

FCC Test Report

Product Name : Dual-band Wireless-AC1200 Gigabit Router

Model No. : RT-AC56U/ RT-AC56R

FCC ID. : MSQ-RTAC56UA

Applicant : ASUSTeK COMPUTER INC.

Address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt : 2013/08/22

Issued Date : 2013/09/03

Report No. : 139121R-RFUSP46V01

Report Version : V0.3-Draft



The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

Test Report Certification

Issued Date : 2013/09/03

Report No. : 139121R-RFUSP46V01



Product Name : Dual-band Wireless-AC1200 Gigabit Router
 Applicant : ASUSTeK COMPUTER INC.
 Address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan
 Manufacturer : Compal Networking (KunShan) Co.,Ltd
 Model No. : RT-AC56U/ RT-AC56R
 FCC ID. : MSQ-RTAC56UA
 EUT Voltage : AC 100-240V, 50-60Hz
 Trade Name : ASUS
 Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.407:2012
 ANSI C63.4: 2009
 Test Result : Complied

The test results relate only to the samples tested.

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 (Carol Tsai / Adm. Specialist)
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Laboratory Information

We, **Quietek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

| | | |
|----------------------|----------|---|
| Taiwan R.O.C. | : | TAF, Accreditation Number: 1313 |
| USA | : | FCC, Registration Number: 365520 |
| Canada | : | IC, Submission No: 150981 |

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site:<http://www.quietek.com/tw/ctg/cts/accreditations.htm>

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

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1. General Information

1.1. EUT Description

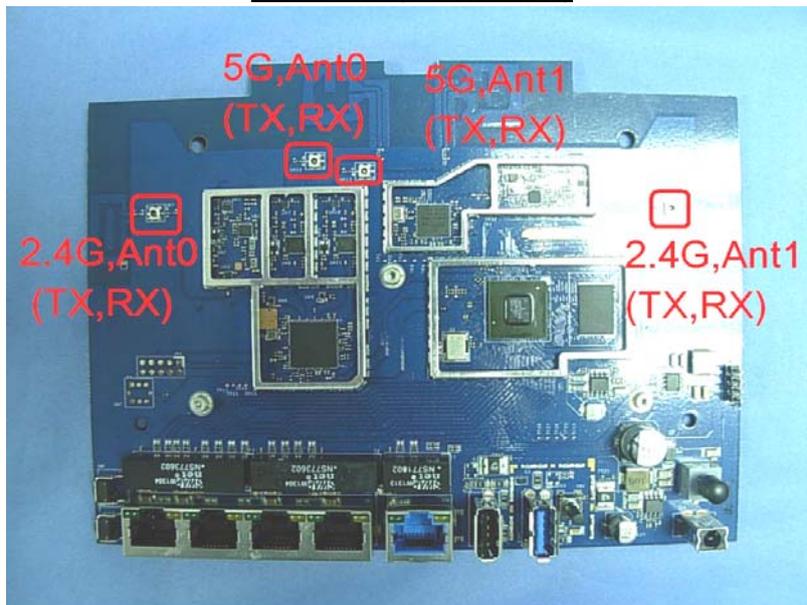
| | | |
|------------------------------------|--|--|
| Product Name | Dual-band Wireless-AC1200 Gigabit Router | |
| Product Type | WLAN (2TX, 2RX) | |
| Trade Name | ASUS | |
| Model No. | RT-AC56U/ RT-AC56R | |
| Frequency Range/ Channel Number | IEEE 802.11a/ IEEE 802.11n (20MHz) / IEEE 802.11ac (20MHz) | 5180~5240MHz / 4 Channels |
| | IEEE 802.11n (40MHz) / IEEE 802.11ac (40MHz) | 5190~5230MHz / 2 Channels |
| | IEEE 802.11ac (80MHz) | 5210~5210MHz / 1 Channel |
| Type of Modulation | IEEE 802.11a/n/ac | Orthogonal Frequency Division Multiplexing (OFDM) |
| Data Speed | IEEE 802.11a | 6, 9, 18, 24, 36, 48, 54Mbps |
| | IEEE 802.11n | Support a subset of the combination of GI, MCS 0~MCS 15 and bandwidth defined in 802.11n |
| | IEEE 802.11ac | Support a subset of the combination of GI, MCS 0~MCS 9 and bandwidth defined in 802.11ac |
| Antenna Gain | Ant0:3.07dBi, Ant1:3.07dBi | |
| Beamforming Gain | 3dB | |
| Antenna Type | PCB on Antenna | |

| Component | |
|---------------|---|
| LAN Cable | YFC-BONEAGLE , Non-Shielded, 1.5m |
| LAN Cable | Cablex Electronics , Non-Shielded, 1.5m |
| LAN Cable | SHENZHEN , Non-Shielded, 1.5m |
| Power Adatper | PIE, AD890326 I/P : 100-240V~50/60Hz 0.8A O/P : 19V \equiv 1.75A Cable Out: Non-Shielded, 2.3m |
| Power Adapter | Enertronix, EXA1206UH I/P : AC 100-240V~50-60Hz, 1.0A O/P : 19Vdc \equiv 1.75A Cable Out: Non-Shielded, 2.3m |

ANT-TX / RX & Bandwidth

| ANT-TX / RX | TX | | | RX | | |
|--------------|-------|-------|-------|-------|-------|-------|
| | 20MHz | 40MHz | 80MHz | 20MHz | 40MHz | 80MHz |
| IEEE802.11a | ✓ | ✗ | ✗ | ✓ | ✗ | ✗ |
| IEEE802.11n | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ |
| IEEE802.11ac | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

2TX / 2RX (Blue Board)



2TX / 2RX (Red Board)



IEEE 802.11n

| MCS Index | Modulation | R | N _{BPSCS} | N _{CBPS} | | N _{DBPS} | | Data Rate(Mb/s) | | | |
|-----------|------------|-----|--------------------|-------------------|-------|-------------------|-------|-----------------|-------|------------------|-------|
| | | | | 20MHz | 40MHz | 20MHz | 40MHz | 800ns GI | | 400ns GI (Note1) | |
| | | | | | | | | 20MHz | 40MHz | 20MHz | 40MHz |
| 0 | BPSK | 1/2 | 1 | 52 | 108 | 26 | 54 | 6.5 | 13.5 | 7.2 | 15.0 |
| 1 | QPSK | 1/2 | 2 | 104 | 216 | 52 | 108 | 13.0 | 27.0 | 14.4 | 30.0 |
| 2 | QPSK | 3/4 | 2 | 104 | 216 | 78 | 162 | 19.5 | 40.5 | 21.7 | 45.0 |
| 3 | 16-QAM | 1/2 | 4 | 208 | 432 | 104 | 216 | 26.0 | 54.0 | 28.9 | 60.0 |
| 4 | 16-QAM | 3/4 | 4 | 208 | 432 | 156 | 324 | 39.0 | 81.0 | 43.3 | 90.0 |
| 5 | 64-QAM | 2/3 | 6 | 312 | 648 | 208 | 432 | 52.0 | 108.0 | 57.8 | 120.0 |
| 6 | 64-QAM | 3/4 | 6 | 312 | 648 | 234 | 486 | 58.5 | 121.5 | 65.0 | 135.0 |
| 7 | 64-QAM | 5/6 | 6 | 312 | 648 | 260 | 540 | 65.0 | 135.0 | 72.2 | 150.0 |

Note 1: Support of 400ns GI is optional on transmit and receive.

Table 1 – MCS parameters for TX Antenna number = 1

| MCS Index | Modulation | R | N _{BPSCS} | N _{CBPS} | | N _{DBPS} | | Data Rate(Mb/s) | | | |
|-----------|------------|-----|--------------------|-------------------|-------|-------------------|-------|-----------------|-------|------------------|-------|
| | | | | 20MHz | 40MHz | 20MHz | 40MHz | 800ns GI | | 400ns GI (Note1) | |
| | | | | | | | | 20MHz | 40MHz | 20MHz | 40MHz |
| 8 | BPSK | 1/2 | 1 | 104 | 216 | 52 | 108 | 13.0 | 27.0 | 14.4 | 30.0 |
| 9 | QPSK | 1/2 | 2 | 208 | 432 | 104 | 216 | 26.0 | 54.0 | 28.9 | 60.0 |
| 10 | QPSK | 3/4 | 2 | 208 | 432 | 156 | 324 | 39.0 | 81.0 | 43.3 | 90.0 |
| 11 | 16-QAM | 1/2 | 4 | 416 | 864 | 208 | 432 | 52.0 | 108.0 | 57.8 | 120.0 |
| 12 | 16-QAM | 3/4 | 4 | 416 | 864 | 312 | 648 | 78.0 | 162.0 | 86.7 | 180.0 |
| 13 | 64-QAM | 2/3 | 6 | 624 | 1296 | 416 | 864 | 104.0 | 216.0 | 115.6 | 240.0 |
| 14 | 64-QAM | 3/4 | 6 | 624 | 1296 | 468 | 972 | 117.0 | 243.0 | 130.0 | 270.0 |
| 15 | 64-QAM | 5/6 | 6 | 624 | 1296 | 520 | 1080 | 130.0 | 270.0 | 144.4 | 300.0 |

Note 1: Support of 400ns GI is optional on transmit and receive.

Table 2 – MCS parameters for TX Antenna number = 2

| Symbol | Explanation |
|-------------------|---|
| R | Code rate |
| N _{BPSC} | Number of coded bits per single carrier |
| N _{CBPS} | Number of coded bits per symbol |
| N _{DBPS} | Number of data bits per symbol |
| GI | guard interval |

Draft IEEE 802.11ac Data Rate

| Spatial Streams (Note1) | MCS Index | Modulation type | Coding rate | Data Rate(Mb/s) | | | | | | | |
|-------------------------|-----------|-----------------|-------------|-----------------|-------|----------------|-------|----------------|-------|----------------|--------|
| | | | | 20 MHz | | 40 MHz | | 80 MHz | | 160 MHz | |
| | | | | Guard Interval | | Guard Interval | | Guard Interval | | Guard Interval | |
| | | | | 800ns | 400ns | 800ns | 400ns | 800ns | 400ns | 800ns | 400ns |
| 1 | 0 | BPSK | 1/2 | 6.5 | 7.2 | 13.5 | 15 | 29.3 | 32.5 | 58.5 | 65 |
| | 1 | QPSK | 1/2 | 13 | 14.4 | 27 | 30 | 58.5 | 65 | 117 | 130 |
| | 2 | QPSK | 3/4 | 19.5 | 21.7 | 40.5 | 45 | 87.8 | 97.5 | 175.5 | 195 |
| | 3 | 16-QAM | 1/2 | 26 | 28.9 | 54 | 60 | 117 | 130 | 234 | 260 |
| | 4 | 16-QAM | 3/4 | 39 | 43.3 | 81 | 90 | 175.5 | 195 | 351 | 390 |
| | 5 | 64-QAM | 2/3 | 52 | 57.8 | 108 | 120 | 234 | 260 | 468 | 520 |
| | 6 | 64-QAM | 3/4 | 58.5 | 65 | 121.5 | 135 | 263.3 | 292.5 | 526.5 | 585 |
| | 7 | 64-QAM | 5/6 | 65 | 72.2 | 135 | 150 | 292.5 | 325 | 585 | 650 |
| | 8 | 256-QAM | 3/4 | 78 | 86.7 | 162 | 180 | 351 | 390 | 702 | 780 |
| | 9 | 256-QAM | 5/6 | N/A | N/A | 180 | 200 | 390 | 433.3 | 780 | 866.7 |
| 2 | 0 | BPSK | 1/2 | 13 | 14.4 | 27 | 30 | 58.6 | 65 | 117 | 130 |
| | 1 | QPSK | 1/2 | 26 | 28.8 | 54 | 60 | 117 | 130 | 234 | 260 |
| | 2 | QPSK | 3/4 | 39 | 43.4 | 81 | 90 | 175.6 | 195 | 351 | 390 |
| | 3 | 16-QAM | 1/2 | 52 | 57.8 | 108 | 120 | 234 | 260 | 468 | 520 |
| | 4 | 16-QAM | 3/4 | 78 | 86.6 | 162 | 180 | 351 | 390 | 702 | 780 |
| | 5 | 64-QAM | 2/3 | 104 | 115.6 | 216 | 240 | 468 | 520 | 936 | 1040 |
| | 6 | 64-QAM | 3/4 | 117 | 130 | 243 | 270 | 526.6 | 585 | 1053 | 1170 |
| | 7 | 64-QAM | 5/6 | 130 | 144.4 | 270 | 300 | 585 | 650 | 1170 | 1300 |
| | 8 | 256-QAM | 3/4 | 156 | 173.4 | 324 | 360 | 702 | 780 | 1404 | 1560 |
| | 9 | 256-QAM | 5/6 | N/A | N/A | 360 | 400 | 780 | 866.6 | 1560 | 1733.4 |

IEEE 802.11a & IEEE 802.11n (20MHz) & IEEE 802.11ac (20MHz)

| Working Frequency of Each Channel | | | | | | | |
|-----------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 36 | 5180MHz | 40 | 5200MHz | 44 | 5220MHz | 48 | 5240MHz |

IEEE 802.11n (40MHz) & IEEE 802.11ac (40MHz)

| Working Frequency of Each Channel | | | |
|-----------------------------------|-----------|---------|-----------|
| Channel | Frequency | Channel | Frequency |
| 38 | 5190MHz | 46 | 5230MHz |

IEEE 802.11ac (80MHz)

| Working Frequency of Each Channel | |
|-----------------------------------|-----------|
| Channel | Frequency |
| 42 | 5210 MHz |

Note:

1. This device is a Dual-band Wireless-AC1200 Gigabit Router including 2.4GHz b/g/n and 5GHz a/n (2x2) transmitting and receiving function.
2. The variation of model number is for different strategy of marketing.
3. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C Paragraph 15.407.
4. Regards to the frequency band operation; the lowest, middle and highest frequency of channel were selected to perform the test, and then shown on this report.
5. The function of the 2.4GHz & 5.8GHz transmitting is measured and makes a test report of the report number: 139121R-RFUSP42V01.
6. This device is a composite device in accordance with Part 15 regulations. The receiving function receiving was tested and its test report number is 139121R-RFUSP37V02 under Declaration of Conformity.
7. The "Red Board" difference between "Blue Board" is feedback circuit of the USB port.

1.3. Test Mode

Quietek has verified the construction and function in typical operation. The preliminary tests were performed in different data rate, and to find the worst condition, which was shown in this test report. The following table is the final test mode.

| | |
|----|---|
| TX | Mode 1: Transmit_EXA1206UH_LAN1 Mode 2: Transmit_EXA1206UH_LAN2 Mode 3: Transmit_EXA1206UH_LAN3 Mode 4: Transmit_AD890326_LAN1 Mode 5: Transmit_AD890326_LAN2 Mode 6: Transmit_AD890326_LAN3 |
|----|---|

| Test Items | Modulation | Channel | Antenna | Result |
|-----------------------------|----------------|----------|---------|----------|
| Conducted Emission | 11ac (80MHz) | 42 | 0+1 | Complies |
| 99 % & 26dB Bandwidth | a | 36/44/48 | 0 | Complies |
| | 11n/ac (20MHz) | 36/44/48 | 0/1 | Complies |
| | 11n/ac (40MHz) | 38/46 | 0/1 | Complies |
| | 11ac (80MHz) | 42 | 0/1 | Complies |
| Peak Transmit Output | a | 36/44/48 | 0 | Complies |
| | 11n/ac (20MHz) | 36/44/48 | 0+1 | Complies |
| | 11n/ac (40MHz) | 38/46 | 0+1 | Complies |
| | 11ac (80MHz) | 42 | 0+1 | Complies |
| Peak Power Spectrum Density | a | 36/44/48 | 0 | Complies |
| | 11n/ac (20MHz) | 36/44/48 | 0+1 | Complies |
| | 11n/ac (40MHz) | 38/46 | 0+1 | Complies |
| | 11ac (80MHz) | 42 | 0+1 | Complies |
| Power Excursion | a | 36/44/48 | 0 | Complies |
| | 11n/ac (20MHz) | 36/44/48 | 0/1 | Complies |
| | 11n/ac (40MHz) | 38/46 | 0/1 | Complies |
| | 11ac (80MHz) | 42 | 0/1 | Complies |

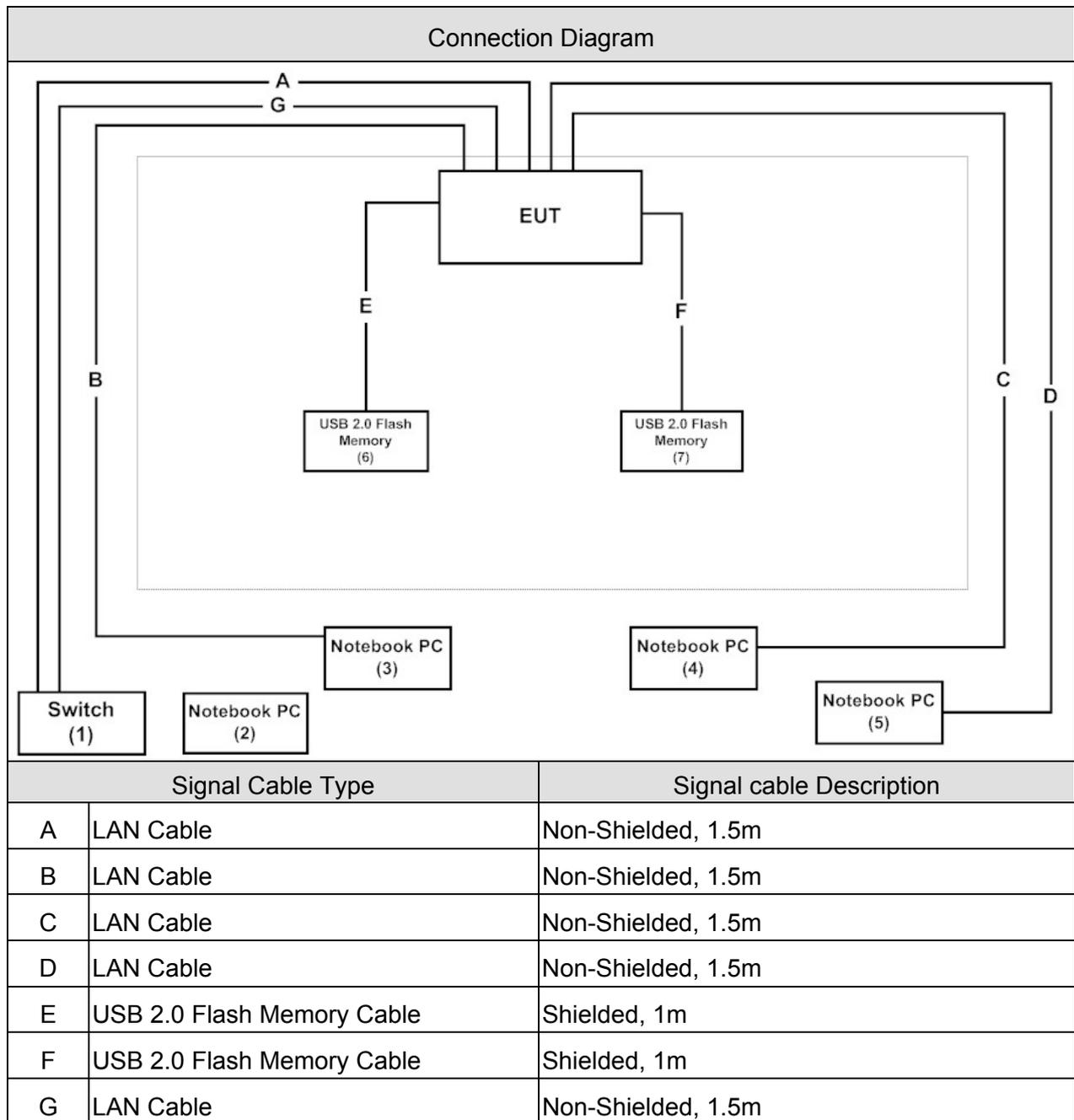
| Test Items | Modulation | Channel | Antenna | Result |
|---------------------|----------------|----------|---------|----------|
| Radiated Emission | a | 36/44/48 | 0 | Complies |
| | 11n/ac (20MHz) | 36/44/48 | 0+1 | Complies |
| | 11n/ac (40MHz) | 38/46 | 0+1 | Complies |
| | 11ac (80MHz) | 42 | 0+1 | Complies |
| Band Edge | a | 36 | 0 | Complies |
| | 11n/ac (20MHz) | 36 | 0+1 | Complies |
| | 11n/ac (40MHz) | 38 | 0+1 | Complies |
| | 11ac (80MHz) | 42 | 0+1 | Complies |
| Frequency Stability | a | 36/44/48 | 0 | Complies |
| | 11n/ac (20MHz) | 36/44/48 | 0/1 | Complies |
| | 11n/ac (40MHz) | 38/46 | 0/1 | Complies |
| | 11ac (80MHz) | 42 | 0/1 | Complies |

1.4. Tested System Details

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

| Product | Manufacturer | Model No. | Serial No. | FCC ID | Power Cord |
|------------------------|--------------|------------|----------------------------|--------|---|
| 1 Switch | D-Link | DGS1216T | F360298000042 | DoC | Non-Shielded, 1.8m |
| 2 Notebook PC | HP | HSTNN-146C | CNU8253S1X | DoC | Non-Shielded, 1.8m |
| 3 Notebook PC | DELL | Vostro3400 | 7F808N1 | DoC | Non-Shielded, 1.8m |
| 4 Notebook PC | ACER | MS2296 | LUSCV02139115 0332C2000 | DoC | Non-Shielded, 2.5m one ferrite core bonded |
| 5 Notebook PC | ACER | PAV70 | LUSEW0D03711 05FE221601 | DoC | Non-Shielded, 2.5m one ferrite core bonded |
| 6 USB 2.0 Flash Memory | Apacer | AH223 | N/A | DoC | -- |
| 7 USB 2.0 Flash Memory | Apacer | AH223 | N/A | DoC | -- |

1.5. Configuration of tested System



1.6. EUT Exercise Software

| | |
|---|---|
| 1 | Setup the EUT as shown in Section 1.5. |
| 2 | Execute the "MFG_UI_AC56" on the EUT. |
| 3 | Configure the test mode, the test channel, and the data rate. |
| 4 | Press "Start TX" to start the continuous transmitting. |
| 5 | Verify that the EUT works properly. |

1.7. Test Facility

Ambient conditions in the laboratory:

| Items | Test Item | Required (IEC 68-1) | Actual |
|----------------------------|---|---------------------|----------|
| Temperature (°C) | FCC PART 15 C 15.407 Conducted Emission | 15 - 35 | 20 |
| Humidity (%RH) | | 25 - 75 | 50 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 99 % & 26dB Bandwidth | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 45 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 Peal Transmit Power | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 45 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 Peak Power Spectrum | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 45 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 Density | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 45 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 Power Excursion | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 45 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 Radiated Emission | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 65 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 Band Edge | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 58 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |
| Temperature (°C) | FCC PART 15 C 15.407 Frequency Stability | 15 - 35 | 25 |
| Humidity (%RH) | | 25 - 75 | 45 |
| Barometric pressure (mbar) | | 860 - 1060 | 950-1000 |

2. Conducted Emission

2.1. Test Equipment

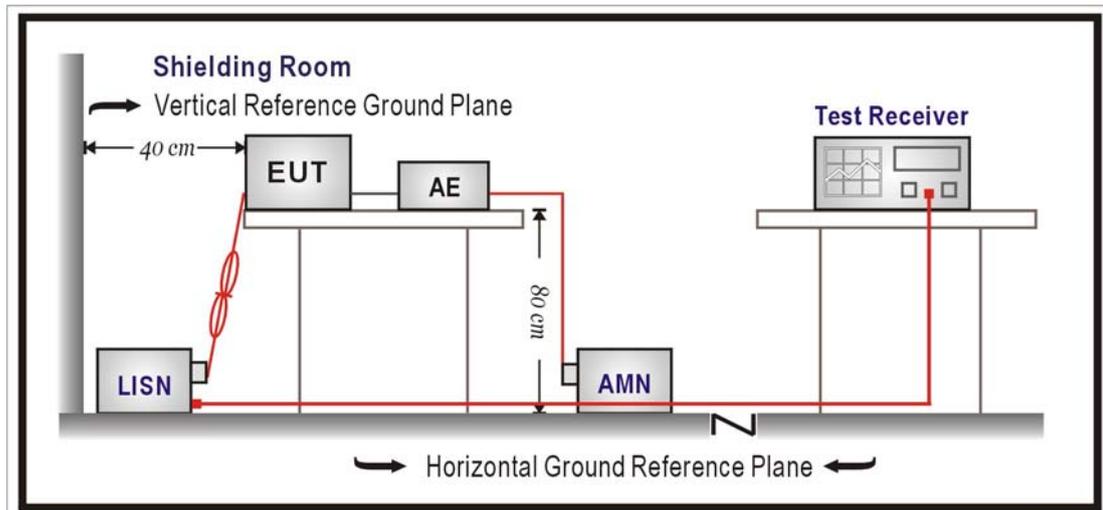
The following test equipments are used during the test:

Conducted Emission / SR2

| Instrument | Manufacturer | Model No. | Serial No | Next Cal. Date |
|--------------------------|--------------|-----------|------------|----------------|
| Artificial Mains Network | R&S | ENV4200 | 848411/010 | 2014/01/24 |
| LISN | R&S | ENV216 | 100092 | 2013/08/21 |
| Test Receiver | R&S | ESCS 30 | 825442/014 | 2013/08/07 |

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV) | | |
|---|-------|-------|
| Frequency MHz | 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 was setup according to ANSI C63.4: 2009. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

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

2.5. Test Specification

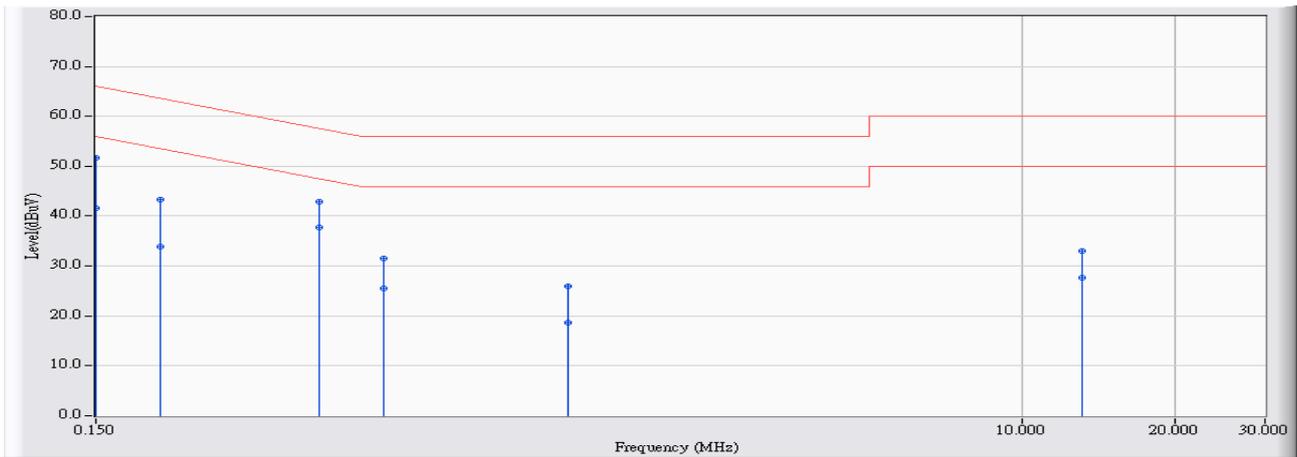
According to FCC Part 15 Subpart C Paragraph 15.207:2012

2.6. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB.

2.7. Test Result

| | |
|--|---|
| Site : SR2 | Time : 2013/02/26 - 19:16 |
| Limit : CISPR_B_00M_QP | Margin : 10 |
| Probe : SR2_LISN(16A)-3_0822 - Line1 | Power : AC 120V/60Hz |
| EUT : Dual-band Wireless-AC1200 Gigabit Router | Note : Mode 1: Transmit_EXA1206UH_LAN1 802.11ac80M 5210MHz |

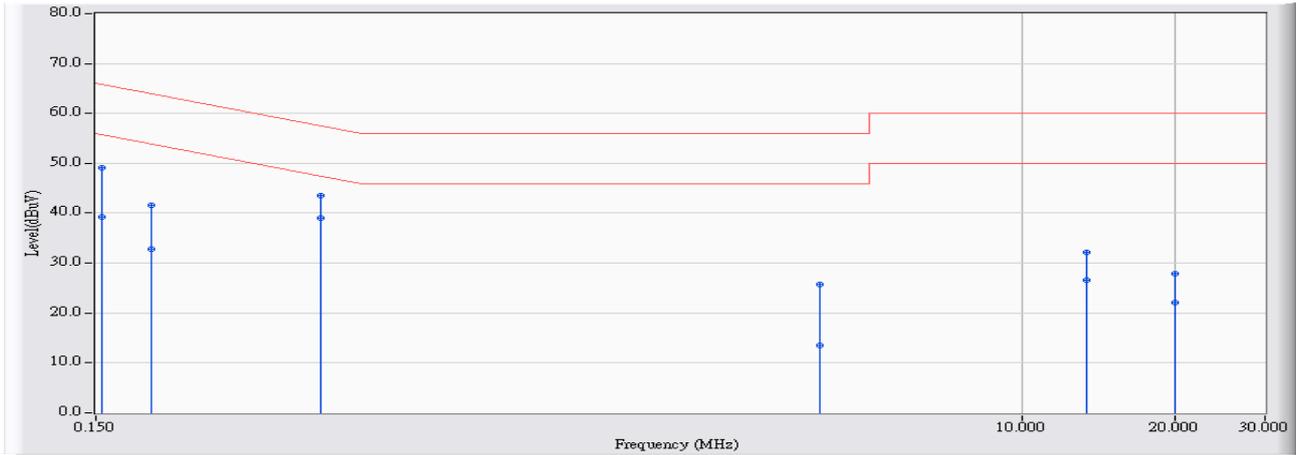


| | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Measure Level (dBuV) | Margin (dB) | Limit (dBuV) | Detector Type |
|----|-----------------|---------------------|----------------------|----------------------|-------------|--------------|---------------|
| 1 | 0.150 | 9.663 | 41.920 | 51.583 | -14.417 | 66.000 | QUASPEAK |
| 2 | 0.150 | 9.663 | 31.970 | 41.633 | -14.367 | 56.000 | AVERAGE |
| 3 | 0.201 | 9.664 | 33.680 | 43.344 | -20.238 | 63.581 | QUASPEAK |
| 4 | 0.201 | 9.664 | 33.580 | 43.244 | -20.335 | 63.578 | QUASPEAK |
| 5 | 0.201 | 9.664 | 24.200 | 33.864 | -19.715 | 53.578 | AVERAGE |
| 6 | 0.412 | 9.675 | 33.290 | 42.965 | -14.648 | 57.614 | QUASPEAK |
| 7 | * | 9.675 | 28.040 | 37.715 | -9.898 | 47.614 | AVERAGE |
| 8 | 0.552 | 9.689 | 21.900 | 31.589 | -24.411 | 56.000 | QUASPEAK |
| 9 | 0.552 | 9.689 | 15.860 | 25.549 | -20.451 | 46.000 | AVERAGE |
| 10 | 1.271 | 9.766 | 16.190 | 25.956 | -30.044 | 56.000 | QUASPEAK |
| 11 | 1.271 | 9.766 | 8.950 | 18.716 | -27.284 | 46.000 | AVERAGE |
| 12 | 13.142 | 10.042 | 23.060 | 33.102 | -26.898 | 60.000 | QUASPEAK |
| 13 | 13.142 | 10.042 | 17.630 | 27.672 | -22.328 | 50.000 | AVERAGE |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

| | |
|--|---|
| Site : SR2 | Time : 2013/02/26 - 19:21 |
| Limit : CISPR_B_00M_QP | Margin : 10 |
| Probe : SR2_LISN(16A)-3_0822 - Line2 | Power : AC 120V/60Hz |
| EUT : Dual-band Wireless-AC1200 Gigabit Router | Note : Mode 1: Transmit_EXA1206UH_LAN1 802.11ac80M 5210MHz |

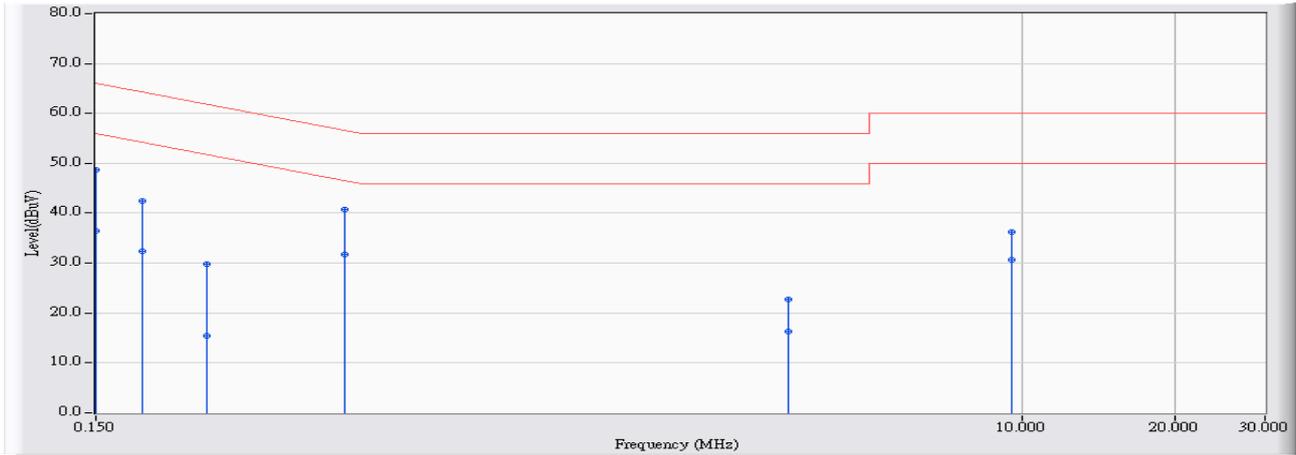


| | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Measure Level (dBuV) | Margin (dB) | Limit (dBuV) | Detector Type |
|----|-----------------|---------------------|----------------------|----------------------|-------------|--------------|---------------|
| 1 | 0.154 | 9.649 | 39.370 | 49.019 | -16.768 | 65.786 | QUASPEAK |
| 2 | 0.154 | 9.649 | 29.540 | 39.189 | -16.598 | 55.786 | AVERAGE |
| 3 | 0.193 | 9.652 | 32.010 | 41.662 | -22.246 | 63.908 | QUASPEAK |
| 4 | 0.193 | 9.652 | 23.130 | 32.782 | -21.126 | 53.908 | AVERAGE |
| 5 | 0.416 | 9.655 | 33.820 | 43.475 | -14.042 | 57.518 | QUASPEAK |
| 6 | * | 9.655 | 29.320 | 38.975 | -8.542 | 47.518 | AVERAGE |
| 7 | 3.986 | 9.836 | 15.930 | 25.766 | -30.234 | 56.000 | QUASPEAK |
| 8 | 3.986 | 9.836 | 3.700 | 13.536 | -32.464 | 46.000 | AVERAGE |
| 9 | 13.404 | 10.094 | 22.080 | 32.173 | -27.827 | 60.000 | QUASPEAK |
| 10 | 13.404 | 10.094 | 16.530 | 26.623 | -23.377 | 50.000 | AVERAGE |
| 11 | 19.990 | 10.270 | 17.590 | 27.860 | -32.140 | 60.000 | QUASPEAK |
| 12 | 19.990 | 10.270 | 11.910 | 22.180 | -27.820 | 50.000 | AVERAGE |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

| | |
|--|--|
| Site : SR2 | Time : 2013/02/26 - 20:23 |
| Limit : CISPR_B_00M_QP | Margin : 10 |
| Probe : SR2_LISN(16A)-3_0822 - Line1 | Power : AC 120V/60Hz |
| EUT : Dual-band Wireless-AC1200 Gigabit Router | Note : Mode 4: Transmit_AD890326_LAN1 802.11ac80M 5210MHz |

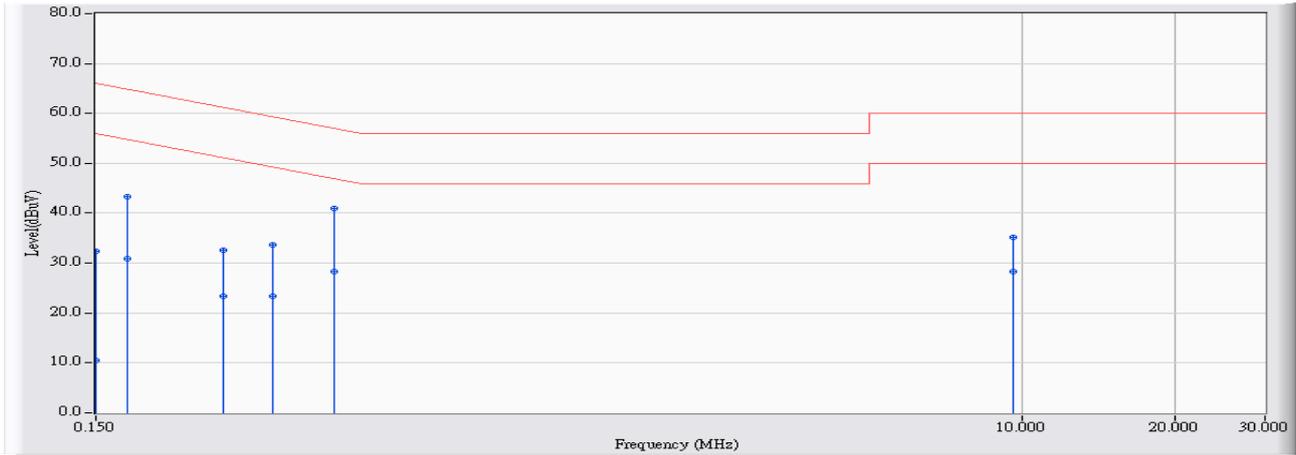


| | Frequency (MHz) | Correct Factor (dB) | ReAD8900326in g Level (dBuV) | Measure Level (dBuV) | Margin (dB) | Limit (dBuV) | Detector Type |
|----|-----------------|---------------------|------------------------------|----------------------|-------------|--------------|---------------|
| 1 | 0.150 | 9.663 | 39.130 | 48.793 | -17.207 | 66.000 | QUASPEAK |
| 2 | 0.150 | 9.663 | 26.740 | 36.403 | -19.597 | 56.000 | AVERAGE |
| 3 | 0.185 | 9.664 | 32.870 | 42.534 | -21.718 | 64.251 | QUASPEAK |
| 4 | 0.185 | 9.664 | 22.630 | 32.294 | -21.958 | 54.251 | AVERAGE |
| 5 | 0.248 | 9.666 | 20.170 | 29.836 | -32.000 | 61.835 | QUASPEAK |
| 6 | 0.248 | 9.666 | 5.850 | 15.516 | -36.320 | 51.835 | AVERAGE |
| 7 | 0.463 | 9.679 | 31.010 | 40.689 | -15.959 | 56.648 | QUASPEAK |
| 8 | * 0.463 | 9.679 | 22.020 | 31.699 | -14.949 | 46.648 | AVERAGE |
| 9 | 3.462 | 9.836 | 12.910 | 22.747 | -33.253 | 56.000 | QUASPEAK |
| 10 | 3.462 | 9.836 | 6.540 | 16.377 | -29.623 | 46.000 | AVERAGE |
| 11 | 9.525 | 9.906 | 26.380 | 36.286 | -23.714 | 60.000 | QUASPEAK |
| 12 | 9.525 | 9.906 | 20.700 | 30.606 | -19.394 | 50.000 | AVERAGE |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

| | |
|--|--|
| Site : SR2 | Time : 2013/02/26 - 20:30 |
| Limit : CISPR_B_00M_QP | Margin : 10 |
| Probe : SR2_LISN(16A)-3_0822 - Line2 | Power : AC 120V/60Hz |
| EUT : Dual-band Wireless-AC1200 Gigabit Router | Note : Mode 4: Transmit_AD890326_LAN1 802.11ac80M 5210MHz |



| | Frequency (MHz) | Correct Factor (dB) | ReAD8900326in g Level (dBuV) | Measure Level (dBuV) | Margin (dB) | Limit (dBuV) | Detector Type |
|----|-----------------|---------------------|------------------------------|----------------------|-------------|--------------|---------------|
| 1 | 0.150 | 9.648 | 22.730 | 32.378 | -33.622 | 66.000 | QUASPEAK |
| 2 | 0.150 | 9.648 | 0.920 | 10.568 | -45.432 | 56.000 | AVERAGE |
| 3 | 0.173 | 9.651 | 33.640 | 43.291 | -21.503 | 64.794 | QUASPEAK |
| 4 | 0.173 | 9.651 | 21.170 | 30.821 | -23.973 | 54.794 | AVERAGE |
| 5 | 0.267 | 9.654 | 22.980 | 32.633 | -28.571 | 61.205 | QUASPEAK |
| 6 | 0.267 | 9.654 | 13.620 | 23.273 | -27.931 | 51.205 | AVERAGE |
| 7 | 0.334 | 9.653 | 24.000 | 33.654 | -25.707 | 59.361 | QUASPEAK |
| 8 | 0.334 | 9.653 | 13.720 | 23.374 | -25.987 | 49.361 | AVERAGE |
| 9 | * 0.443 | 9.658 | 31.280 | 40.937 | -16.069 | 57.006 | QUASPEAK |
| 10 | 0.443 | 9.658 | 18.670 | 28.327 | -18.679 | 47.006 | AVERAGE |
| 11 | 9.580 | 9.924 | 25.200 | 35.124 | -24.876 | 60.000 | QUASPEAK |
| 12 | 9.580 | 9.924 | 18.290 | 28.214 | -21.786 | 50.000 | AVERAGE |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

3. 99% & 26dB Bandwidth

3.1. Test Equipment

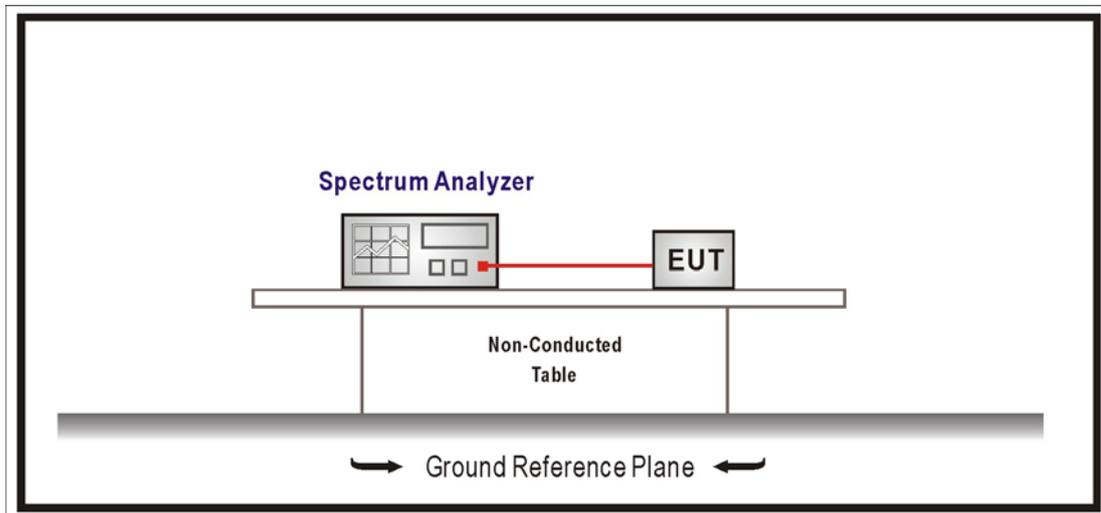
The following test equipments are used during the radiated emission tests:

99% & 26dB Bandwidth / SR7

| Instrument | Manufacturer | Model No. | Serial No | Next Cal. Date |
|-------------------|--------------|------------|------------|----------------|
| Spectrum Analyzer | Agilent | N9010A-EXA | US47140172 | 2013/08/06 |

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup



3.3. Limits

No Required

3.4. Test Procedure

The EUT was tested according to U-NII test procedure of March 2012 KDB 789033. Set RBW 1% of the emission bandwidth, VBW equal to 3 times the RBW.

3.5. Uncertainty

The measurement uncertainty is defined as $\pm 150\text{Hz}$

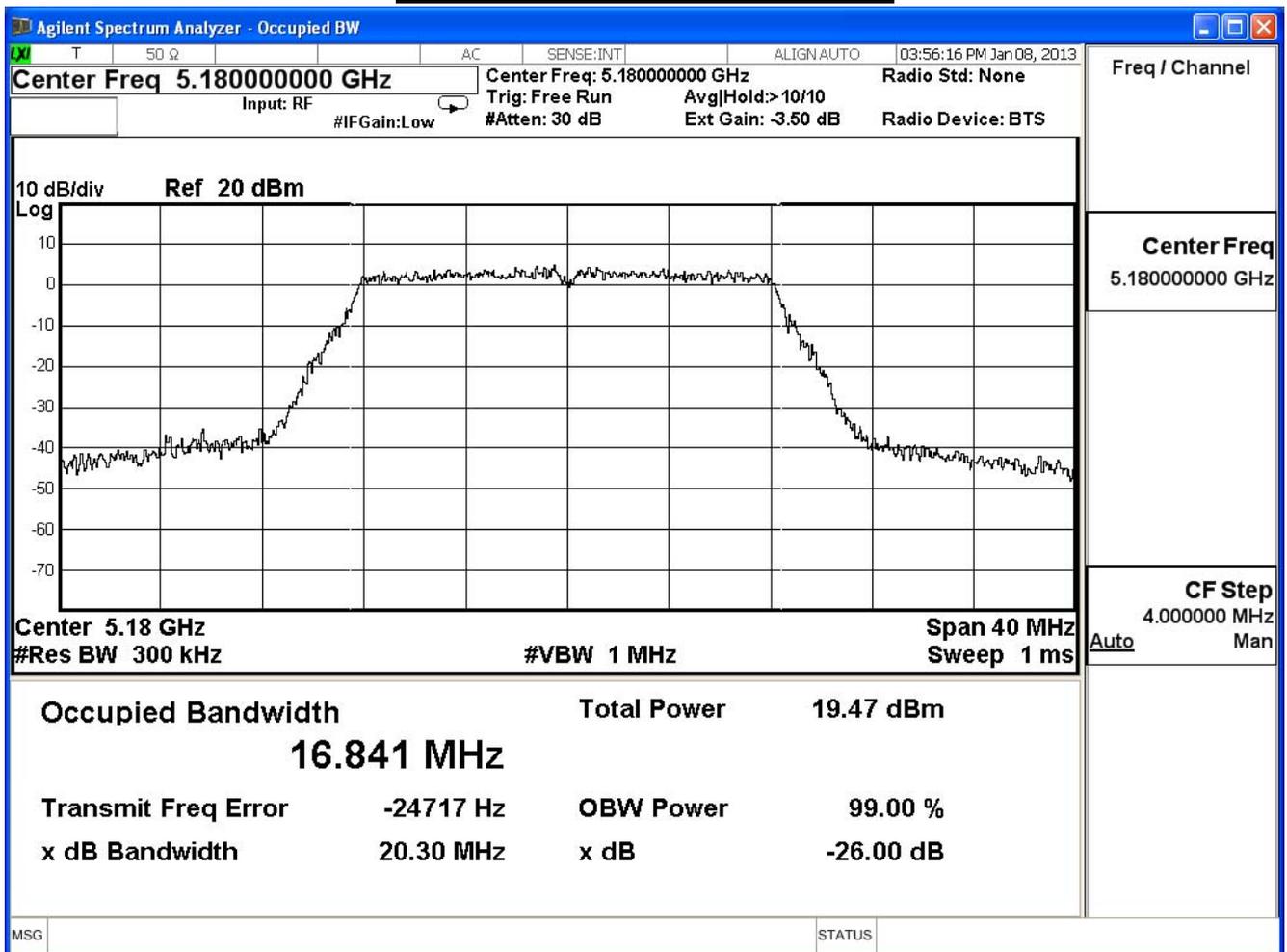
3.6. Test Result

| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | 99% & 26dB Bandwidth | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

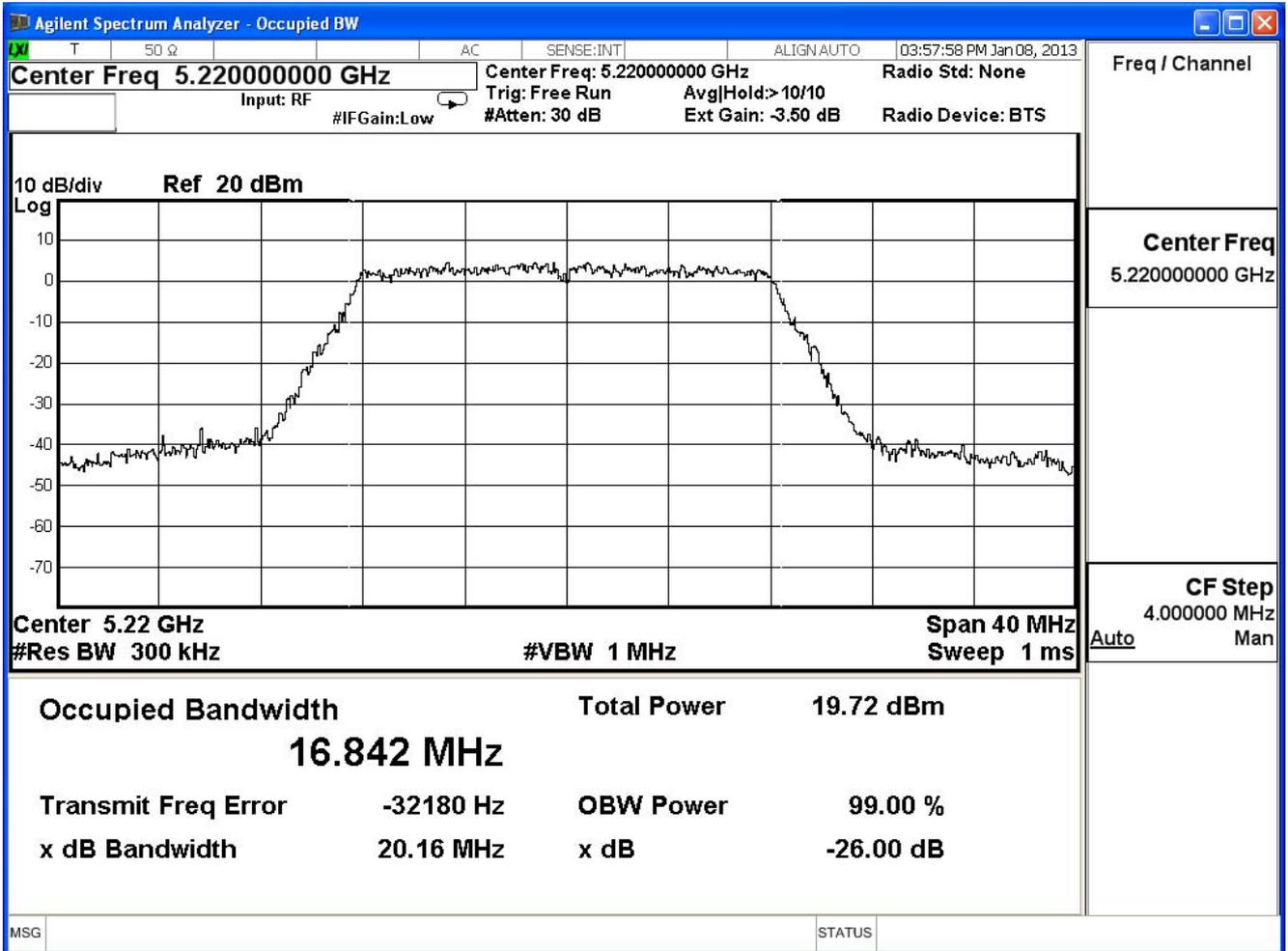
802.11a

| Channel No. | Frequency (MHz) | 26dB BW (MHz) | 99 % OBW (MHz) | Required Limit (MHz) | Result |
|-------------|-----------------|---------------|----------------|----------------------|--------|
| 36 | 5180 | 20.30 | 16.841 | -- | PASS |
| 44 | 5220 | 20.16 | 16.842 | -- | PASS |
| 48 | 5240 | 20.34 | 16.842 | -- | PASS |

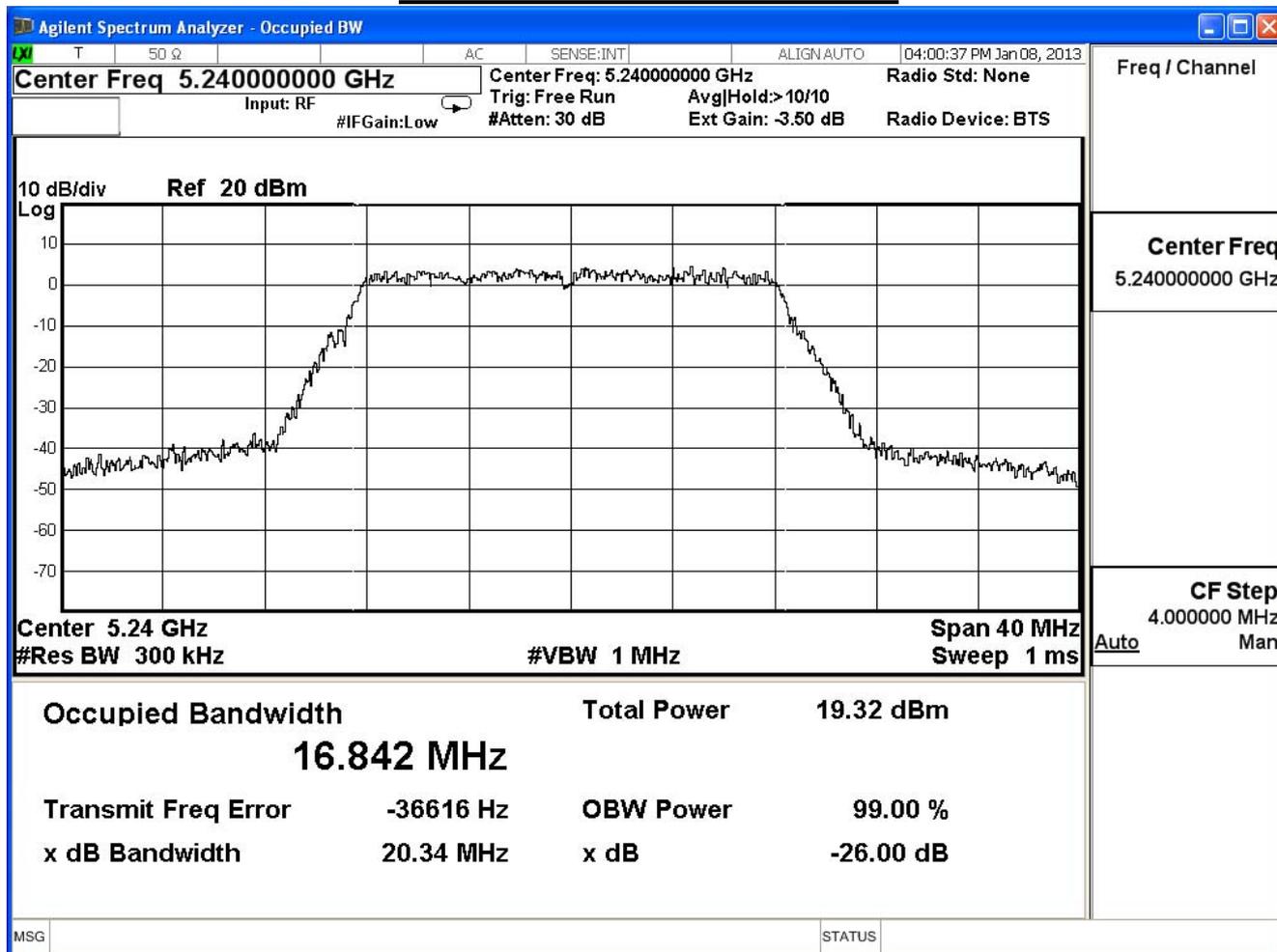
99% & 26dB Bandwidth – Channel 36



99% & 26dB Bandwidth – Channel 44



99% & 26dB Bandwidth – Channel 48

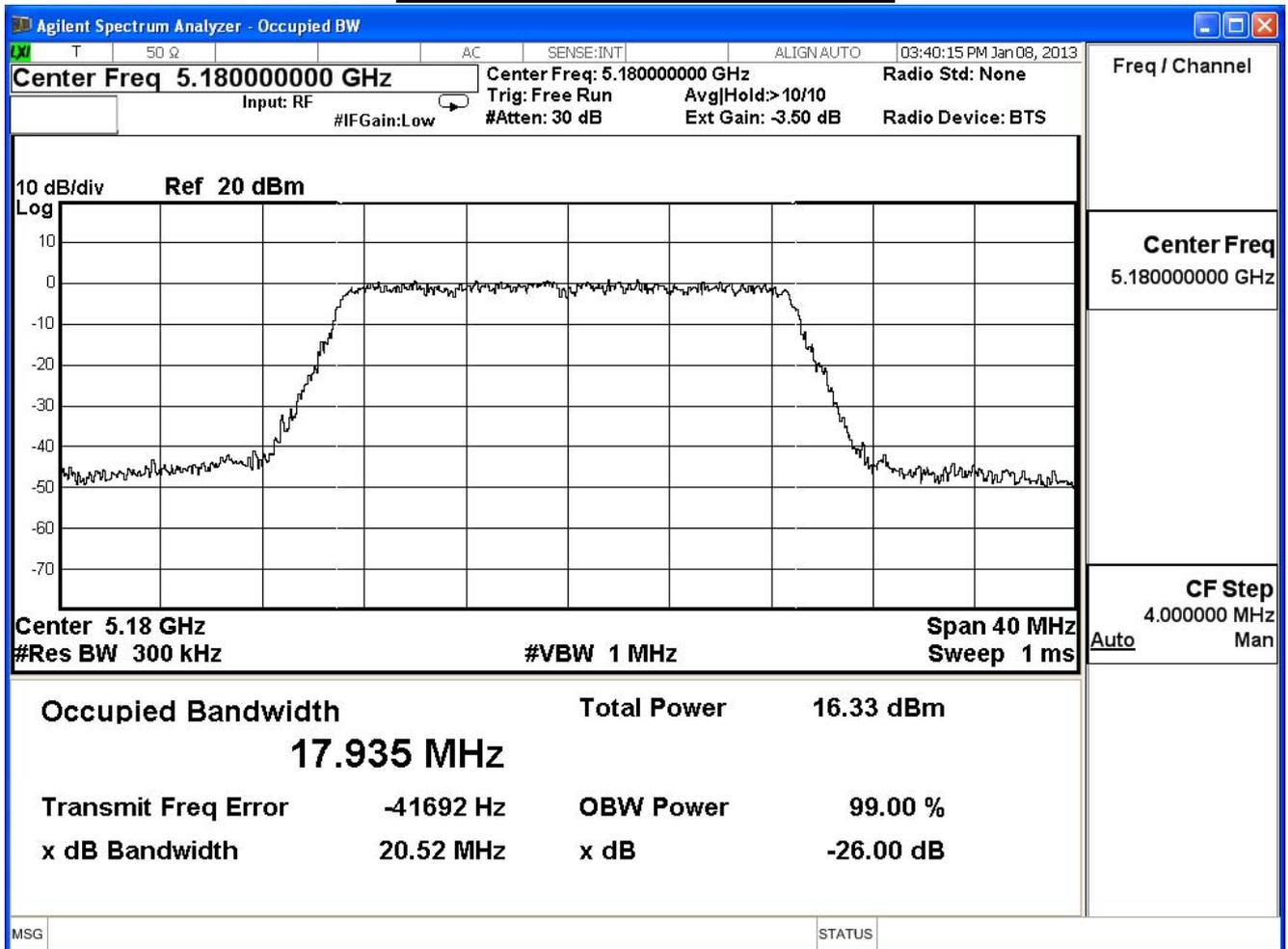


| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | 99% & 26dB Bandwidth | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

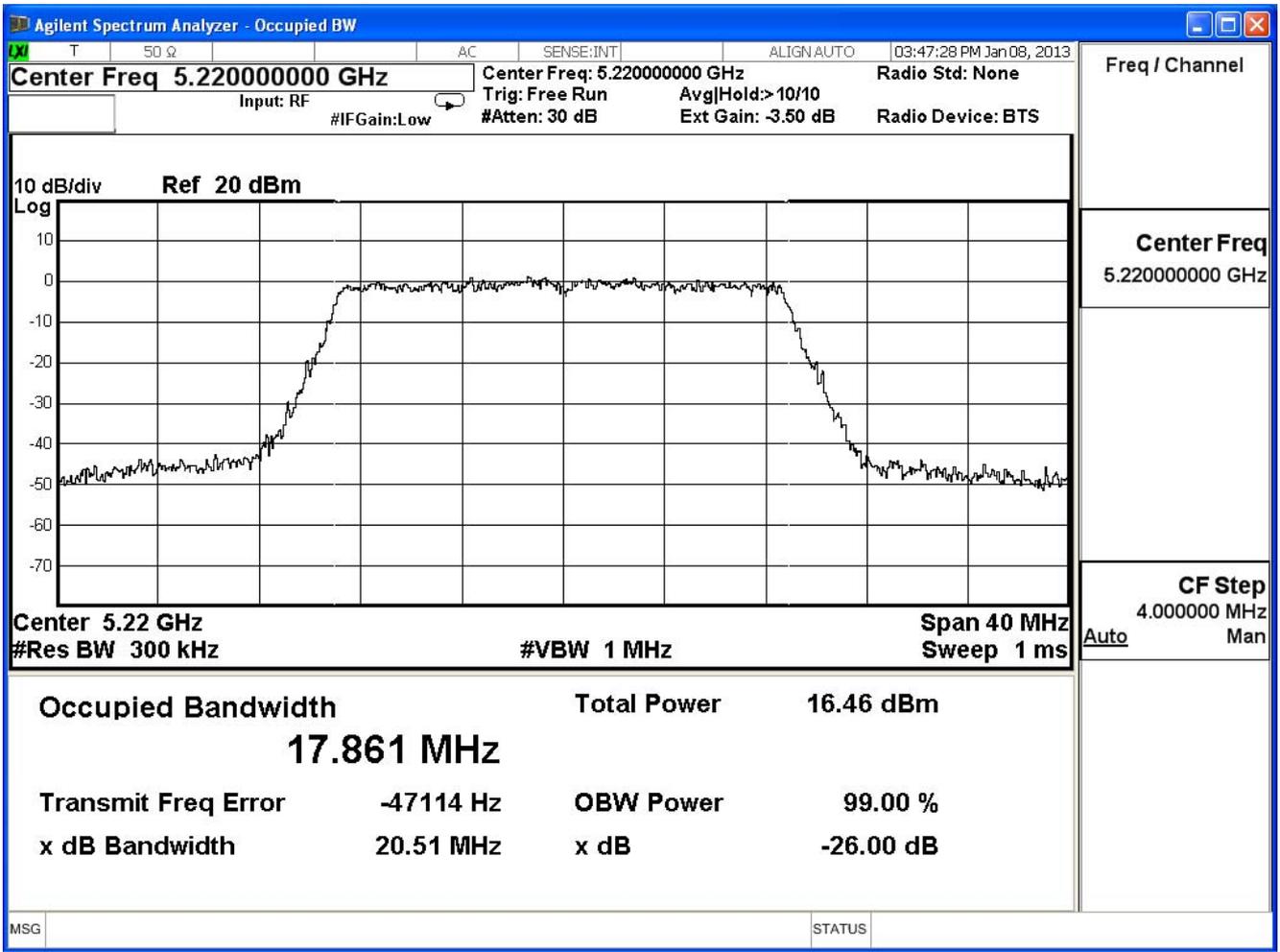
802.11n_20M(ANT 0)

| Channel No. | Frequency (MHz) | 26dB BW (MHz) | 99 % OBW (MHz) | Required Limit (MHz) | Result |
|-------------|-----------------|---------------|----------------|----------------------|--------|
| 36 | 5180 | 20.52 | 17.935 | -- | PASS |
| 44 | 5220 | 20.51 | 17.861 | -- | PASS |
| 48 | 5240 | 20.53 | 17.846 | -- | PASS |

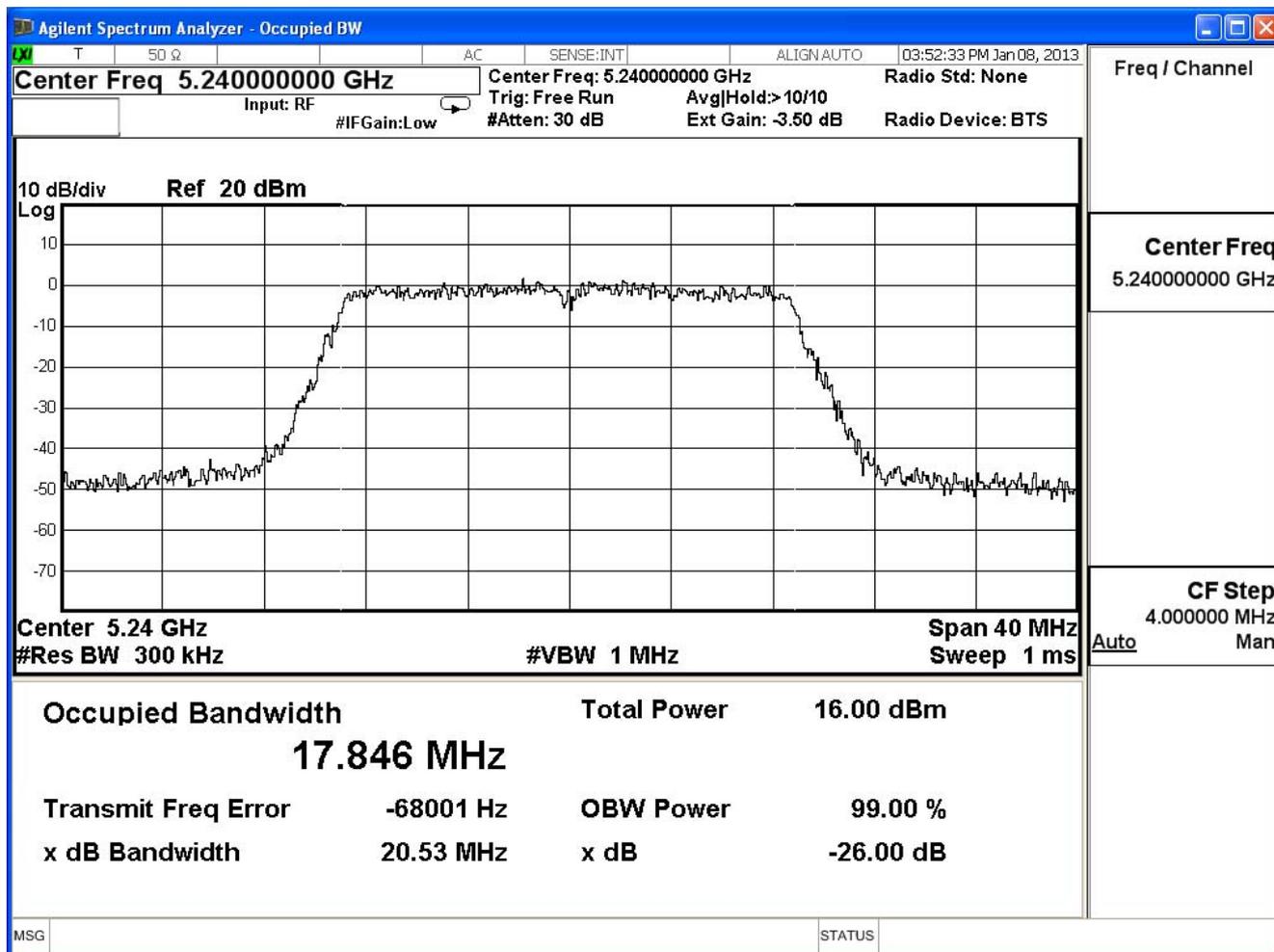
99% & 26dB Bandwidth – Channel 36



99% & 26dB Bandwidth – Channel 44



99% & 26dB Bandwidth – Channel 48

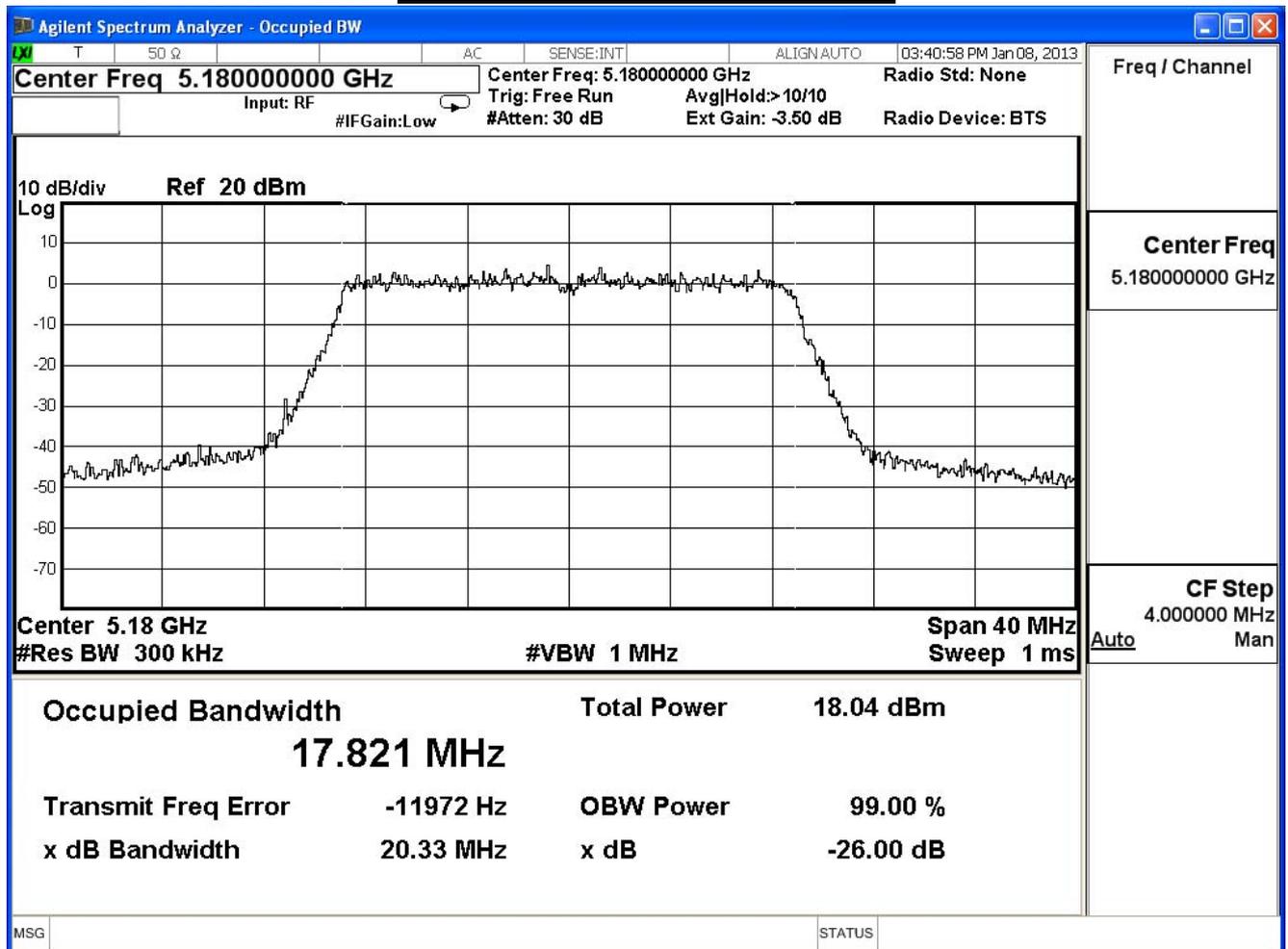


| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | 99% & 26dB Bandwidth | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

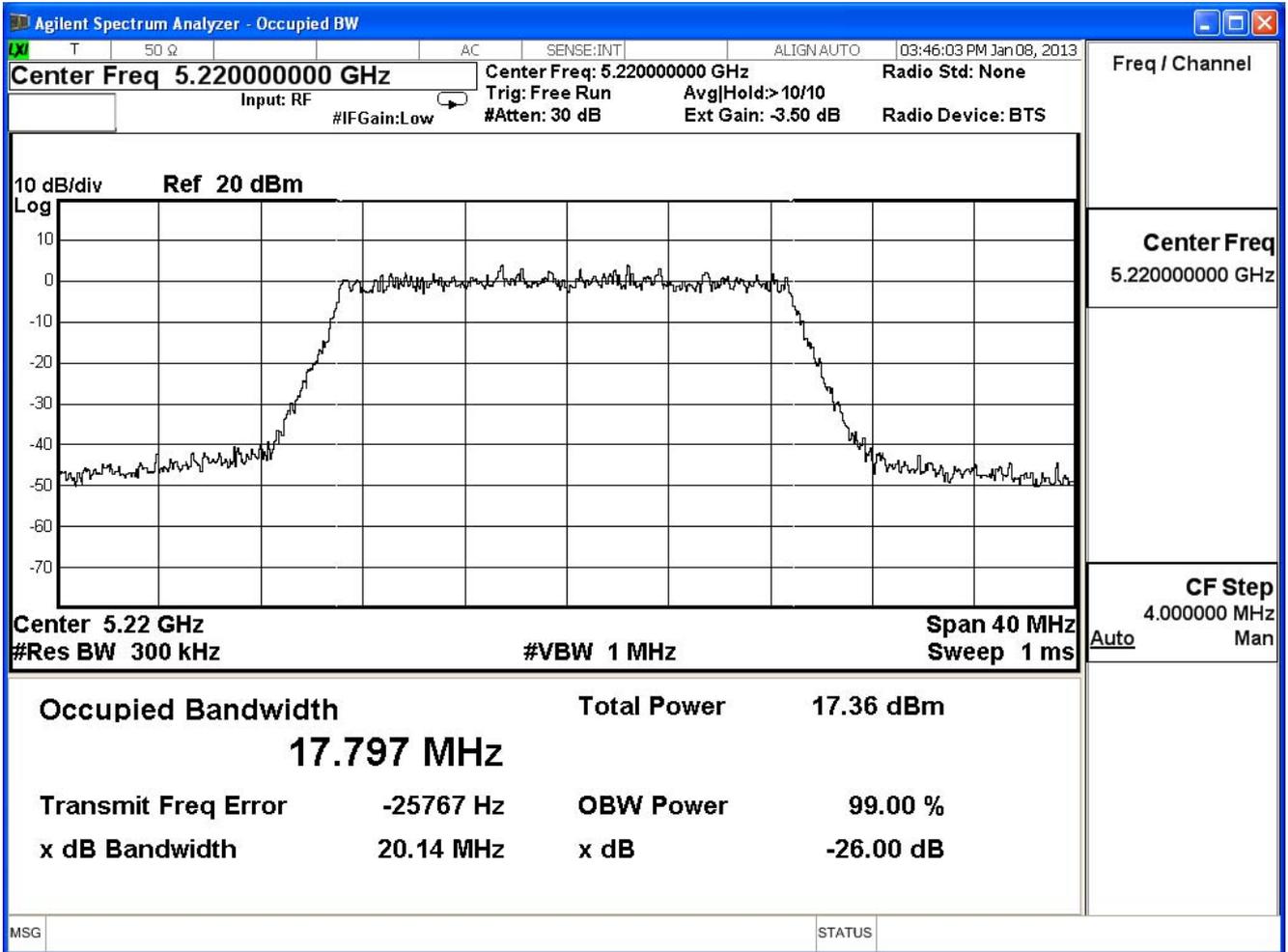
802.11n_20M(ANT 1)

| Channel No. | Frequency (MHz) | 26dB BW (MHz) | 99 % OBW (MHz) | Required Limit (MHz) | Result |
|-------------|-----------------|---------------|----------------|----------------------|--------|
| 36 | 5180 | 20.33 | 17.821 | -- | PASS |
| 44 | 5220 | 20.14 | 17.797 | -- | PASS |
| 48 | 5240 | 20.02 | 17.793 | -- | PASS |

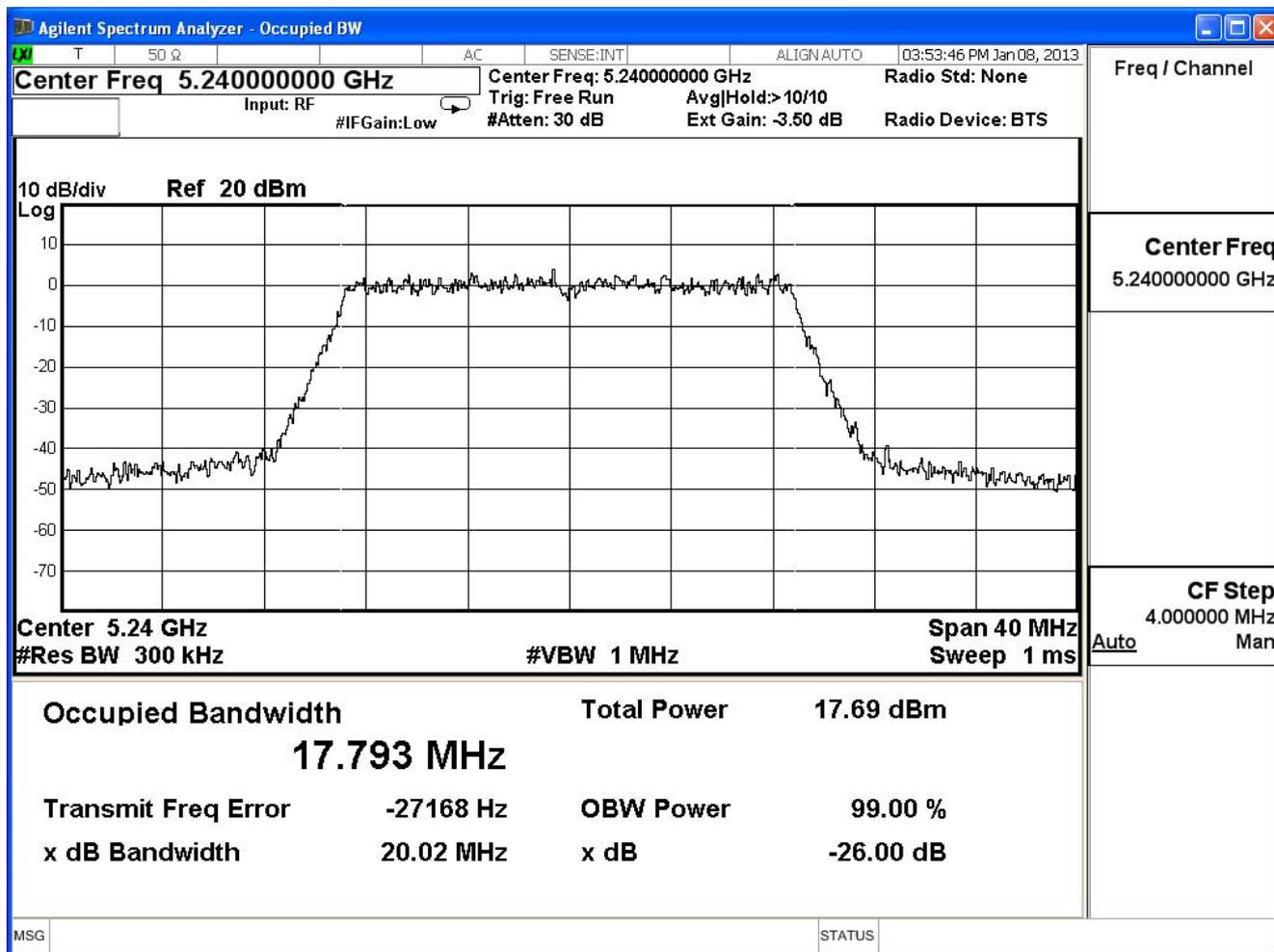
99% & 26dB Bandwidth – Channel 36



99% & 26dB Bandwidth – Channel 44



99% & 26dB Bandwidth – Channel 48

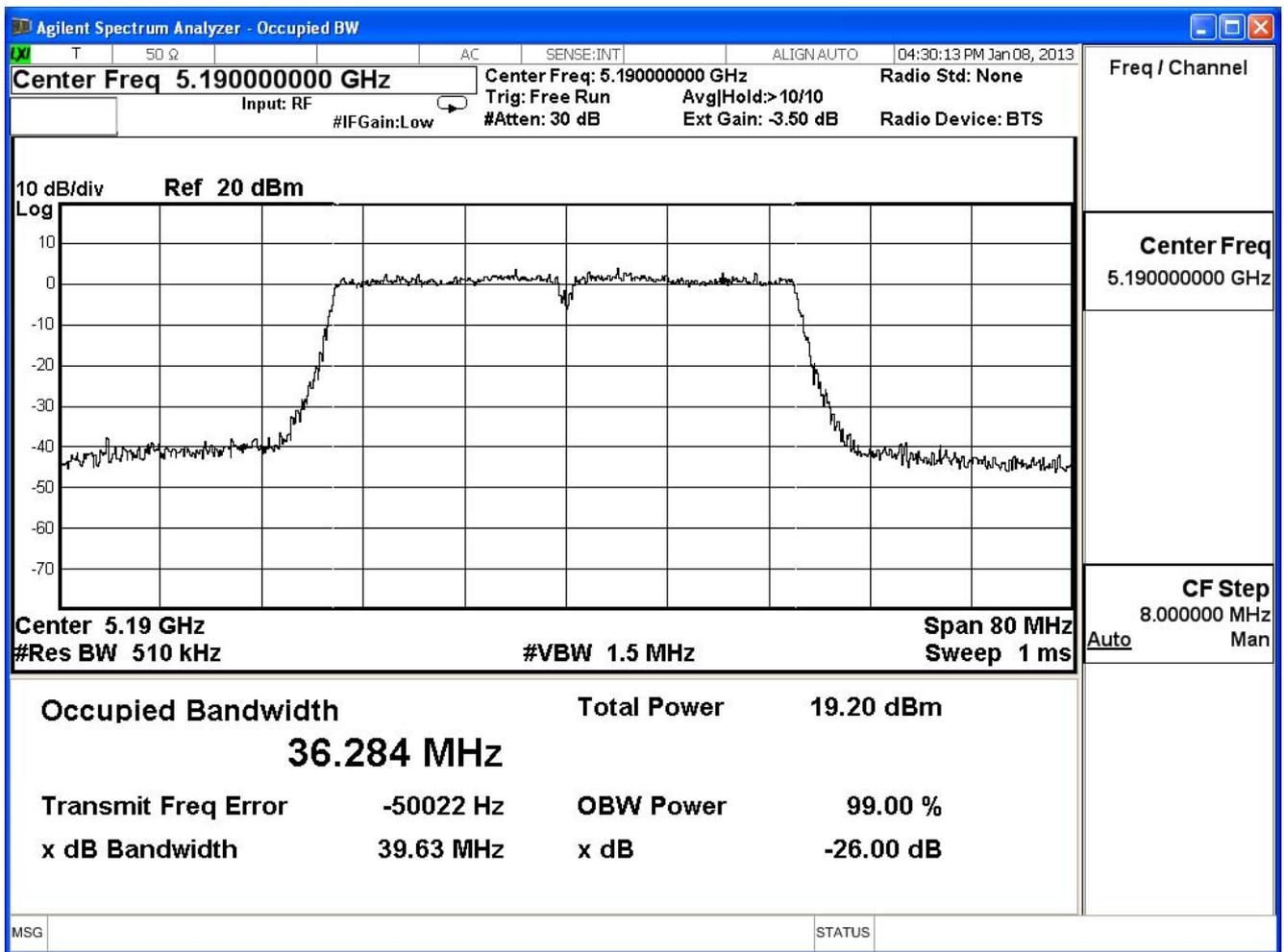


| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | 99% & 26dB Bandwidth | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

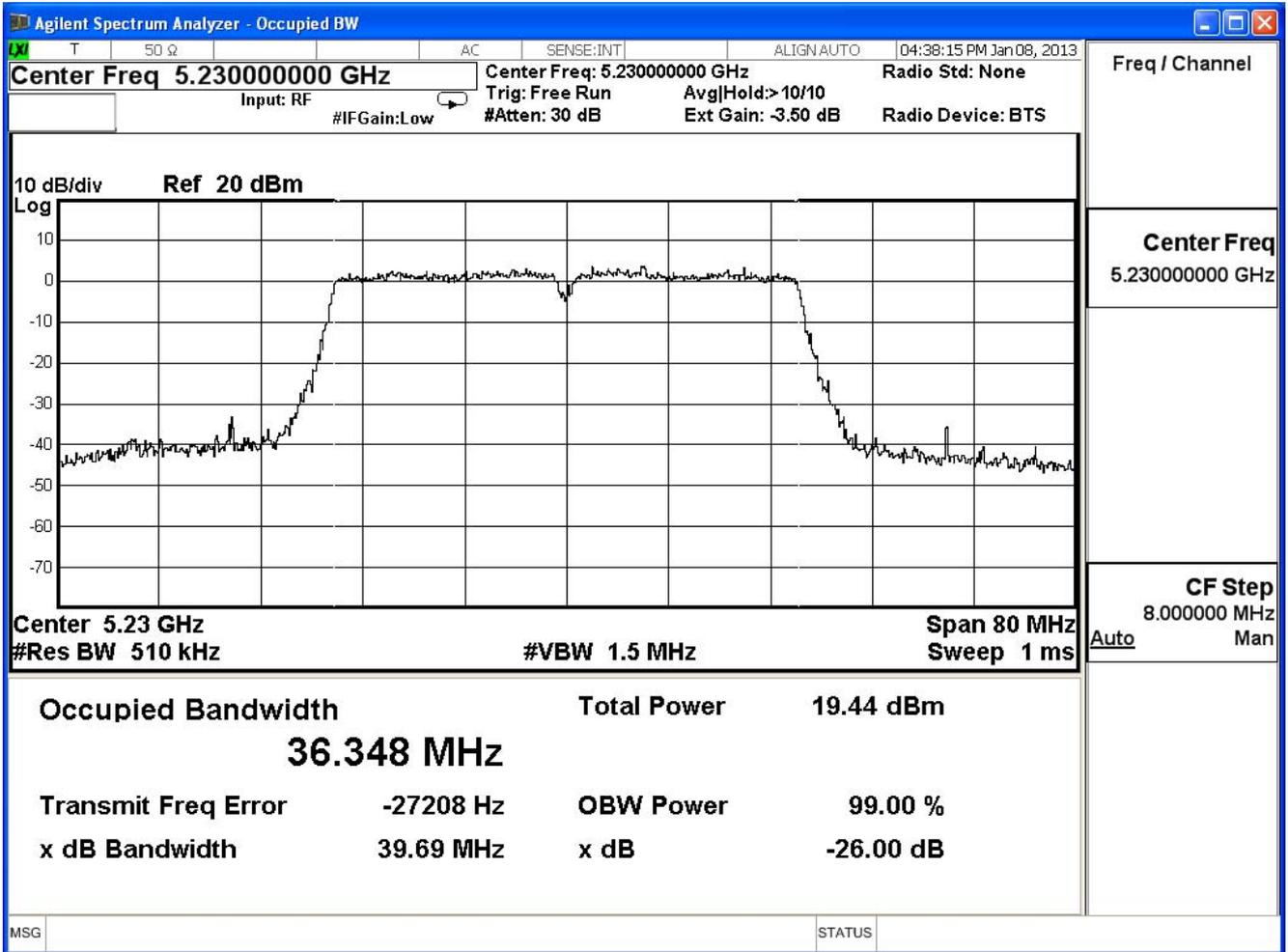
802.11n_40M(ANT 0)

| Channel No. | Frequency (MHz) | 26dB BW (MHz) | 99 % OBW (MHz) | Required Limit (MHz) | Result |
|-------------|-----------------|---------------|----------------|----------------------|--------|
| 38 | 5190 | 39.63 | 36.284 | -- | PASS |
| 46 | 5230 | 39.69 | 36.348 | -- | PASS |

99% & 26dB Bandwidth – Channel 38



99% & 26dB Bandwidth – Channel 46

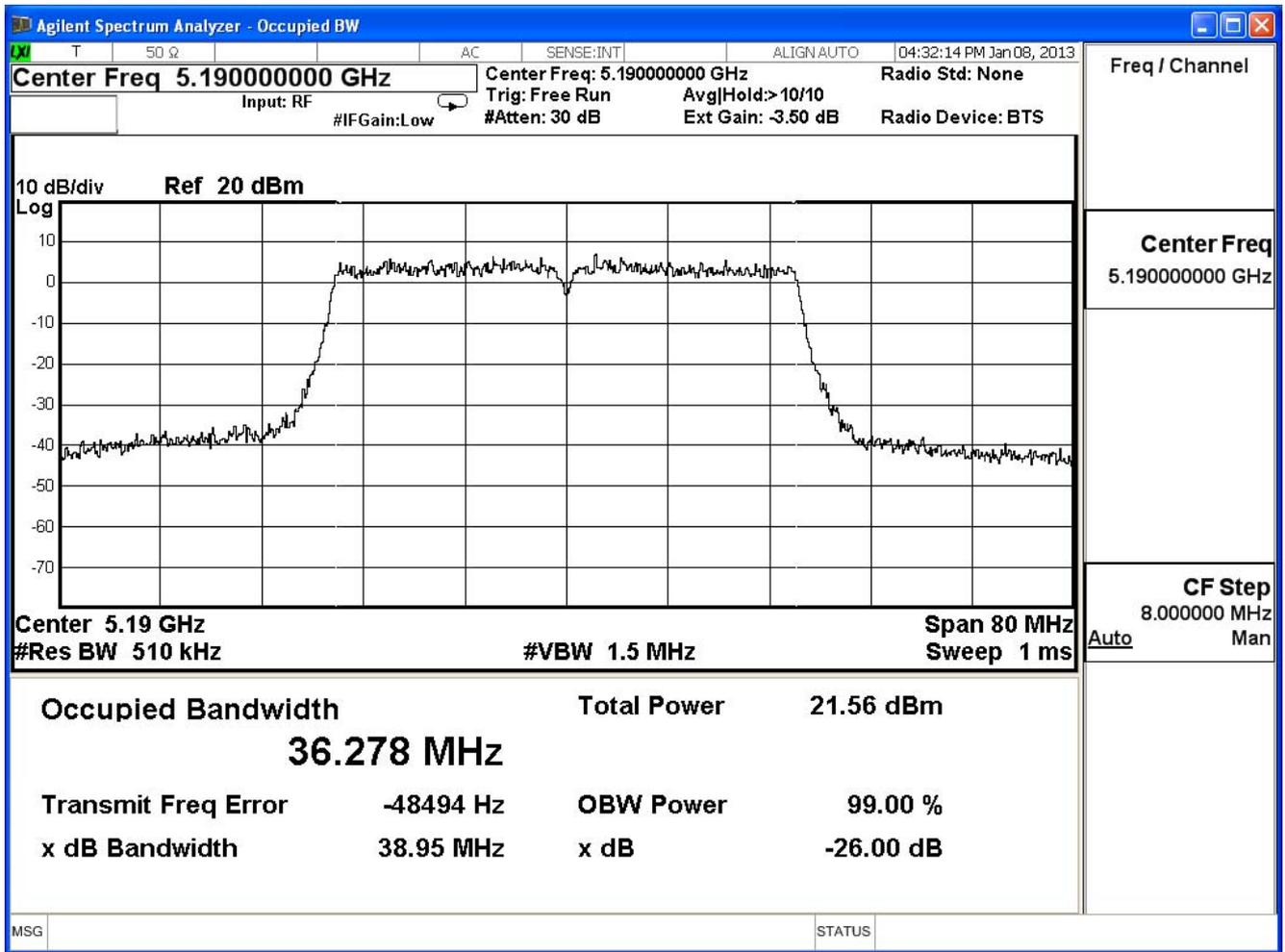


| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | 99% & 26dB Bandwidth | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

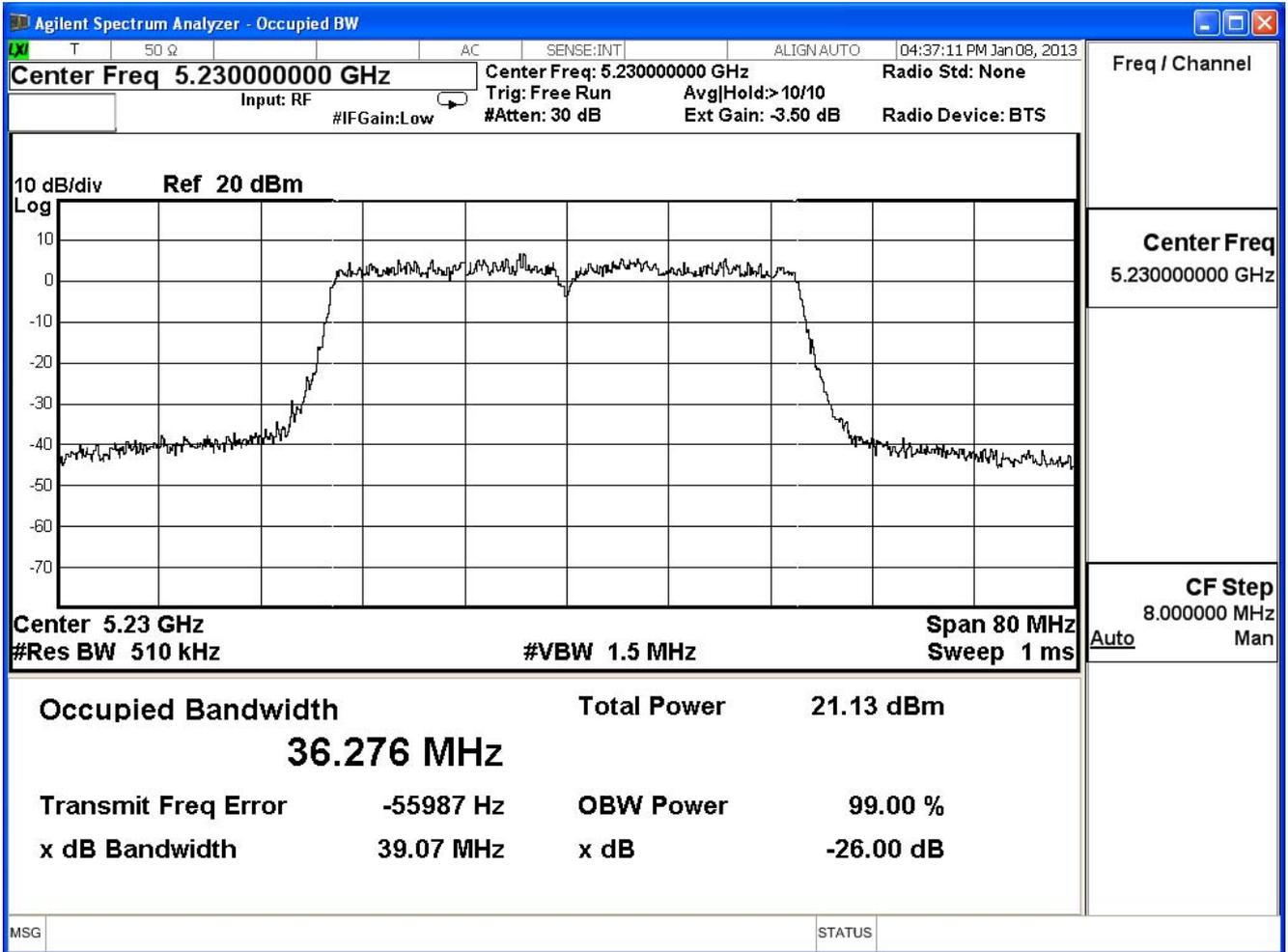
802.11n_40M(ANT 1)

| Channel No. | Frequency (MHz) | 26dB BW (MHz) | 99 % OBW (MHz) | Required Limit (MHz) | Result |
|-------------|-----------------|---------------|----------------|----------------------|--------|
| 38 | 5190 | 38.95 | 36.278 | -- | PASS |
| 46 | 5230 | 39.07 | 36.276 | -- | PASS |

99% & 26dB Bandwidth – Channel 38



99% & 26dB Bandwidth – Channel 46

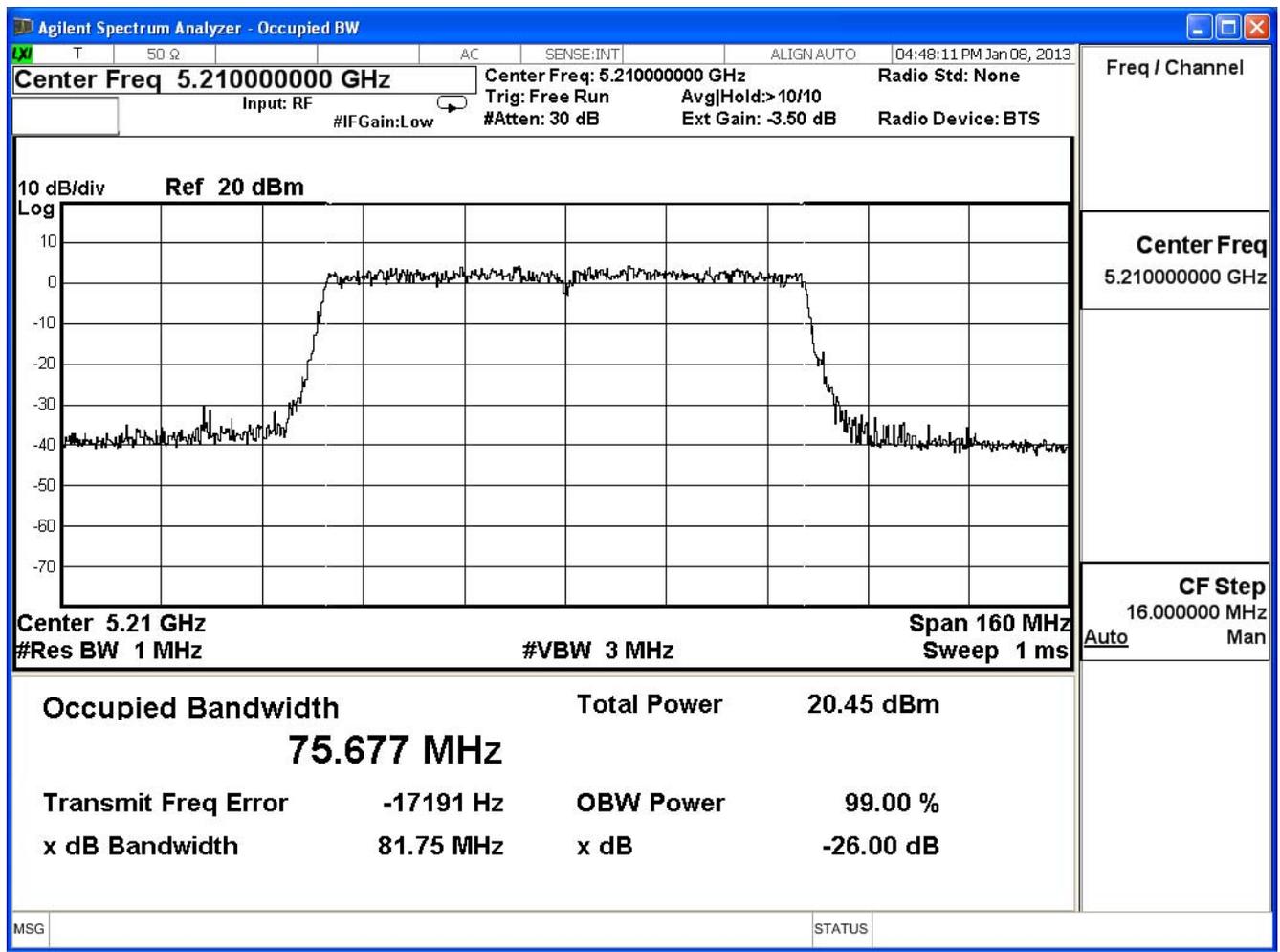


| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | 99% & 26dB Bandwidth | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

802.11ac_80M(ANT 0)

| Channel No. | Frequency (MHz) | 26dB BW (MHz) | 99 % OBW (MHz) | Required Limit (MHz) | Result |
|-------------|-----------------|---------------|----------------|----------------------|--------|
| 42 | 5210 | 81.75 | 75.677 | -- | PASS |

99% & 26dB Bandwidth – Channel 42

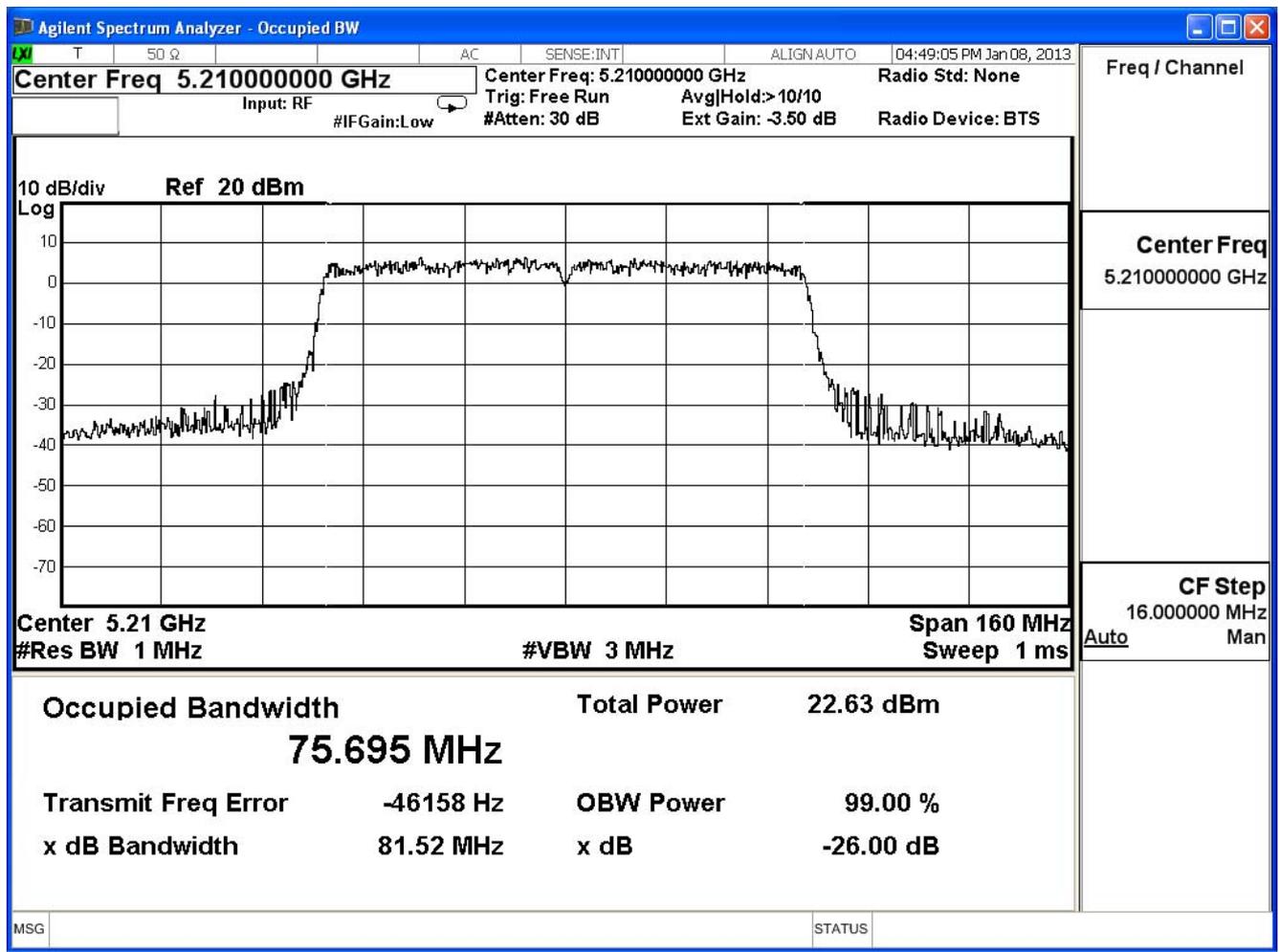


| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | 99% & 26dB Bandwidth | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

802.11ac_80M(ANT 1)

| Channel No. | Frequency (MHz) | 26dB BW (MHz) | 99 % OBW (MHz) | Required Limit (MHz) | Result |
|-------------|-----------------|---------------|----------------|----------------------|--------|
| 42 | 5210 | 81.52 | 75.695 | -- | PASS |

99% & 26dB Bandwidth – Channel 42



4. Peak Transmit Output

4.1. Test Equipment

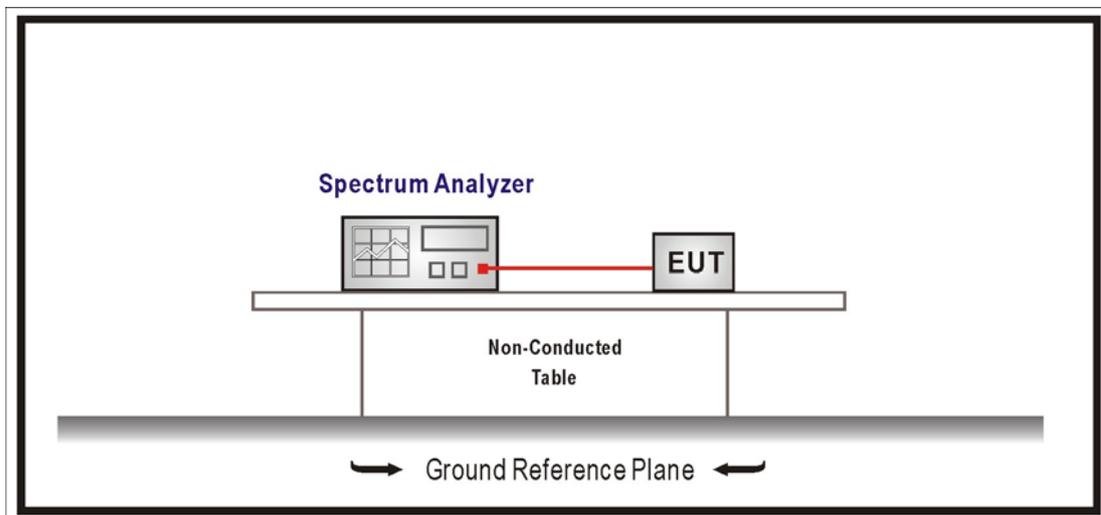
The following test equipments are used during the radiated emission tests:

Peak Transmit Output / SR7

| Instrument | Manufacturer | Model No. | Serial No | Next Cal. Date |
|-------------------|--------------|------------|------------|----------------|
| Spectrum Analyzer | Agilent | N9010A-EXA | US47140172 | 2013/08/06 |

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup



4.3. Limits

1. For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10\log B$, where B is the 26dB 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.
2. For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10\log B$, where B is the 26dB 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. For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W or $17 \text{ dBm} + 10\log B$, where B is the 26dB 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.

4.4. Test Procedure

The EUT was setup to ANSI C63.4, 2009; tested to U-NII test procedure of March 2012 KDB 789033 for compliance to FCC 47CFR Subpart E requirements. The Method SA-1 of the Maximum conducted output power was used.

Set RBW=1MHz, VBW=3MHz with RMS detector and trace average 100 traces in power averaging mode. Set span to encompass the entire emission bandwidth (EBW) of the signal. Compute power by integrating the spectrum across the 26 dB EBW of the signal.

4.5. Uncertainty

The measurement uncertainty is defined as $\pm 1.27 \text{ dB}$

4.6. Test Result

| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| 802.11a | | | | | | |
|-------------|-----------------|----------------------|--------------------|-------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | Output Power (dBm) | Required Limit | | Result |
| | | | | Fixed Limit (dBm) | 4+10logB Limit (dBm) | |
| 36 | 5180 | 20.30 | 13.73 | ≤ 16.93 | ≤17.07 | Pass |
| 44 | 5220 | 20.16 | 13.67 | ≤ 16.93 | ≤17.04 | Pass |
| 48 | 5240 | 20.34 | 13.60 | ≤ 16.93 | ≤17.08 | Pass |

The worst emission of data rate is 6 Mbps.

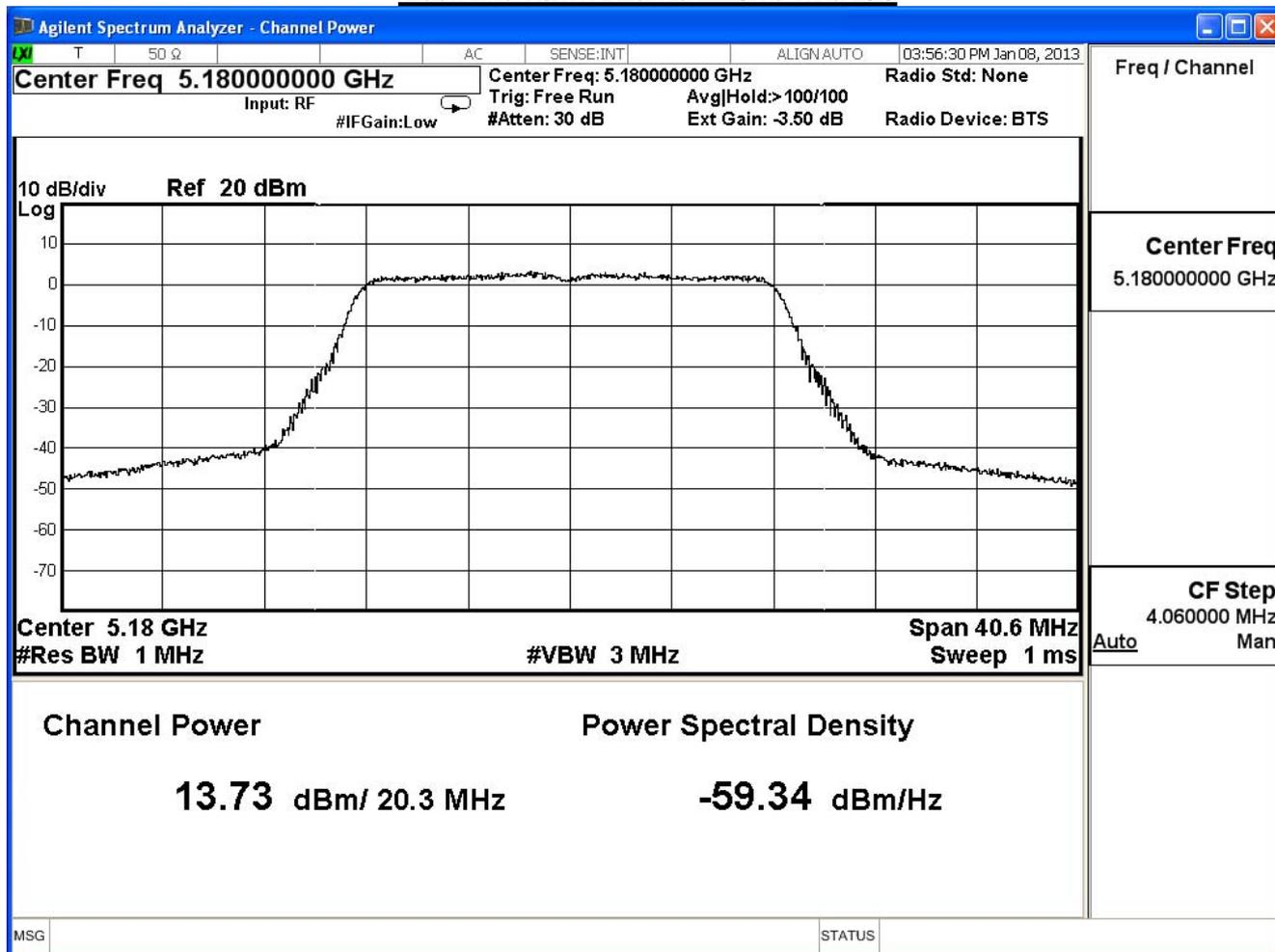
| Peak Power Output (dBm) | | | | | | | | | |
|-------------------------|-----------------|-----------|-------|-------|-------|-------|-------|-------|-------------------------|
| Channel No | Frequency (MHz) | Data Rate | | | | | | | Required Limit |
| | | 6 | 12 | 18 | 24 | 36 | 48 | 54 | |
| 36 | 5180 | 13.73 | -- | -- | -- | -- | -- | -- | 16.93dBm or 4dBm+10logB |
| 44 | 5220 | 13.67 | 13.66 | 13.65 | 13.62 | 13.61 | 13.59 | 13.58 | |
| 48 | 5240 | 13.60 | -- | -- | -- | -- | -- | -- | |

Note:

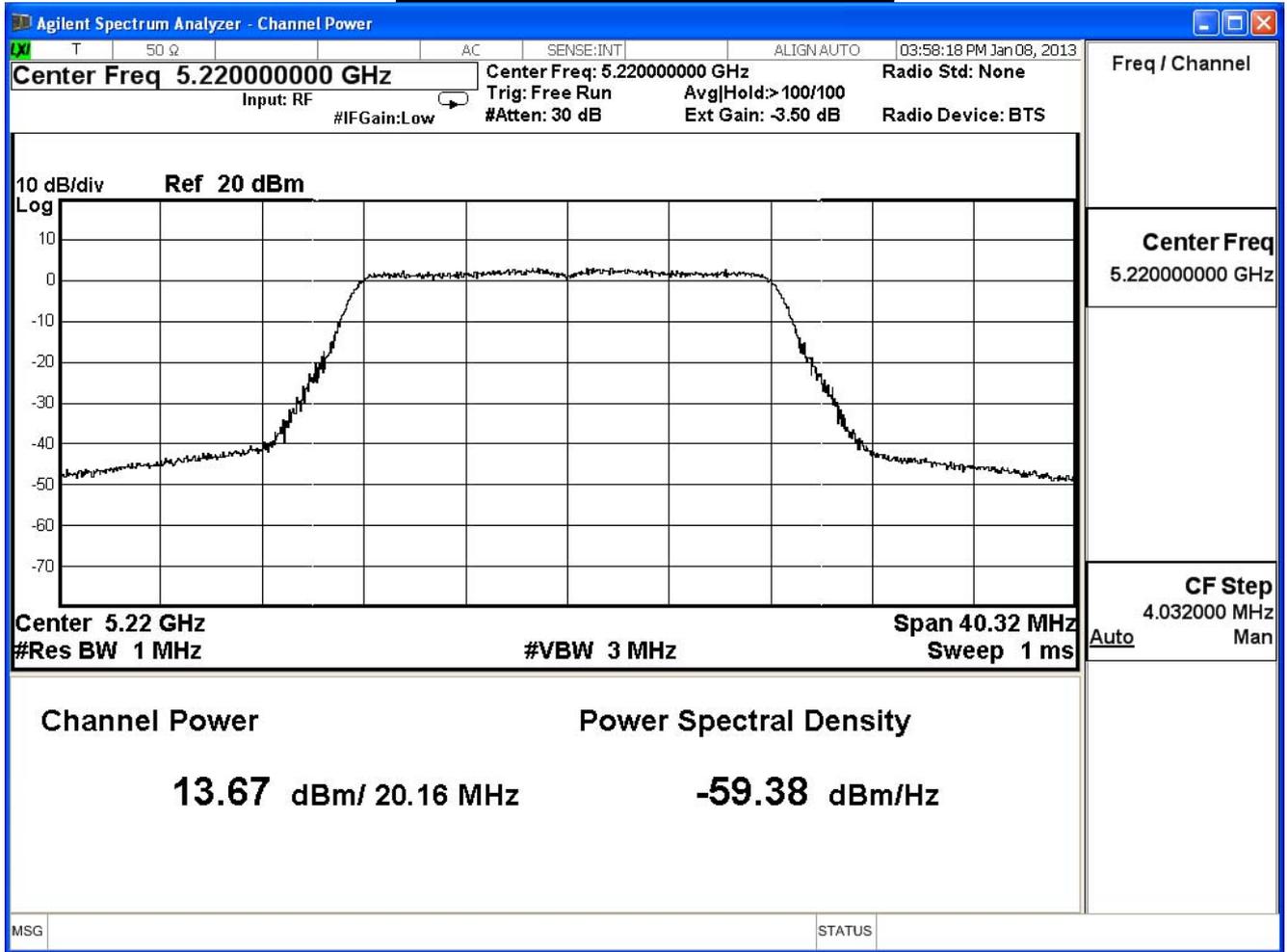
Girectional Gain = Beamforming Gain + Max Gain = 3dB + 3.07dBi =6.07dBi

Required Limit = 17dBm - (6.07dBi – 6dB) = 17 – 0.07 = 16.93 dBm

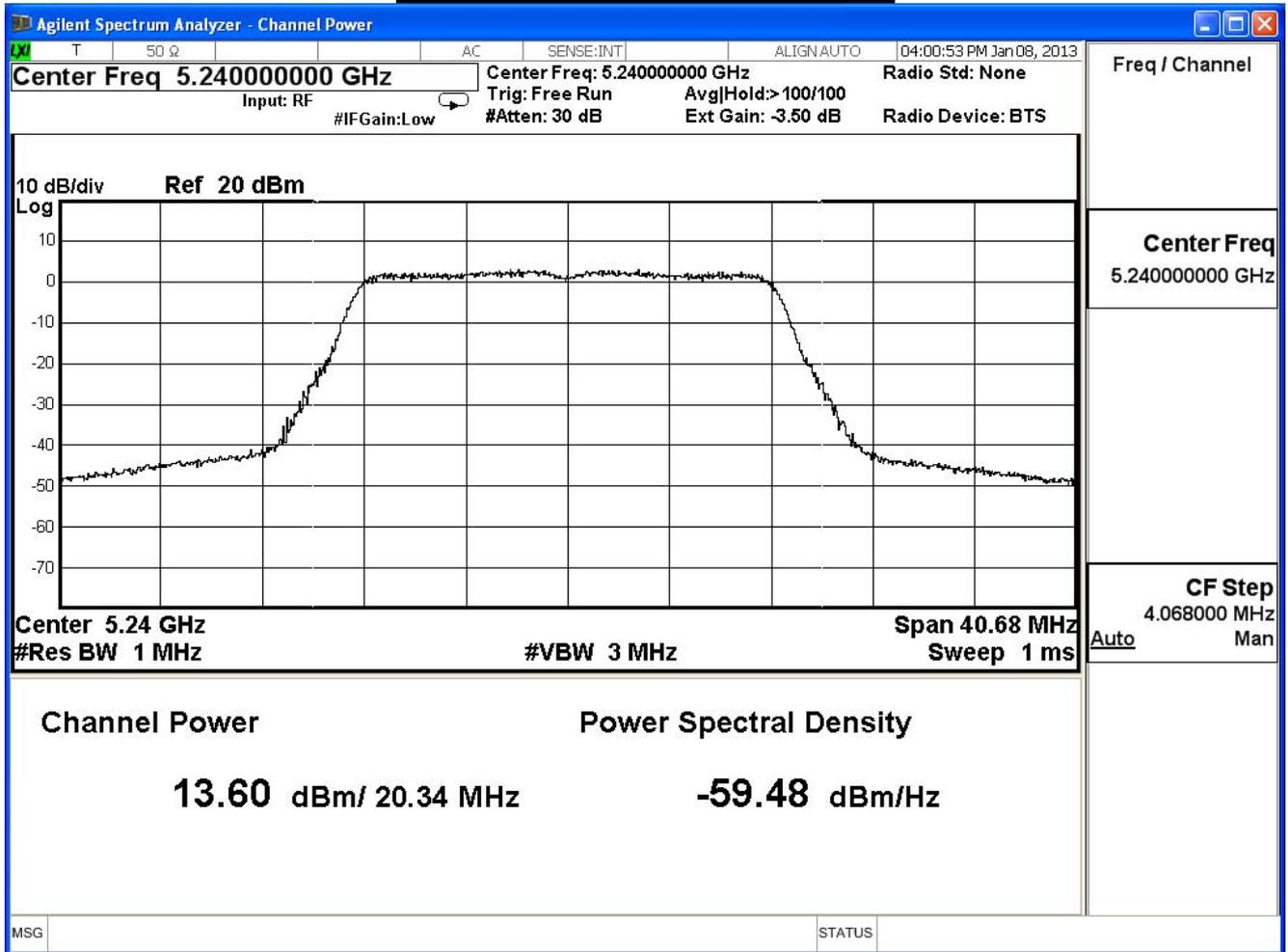
Peak transmit Power - Channel 36



Peak transmit Power - Channel 44



Peak transmit Power - Channel 48



| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11n(20MHz)_ANT 0 | | | | | | |
|---------------------------|-----------------|----------------------|--------------------|-------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | Output Power (dBm) | Required Limit | | Result |
| | | | | Fixed Limit (dBm) | 4+10logB Limit (dBm) | |
| 36 | 5180 | 20.52 | 9.99 | ≤ 16.93 | ≤17.12 | Pass |
| 44 | 5220 | 20.51 | 10.18 | ≤ 16.93 | ≤17.11 | Pass |
| 48 | 5240 | 20.53 | 10.49 | ≤ 16.93 | ≤17.12 | Pass |

The worst emission of data rate is 19.5Mbps.

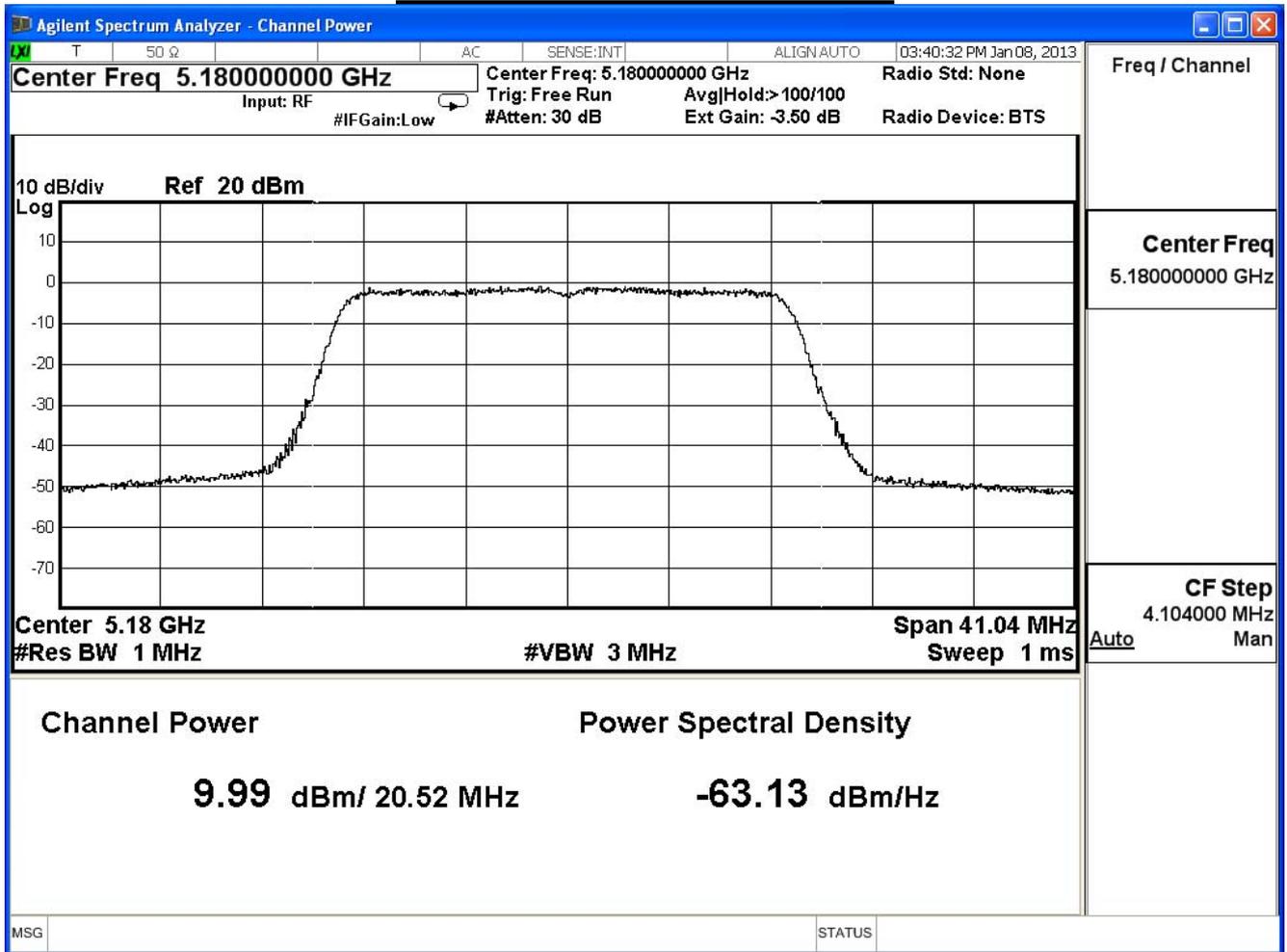
| Peak Power Output (dBm) | | | | | | | | | | |
|-------------------------|-----------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------------------------|
| MCS Index | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Required Limit |
| Channel No | Frequency (MHz) | Data Rate | | | | | | | | |
| | | 19.5 | 39 | 58.5 | 78 | 117 | 156 | 175.5 | 195 | |
| 36 | 5180 | 9.99 | -- | -- | -- | -- | -- | -- | -- | 16.93dBm or 4dBm+10logB |
| 44 | 5220 | 10.18 | 10.17 | 10.15 | 10.14 | 10.12 | 10.13 | 10.11 | 10.10 | |
| 48 | 5240 | 10.49 | -- | -- | -- | -- | -- | -- | -- | |

Note:

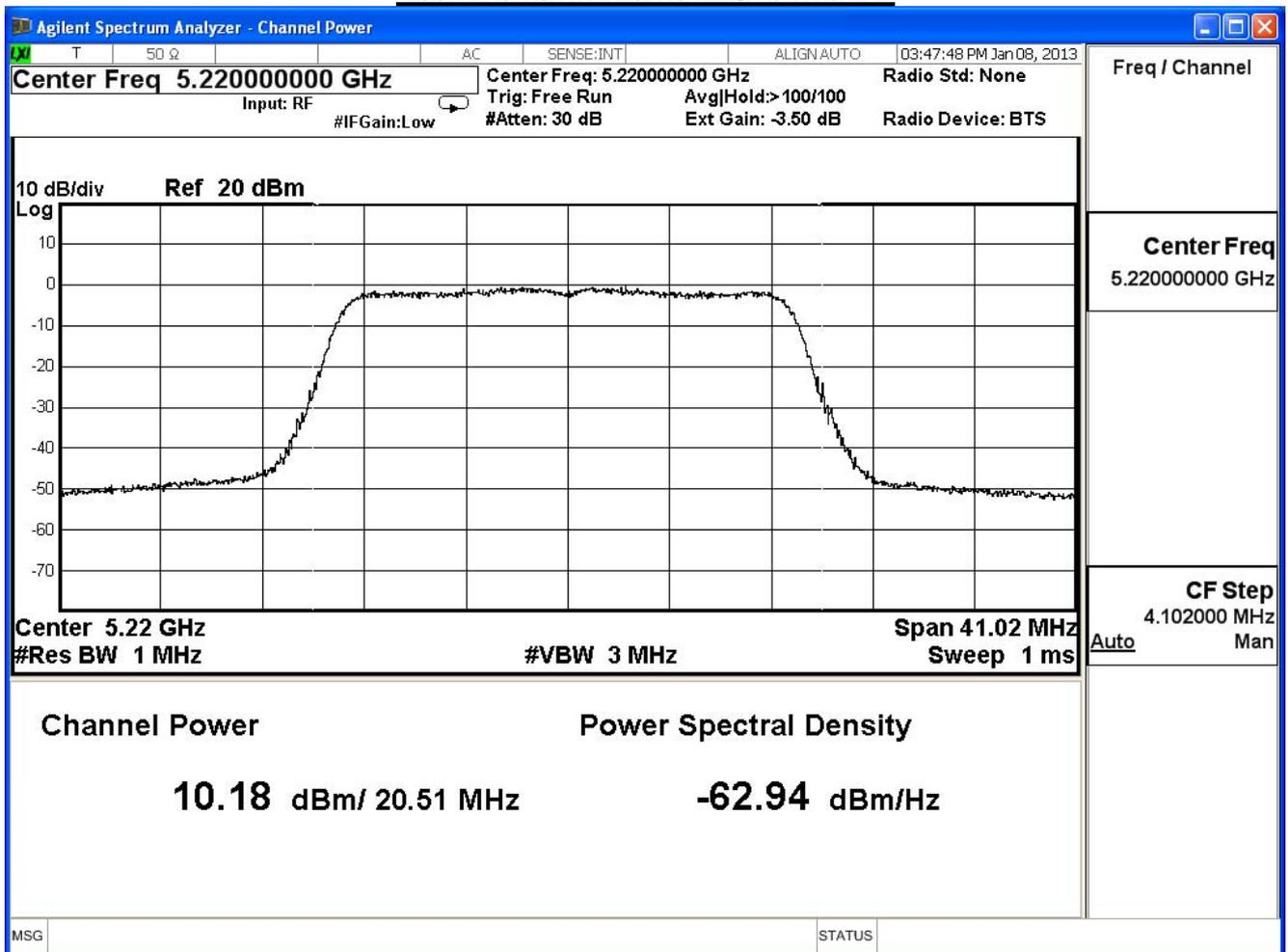
Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

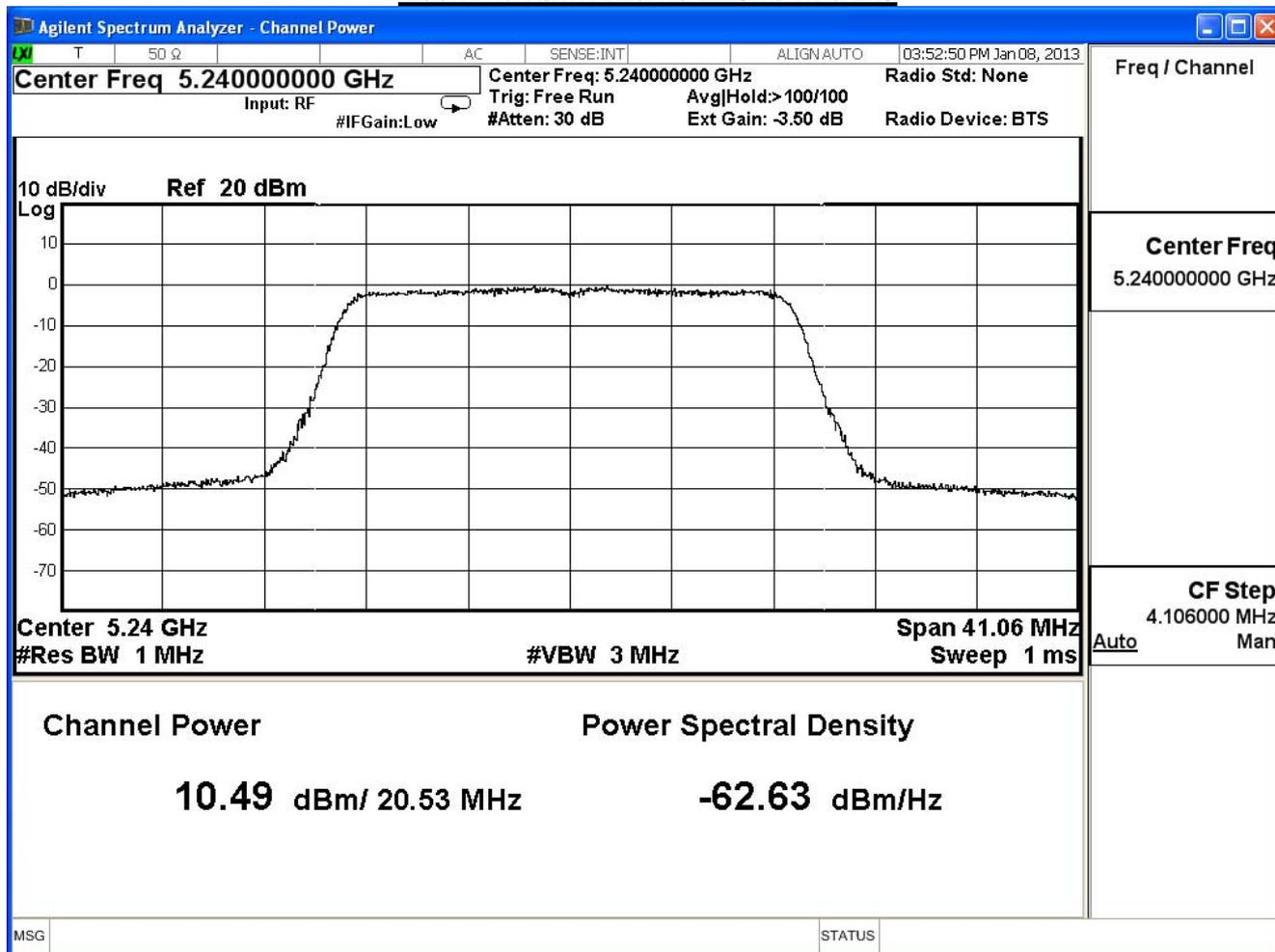
Peak transmit Power - Channel 36



Peak transmit Power - Channel 44



Peak transmit Power - Channel 48



| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11n(20MHz)_ANT 1 | | | | | | |
|---------------------------|-----------------|----------------------|--------------------|-------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | Output Power (dBm) | Required Limit | | Result |
| | | | | Fixed Limit (dBm) | 4+10logB Limit (dBm) | |
| 36 | 5180 | 20.33 | 11.79 | ≤ 16.93 | ≤17.08 | Pass |
| 44 | 5220 | 20.14 | 11.46 | ≤ 16.93 | ≤17.04 | Pass |
| 48 | 5240 | 20.02 | 11.68 | ≤ 16.93 | ≤17.01 | Pass |

The worst emission of data rate is 19.5Mbps.

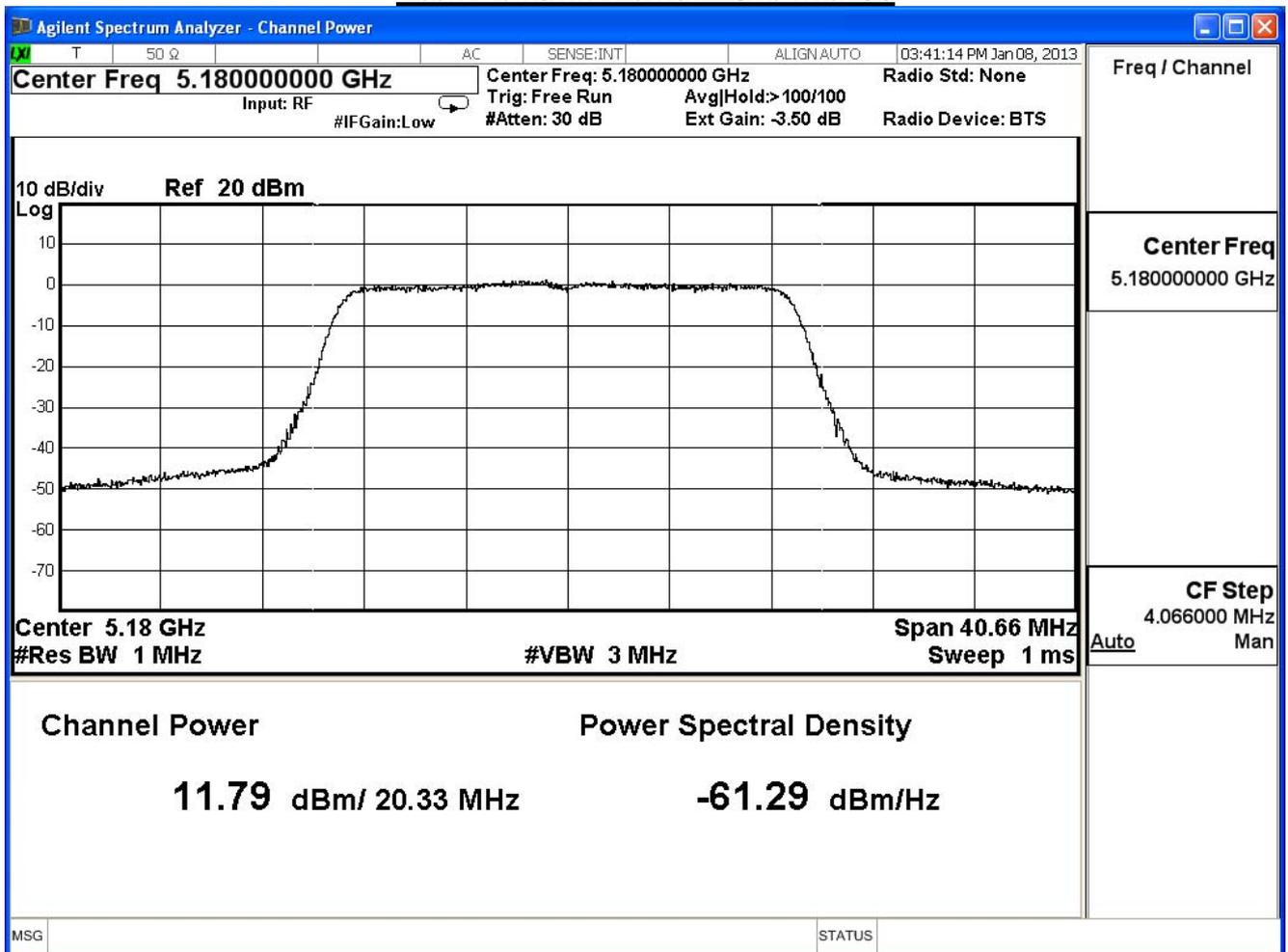
| Peak Power Output (dBm) | | | | | | | | | | |
|-------------------------|-----------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------------------------|
| MCS Index | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Required Limit |
| Channel No | Frequency (MHz) | Data Rate | | | | | | | | |
| | | 19.5 | 39 | 58.5 | 78 | 117 | 156 | 175.5 | 195 | |
| 36 | 5180 | 11.79 | -- | -- | -- | -- | -- | -- | -- | 16.93dBm or 4dBm+10logB |
| 44 | 5220 | 11.46 | 11.45 | 11.42 | 11.41 | 11.40 | 11.39 | 11.38 | 11.37 | |
| 48 | 5240 | 11.68 | -- | -- | -- | -- | -- | -- | -- | |

Note:

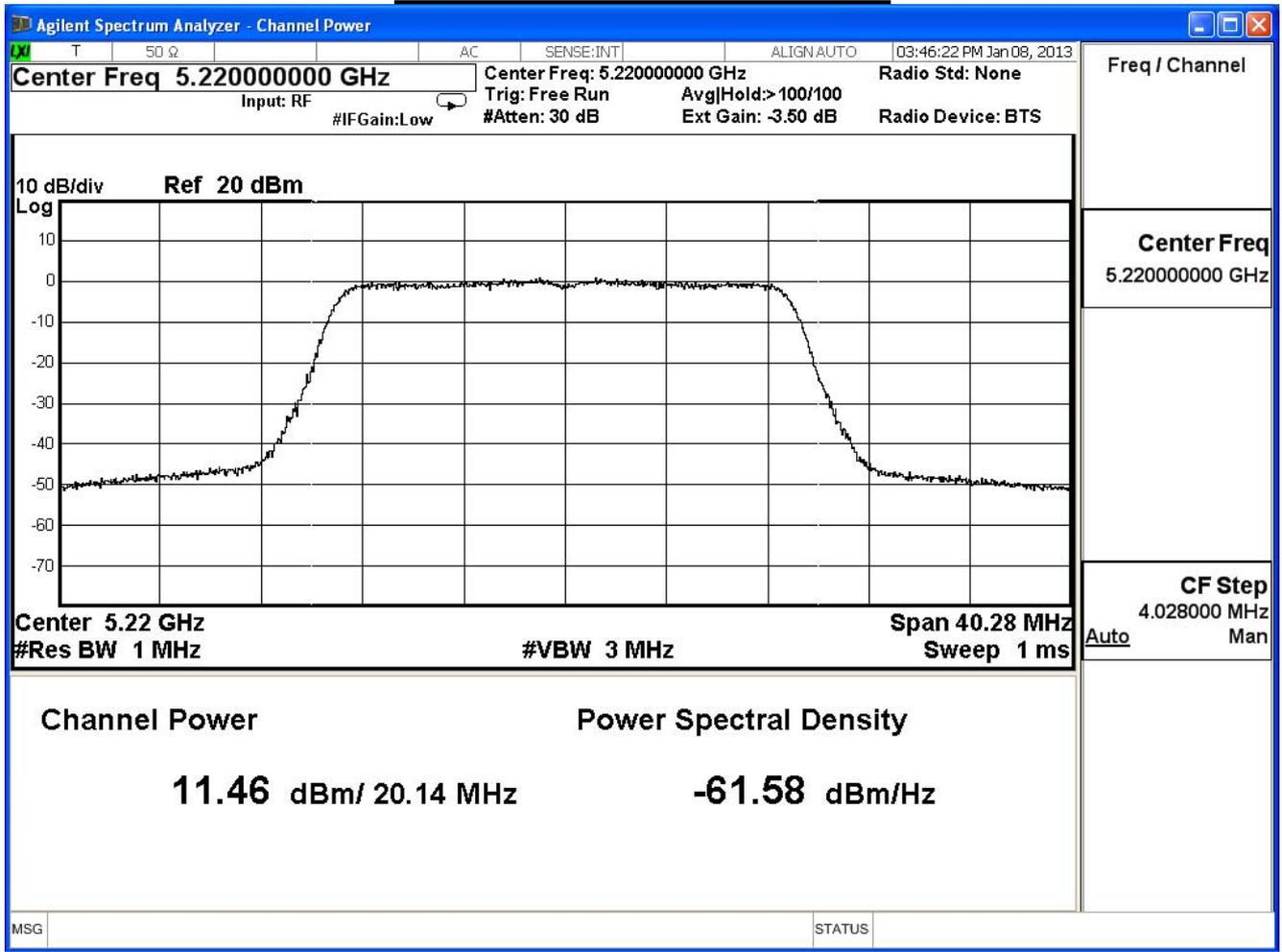
Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

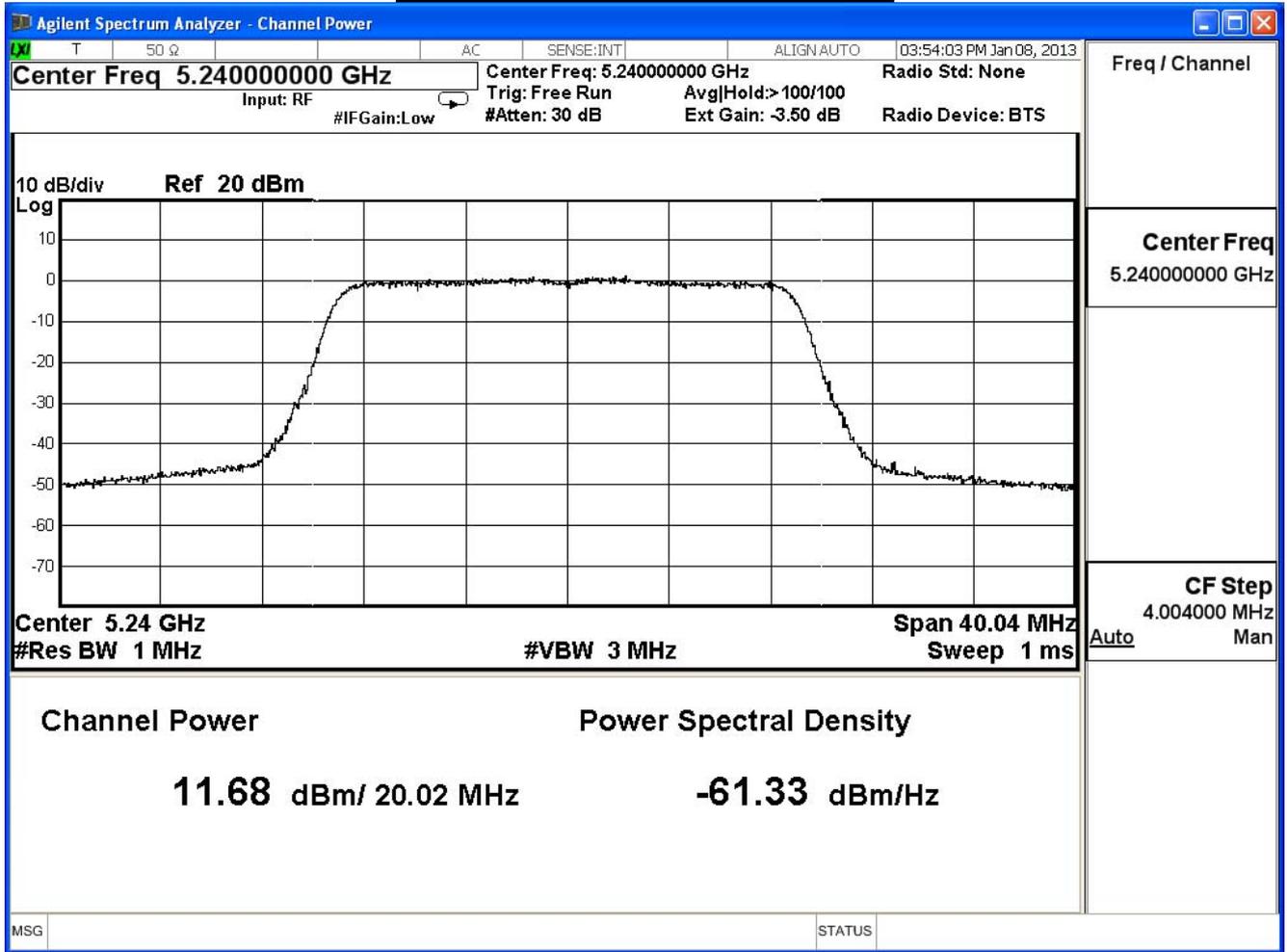
Peak transmit Power - Channel 36



Peak transmit Power - Channel 44



Peak transmit Power - Channel 48



| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11n(20MHz)_ANT 0+1 | | | | | |
|-----------------------------|-----------------|--------------------|-------|----------------------|--------|
| Channel No. | Frequency (MHz) | Total Output Power | | Required Limit (dBm) | Result |
| | | (mW) | (dBm) | | |
| 36 | 5180 | 25.08 | 13.99 | ≤ 16.93 | Pass |
| 44 | 5220 | 24.42 | 13.88 | ≤ 16.93 | Pass |

Note:

Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11n(40MHz)_ANT 0 | | | | | | |
|---------------------------|-----------------|----------------------|--------------------|-------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | Output Power (dBm) | Required Limit | | Result |
| | | | | Fixed Limit (dBm) | 4+10logB Limit (dBm) | |
| 38 | 5190 | 39.63 | 12.51 | ≤ 16.93 | ≤19.98 | Pass |
| 46 | 5230 | 39.69 | 12.52 | ≤ 16.93 | ≤19.98 | Pass |

The worst emission of data rate is 40.5 Mbps

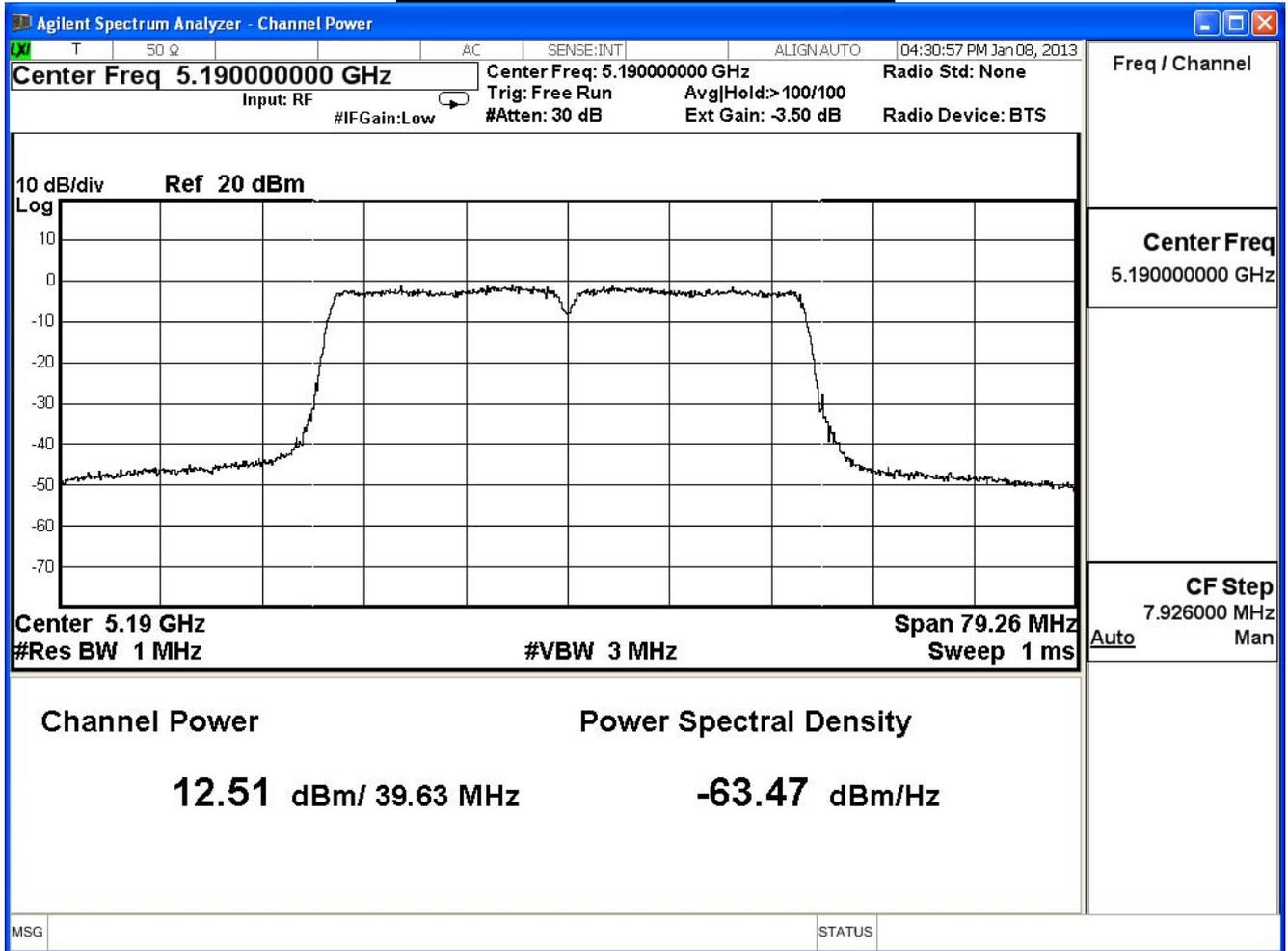
| Peak Power Output (dBm) | | | | | | | | | | |
|-------------------------|-----------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------------------------|
| MCS Index | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Required Limit |
| Channel No | Frequency (MHz) | Data Rate | | | | | | | | |
| | | 40.5 | 81.0 | 121.5 | 162.0 | 243.0 | 324.0 | 364.5 | 405.0 | |
| 38 | 5190 | 12.51 | 12.50 | 12.48 | 12.47 | 12.45 | 12.43 | 12.41 | 12.40 | 16.93dBm or 4dBm+10logB |
| 46 | 5230 | 12.52 | -- | -- | -- | -- | -- | -- | -- | |

Note:

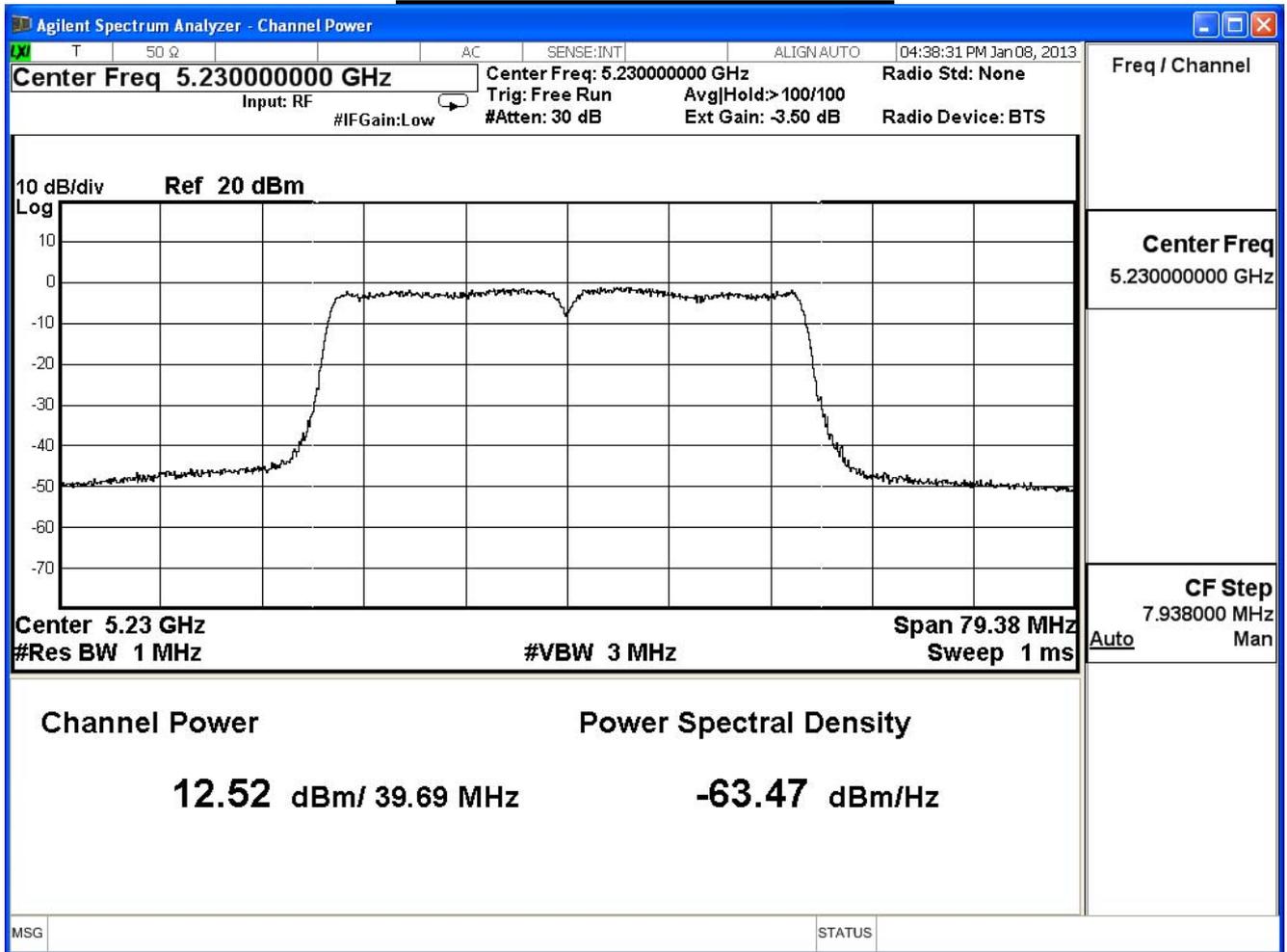
Girectional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

Peak transmit Power - Channel 38



Peak transmit Power - Channel 46



| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11n(40MHz)_ANT 1 | | | | | | |
|---------------------------|-----------------|----------------------|--------------------|-------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | Output Power (dBm) | Required Limit | | Result |
| | | | | Fixed Limit (dBm) | 4+10logB Limit (dBm) | |
| 38 | 5190 | 38.95 | 13.96 | ≤ 16.93 | ≤19.90 | Pass |
| 46 | 5230 | 39.07 | 13.68 | ≤ 16.93 | ≤19.88 | Pass |

The worst emission of data rate is 40.5 Mbps

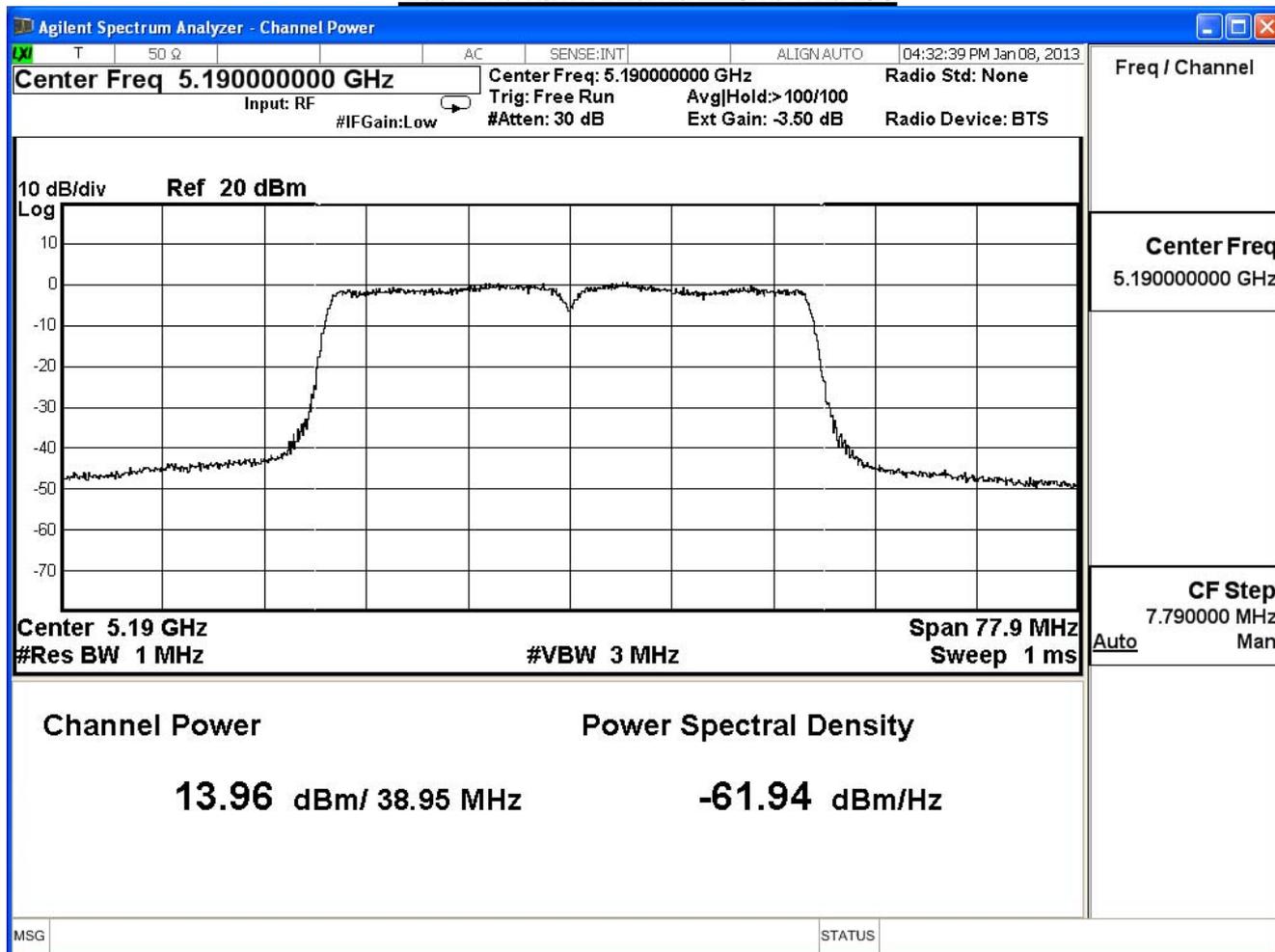
| Peak Power Output (dBm) | | | | | | | | | | |
|-------------------------|-----------------|-----------|-------|-------|-------|-------|-------|-------|-------|----------------|
| MCS Index | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Required Limit |
| Channel No | Frequency (MHz) | Data Rate | | | | | | | | |
| | | 40.5 | 81.0 | 121.5 | 162.0 | 243.0 | 324.0 | 364.5 | 405.0 | |
| 38 | 5190 | 13.96 | 13.95 | 13.94 | 13.93 | 13.91 | 13.90 | 13.89 | 13.87 | 16.93dBm or |
| 46 | 5230 | 13.68 | -- | -- | -- | -- | -- | -- | -- | 4dBm+10logB |

Note:

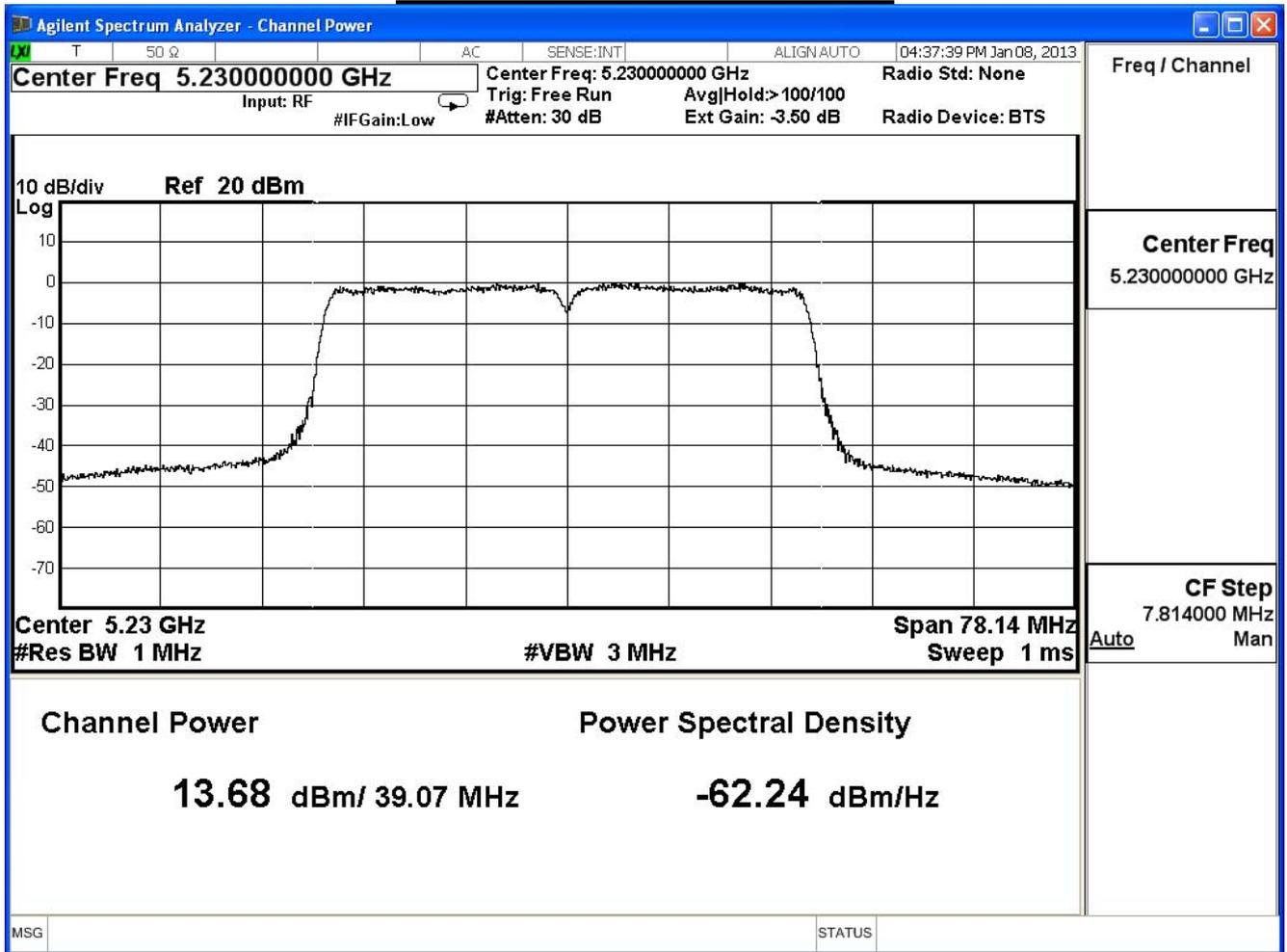
Girectional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

Peak transmit Power - Channel 38



Peak transmit Power - Channel 46



| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11n(40MHz)_ANT 0+1 | | | | | |
|-----------------------------|-----------------|--------------------|-------|----------------------|--------|
| Channel No. | Frequency (MHz) | Total Output Power | | Required Limit (dBm) | Result |
| | | (mW) | (dBm) | | |
| 38 | 5190 | 42.71 | 16.31 | ≤ 16.93 | Pass |
| 46 | 5230 | 41.20 | 16.15 | ≤ 16.93 | Pass |

Note:

Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11ac(80MHz)_ANT 0 | | | | | | |
|----------------------------|-----------------|----------------------|--------------------|-------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | Output Power (dBm) | Required Limit | | Result |
| | | | | Fixed Limit (dBm) | 4+10logB Limit (dBm) | |
| 42 | 5210 | 81.75 | 12.26 | ≤ 16.93 | ≤ 22.99 | Pass |

The worst emission of data rate is 293. Mbps.

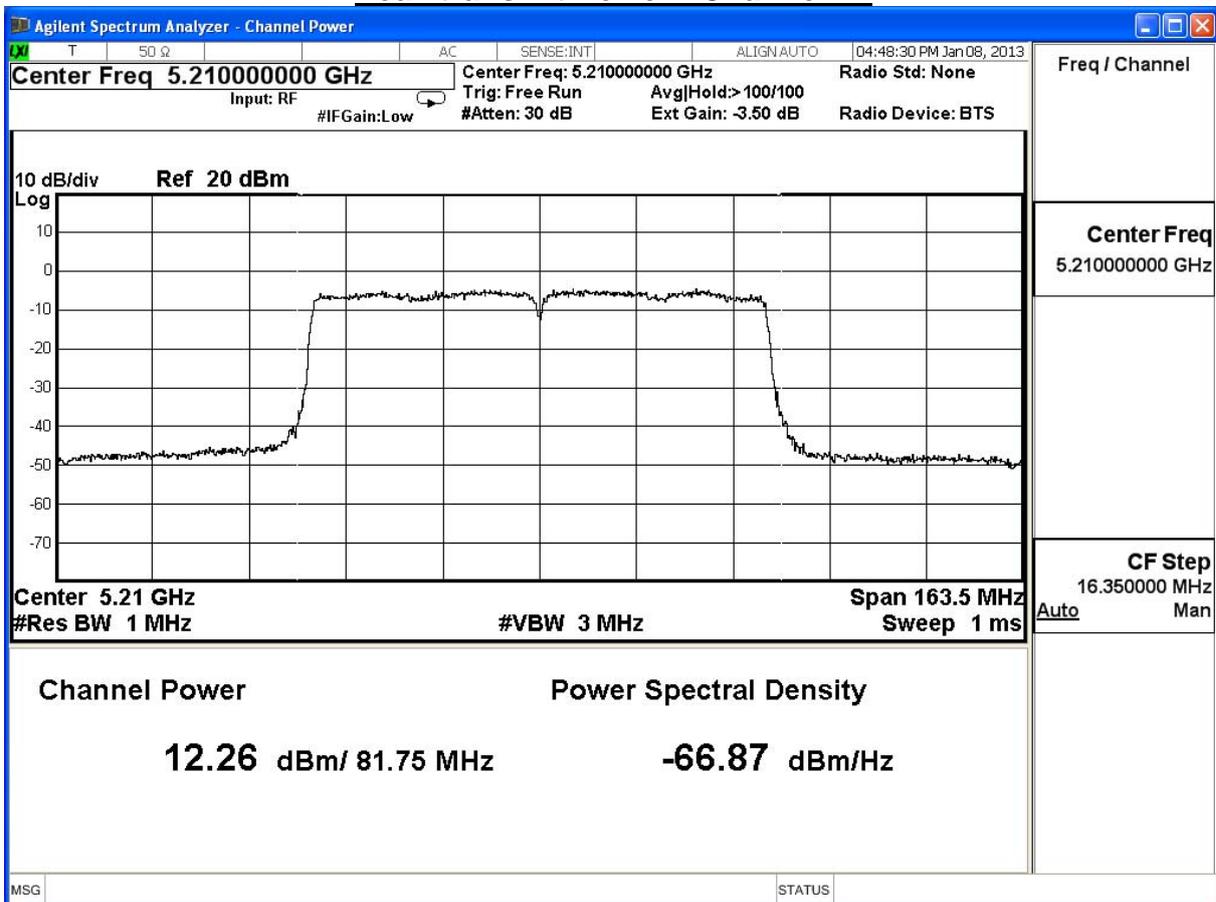
| Peak Power Output (dBm) | | | | | | | | | | |
|-------------------------|-----------------|-----------|-------|-------|-------|-------|-------|-------|-------|----------------|
| MCS Index | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Required Limit |
| Channel No | Frequency (MHz) | Data Rate | | | | | | | | |
| | | 29.3 | 58.5 | 121.5 | 162.0 | 243.0 | 324.0 | 364.5 | 405.0 | |
| 42 | 5210 | 12.26 | 12.25 | 12.24 | 12.23 | 12.22 | 12.20 | 11.19 | 11.17 | ≤17 |

Note:

$$\text{Girectional Gain} = 10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$$

$$\text{Required Limit} = 17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$$

Peak transmit Power - Channel 42



| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11ac(80MHz)_ANT 1 | | | | | | |
|----------------------------|-----------------|----------------------|--------------------|-------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | 26dB Bandwidth (MHz) | Output Power (dBm) | Required Limit | | Result |
| | | | | Fixed Limit (dBm) | 4+10logB Limit (dBm) | |
| 42 | 5210 | 81.52 | 13.81 | ≤ 16.93 | ≤ 23.01 | Pass |

The worst emission of data rate is 29.3Mbps.

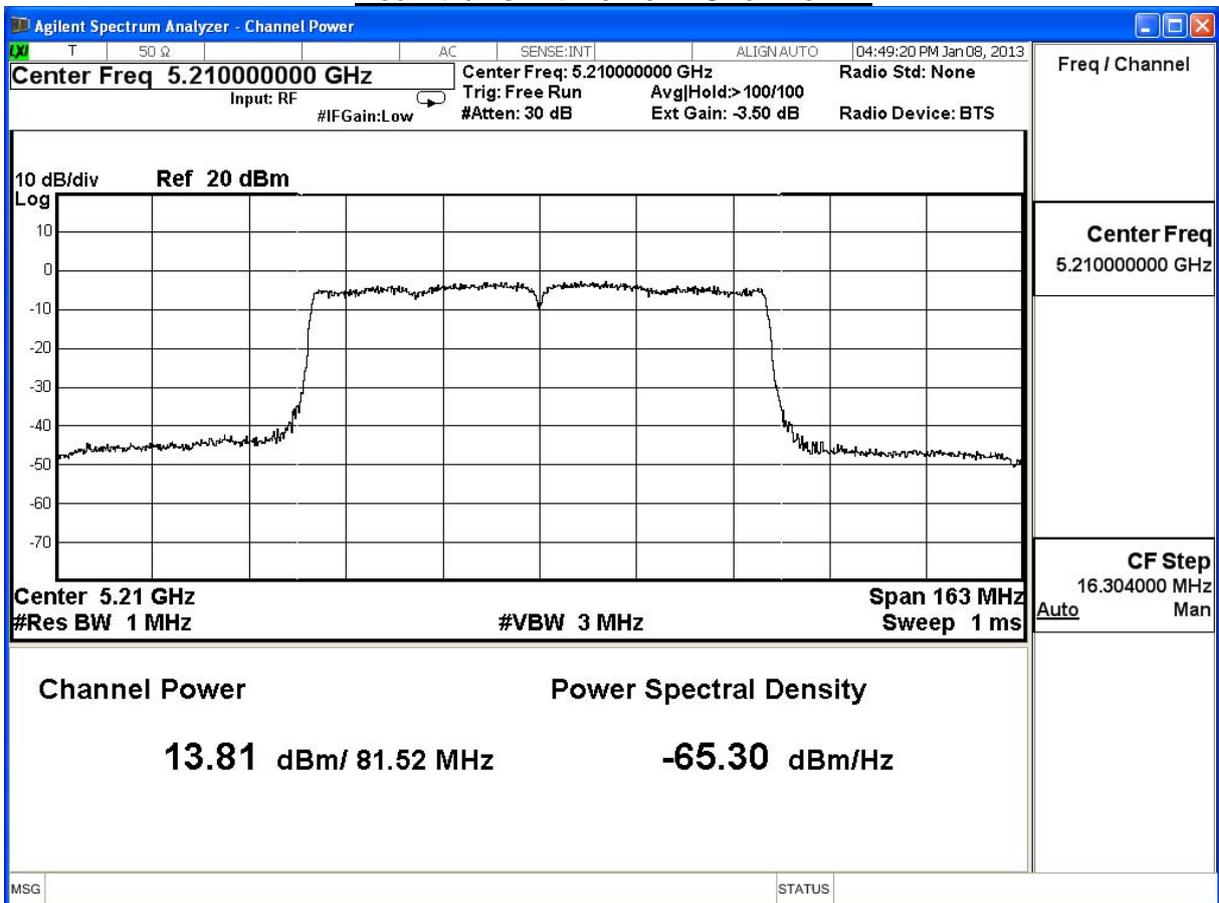
| Peak Power Output (dBm) | | | | | | | | | | |
|-------------------------|-----------------|-----------|-------|-------|-------|-------|-------|-------|-------|----------------|
| MCS Index | | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Required Limit |
| Channel No | Frequency (MHz) | Data Rate | | | | | | | | |
| | | 29.3 | 58.5 | 121.5 | 162.0 | 243.0 | 324.0 | 364.5 | 405.0 | |
| 42 | 5210 | 13.81 | 13.79 | 13.78 | 13.76 | 13.75 | 13.74 | 13.73 | 13.71 | 16.83 |

Note:

Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

Peak transmit Power - Channel 42



| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Transmit Output | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

| IEEE 802.11ac(80MHz)_ANT 0+1 | | | | | |
|------------------------------|-----------------|--------------------|-------|----------------------|--------|
| Channel No. | Frequency (MHz) | Total Output Power | | Required Limit (dBm) | Result |
| | | (mW) | (dBm) | | |
| 42 | 5210 | 40.83 | 16.11 | ≤ 16.93 | Pass |

Note:

Girectional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $17\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 17 - 0.07 = 16.93\text{ dBm}$

5. Peak Power Spectrum Density

5.1. Test Equipment

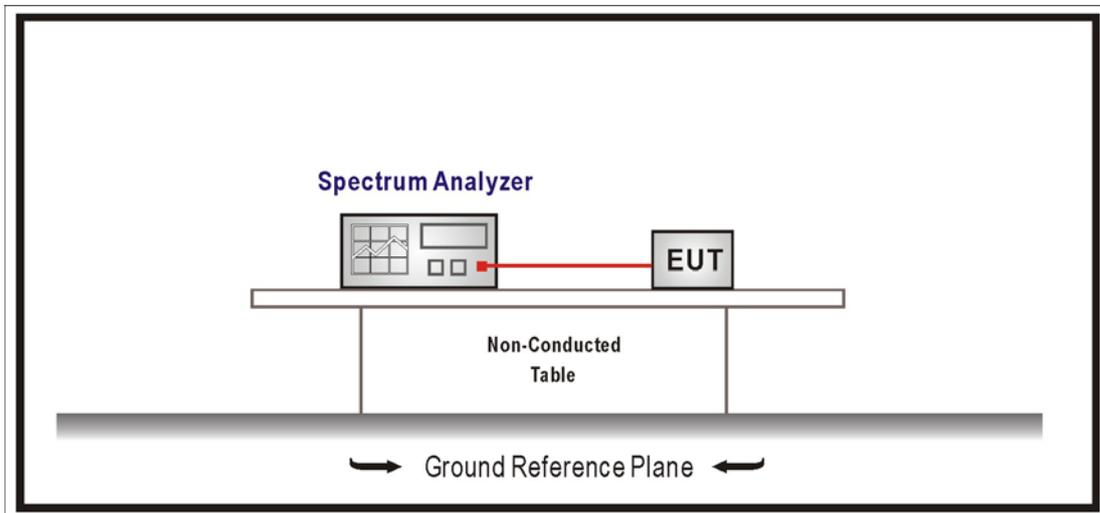
The following test equipments are used during the radiated emission tests:

Peak Power Spectrum Density / SR7

| Instrument | Manufacturer | Model No. | Serial No | Next Cal. Date |
|-------------------|--------------|------------|------------|----------------|
| Spectrum Analyzer | Agilent | N9010A-EXA | US47140172 | 2013/08/06 |

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

5.2. Test Setup



5.3. Limits

1. 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.
2. 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.
3. 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.

5.4. Test Procedure

The EUT was setup to ANSI C63.4, 2009; tested to U-NII test procedure of March 2012 KDB 789033 for compliance to FCC 47CFR Subpart E requirements.

Set RBW=1MHz, VBW=3MHz with RMS detector. The PPSD is the highest level found across the emission in any 1-MHz band after 100 sweeps of averaging.

5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

5.6. Test Result

| | | | |
|--------------|--|-----------|-----|
| Product | Dual-band Wireless-AC1200 Gigabit Router | | |
| Test Item | Peak Power Spectral Density | | |
| Test Mode | Transmit | | |
| Date of Test | 2013/01/08 | Test Site | SR7 |

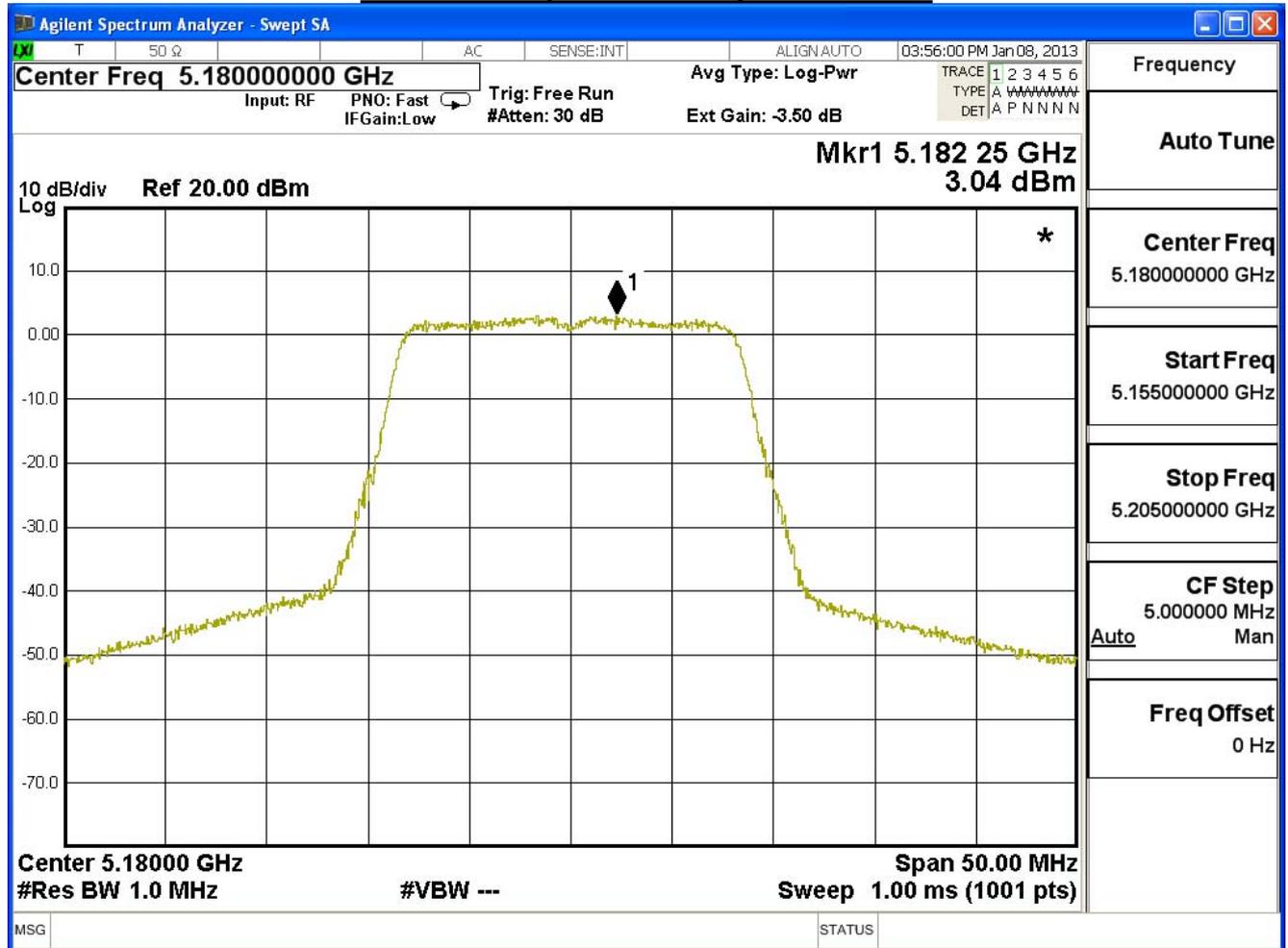
| IEEE 802.11a | | | | |
|--------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 36 | 5180 | 3.04 | ≤ 3.93 | Pass |
| 44 | 5220 | 3.31 | ≤ 3.93 | Pass |
| 48 | 5240 | 3.09 | ≤ 3.93 | Pass |

Note:

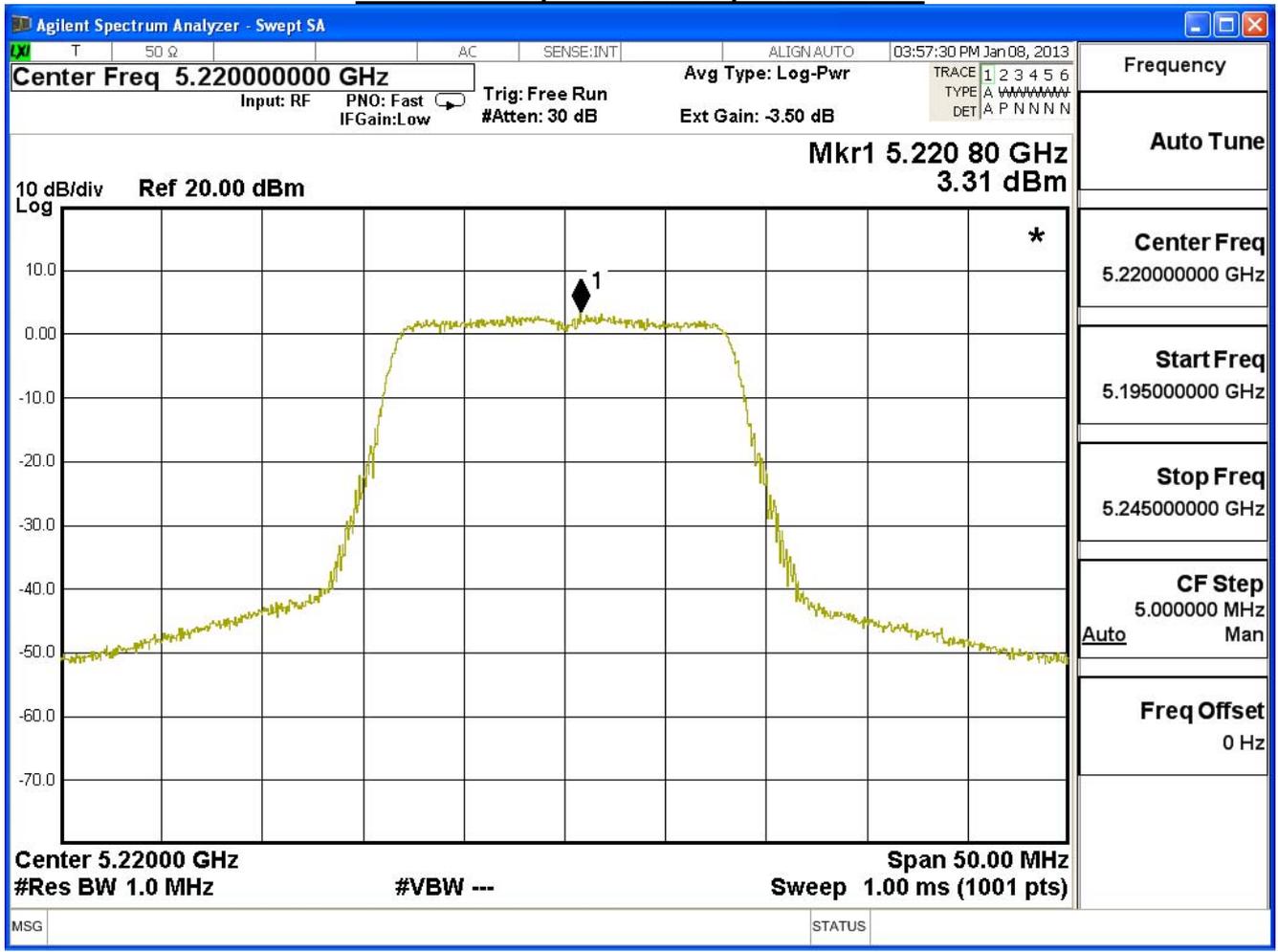
Girectional Gain = Beamforming Gain + Max Gain = 3dB + 3.07dBi =6.07dBi

Required Limit = 4dBm - (6.07dBi – 6dBi) = 4 – 0.07 = 3.93 dBm

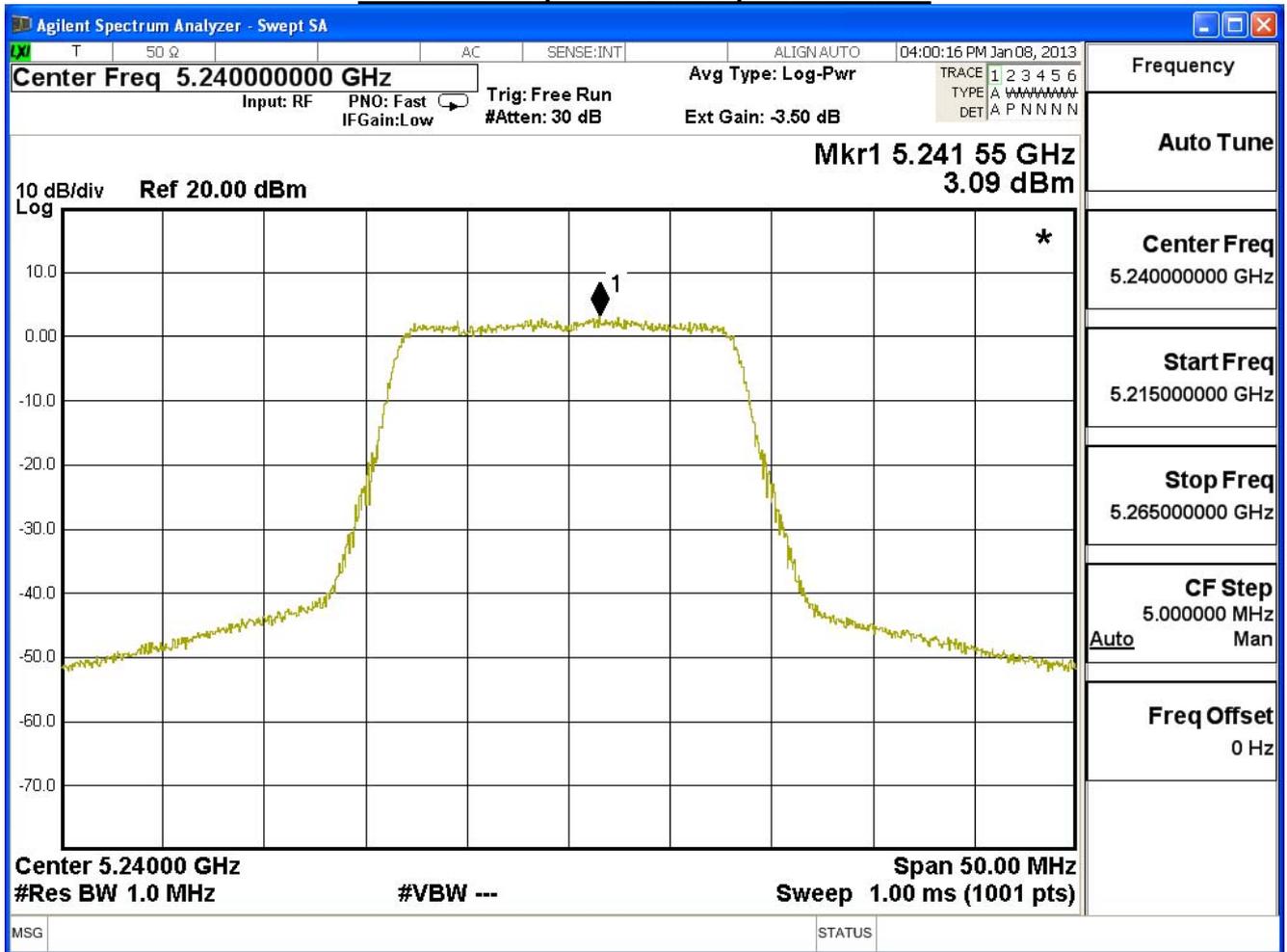
Peak Power Spectral Density – Channel 36



Peak Power Spectral Density – Channel 44



Peak Power Spectral Density – Channel 48



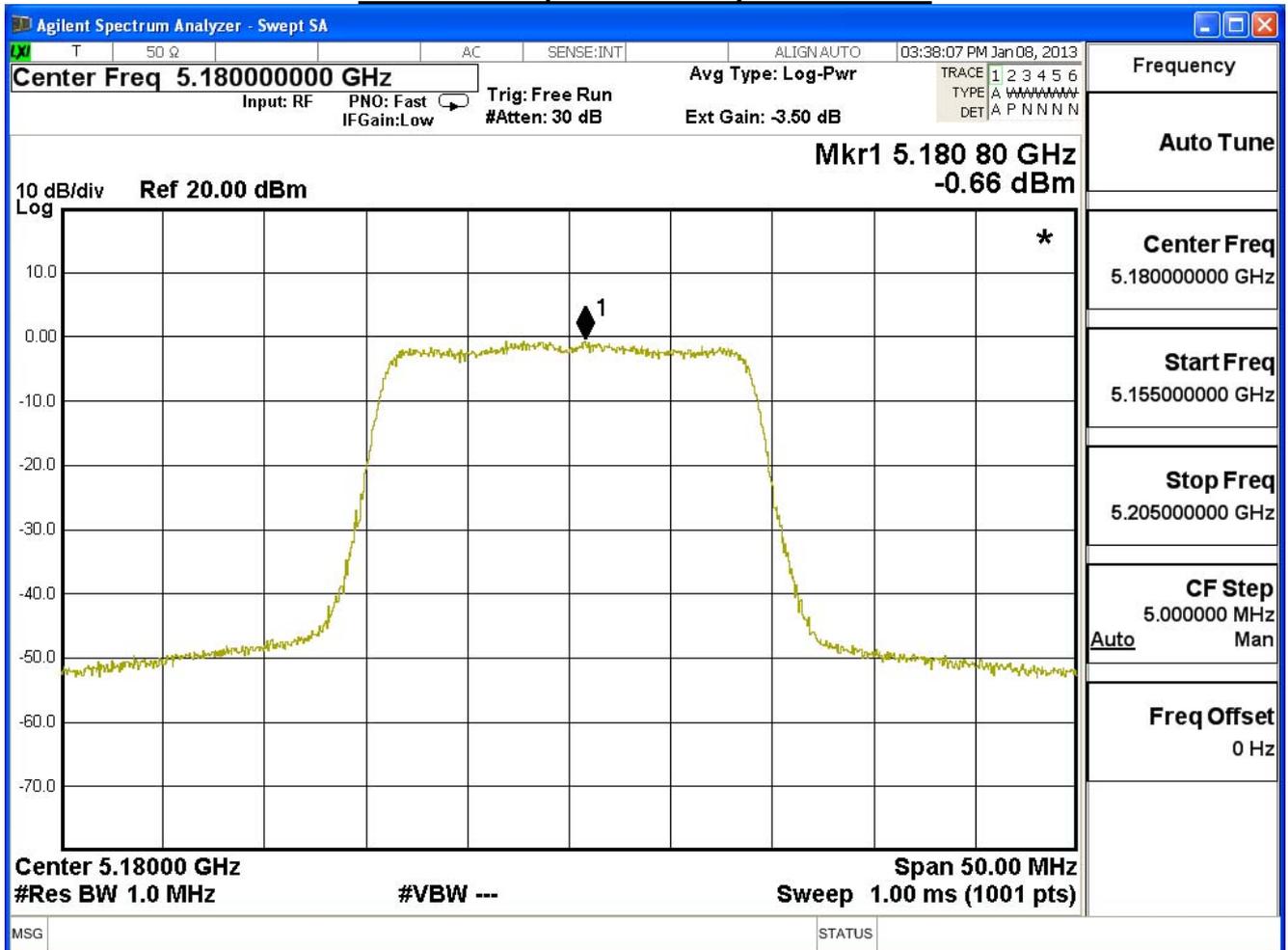
| IEEE 802.11n_20M(ANT 0) | | | | |
|-------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 36 | 5180 | -0.66 | ≤ 3.93 | Pass |
| 44 | 5220 | -0.52 | ≤ 3.93 | Pass |
| 48 | 5240 | -0.55 | ≤ 3.93 | Pass |

Note:

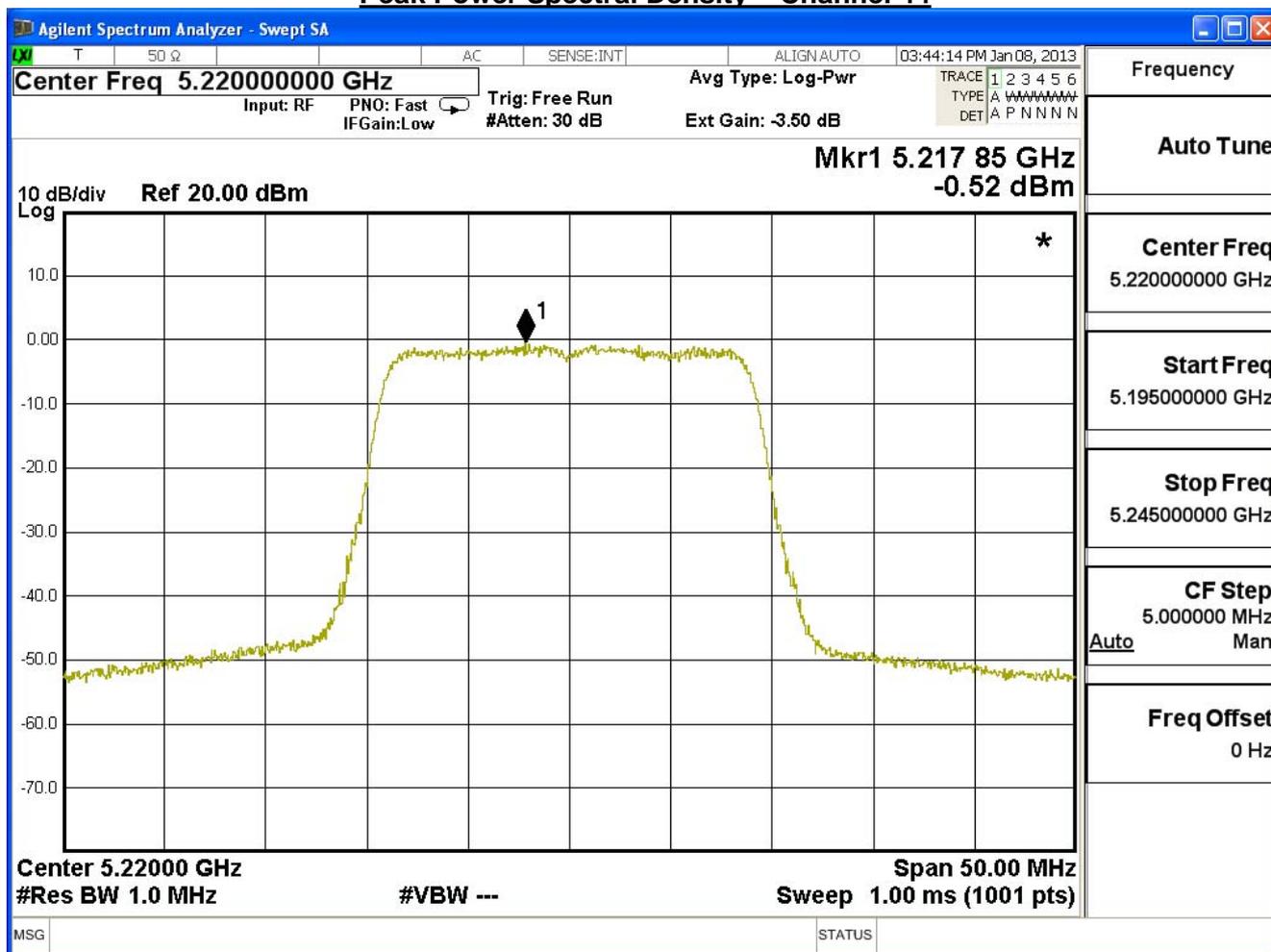
Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

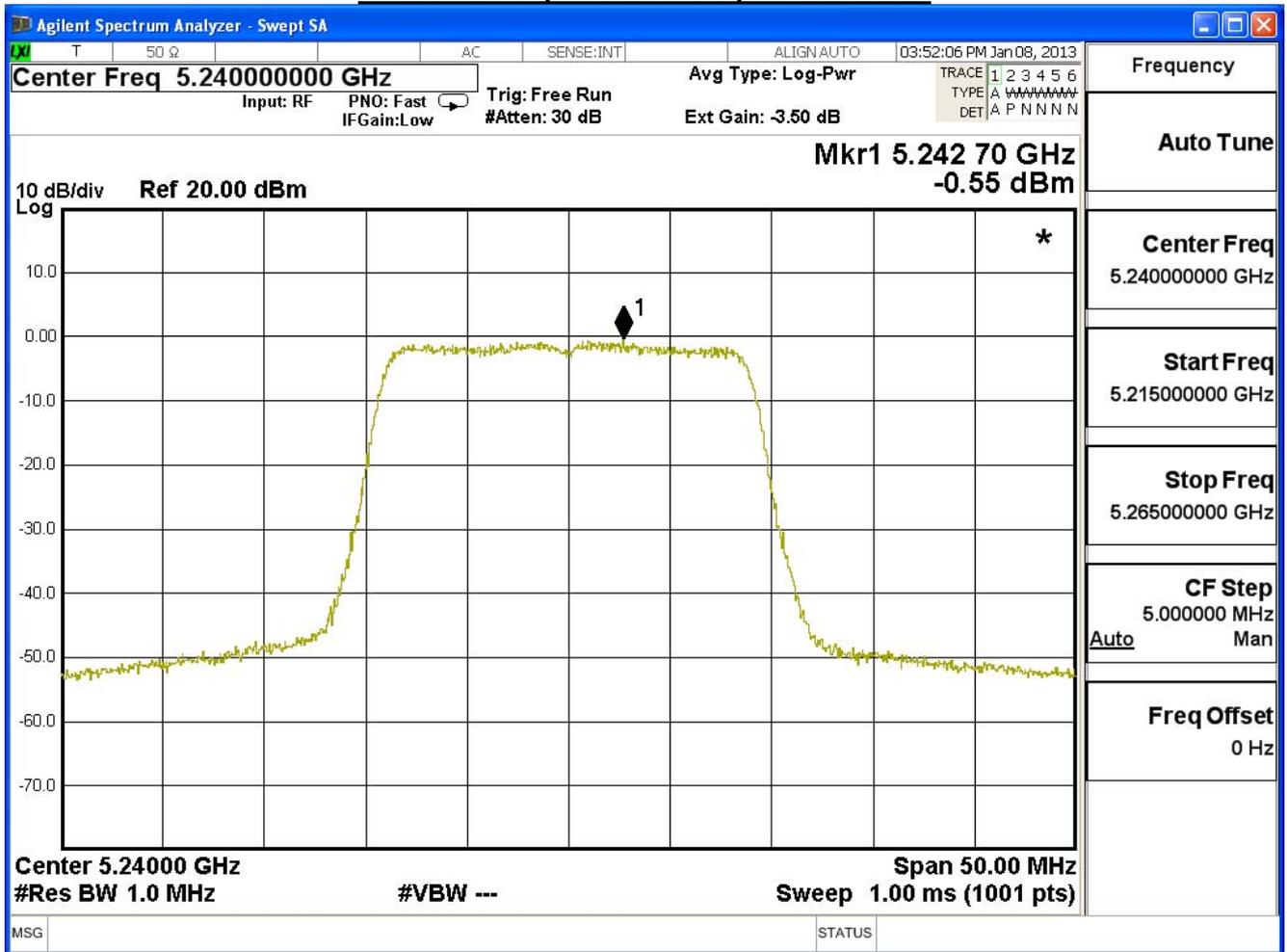
Peak Power Spectral Density – Channel 36



Peak Power Spectral Density – Channel 44



Peak Power Spectral Density – Channel 48



IEEE 802.11n_20M(ANT 1)

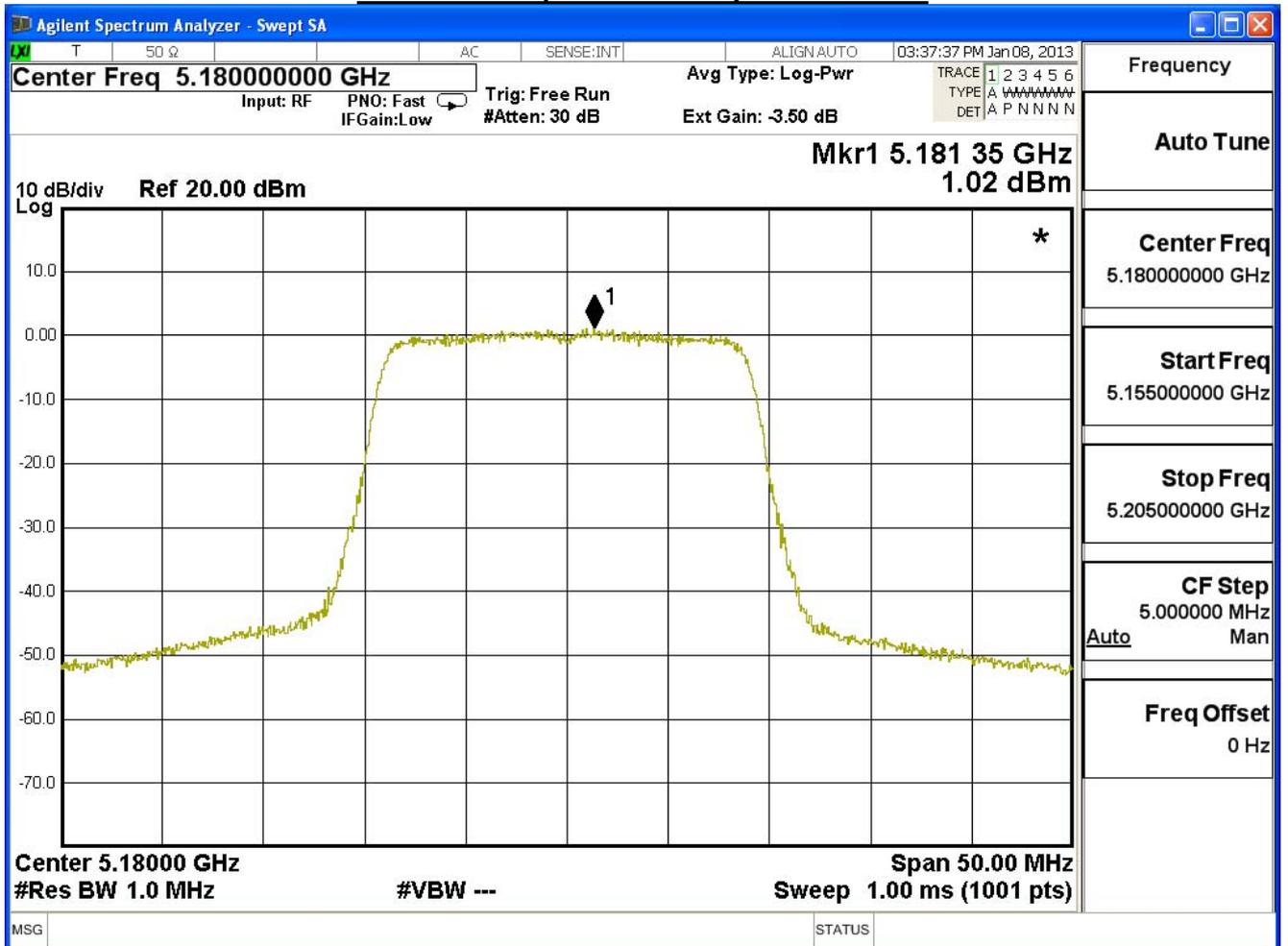
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
|-------------|-----------------|---------------------|----------------------|--------|
| 36 | 5180 | 1.02 | ≤ 3.93 | Pass |
| 44 | 5220 | 0.47 | ≤ 3.93 | Pass |
| 48 | 5240 | 0.89 | ≤ 3.93 | Pass |

Note:

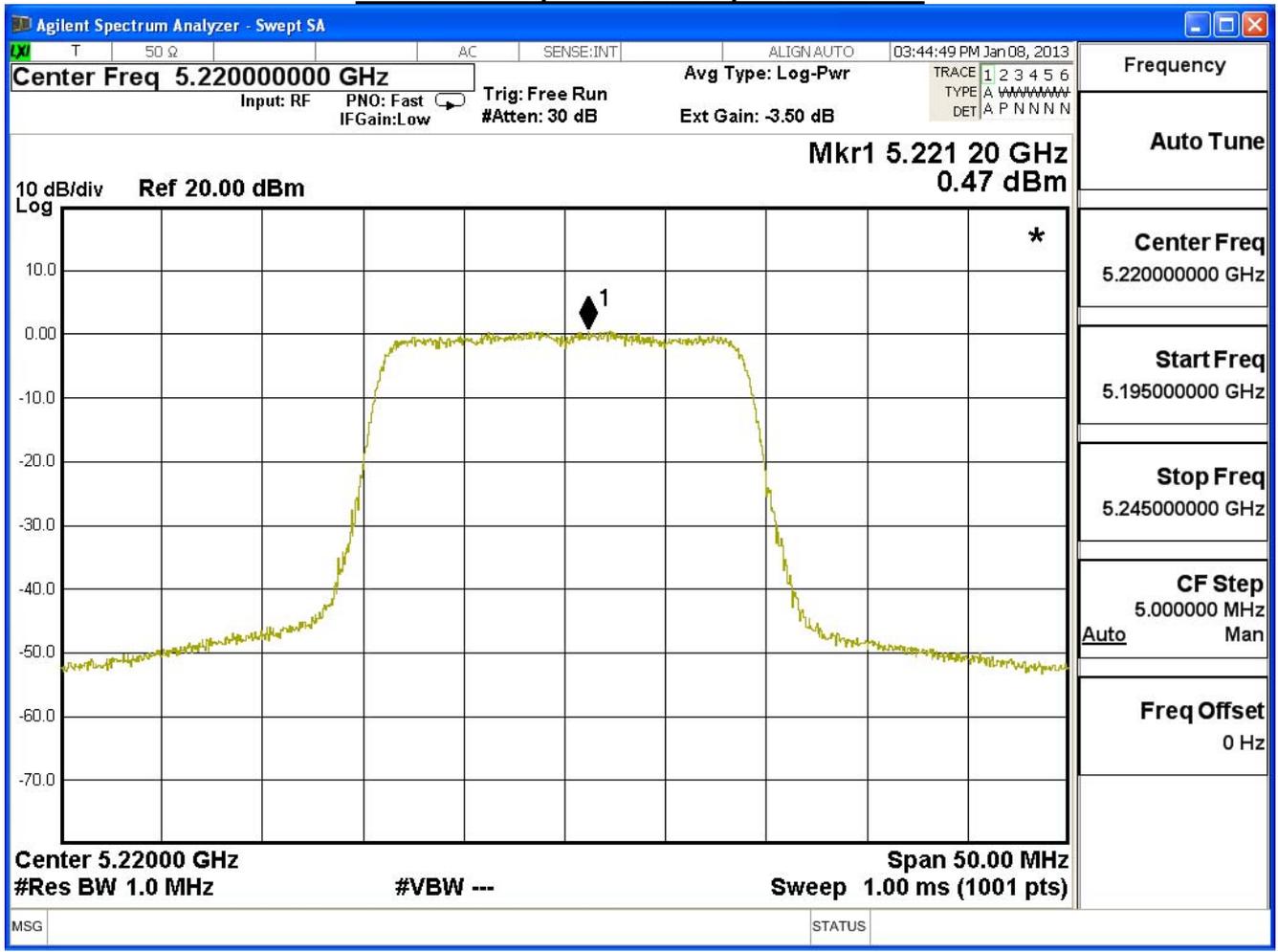
Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

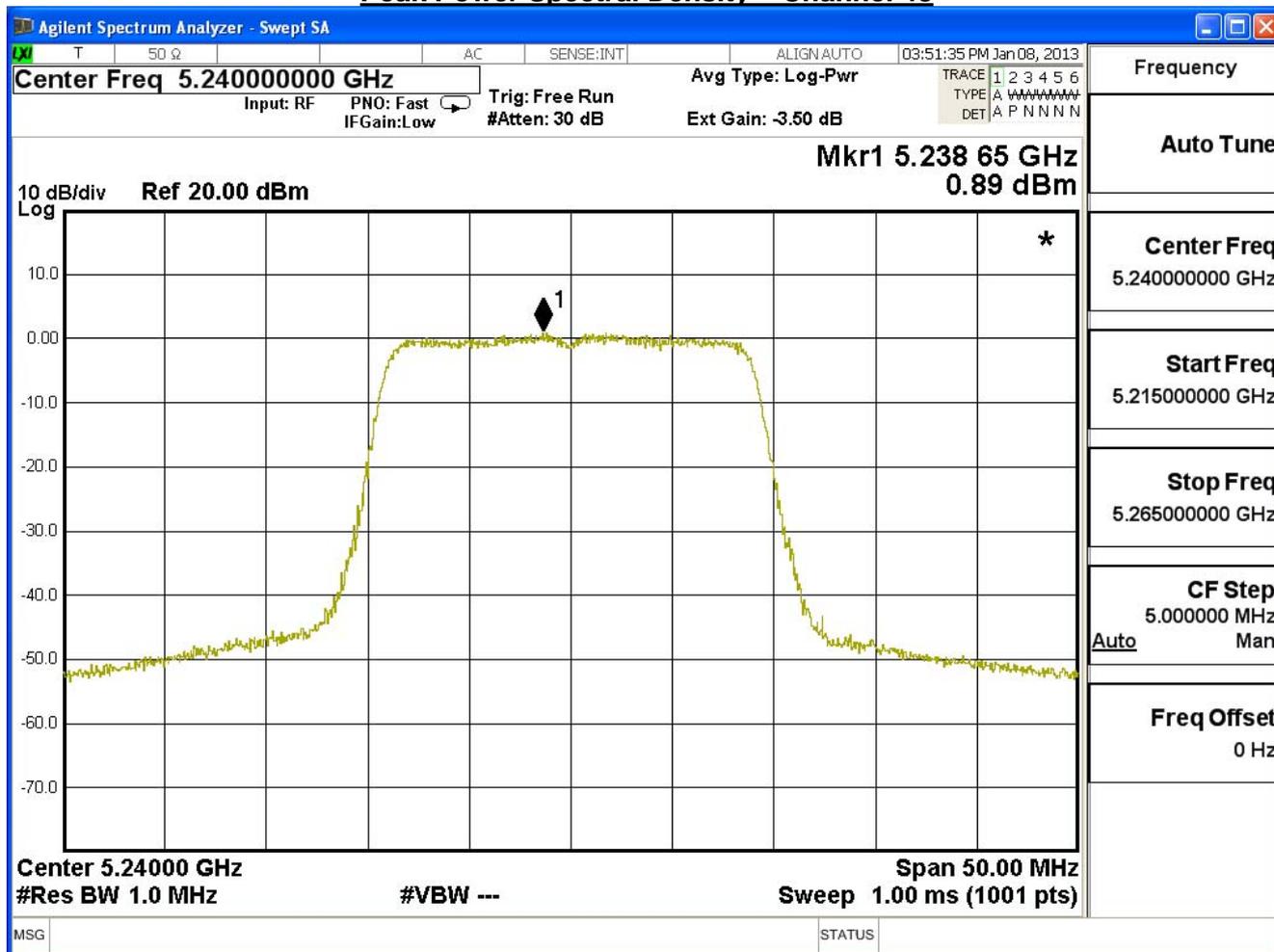
Peak Power Spectral Density – Channel 36



Peak Power Spectral Density – Channel 44



Peak Power Spectral Density – Channel 48



| IEEE 802.11n_20M(ANT 0+1) | | | | |
|---------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 36 | 5180 | 3.27 | ≤ 3.93 | Pass |
| 44 | 5220 | 3.01 | ≤ 3.93 | Pass |
| 48 | 5240 | 3.24 | ≤ 3.93 | Pass |

Note:

Girectional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

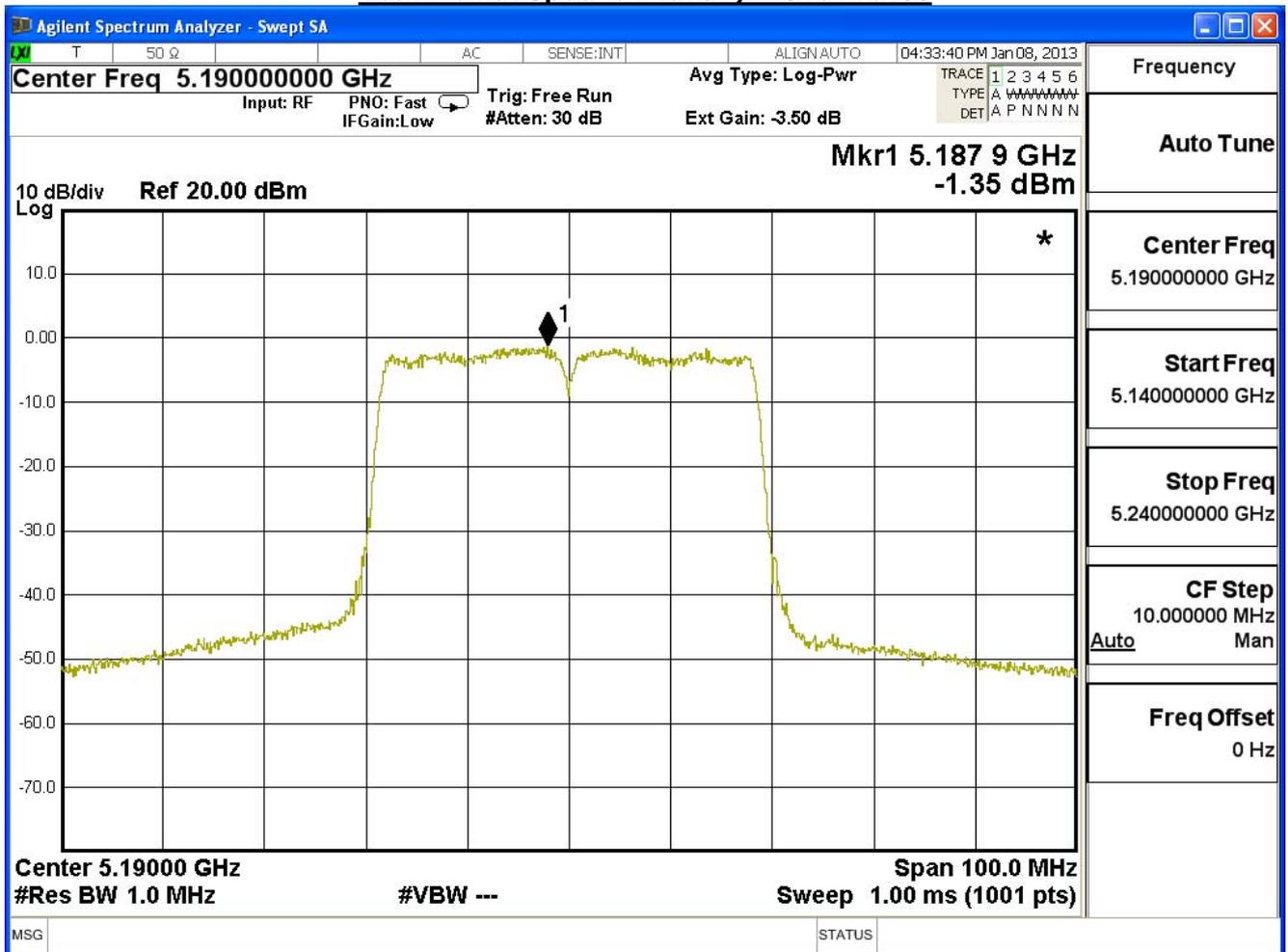
| IEEE 802.11n_40M(ANT 0) | | | | |
|-------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 38 | 5190 | -1.35 | ≤ 3.93 | Pass |
| 46 | 5230 | -1.24 | ≤ 3.93 | Pass |

Note:

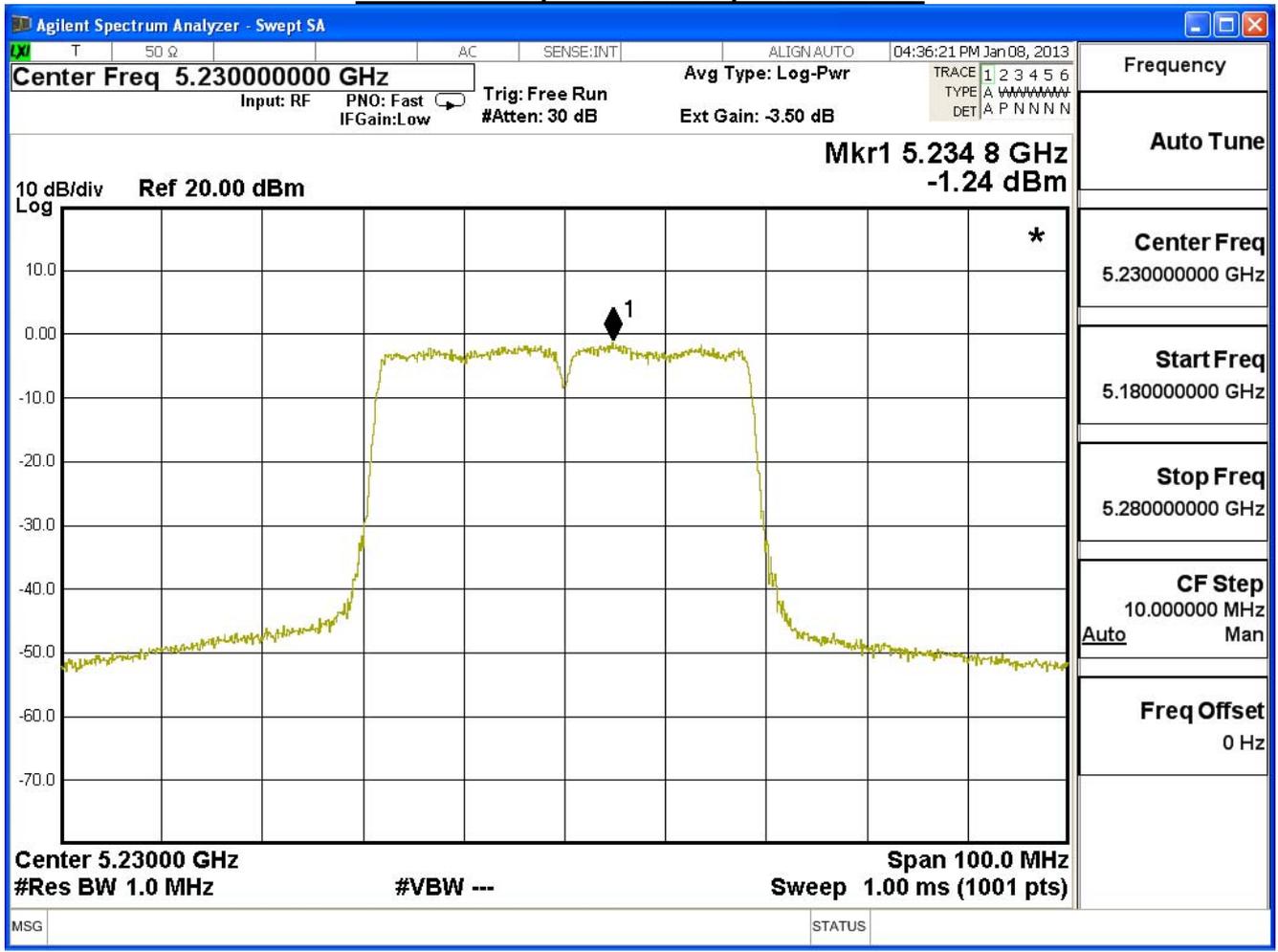
Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

Peak Power Spectral Density – Channel 38



Peak Power Spectral Density – Channel 46



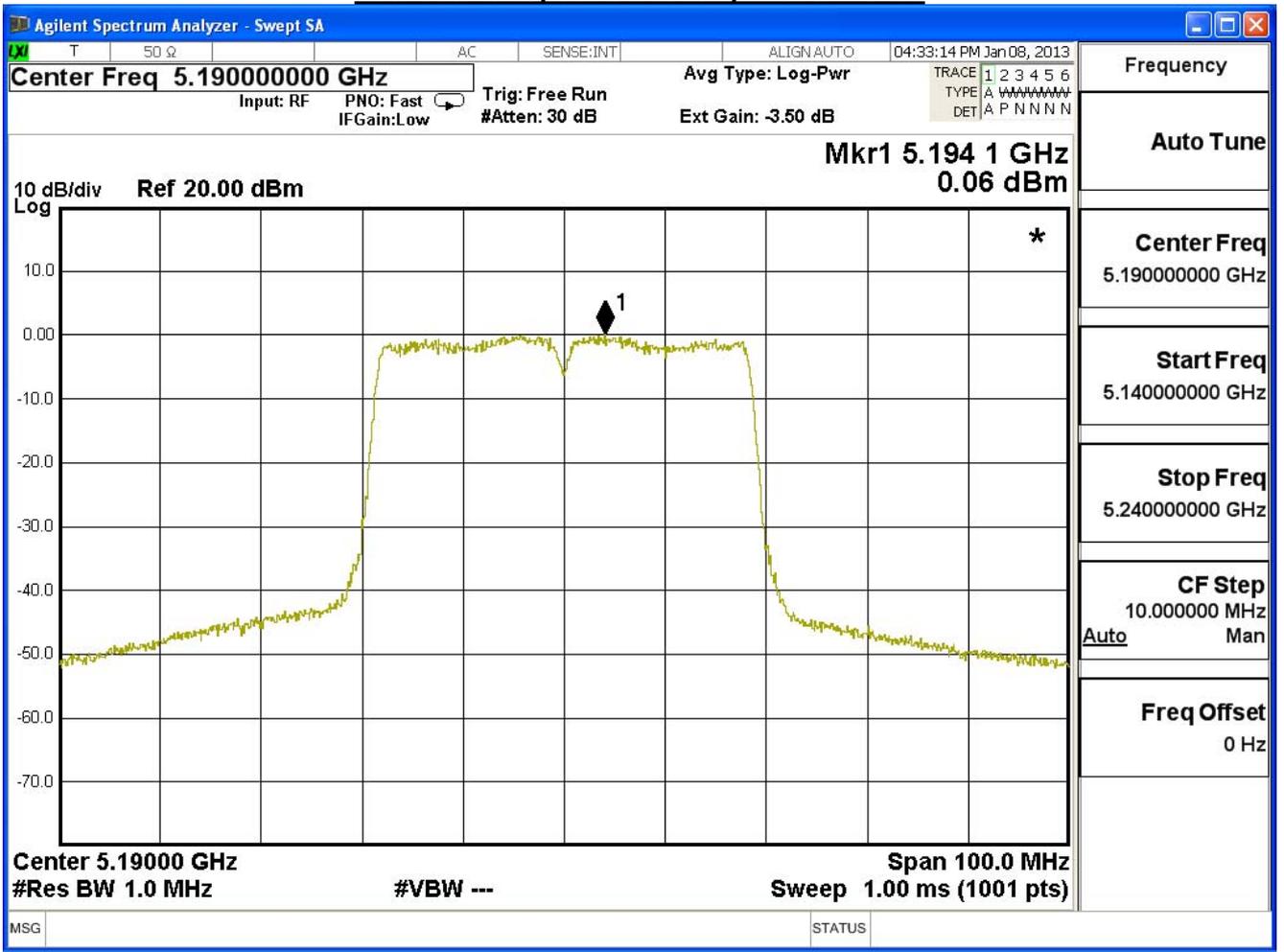
| IEEE 802.11n_40M(ANT 1) | | | | |
|-------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 38 | 5190 | 0.06 | ≤ 3.93 | Pass |
| 46 | 5230 | -0.19 | ≤ 3.93 | Pass |

Note:

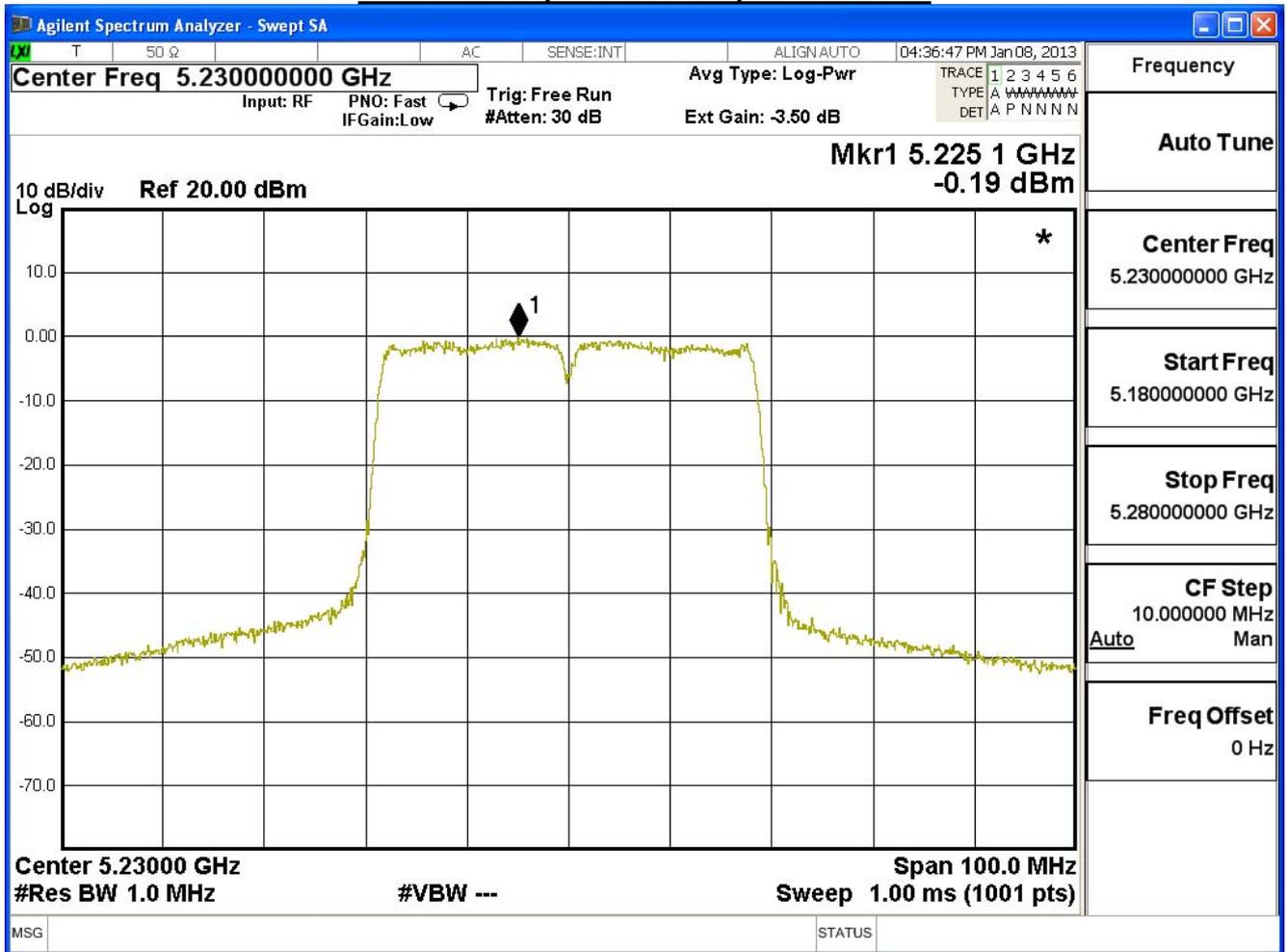
Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

Peak Power Spectral Density – Channel 38



Peak Power Spectral Density – Channel 46



| IEEE 802.11n_40M(ANT 0+1) | | | | |
|---------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 38 | 5190 | 2.78 | ≤ 3.93 | Pass |
| 46 | 5230 | 2.33 | ≤ 3.93 | Pass |

Note:

Girectional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

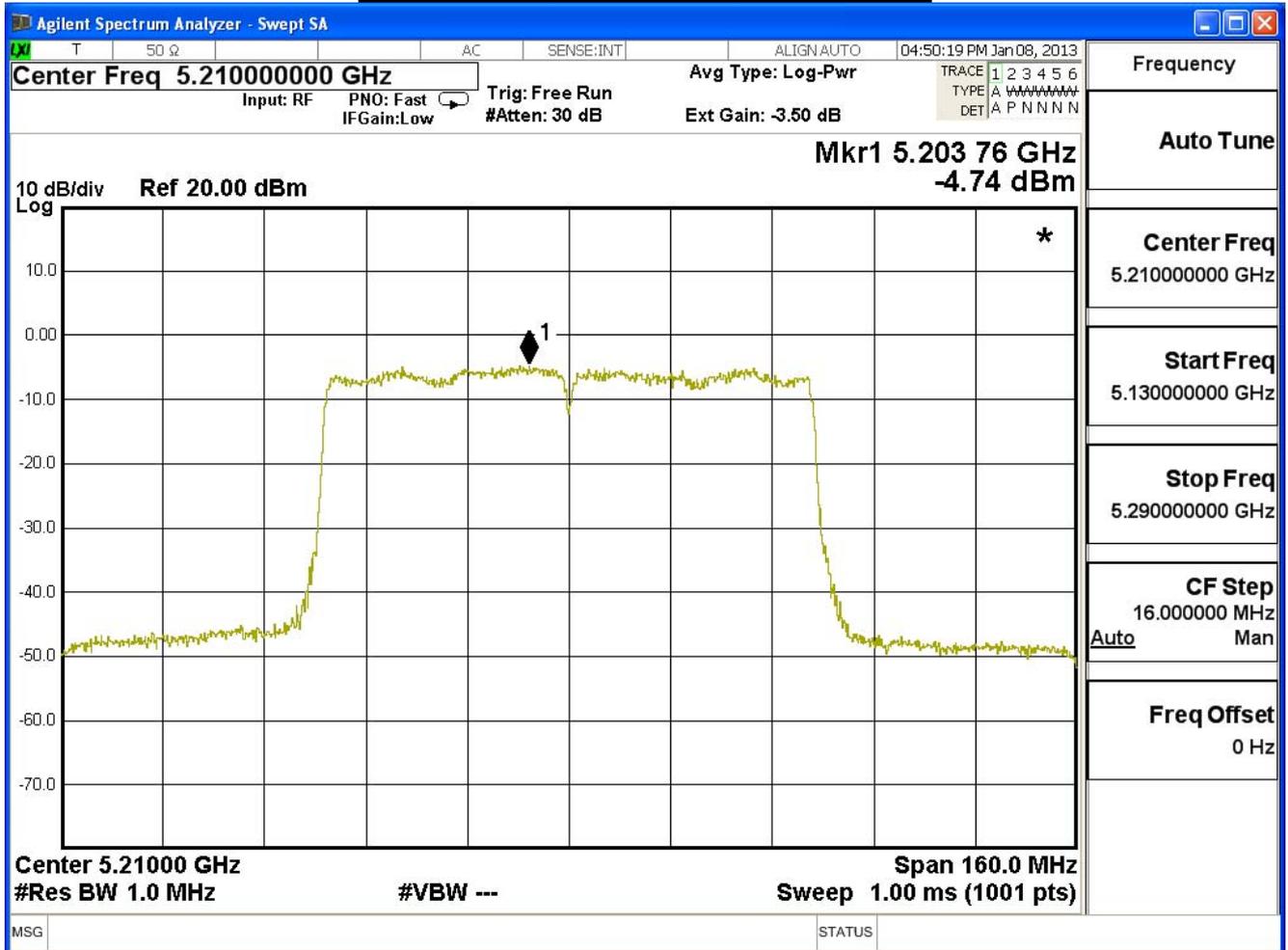
| IEEE 802.11ac_80M(ANT 0) | | | | |
|--------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 42 | 5210 | -4.74 | ≤3.93 | Pass |

Note:

Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

Peak Power Spectral Density – Channel 42



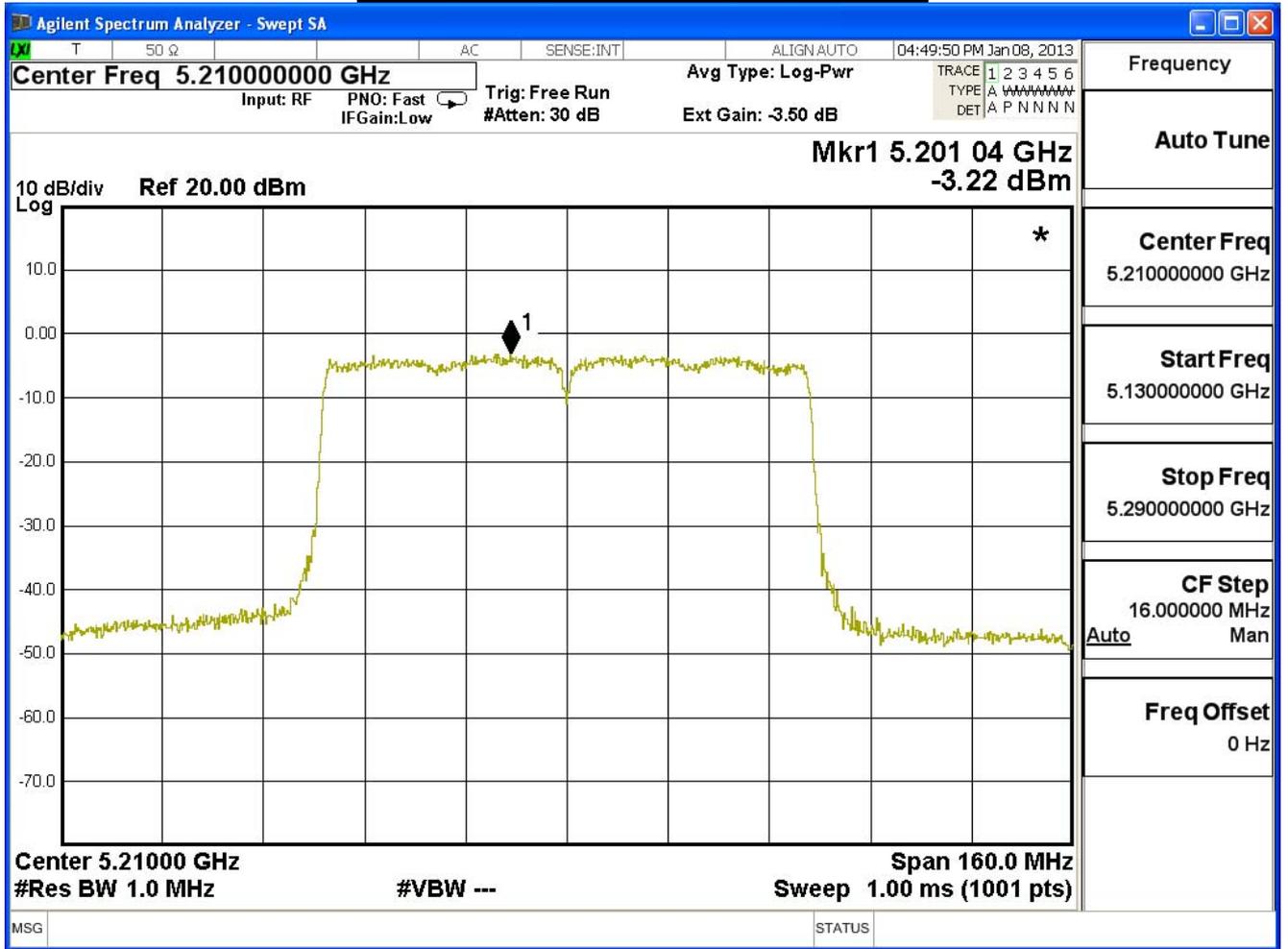
| IEEE 802.11ac_80M(ANT 1) | | | | |
|--------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 42 | 5210 | -3.22 | ≤3.93 | Pass |

Note:

Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$

Peak Power Spectral Density – Channel 42



| IEEE 802.11ac_80M(ANT 0+1) | | | | |
|----------------------------|-----------------|---------------------|----------------------|--------|
| Channel No. | Frequency (MHz) | Measure Level (dBm) | Required Limit (dBm) | Result |
| 42 | 5210 | -0.90 | ≤3.93 | Pass |

Note:

Directional Gain = $10\log(\text{Ant N}) + \text{max Gain} = 10\log(2) + 3.07 = 6.07\text{dBi}$

Required Limit = $4\text{dBm} - (6.07\text{dBi} - 6\text{dBi}) = 4 - 0.07 = 3.93\text{ dBm}$