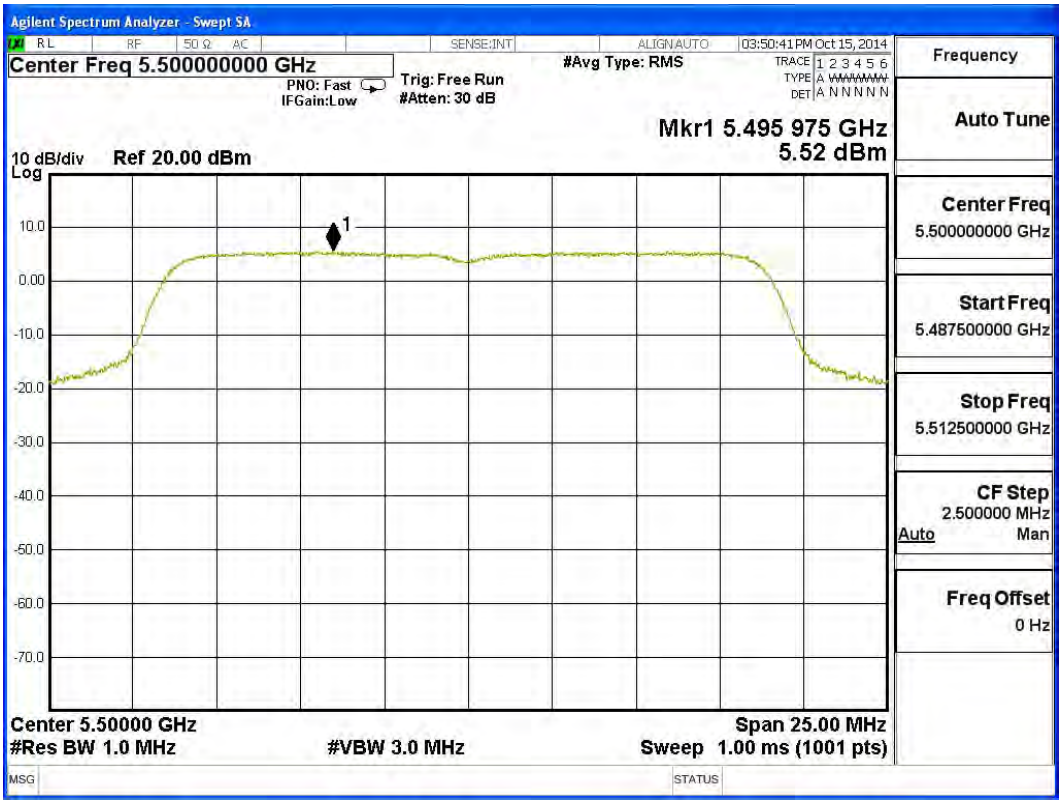
**Channel 64: Chain A**



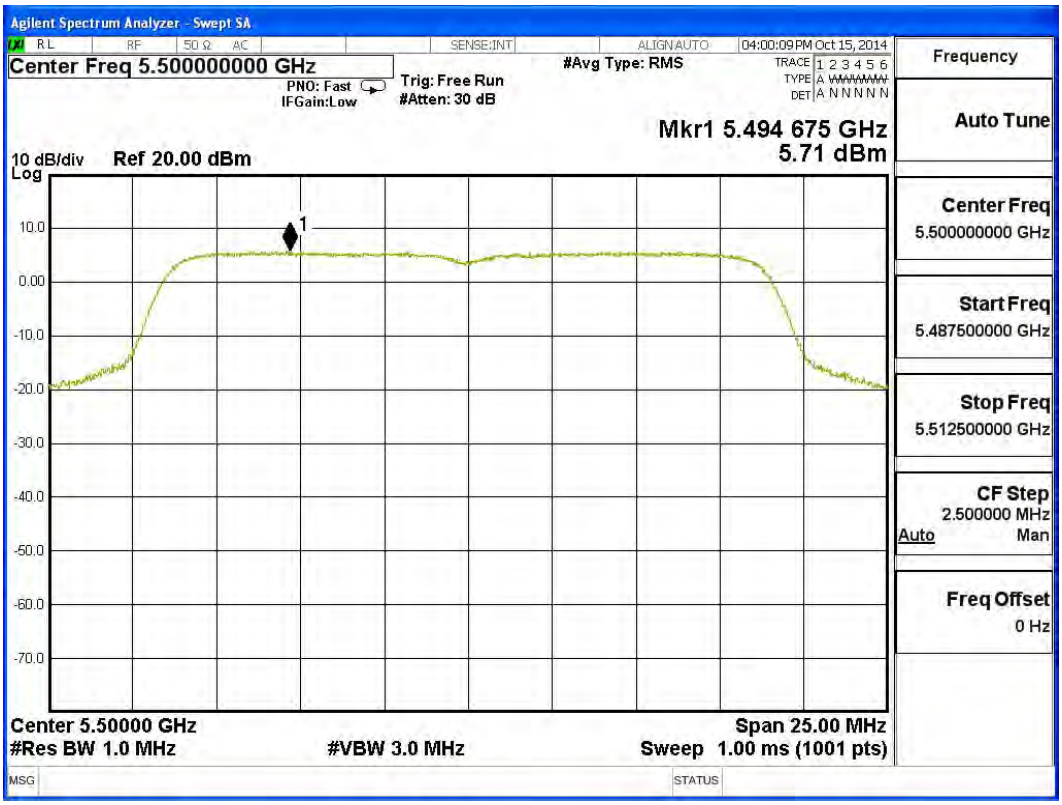

**Channel 64: Chain B**



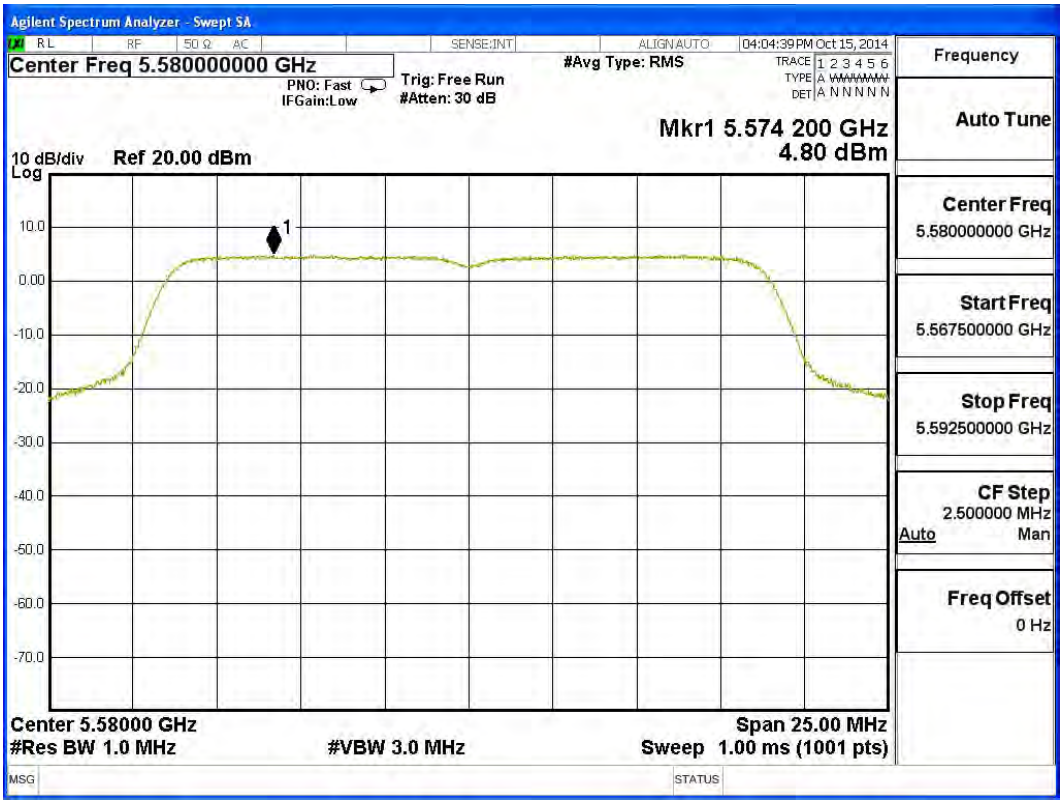
**Channel 100: Chain A**



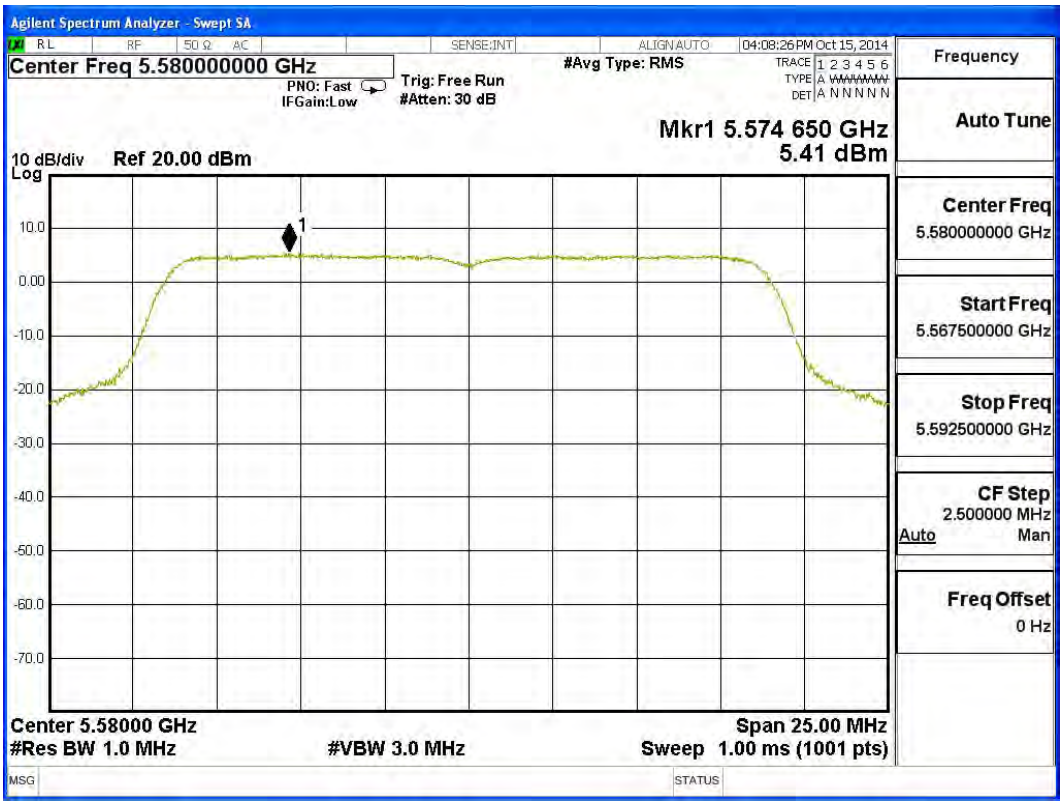

**Channel 100: Chain B**



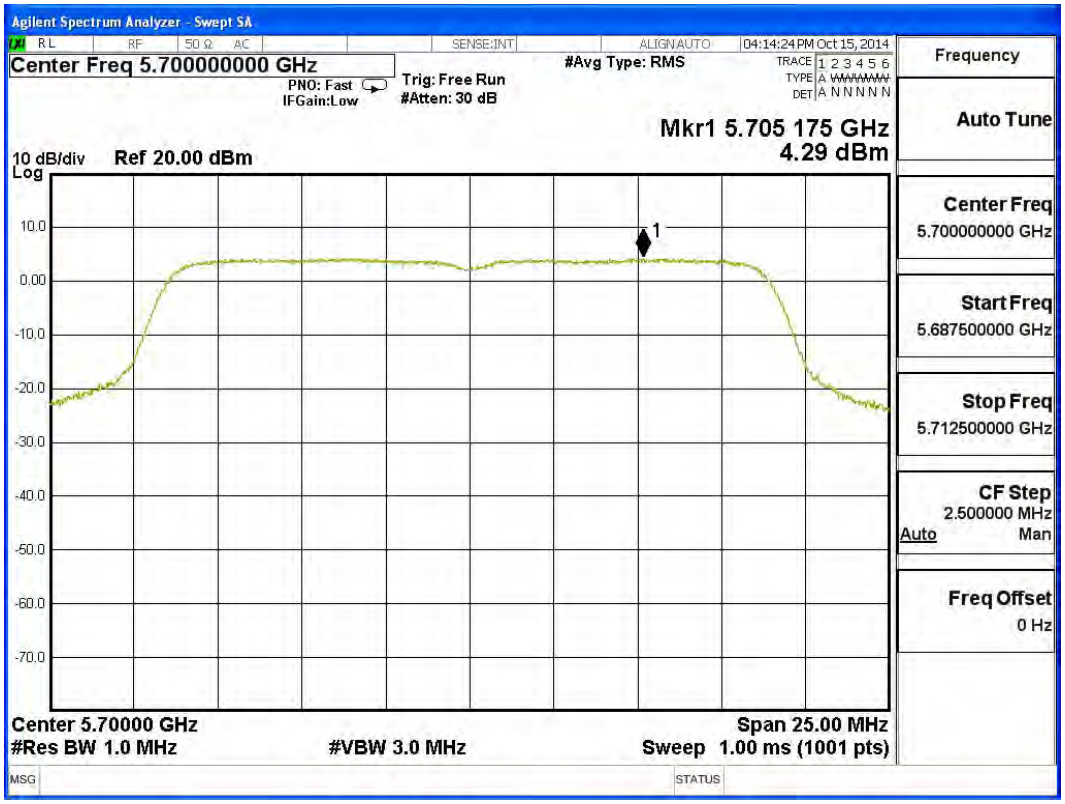
**Channel 120: Chain A**



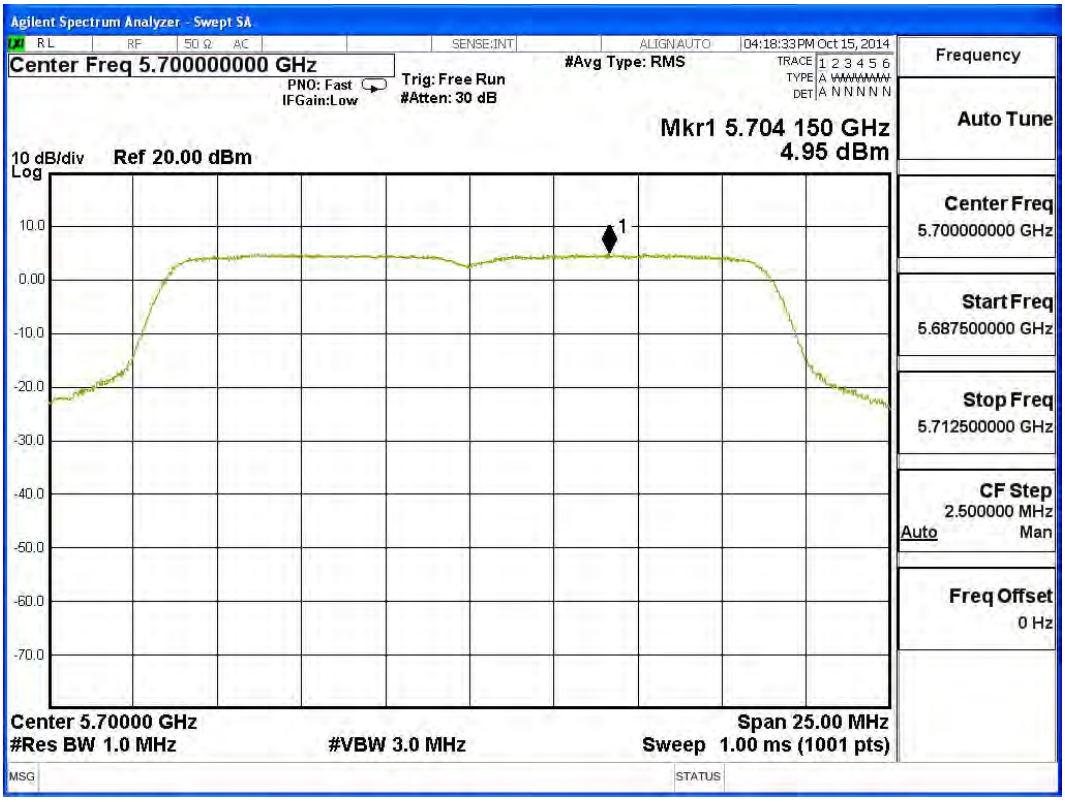

**Channel 120: Chain B**



**Channel 140: Chain A**




**Channel 140: Chain B**



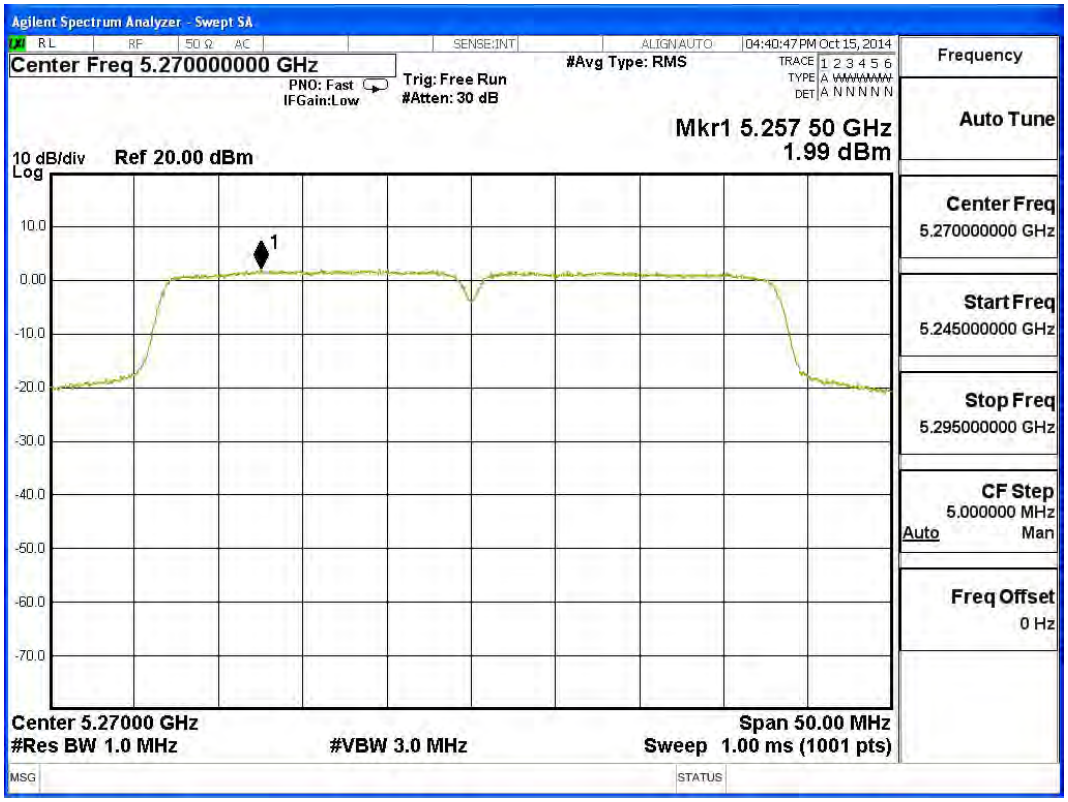
Product : Access Point/Sensor
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps)

| Channel Number | Frequency (MHz) | Chain | PPSD/MHz (dBm) | Total PPSD/MHz (dBm)[1] | Required Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 54 | 5270 | A | 1.990 | 5.000 | <11 | Pass |
| | | B | 2.170 | 5.180 | <11 | Pass |
| 62 | 5310 | A | -0.460 | 2.550 | <11 | Pass |
| | | B | -0.080 | 2.930 | <11 | Pass |
| 102 | 5510 | A | -0.130 | 2.880 | <11 | Pass |
| | | B | -1.420 | 1.590 | <11 | Pass |
| 110 | 5550 | A | 2.330 | 5.340 | <11 | Pass |
| | | B | 2.470 | 5.480 | <11 | Pass |
| 134 | 5670 | A | 1.450 | 4.460 | <11 | Pass |
| | | B | 2.000 | 5.010 | <11 | Pass |

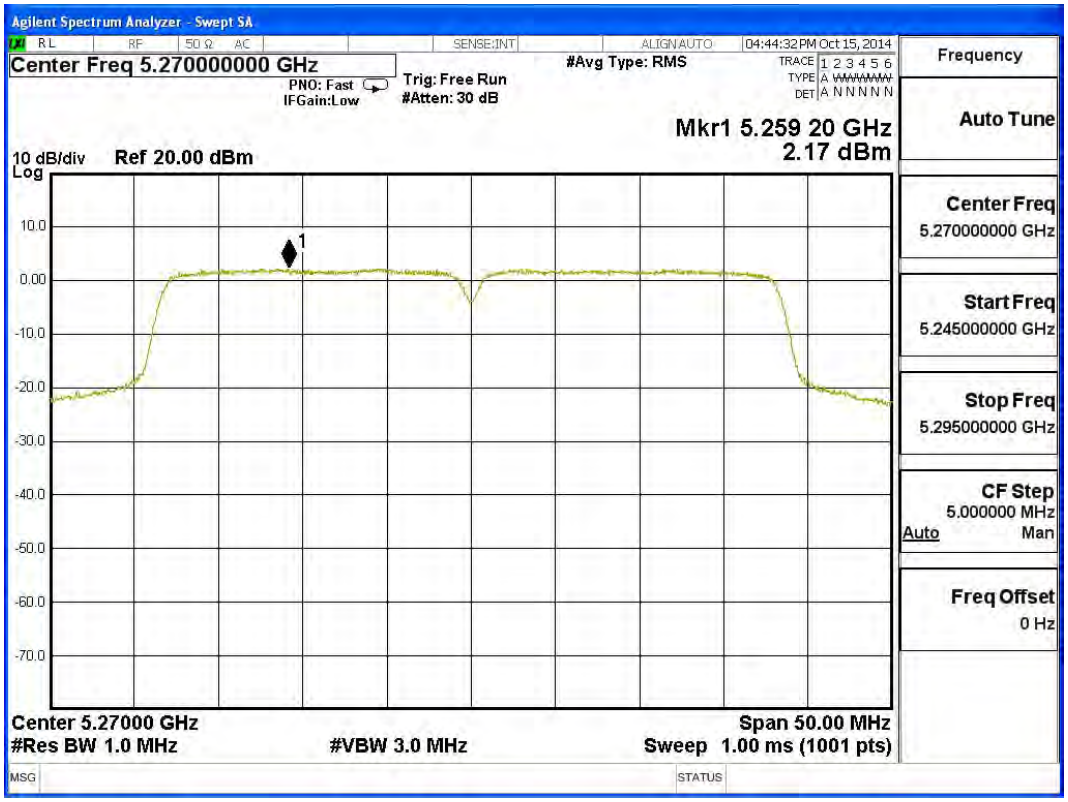
Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01

.

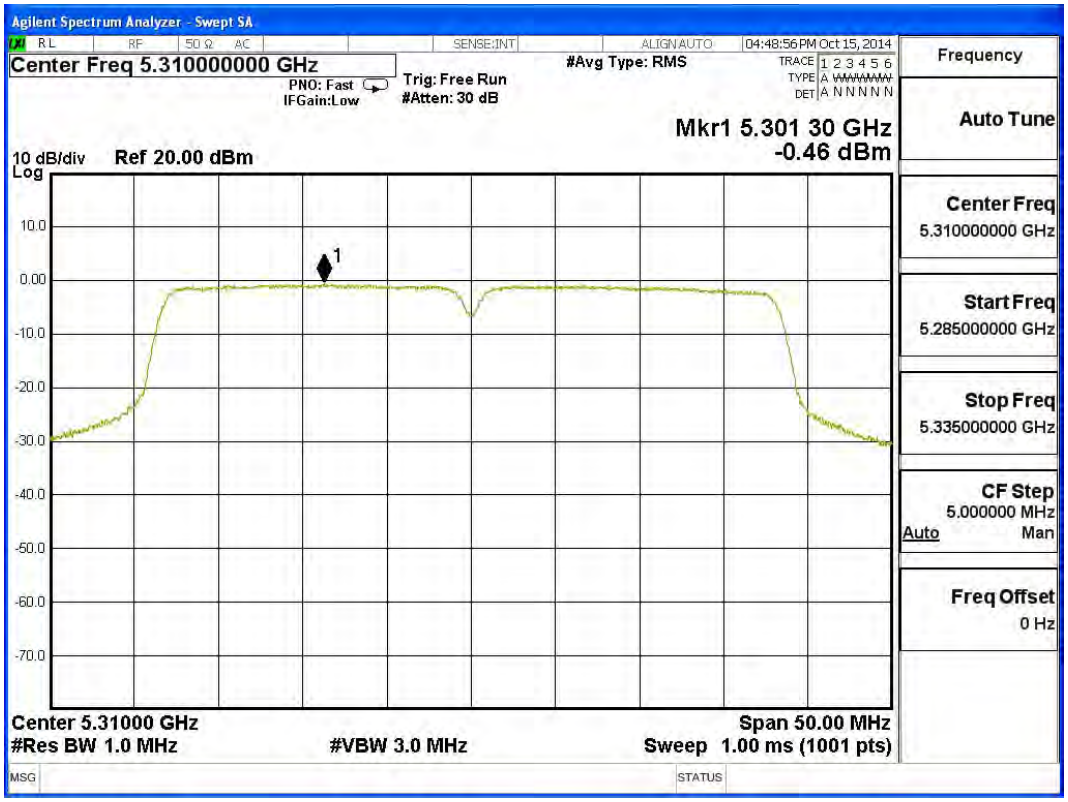
**Channel 54: Chain A**



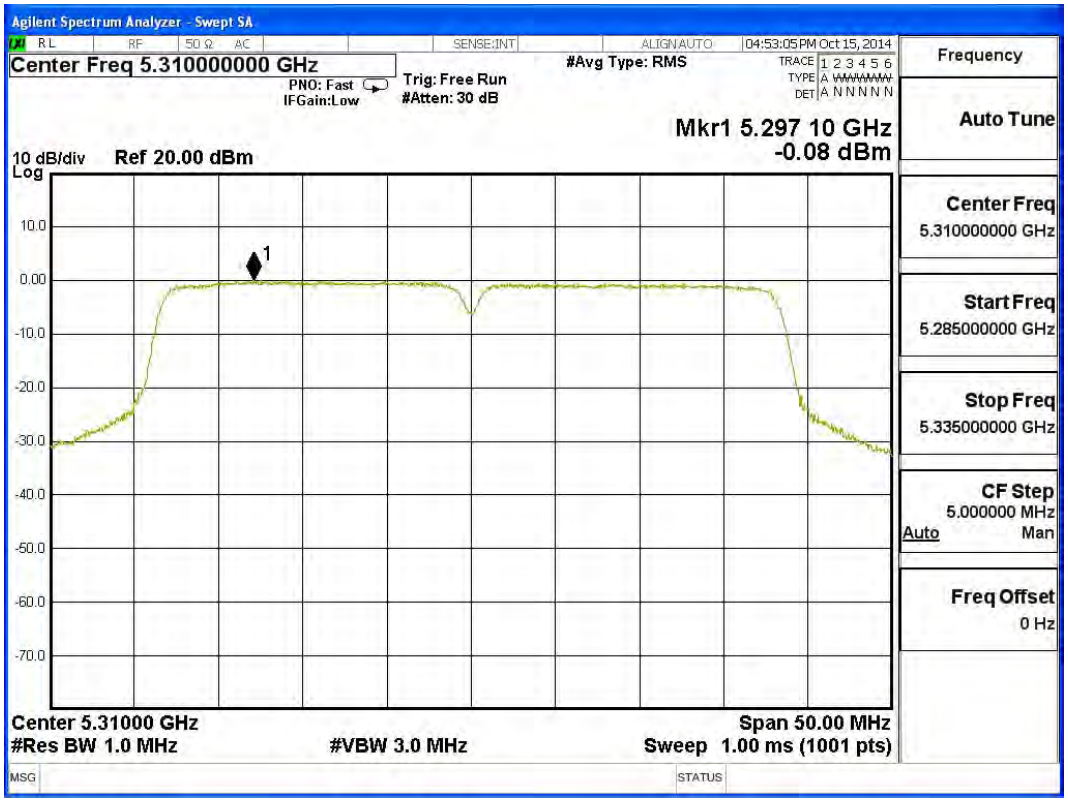

**Channel 54: Chain B**



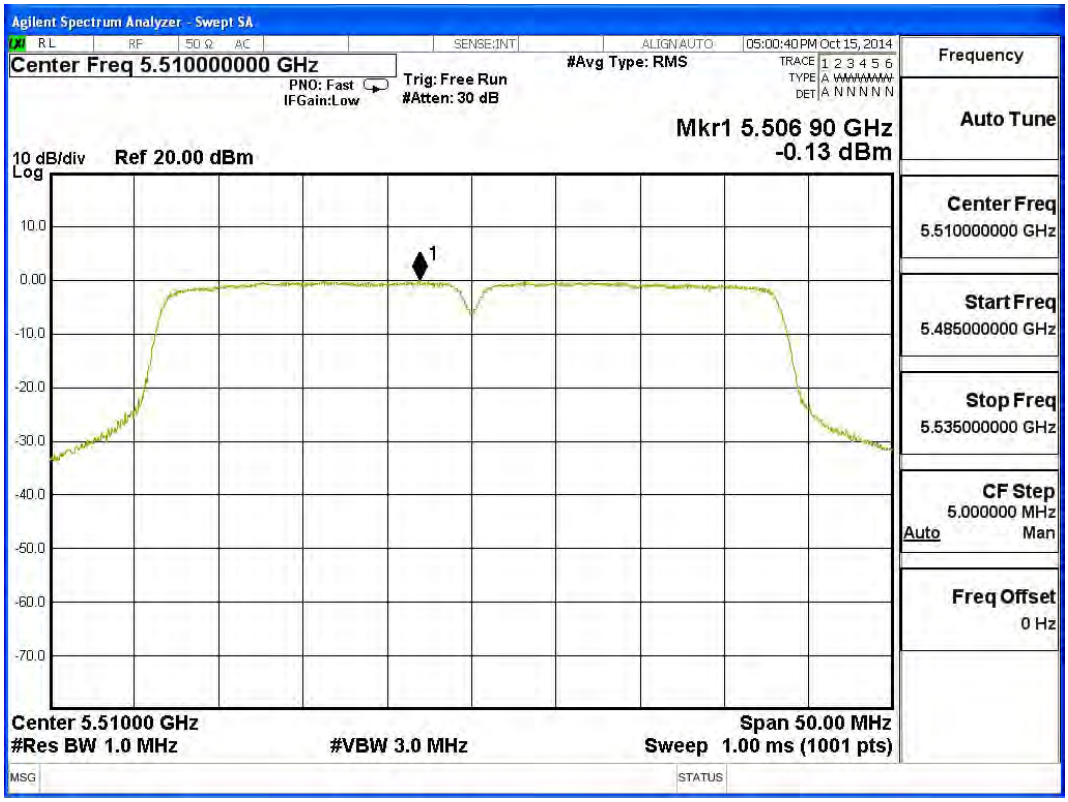
**Channel 62: Chain A**



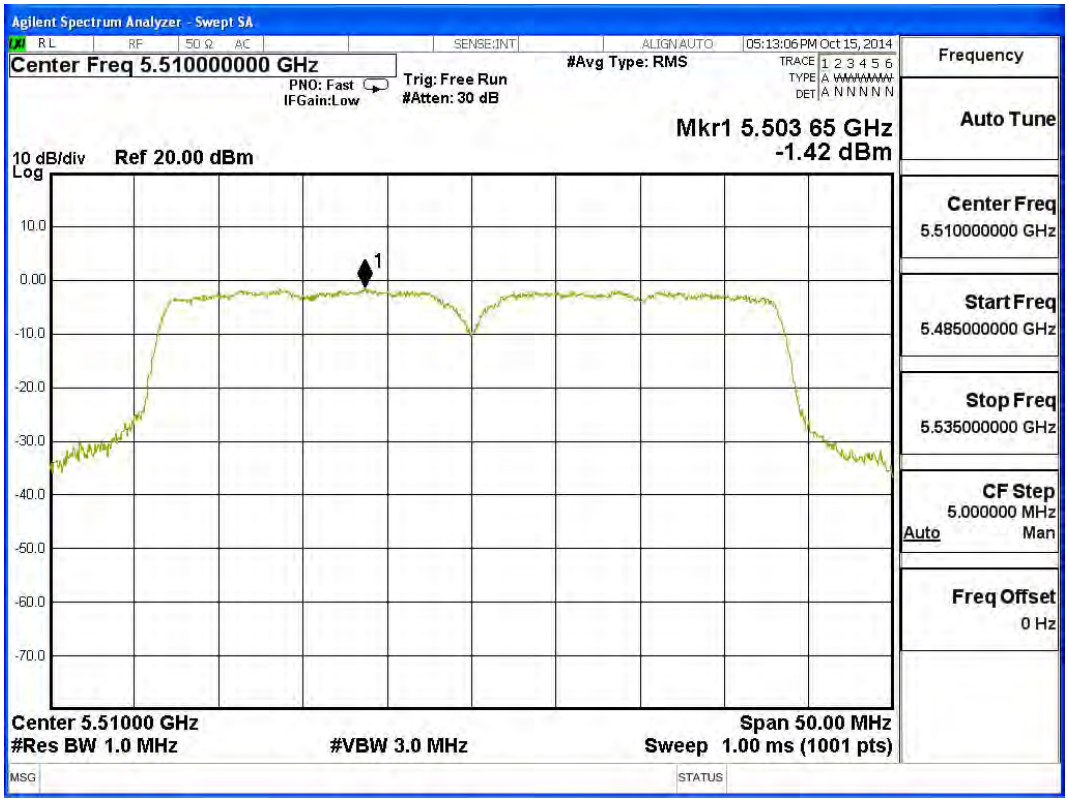

**Channel 62: Chain B**



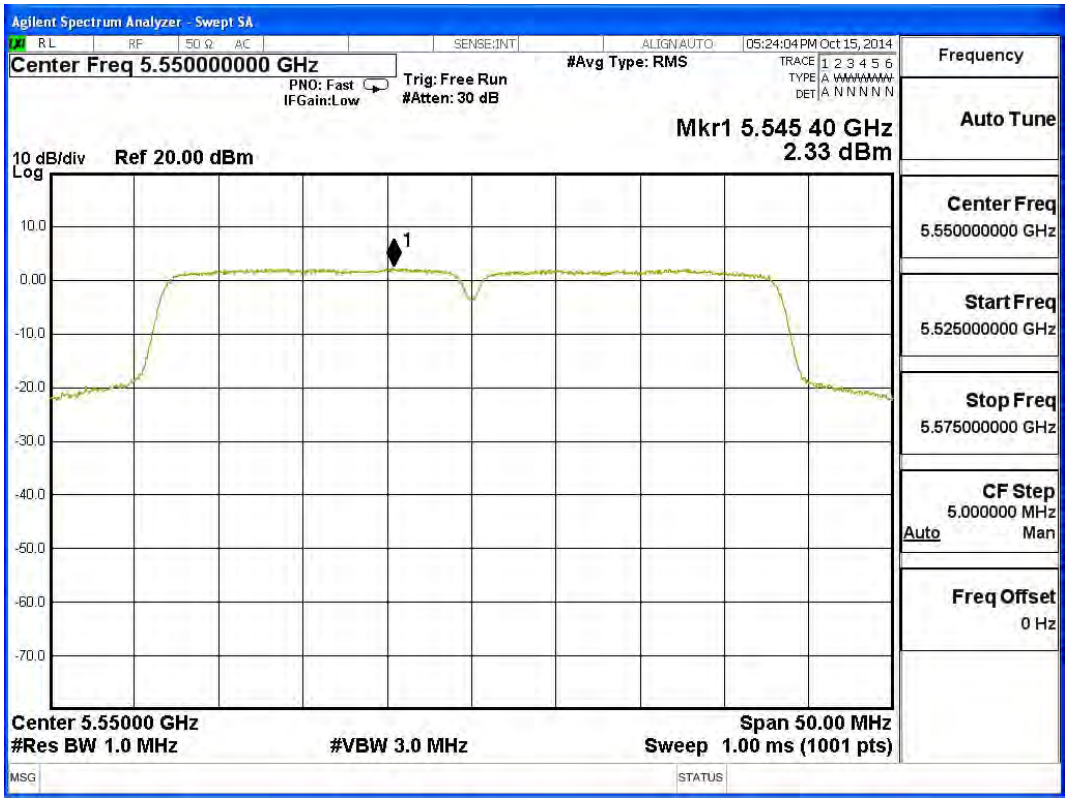
**Channel 102: Chain A**



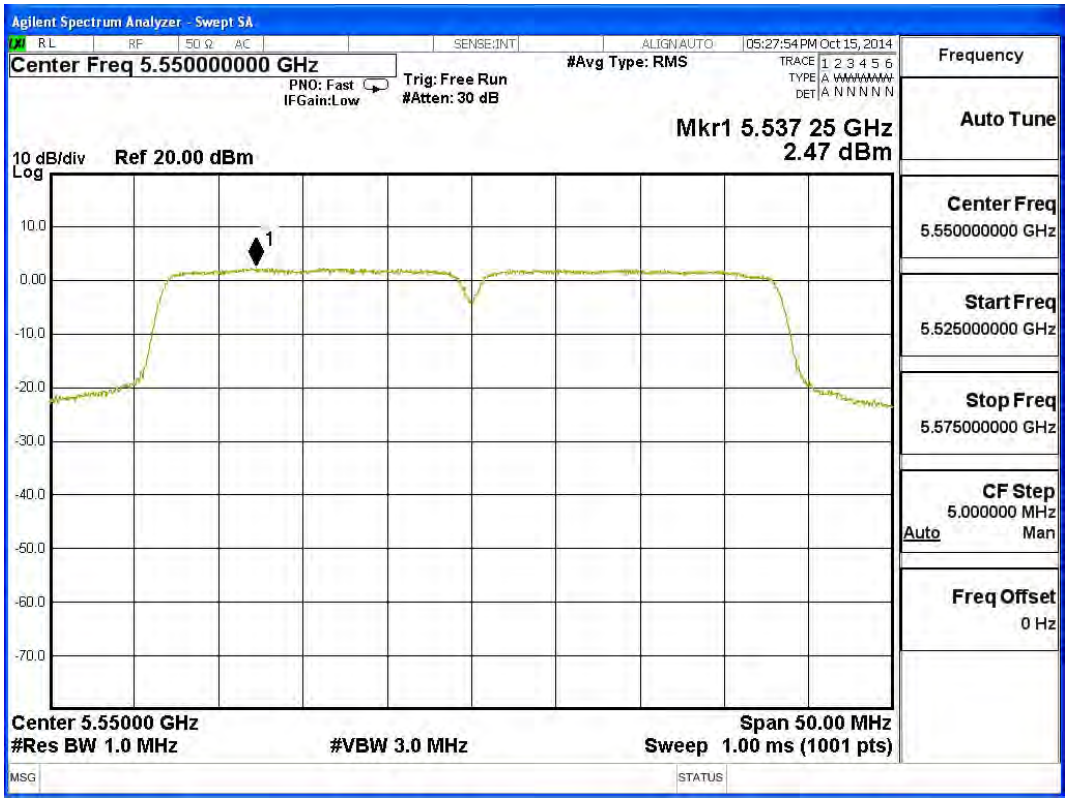

**Channel 102: Chain B**



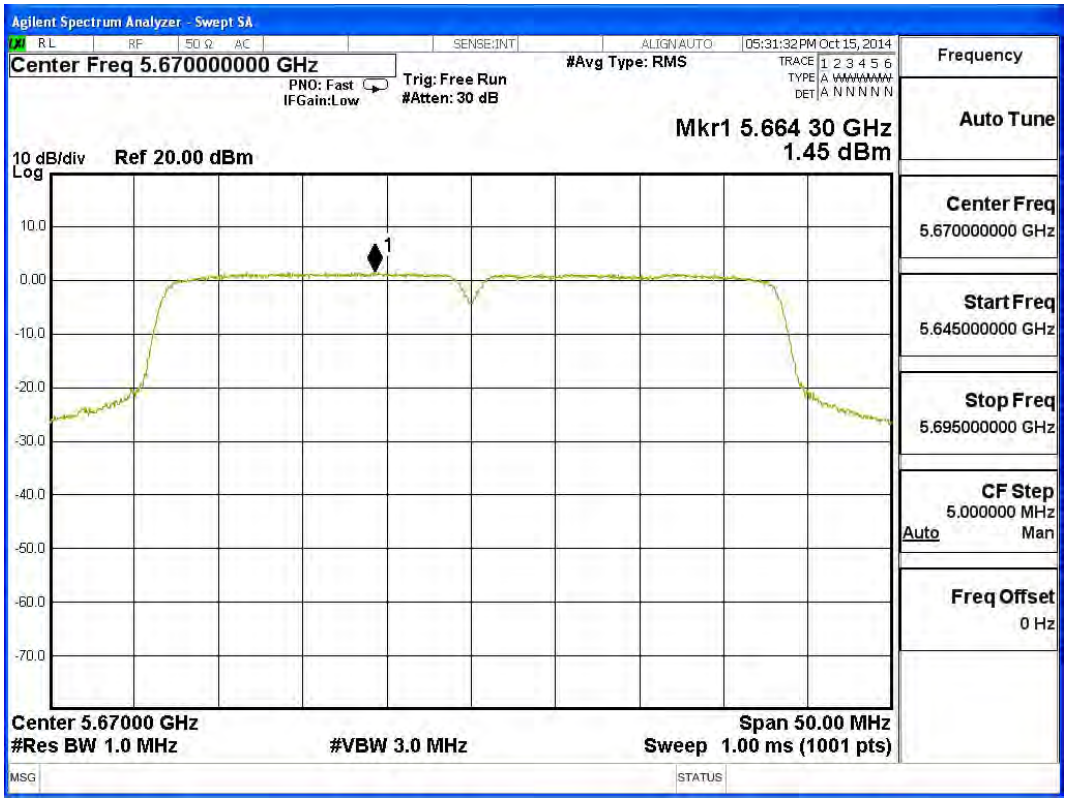
**Channel 110: Chain A**



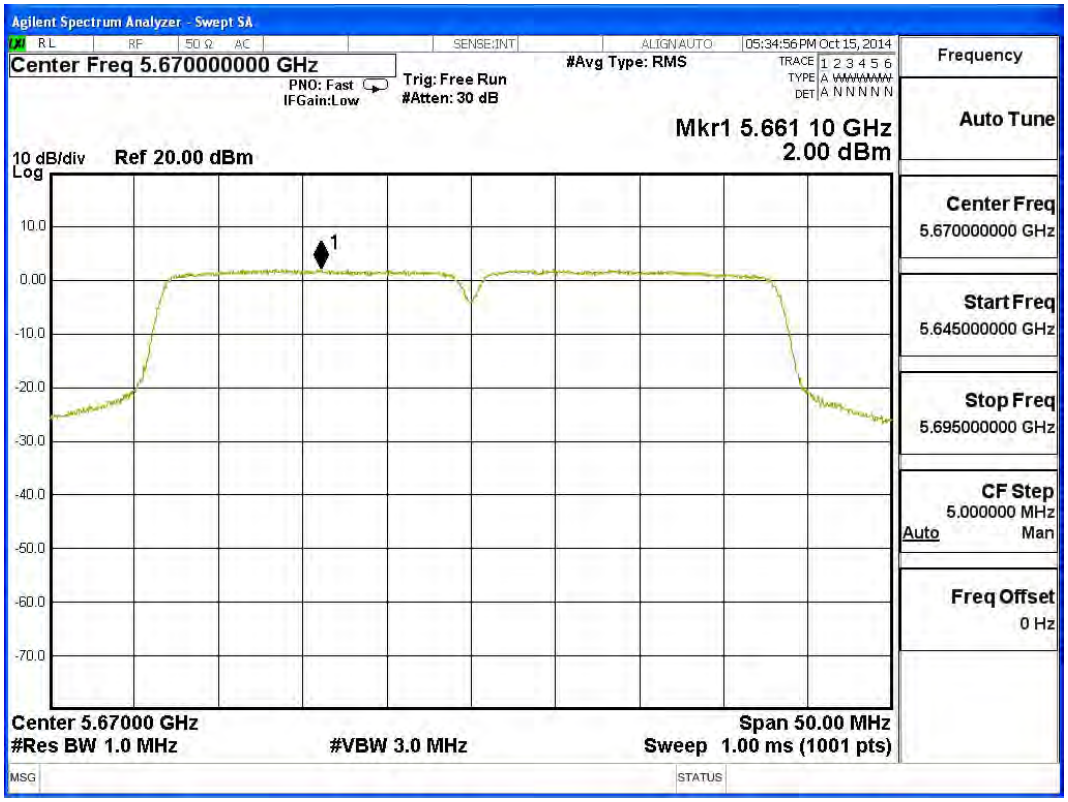

**Channel 110: Chain B**



**Channel 134: Chain A**




**Channel 134: Chain B**

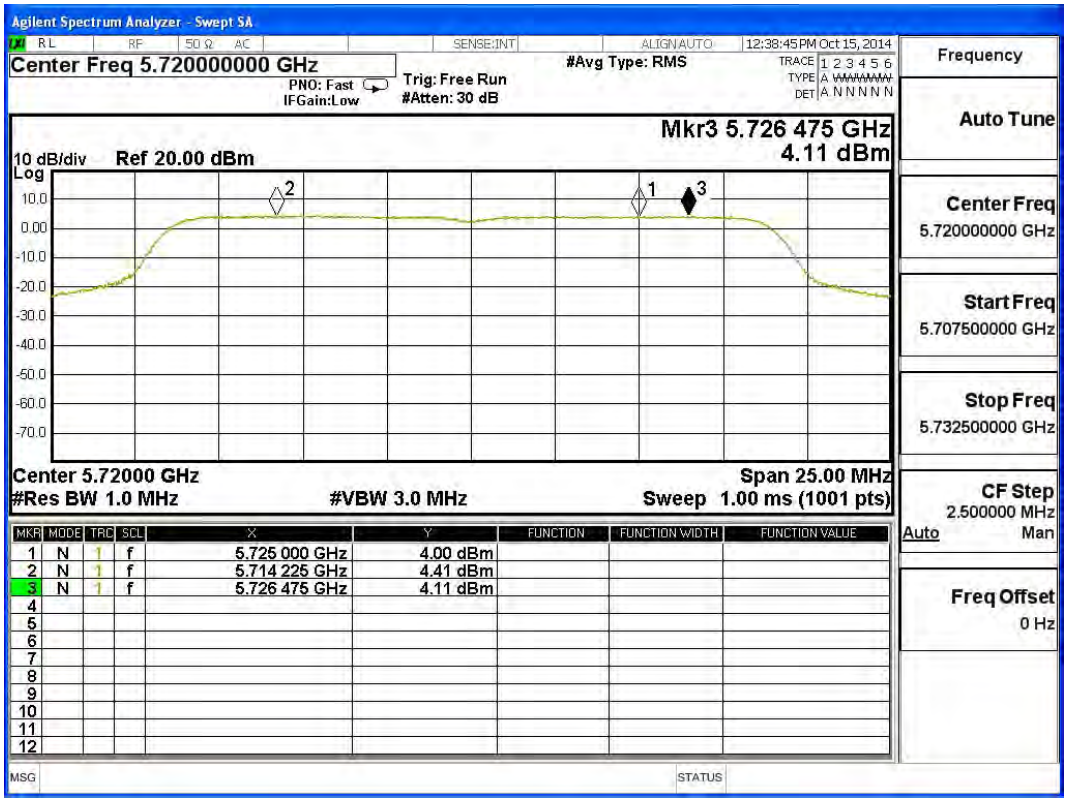


Product : Access Point/Sensor
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 5 Transmit (802.11ac-20BW-65Mbps)

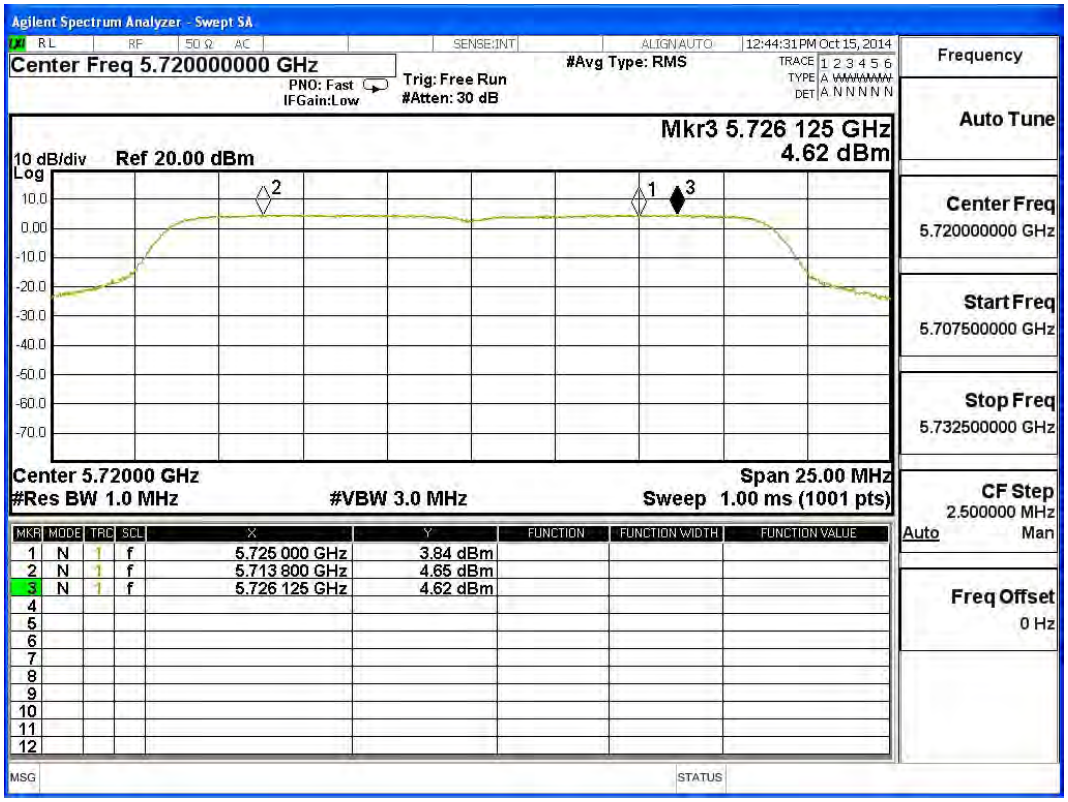
| Channel Number | Frequency (MHz) | Chain | PPSD/MHz (dBm) | Total PPSD/MHz (dBm)[1] | Required Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 144 | 5720 | A | 4.410 | 7.420 | <11 | Pass |
| | | B | 4.650 | 7.660 | <11 | Pass |
| 144 | 5720 | A | 4.110 | 7.120 | <11 | Pass |
| | | B | 4.620 | 7.630 | <11 | Pass |

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

**Channel 144: Chain A**




**Channel 144: Chain B**

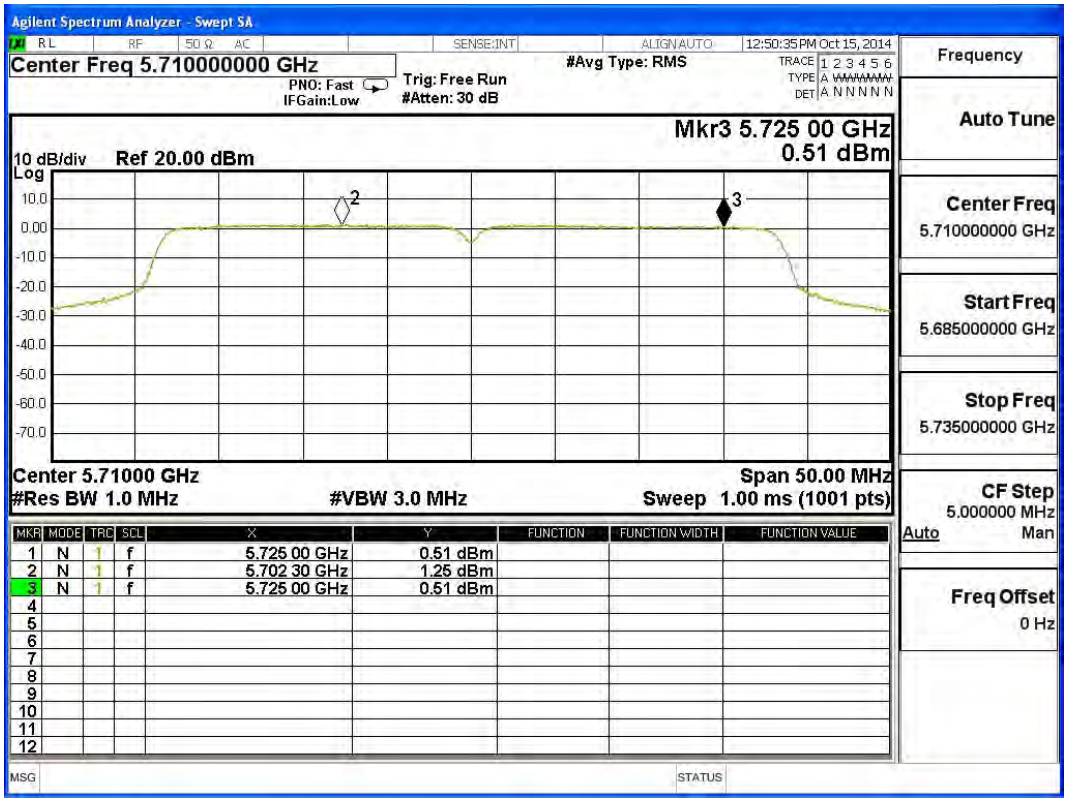


Product : Access Point/Sensor
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 6 Transmit (802.11ac-40BW-65Mbps)

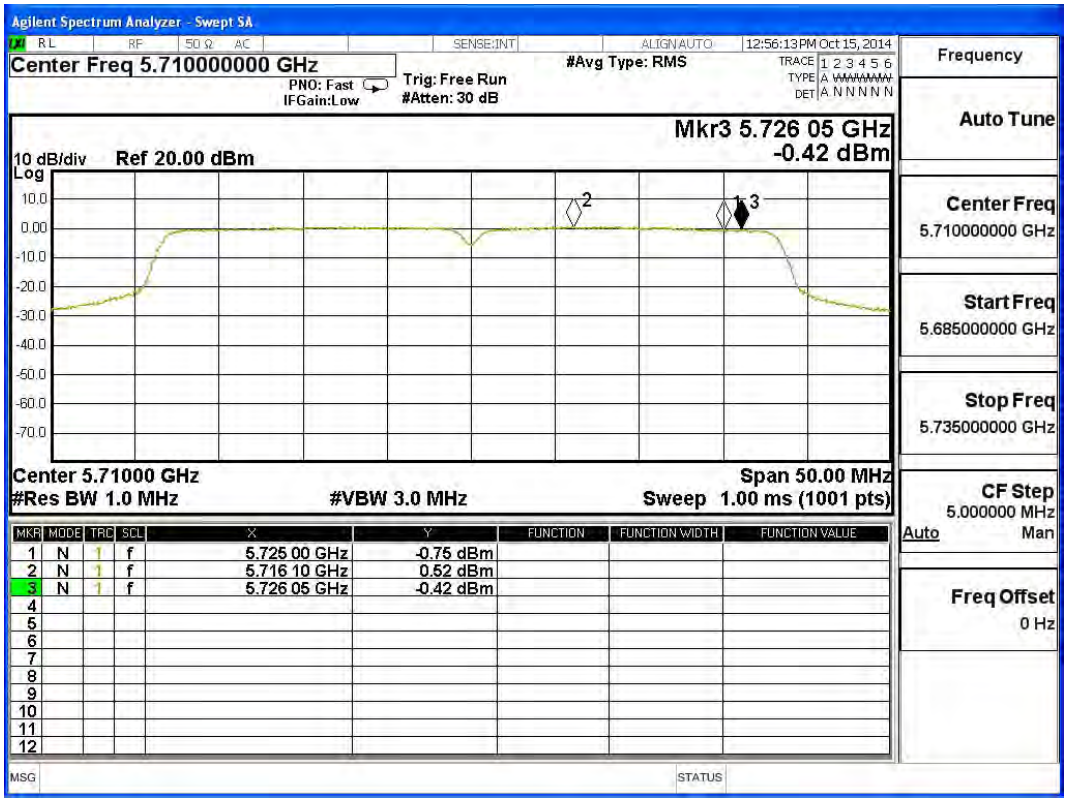
| Channel Number | Frequency (MHz) | Chain | PPSD/MHz (dBm) | Total PPSD/MHz (dBm)[1] | Required Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 142 | 5710 | A | 1.250 | 4.260 | <11 | Pass |
| | | B | 0.520 | 3.530 | <11 | Pass |
| 142 | 5710 | A | 0.510 | 3.520 | <11 | Pass |
| | | B | -0.420 | 2.590 | <11 | Pass |

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

**Channel 142: Chain A**




**Channel 142: Chain B**

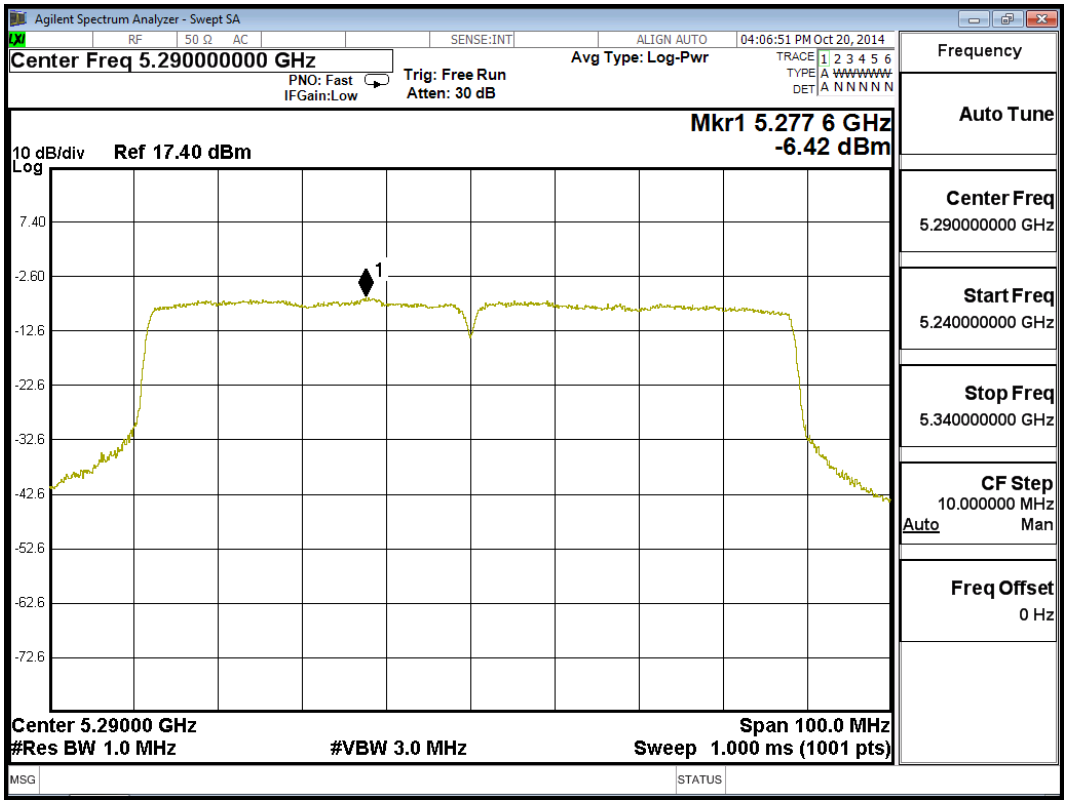


Product : Access Point/Sensor
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Mode : Mode 4 Transmit (802.11ac-80BW-65Mbps)

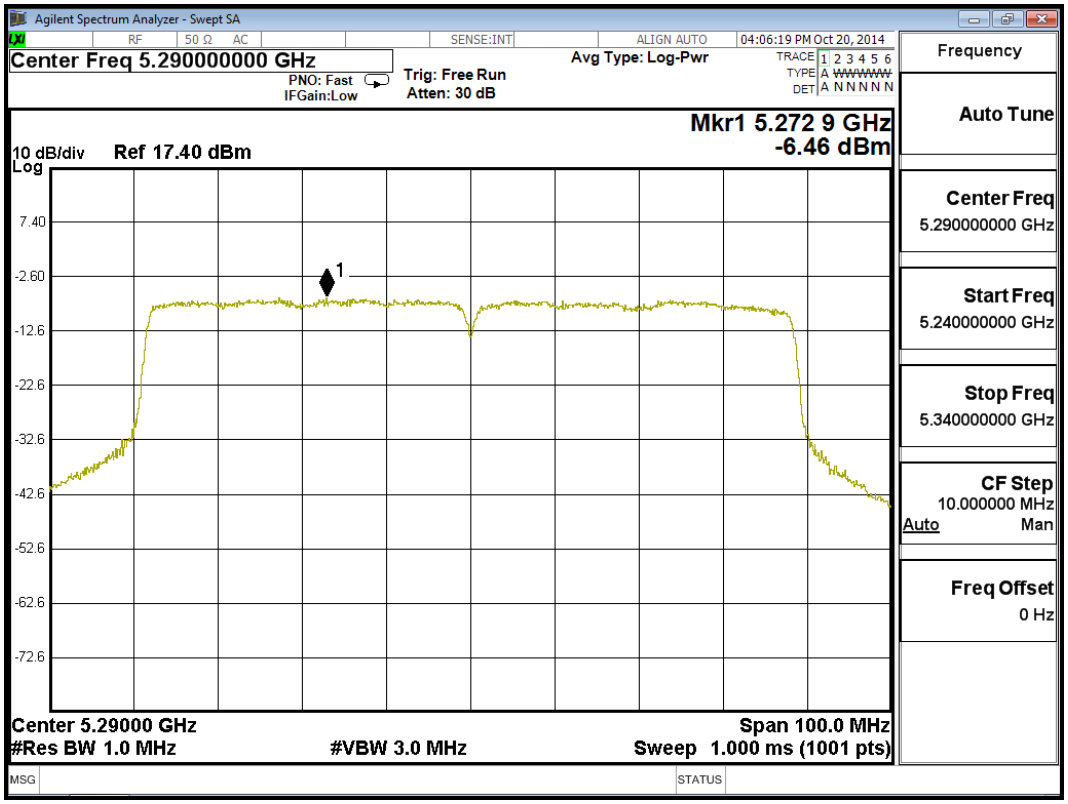
| Channel Number | Frequency (MHz) | Chain | PPSD/MHz (dBm) | Total PPSD/MHz (dBm)[1] | Required Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 58 | 5290 | A | -6.420 | -3.410 | <4 | Pass |
| | | B | -6.460 | -3.450 | <4 | Pass |
| 106 | 5530 | A | -5.890 | -2.880 | <11 | Pass |
| | | B | -6.060 | -3.050 | <11 | Pass |
| 138 | 5690 | A | -2.880 | 0.130 | <11 | Pass |
| | | B | -2.450 | 0.560 | <11 | Pass |
| 138 | 5690 | A | -4.580 | -1.570 | <17 | Pass |
| | | B | -4.130 | -1.120 | <17 | Pass |

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

## Channel 58: Chain A



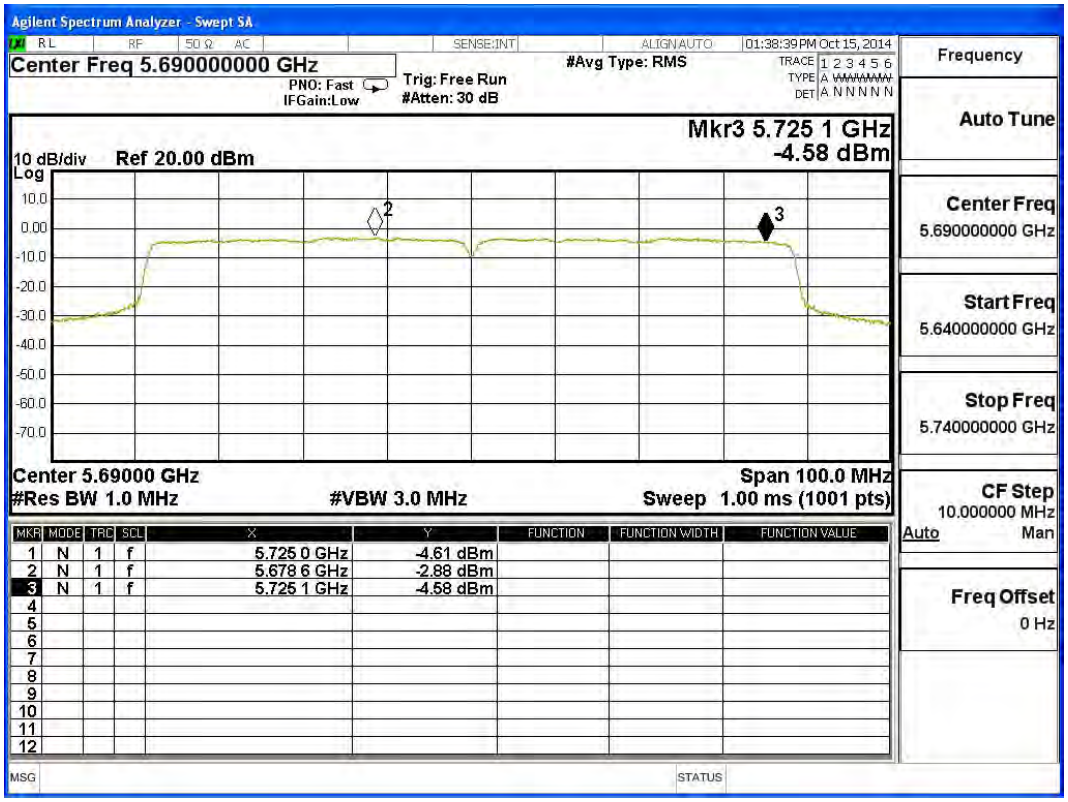

## Channel 58: Chain B



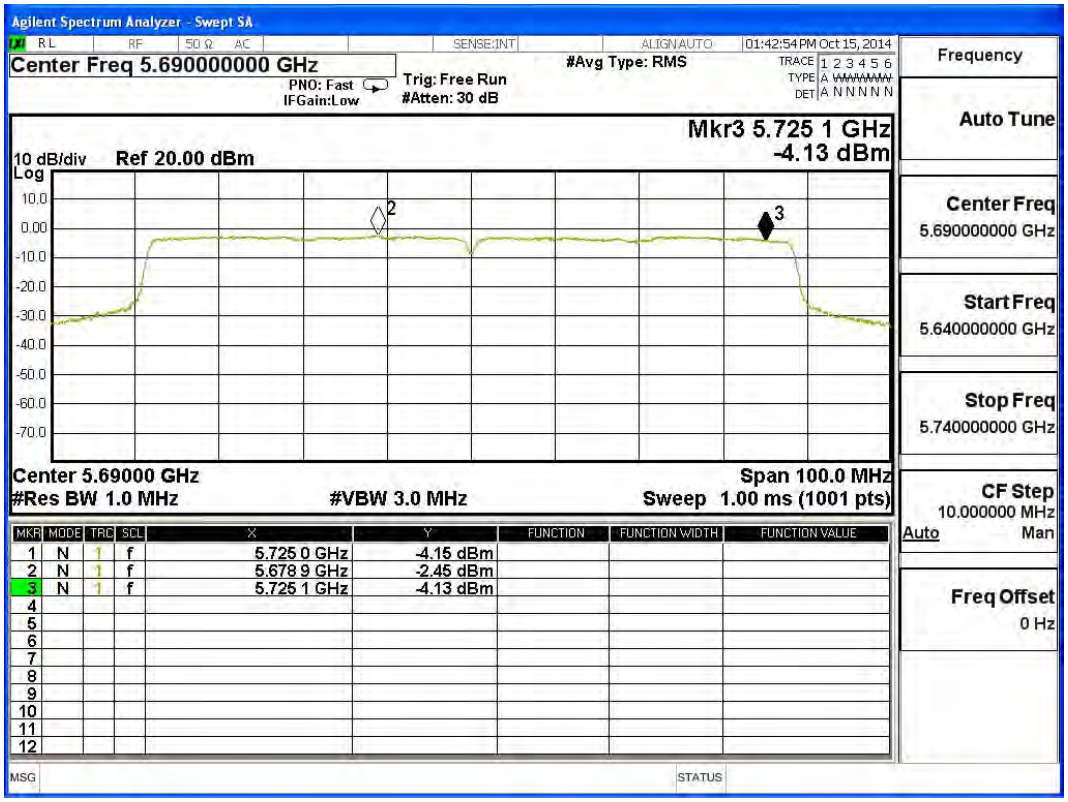
**Channel 106: Chain A**

**Channel 106: Chain B**

**Channel 138: Chain A**




**Channel 138: Chain B**



# 5. Peak Excursion

## 5.1. Test Equipment

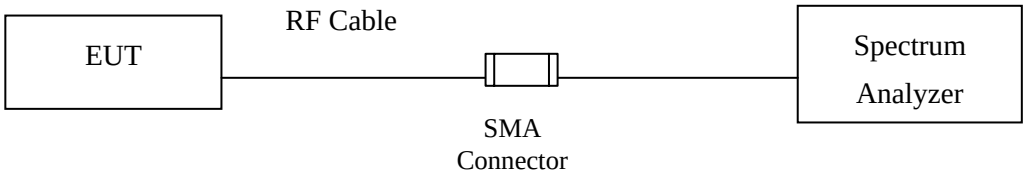
| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|---|---|---|---|
| | Spectrum Analyzer | R&S | FSP40 / 100170 | Jun., 2014 |
| | Spectrum Analyzer | Agilent | E4407B / US39440758 | Jun., 2014 |
| X | Spectrum Analyzer | Agilent | N9010A / MY48030495 | Apr., 2014 |

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

## 5.2. Test Setup

**Conduction Power Measurement**




## 5.3. Limits

The ratio of the peak excursion of the modulation envelope (measured suing a peak hold function) to the Maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## 5.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

Step 1: Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.

Step 2: Find the maximum of the peak-max-hold spectrum.

(Set RBW = 1 MHz, VBW ≥ 3 MHz, Detector = peak, Trace mode = max-hold, Allow the sweeps to continue until the trace stabilizes,Use the peak search function to find the peak of the spectrum.)

Step 3: Use the procedure found under KDB-789033 F) to measure the PPSD.

Step 4: Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

## 5.5. Uncertainty

± 1.27 dB

## 5.6. Test Result of Peak Excursion

Product : Access Point/Sensor
Test Item : Peak Excursion
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

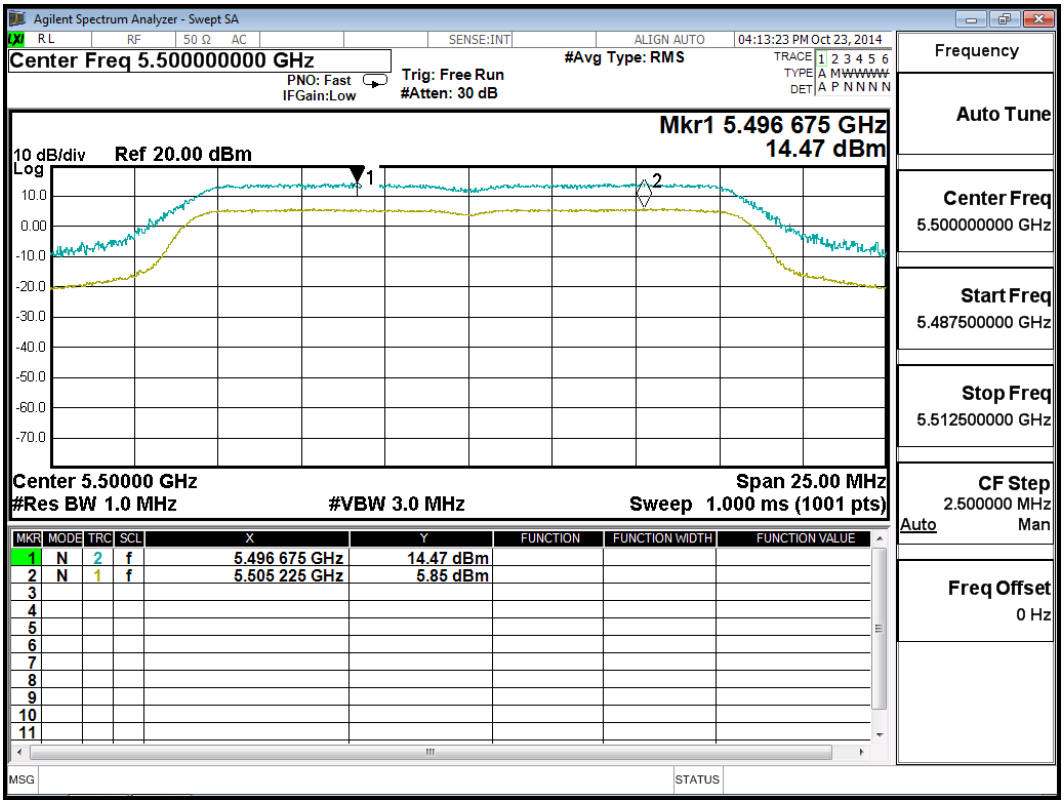
**Chain A**

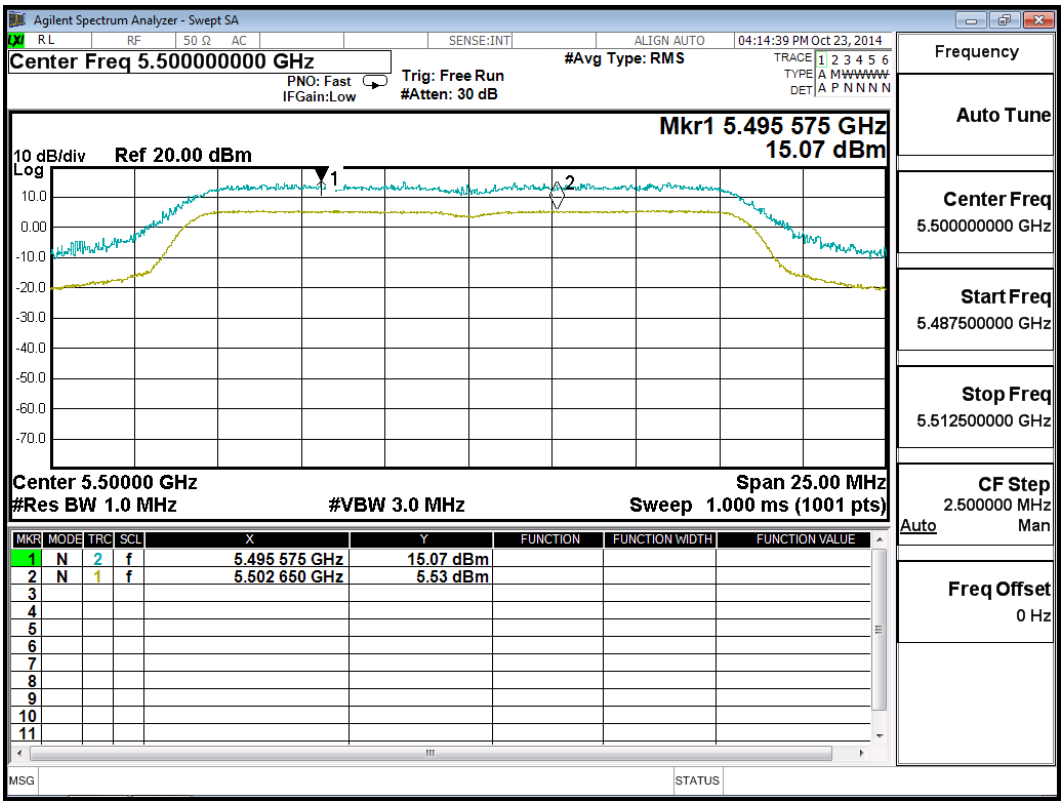
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | Measurement Level (dB) | Required Limit (dB) | Result |
|---|---|---|---|---|---|
| 100 | 5500 | MCS (0) | 8.620 | <13 | Pass |
| | | MCS (2) | 9.540 | <13 | Pass |
| | | MCS (4) | 9.890 | <13 | Pass |
| | | MCS (7) | 10.340 | <13 | Pass |

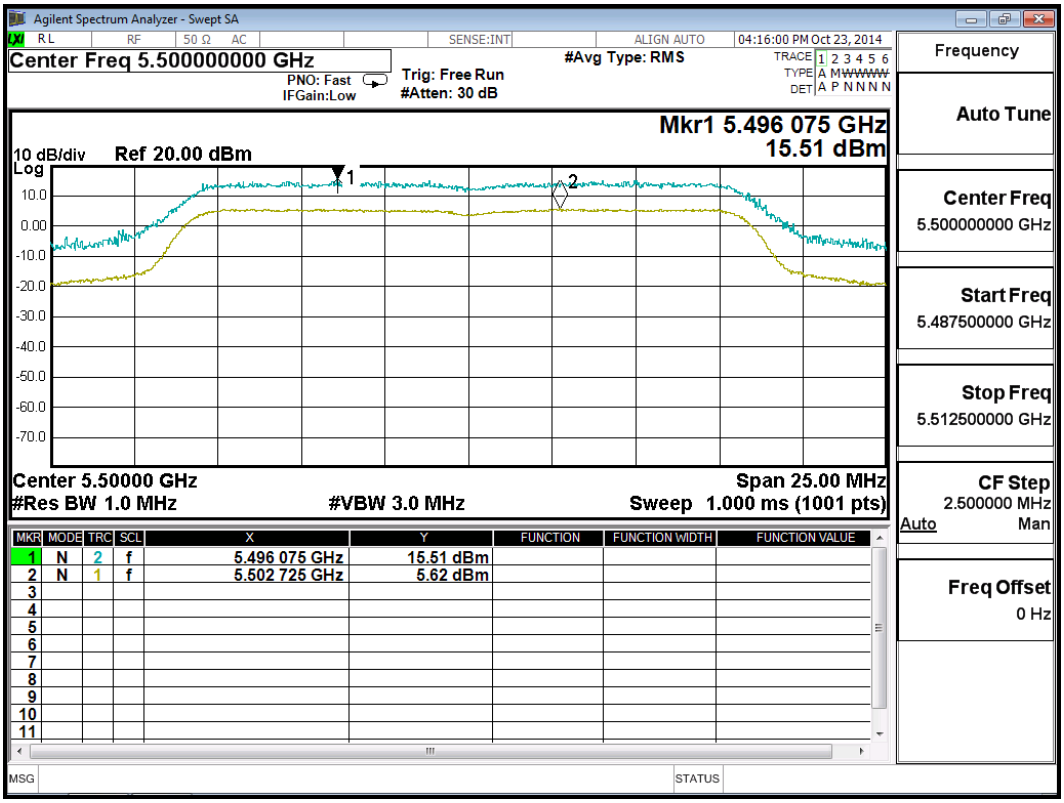
**Chain B**

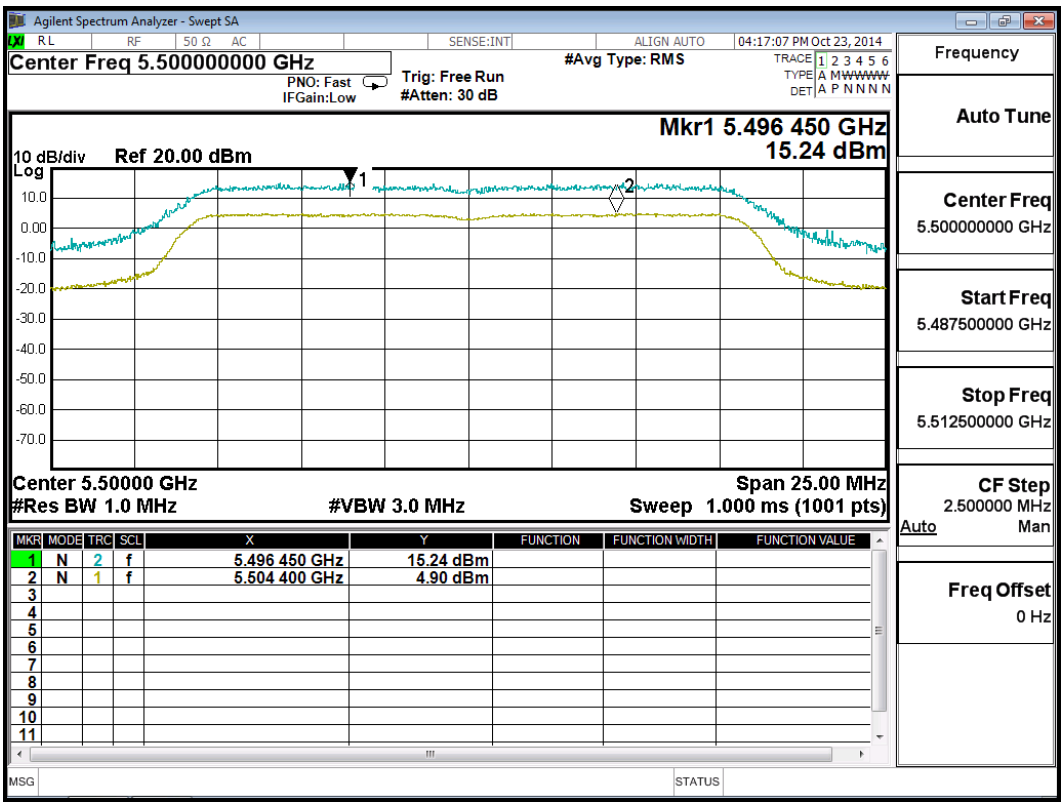
| Channel No. | Frequency (MHz) | Data Rate (Mbps) | Measurement Level (dB) | Required Limit (dB) | Result |
|---|---|---|---|---|---|
| 100 | 5500 | MCS (0) | 9.730 | <13 | Pass |
| | | MCS (2) | 9.560 | <13 | Pass |
| | | MCS (4) | 9.700 | <13 | Pass |
| | | MCS (7) | 9.540 | <13 | Pass |

## Channel 100: Chain A

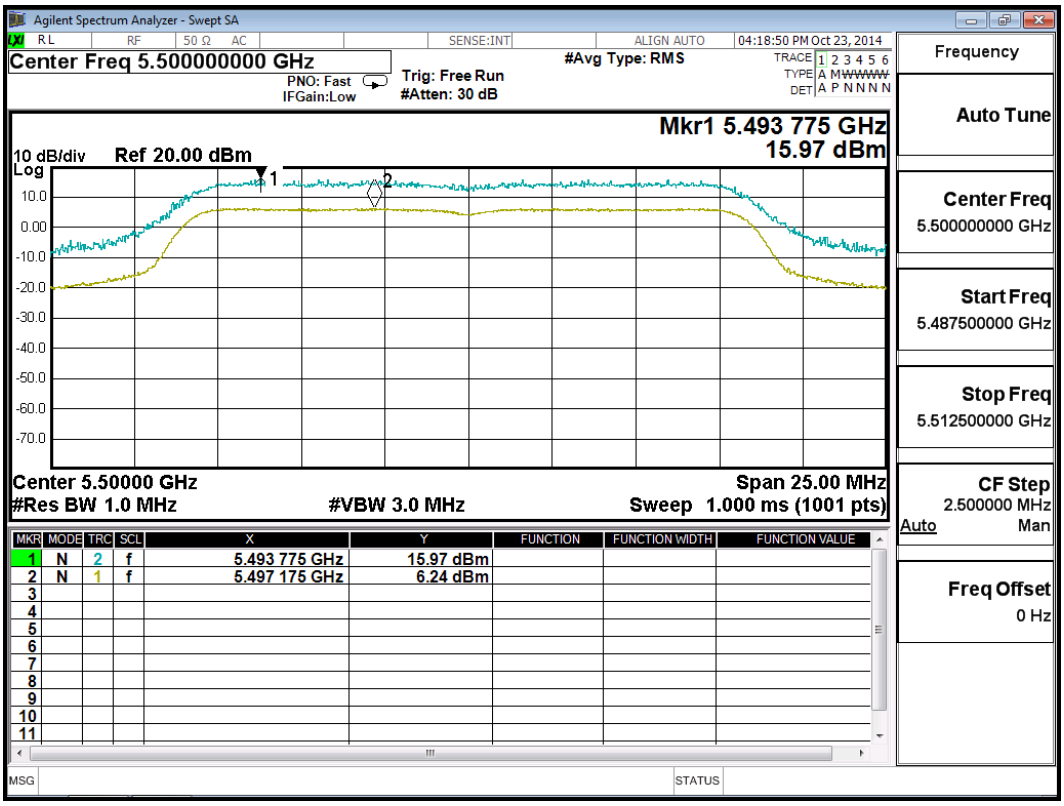


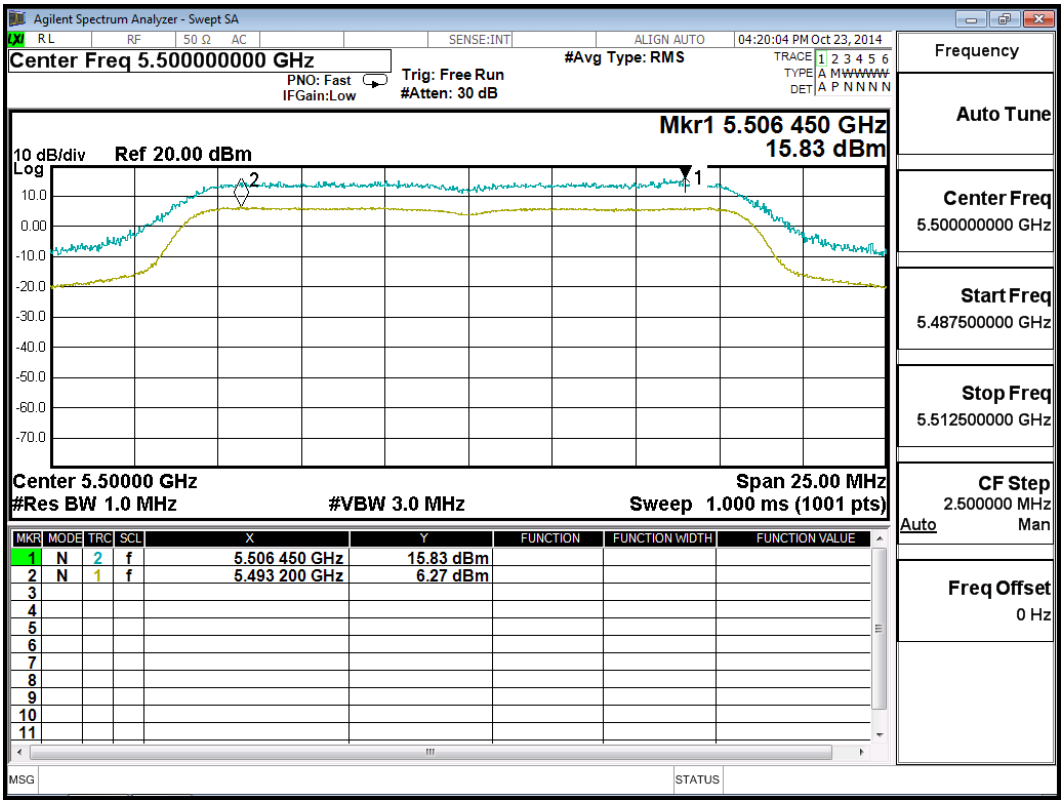



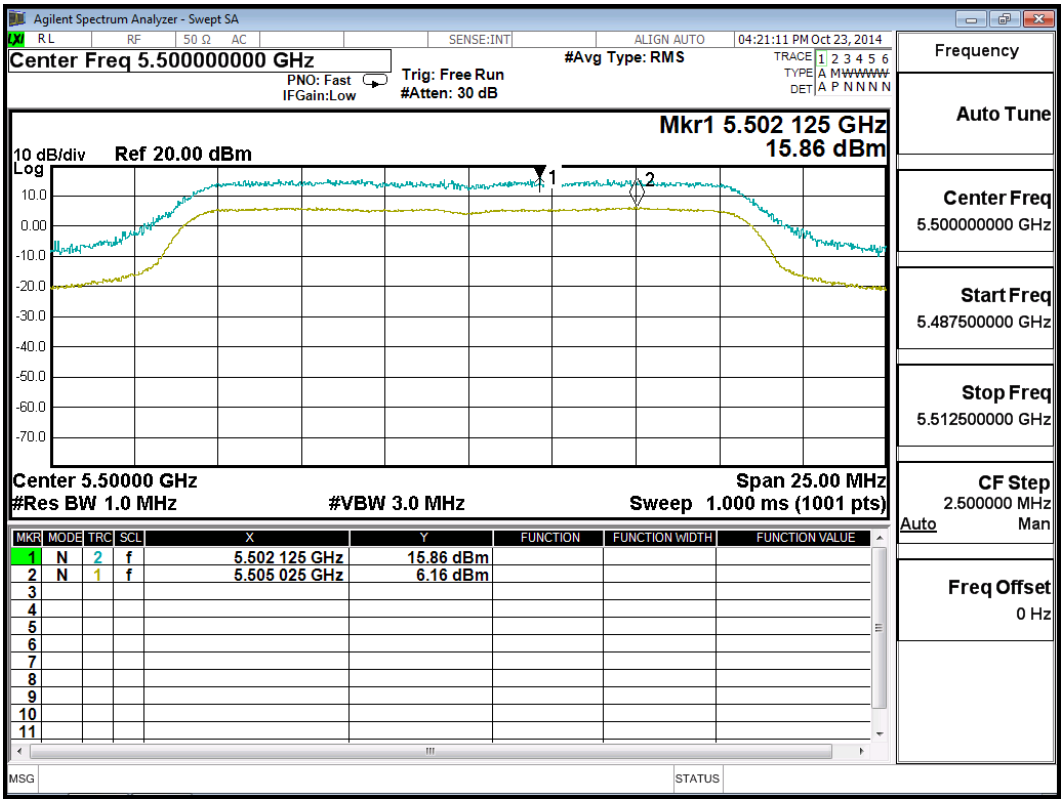

Agilent Spectrum Analyzer - Swept SA
Center Freq 5.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
04:16:00 PM Oct 23, 2014
Mkr1 5.496 075 GHz
15.51 dBm
10 dB/div Ref 20.00 dBm
Center 5.50000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 25.00 MHz
Sweep 1.000 ms (1001 pts)
1 N 2 f 5.496 075 GHz 15.51 dBm
2 N 1 f 5.502 725 GHz 5.62 dBm
Frequency
Auto Tune
Center Freq 5.500000000 GHz
Start Freq 5.487500000 GHz
Stop Freq 5.512500000 GHz
CF Step 2.500000 MHz
Auto Man
Freq Offset 0 Hz

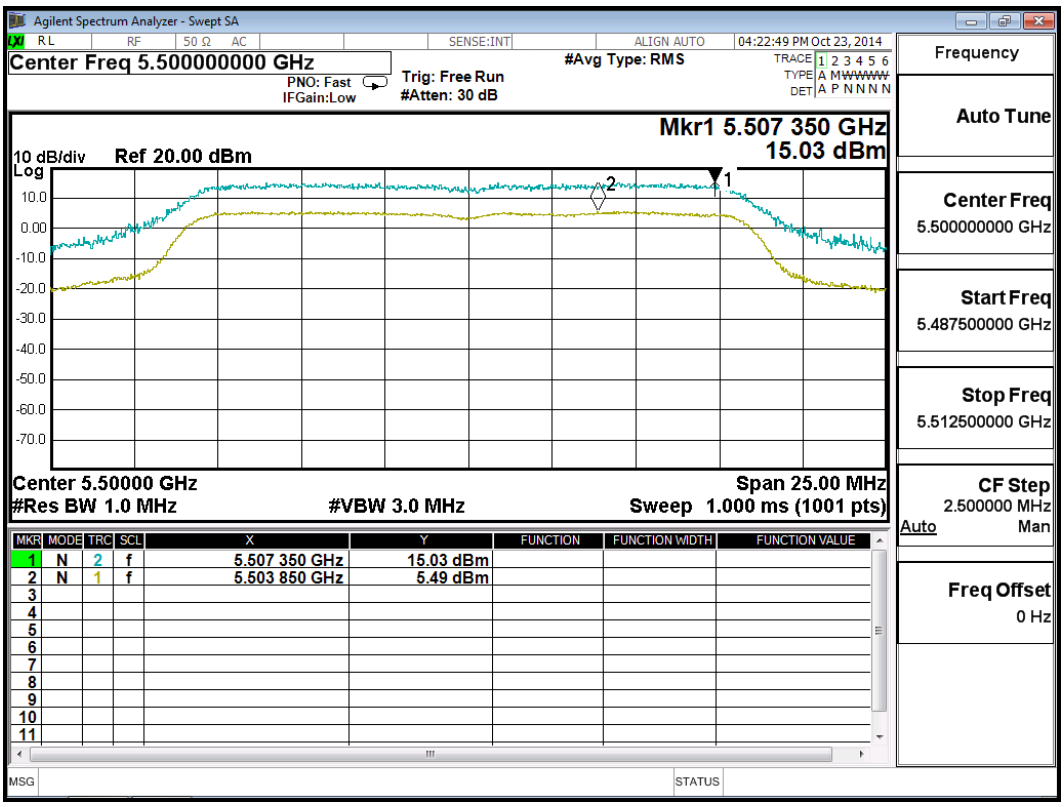

Agilent Spectrum Analyzer - Swept SA
Center Freq 5.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
04:17:07 PM Oct 23, 2014
Mkr1 5.496 450 GHz
15.24 dBm
10 dB/div Ref 20.00 dBm
Center 5.50000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 25.00 MHz
Sweep 1.000 ms (1001 pts)
1 N 2 f 5.496 450 GHz 15.24 dBm
2 N 1 f 5.504 400 GHz 4.90 dBm
Frequency
Auto Tune
Center Freq 5.500000000 GHz
Start Freq 5.487500000 GHz
Stop Freq 5.512500000 GHz
CF Step 2.500000 MHz
Auto Man
Freq Offset 0 Hz

## Channel 100: Chain B




Agilent Spectrum Analyzer - Swept SA
RL RF 50 Ω AC SENSE:INT ALIGN AUTO 04:21:11 PM Oct 23, 2014
Center Freq 5.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
TRACE 1 2 3 4 5 6
TYPE A MWWWWW
DET A P N N N N
Mkr1 5.502 125 GHz
15.86 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 5.50000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 25.00 MHz
Sweep 1.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 2 f 5.502 125 GHz 15.86 dBm
2 N 1 f 5.505 025 GHz 6.16 dBm
Frequency
Auto Tune
Center Freq
5.500000000 GHz
Start Freq
5.487500000 GHz
Stop Freq
5.512500000 GHz
CF Step
2.500000 MHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
RL RF 50 Ω AC SENSE:INT ALIGN AUTO 04:22:49 PM Oct 23, 2014
Center Freq 5.500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
TRACE 1 2 3 4 5 6
TYPE A MWWWWW
DET A P N N N N
Mkr1 5.507 350 GHz
15.03 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 5.50000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 25.00 MHz
Sweep 1.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 2 f 5.507 350 GHz 15.03 dBm
2 N 1 f 5.503 850 GHz 5.49 dBm
Frequency
Auto Tune
Center Freq
5.500000000 GHz
Start Freq
5.487500000 GHz
Stop Freq
5.512500000 GHz
CF Step
2.500000 MHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS