Emissions
Test Report

EUT Name: Wireless Residential Gateway

Model No.: 5268AC

CFR 47 Part 15.407:2013 and RSS-210:2010

Prepared for:

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Note: Latest revision report will replace all previous reports.

Statement of Compliance

Manufacturer:	Pace Americas 310 Providence Mine Road, Ste. 200 Nevada City, CA 95959 U.S.A. (530) 274-5440
Requester / Applicant:	Mark Rieger
Name of Equipment:	Wireless Residential Gateway
Model No.	5268AC
Type of Equipment:	Intentional Radiator
Application of Regulations:	CFR 47 Part 15.407:2013 and RSS-210:2010
Test Dates:	29 March 2014 to 19 April 2014

Guidance Documents:

Emissions: ANSI C63.10-2009, KDB 789033 D01 General UNII Test Procedure v01r03, KDB 662911 D01 Multiple Transmitter Output v02r01

Test Methods:

Emissions: ANSI C63.10-2009, KDB 789033 D01 General UNII Test Procedure v01r03

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report contains data that are not covered by A2LA accreditation. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

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Jeremy Luong	April 23, 2014	Conan Boyle	April 30, 2014 (Reissue Date)
Test Engineer	Date	Laboratory Signature	Date

Testing Cert #3331.02 **US5254** **2932M-1**

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1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.407:2013 and RSS-210:2010 based on the results of testing performed on 29 March 2014 to 19 April 2014 on the Wireless Residential Gateway Model 5268AC manufactured by Pace Americas This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

The 5150 MHz to 5250 MHz frequency band was covered this document.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.4:2003/ ANSI C63.10:2009	Test Parameters	Measured Value	Result
Spurious Emission in Transmitted Mode	CFR47 15.209, CFR47 15.407 (b) RSS-GEN Sect.7.2.3, RSS-210 Sect. A.9.2	Class B	-4.72 dB (margin)	**Complied**
Restricted Bands of Operation	CFR47 15.205, RSS-210 Sect.2.6	Class B		**Complied**
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.7.2.2	Class B	-14.27 dB (margin)	**Complied**
Occupied Bandwidth	CFR47 15.407 (a), RSS GEN Sect.4.4.1	N/A	26dB BW: 22.21 MHz 99% BW: 16.61 MHz	**Complied**
Maximum Output Power	CFR47 15.407 (a), RSS-210 Sect. A.9.2	14.92 dBm	14.47 dBm	**Complied**
Peak Power Spectral Density	CFR47 15.407 (a), RSS-210 Sect. A.9.2	1.92 dBm/MHz	0.83 dBm/MHz	**Complied**
Peak Excursion Ratio	CFR47 15.407 (a)(6)	< 13 dB	-8.44 dB	**Complied**
Conducted Emission – Antenna Port	CFR47 15.407 (b), RSS-210 Sect.6.2.2	< -27 dBm/MHz	Note 2	**Complied**
Frequency Stability	CFR47 15.407 (g), RSS GEN Sect. 4.7.	±20 ppm	8.98 ppm	**Complied**
RF Exposure - General Population	CFR47 15.247 (i), 2.1091	1.0 mW/cm^2	0.39 mW/cm2	**Complied**

Note: 1. Test limit was accounted for the maximum directional gain antenna.
2. Meet restricted band emission requirements.
3. This report is only documented for 5150 – 5250 MHz.

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 is recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (US5254). The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

2.1.2 NIST / A2LA

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:2005 and ISO 9002 (Lab Code 3331.02). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Canada – Industry Canada

TUV Rheinland of North America at the 1279 Quarry Ln, Pleasanton, CA 94566 address is accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by Industry Canada (File Number 2932M). This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). The accreditation is updated every 3 years.

2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0031

VCCI Registration No. for Santa Clara: A-0032

2.1.5 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2009, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code 3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2009, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	**U_{lab}**	**U_{cispr}**
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.3 dB

Voltech PM6000A

The estimated combined standard uncertainty for harmonic current and flicker measurements is ± 5.0%.	Per CISPR 16-4-2 Methods

2.3.3 Measurement Uncertainty Immunity

The estimated combined standard uncertainty for ESD immunity measurements is ± 8.2%.	Per IEC 61000-4-2
The estimated combined standard uncertainty for radiated immunity measurements is ± 4.10 dB.	Per IEC 61000-4-3
The estimated combined standard uncertainty for conducted immunity measurements with CDN is ± 3.66 dB	Per IEC 61000-4-6
The estimated combined standard uncertainty for power frequency magnetic field immunity is ± 11.6%.	Per IEC 61000-4-8

Thermo KeyTek EMC Pro

The estimated combined standard uncertainty for EFT fast transient immunity measurements is ± 5.84%.
The estimated combined standard uncertainty for surge immunity measurements is ± 5.84 %.
The estimated combined standard uncertainty for voltage variation and interruption measurements is ± 3.48%.

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

Measurement Uncertainty – Radio Testing

The estimated combined standard uncertainty for frequency error measurements is ± 3.88 Hz
The estimated combined standard uncertainty for carrier power measurements is ± 1.59 dB.
The estimated combined standard uncertainty for adjacent channel power measurements is ± 1.47 dB.
The estimated combined standard uncertainty for modulation frequency response measurements is ± 0.46 dB.
The estimated combined standard uncertainty for transmitter conducted emission measurements is ± 4.01 dB

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005.

3 Product Information

3.1 Product Description

Pace Americas 5268AC is a residential gateway that provides an 802.11 a/b/g/n/ac Wi-Fi access point and ethernet switch function for connecting personal computers and other in-home networked devices to the service provider's network. The 5168AC features:

- Bonded ADSL2+/VDSL2
- Gigabit Ethernet WAN
- HomePNA 3.1 coax port
- 4 Gigabit Ethernet LAN ports
- 5GHZ 802.11n 4x4 MIMO Wi-Fi
- 2.4GHZ 802.11n 2x2 MIMO Wi-Fi
- 2 FXS (VoIP) Lines
- USB Host Port

3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

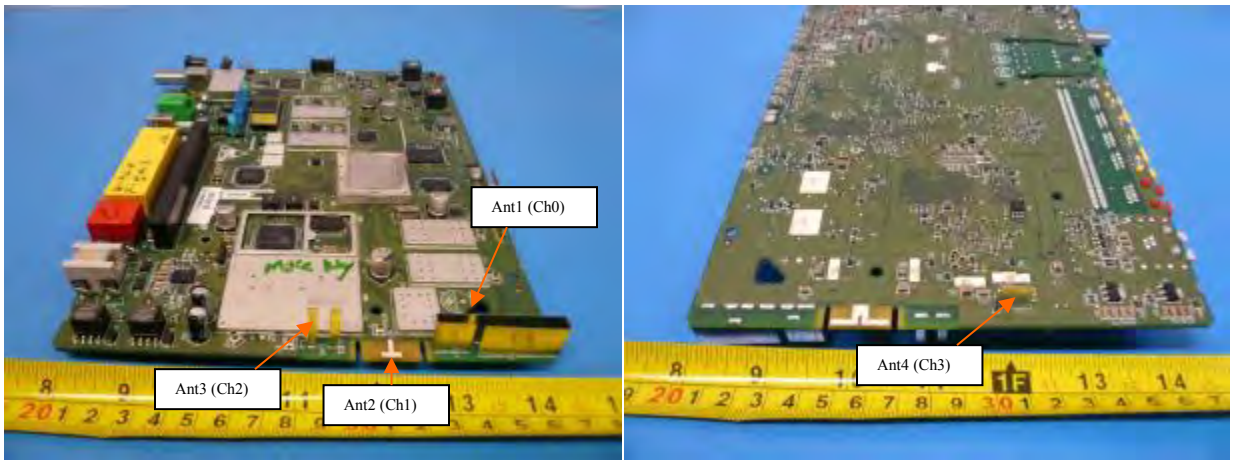
3.4 Unique Antenna Connector

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.4.1 Results

The Wireless Residential Gateway has 4 internal fixed antennas. All antennas are integrated on the PCB. There is no external antenna connection available.

Antenna	Peak Gain (dBi)
1	1.95
2	2.27
3	1.83
4	2.03
Total Directional gain is +8.08 dBi.	



4 Emissions

Testing was performed in accordance with CFR 47 Part 15.407: 2013 and RSS 210 Annex 9: 2010. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

The maximum output power and harmonics shall not exceed CFR47 Part 15.407 (a):2012 and RSS-210 A9.2: 2010.

The maximum transmitted powers are

Band 5150-5250 MHz:50 mW or 4 dBm + 10Log B.

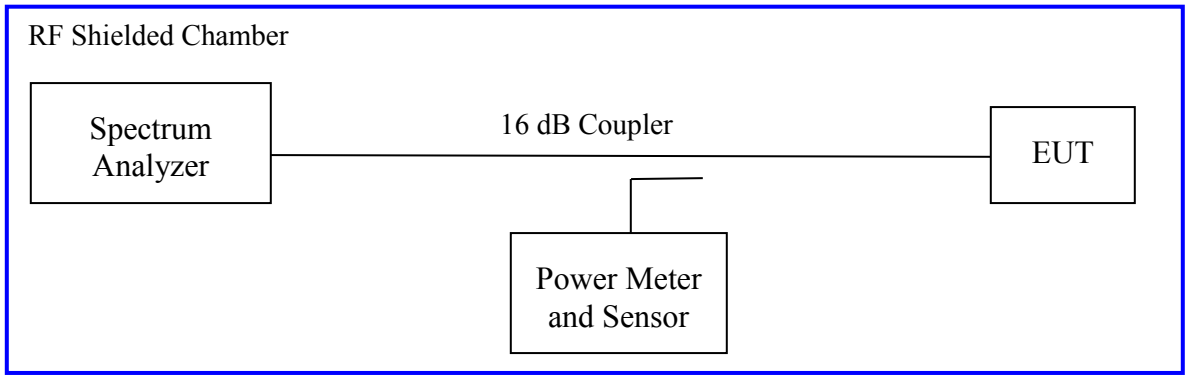
Band 5250-5350 MHz, 5470-5725 MHz:250 mW or 11 dBm + 10Log B.

Band 5725-5825 MHz:1 W or 17 dBm + 10Log B. Where B is 26 dB Bandwidth.

4.1.1 Test Method

The ANSI C63.10-2009 Section 6.10.3.1 conducted method was used to measure the channel power output. The preliminary investigation was performed at different data rate/ chain to determine the highest power output for each mode. The worst findings were conducted on 3 channels in each mode on the sample, S/N 121404000111, per CFR47 Part 15.407(a): 2013 and RSS-210 A.9.2; 5150 MHz to 5250 MHz. The worst mode results indicated below.

Test Setup:



Method SA-2 of "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices" applies since the EUT continuously transmit with duty cycle less 100%.
The duty cycle, CF = 10Log(1/duty cycle), was applied.

Each chain was measured individually and applied the measure-and-sum approach per KDB66291.
All chains will be on at all time and beam performing. Per CFR47 Part 15.407 (a) (1), the limit is reduced for every dBi gain exceeding 6 dBi. The adjusted limit is 14.92 dBm since the total directional gain is 8.08 dBi.

4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 2: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement				**Test Date:** April 19, 2014				
Antenna Type: Integrated				**Power Setting:** See test plan				
Directional Antenna Gain: + 8.08 dBi				**Signal State:** Modulated.				
Ambient Temp.: 22 °C				**Relative Humidity:**35%				
802.11a, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5180	14.92	6.03	5.97	4.73	5.38	0.04	11.62	-3.30
5200	14.92	5.64	5.71	4.28	5.08	0.04	11.28	-3.64
5240	14.92	5.67	6.02	4.62	5.33	0.04	11.51	-3.41
Note: The highest output power was observed at 802.11a, 6Mbps, 4 Data Streams at 99% duty cycle. Power Setting was 9 dBm.								
802.11n HT20, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5180	14.92	6.60	5.62	5.03	5.62	0.09	11.86	-3.06
5200	14.92	6.02	5.51	5.13	4.87	0.09	11.51	-3.41
5240	14.92	5.47	5.97	5.71	5.02	0.09	11.66	-3.26
Note: The highest output power was observed at MCS0, 4 Data Streams at 98% duty cycle. Power Setting was 9 dBm.								
802.11n HT40, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5190	14.92	9.11	8.20	7.82	7.83	0.18	14.47	-0.45
5230	14.92	8.47	8.26	8.03	7.47	0.18	14.27	-0.65
Note: The highest output power was observed at MCS0, 4 Data Streams at 96% duty cycle. Power Setting was 11 dBm.								

802.11ac VHT20, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5180	14.92	6.68	5.34	5.06	5.18	0.09	11.72	-3.19
5200	14.92	6.10	5.10	5.01	4.86	0.09	11.40	-3.52
5240	14.92	5.37	5.75	5.57	4.97	0.09	11.53	-3.39
Note: The highest output power was observed at MCS0, 4 Data Streams at 98% duty cycle. Power Setting was 9 dBm.								
802.11ac VHT40 Mode, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5190	14.92	9.08	7.74	7.35	7.77	0.13	14.19	-0.73
5230	14.92	8.70	8.40	8.21	8.07	0.13	14.51	-0.41
Note: The highest output power was observed at MCS0, 4 Data Streams at 97% duty cycle. Power Setting was 11 dBm.								
802.11ac VHT80 Mode, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5210	14.92	8.62	8.31	7.41	7.86	0.32	14.41	-0.51
Note: The highest output power was observed at MCS0, 4 Data Streams at 93% duty cycle. Power Setting was 11 dBm.								

Table 3: Average Output Power at the Antenna Port – Reference Only

Test Conditions: Conducted Measurement				**Test Date:** April 19, 2014				
Antenna Type: Integrated				**Power Setting:** See test plan				
Directional Antenna Gain: + 8.08 dBi				**Signal State:** Modulated.				
Ambient Temp.: 22 °C				**Relative Humidity:**35%				
802.11a, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5180		6.41	6.36	5.13	5.80	0.04	12.02	
5200		6.07	6.14	6.14	5.55	0.04	12.05	
5240		5.90	6.21	4.82	5.53	0.04	11.71	
Note: The highest output power was observed at 802.11a, 6Mbps, 4 Data Streams at 99% duty cycle. Power Setting was 9 dBm.								
802.11n HT20, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5180		7.01	6.00	5.39	6.00	0.09	12.25	
5200		6.47	5.95	5.95	5.26	0.09	12.04	
5240		5.71	6.14	5.94	5.19	0.09	11.87	
Note: The highest output power was observed at MCS0, 4 Data Streams at 98% duty cycle. Power Setting was 9 dBm.								
802.11n HT40, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5190		9.52	8.61	8.22	8.30	0.18	14.89	
5230		8.89	8.62	8.62	8.03	0.18	14.75	
Note: The highest output power was observed at MCS0, 4 Data Streams at 96% duty cycle. Power Setting was 11 dBm.								

802.11ac VHT20, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5180		7.31	5.81	5.53	5.66	0.09	12.25	
5200		6.58	5.61	5.61	5.38	0.09	11.93	
5240		5.62	6.01	5.76	5.22	0.09	11.77	
Note: The highest output power was observed at MCS0, 4 Data Streams at 98% duty cycle. Power Setting was 9 dBm.								
802.11ac VHT40, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5190		9.77	8.51	7.83	8.22	0.13	14.80	
5230		8.88	8.57	8.57	8.18	0.13	14.71	
Note: The highest output power was observed at MCS0, 4 Data Streams at 97% duty cycle. Power Setting was 11 dBm.								
802.11ac VHT80, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5210		8.85	8.50	7.64	8.06	0.32	14.62	
Note: The highest output power was observed at MCS0, 4 Data Streams at 93% duty cycle. Power Setting was 11 dBm.								

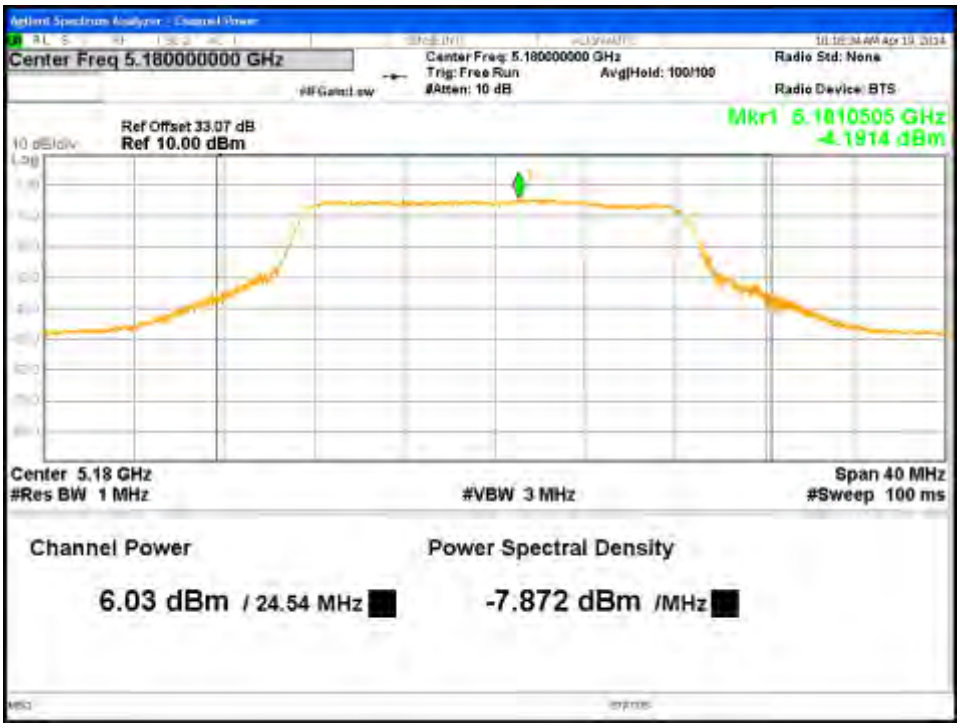


Figure 1: Maximum Conducted Output Power-5180 MHz-11a-6Mbps-Ch0

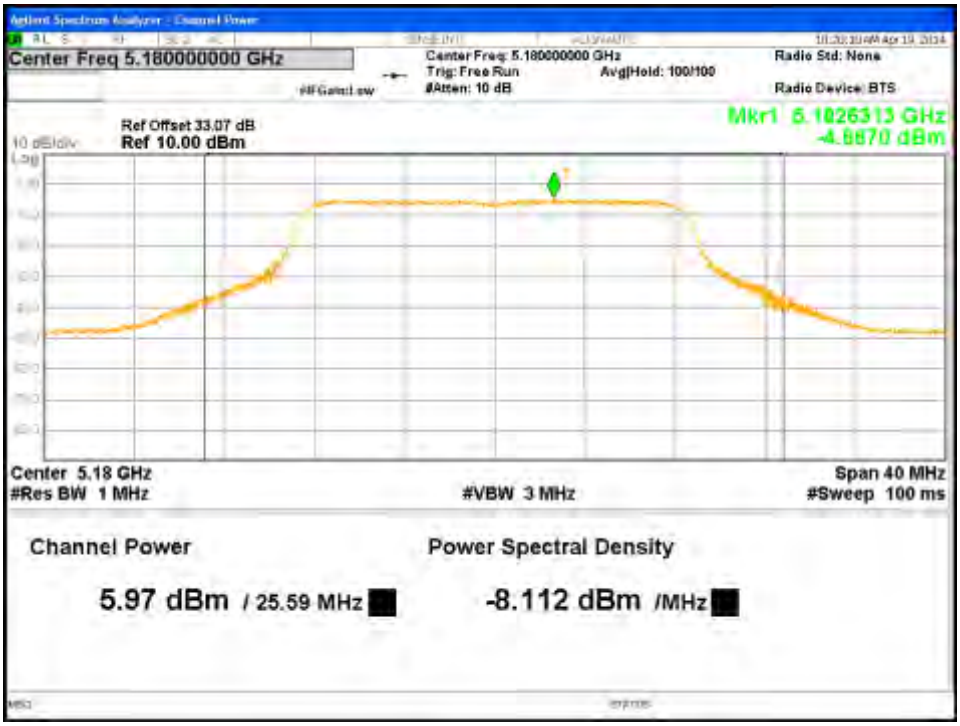


Figure 2: Maximum Conducted Output Power-5180 MHz-11a-6Mbps-Ch1

Figure 3: Maximum Conducted Output Power-5180 MHz-11a-6Mbps-Ch2

Figure 4: Maximum Conducted Output Power-5180 MHz-11a-6Mbps-Ch3

Figure 5: Maximum Conducted Output Power-5200 MHz-11a-6Mbps-Ch0

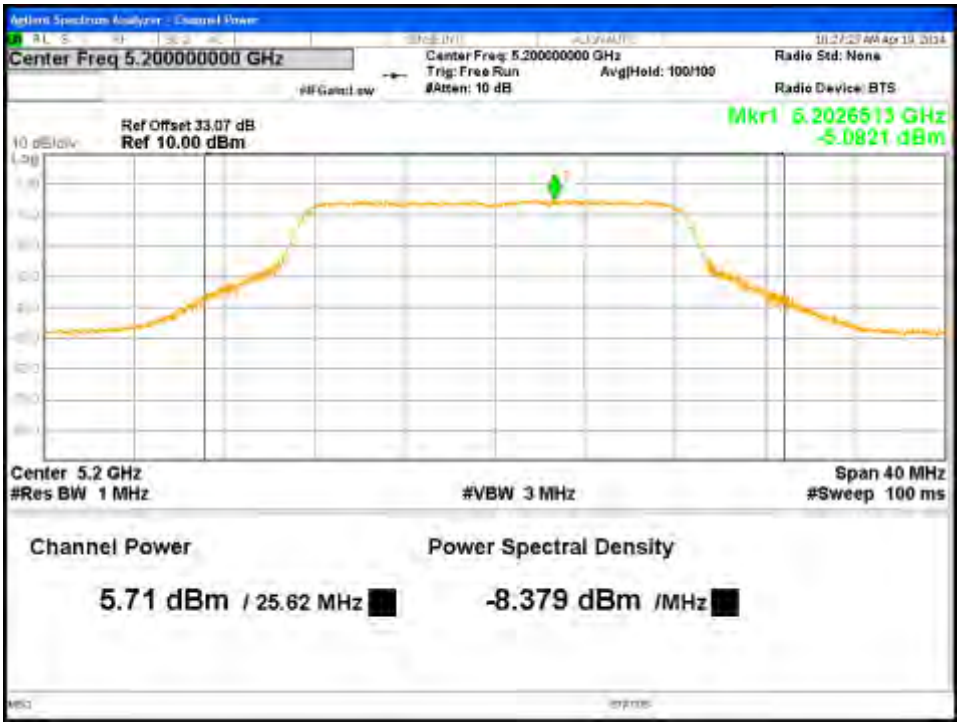


Figure 6: Maximum Conducted Output Power-5200 MHz-11a-6Mbps-Ch1

Figure 7: Maximum Conducted Output Power-5200 MHz-11a-6Mbps-Ch2

Figure 8: Maximum Conducted Output Power-5200 MHz-11a-6Mbps-Ch3

Figure 9: Maximum Conducted Output Power-5240 MHz-11a-6Mbps-Ch0

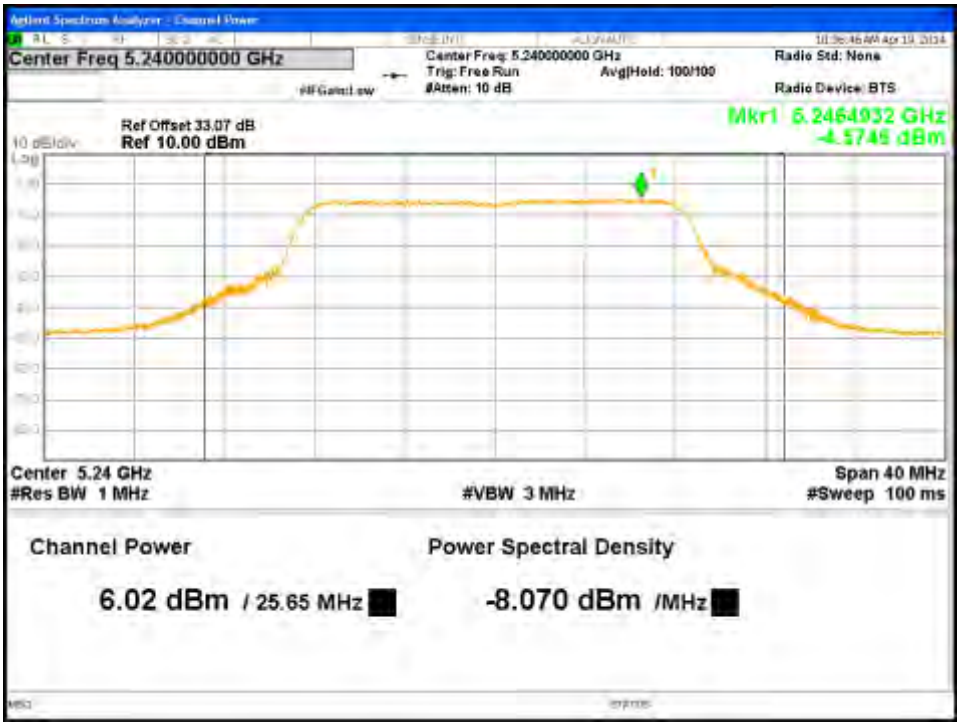


Figure 10: Maximum Conducted Output Power-5240 MHz-11a-6Mbps-Ch1

Figure 11: Maximum Conducted Output Power-5240 MHz-11a-6Mbps-Ch2

Figure 12: Maximum Conducted Output Power-5240 MHz-11a-6Mbps-Ch3

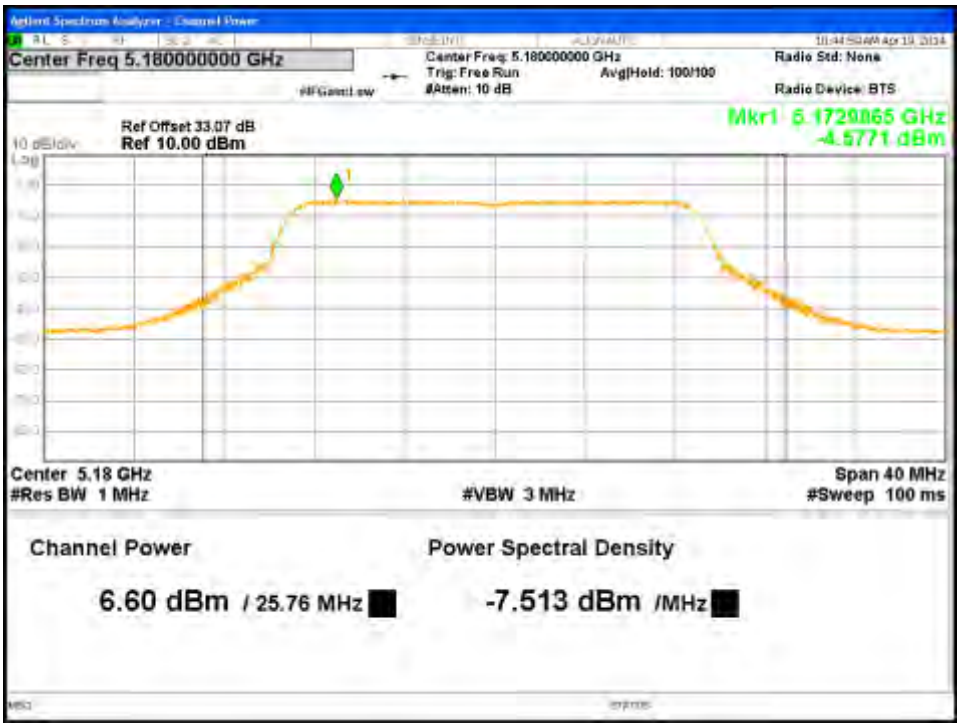


Figure 13: Maximum Conducted Output Power-5180 MHz-HT20-MCS0-Ch0

Figure 14: Maximum Conducted Output Power-5180 MHz-HT20-MCS0-Ch1

Figure 15: Maximum Conducted Output Power-5180 MHz-HT20-MCS0-Ch2

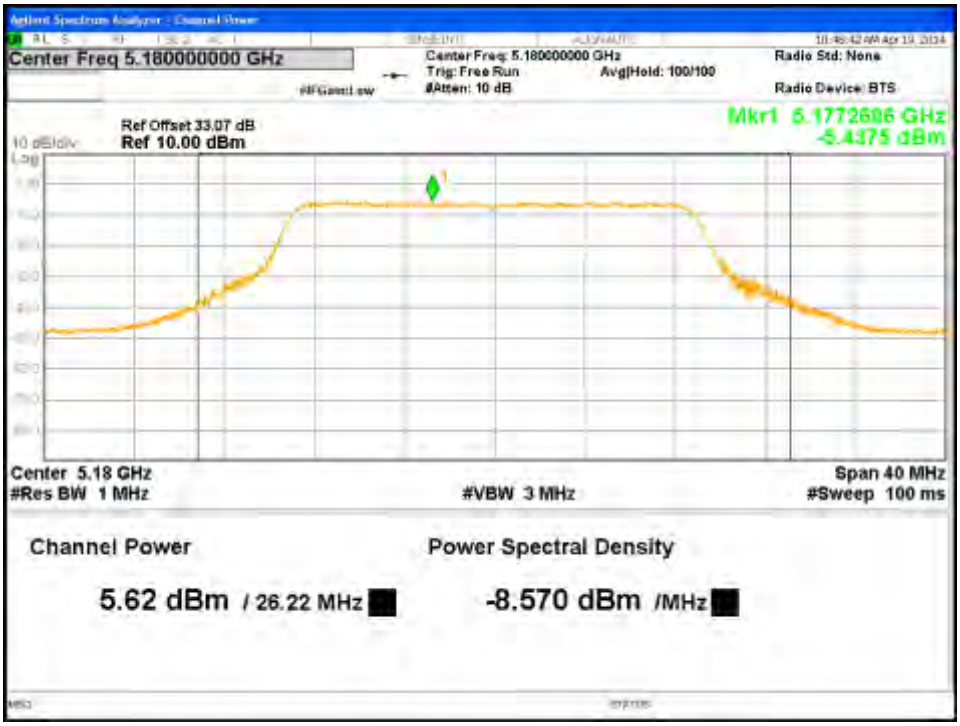


Figure 16: Maximum Conducted Output Power-5180 MHz-HT20-MCS0-Ch3

Figure 17: Maximum Conducted Output Power-5200 MHz-HT20-MCS0-Ch0

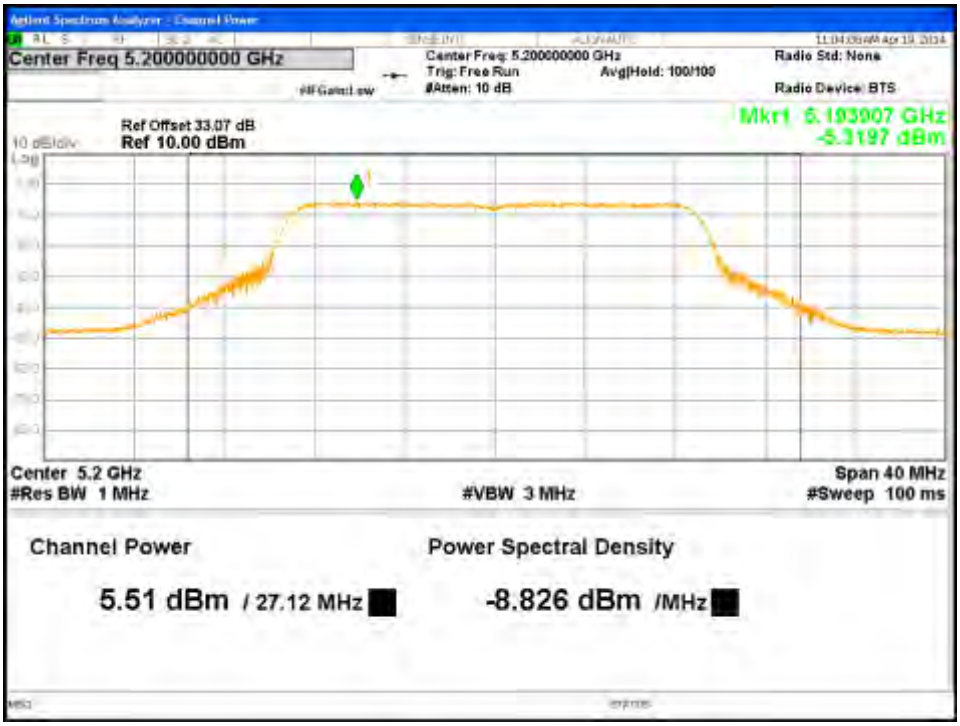


Figure 18: Maximum Conducted Output Power-5200 MHz-HT20-MCS0-Ch1

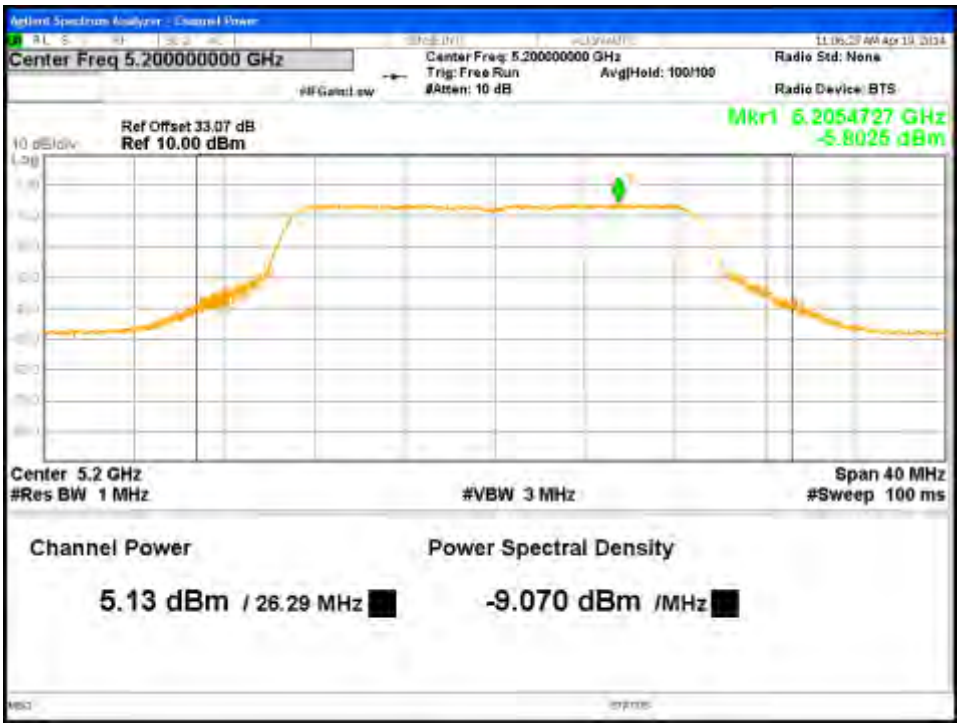


Figure 19: Maximum Conducted Output Power-5200 MHz-HT20-MCS0-Ch2

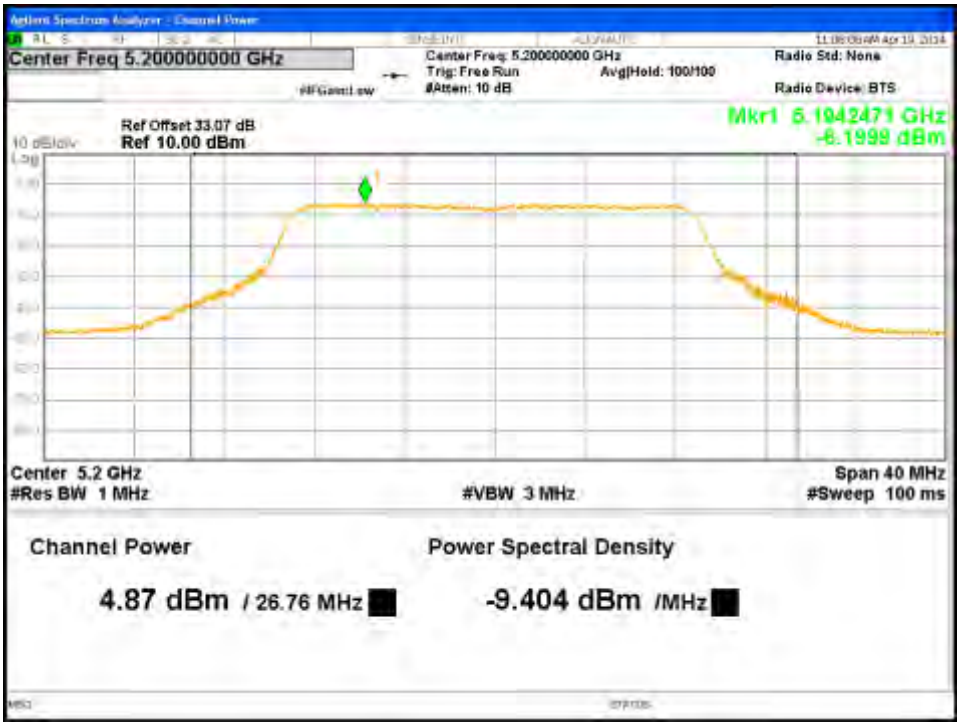


Figure 20: Maximum Conducted Output Power-5200 MHz-HT20-MCS0-Ch3

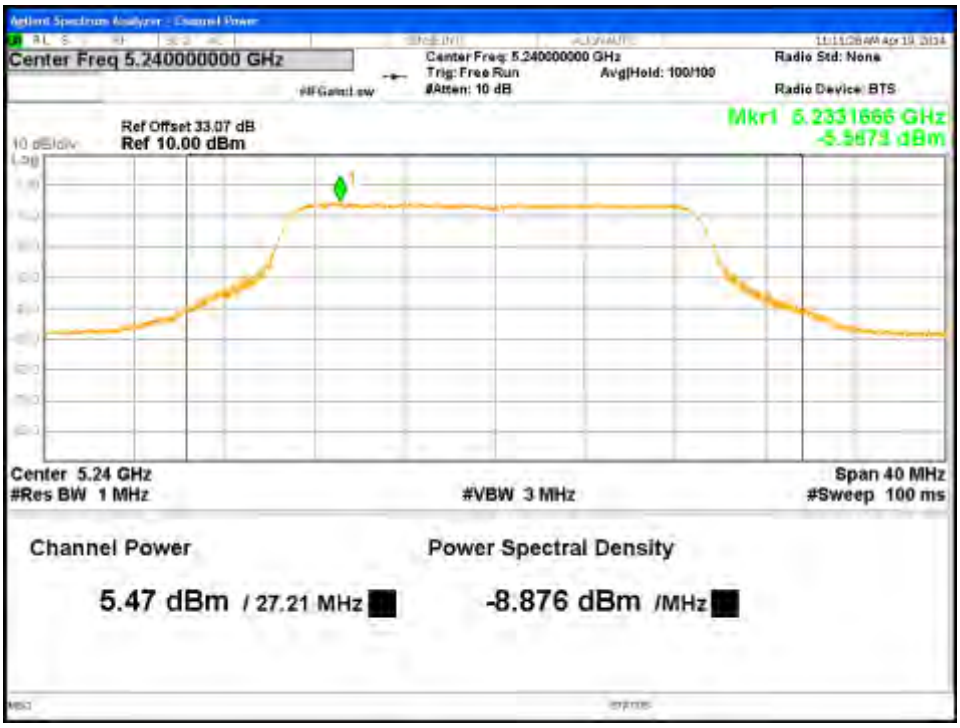


Figure 21: Maximum Conducted Output Power-5240 MHz-HT20-MCS0-Ch0

Figure 22: Maximum Conducted Output Power-5240 MHz-HT20-MCS0-Ch1

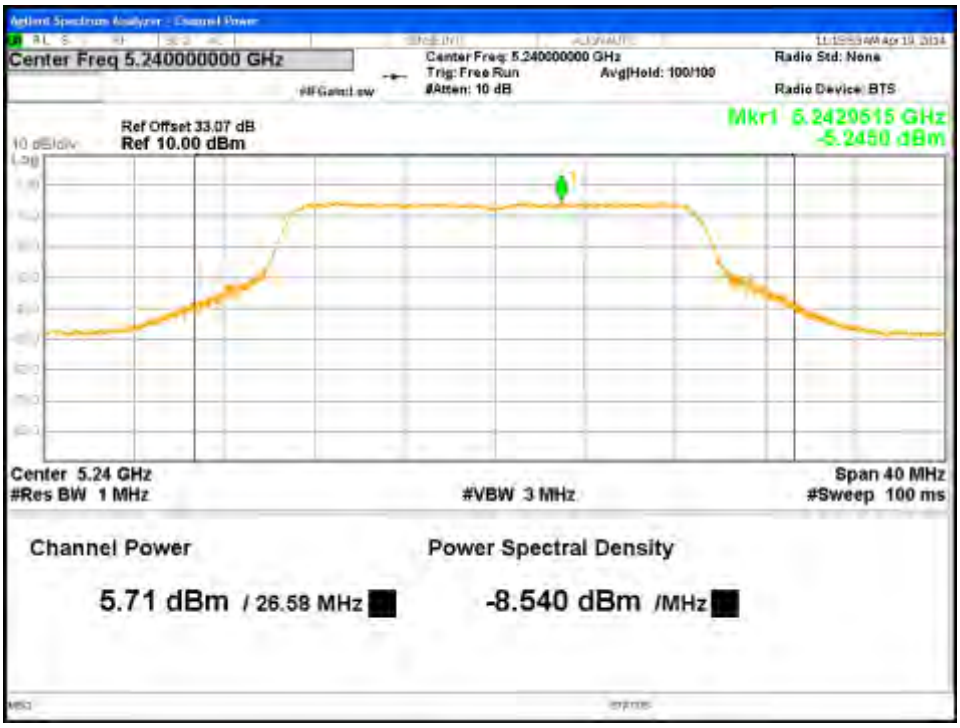


Figure 23: Maximum Conducted Output Power-5240 MHz-HT20-MCS0-Ch2

Figure 24: Maximum Conducted Output Power-5240 MHz-HT20-MCS0-Ch3

Figure 25: Maximum Conducted Output Power-5190 MHz-HT40-MCS0-Ch0

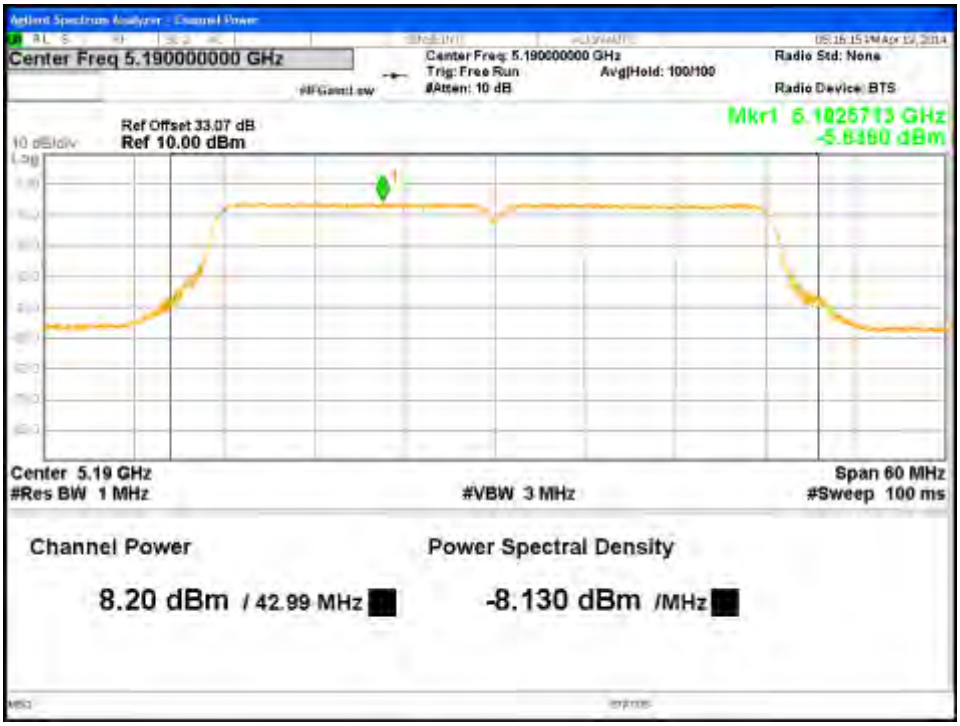


Figure 26: Maximum Conducted Output Power-5190 MHz-HT40-MCS0-Ch1

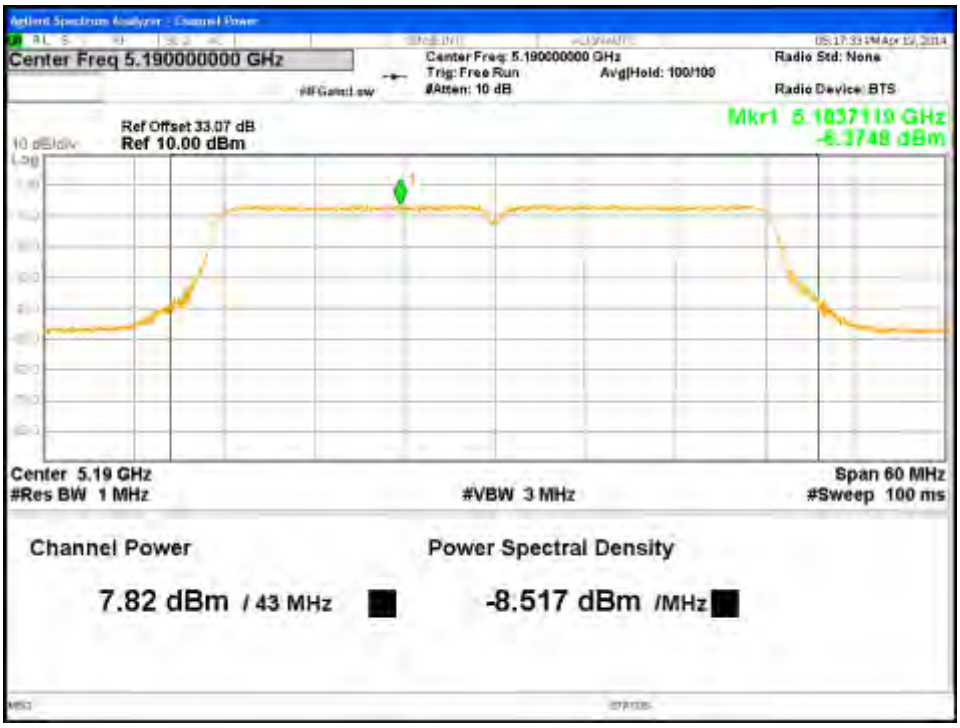


Figure 27: Maximum Conducted Output Power-5190 MHz-HT40-MCS0-Ch2

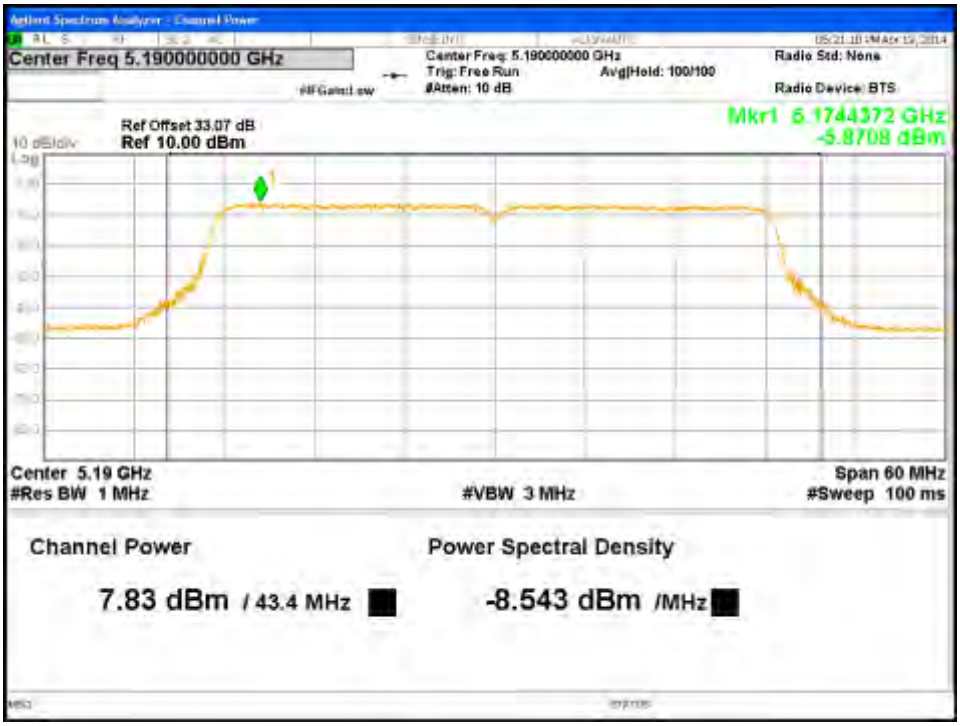


Figure 28: Maximum Conducted Output Power-5190 MHz-HT40-MCS0-Ch3

Figure 29: Maximum Conducted Output Power-5230 MHz-HT40-MCS0-Ch0

Figure 30: Maximum Conducted Output Power-5230 MHz-HT40-MCS0-Ch1

Figure 31: Maximum Conducted Output Power-5230 MHz-HT40-MCS0-Ch2

Figure 32: Maximum Conducted Output Power-5230 MHz-HT40-MCS0-Ch3

Figure 33: Maximum Conducted Output Power-5180 MHz-VHT20-MCS0-Ch0

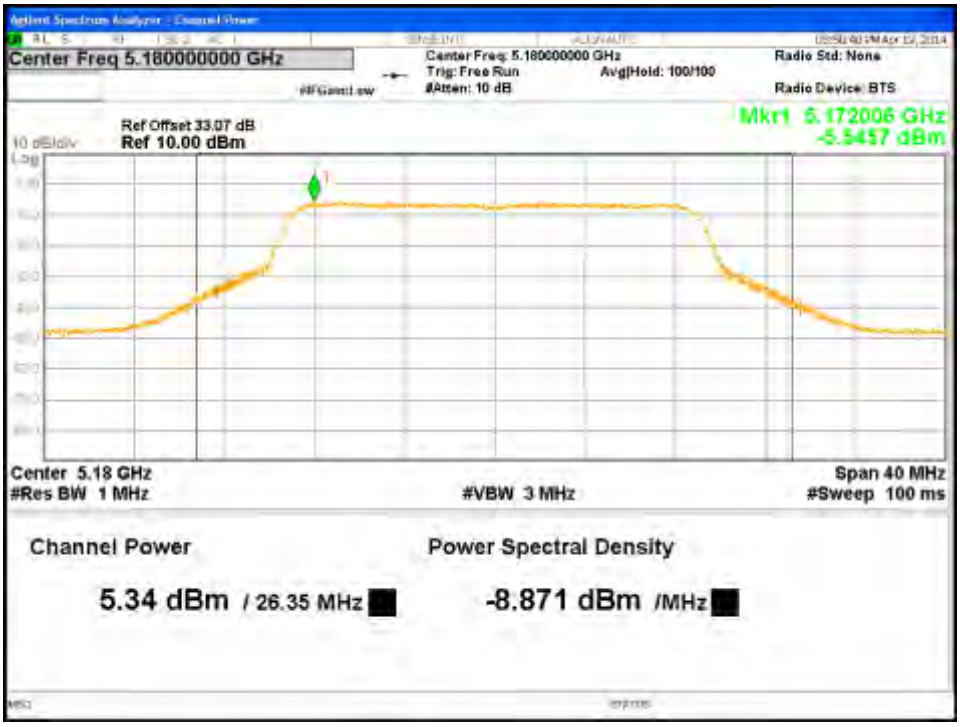


Figure 34: Maximum Conducted Output Power-5180 MHz-VHT20-MCS0-Ch1

Figure 35: Maximum Conducted Output Power-5180 MHz-VHT20-MCS0-Ch2

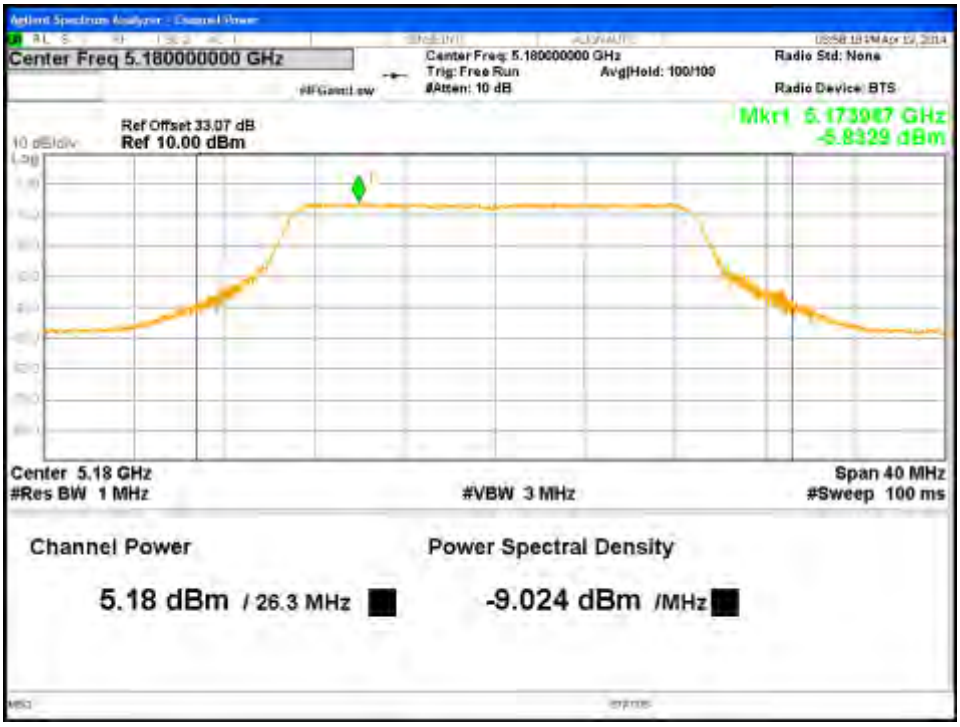


Figure 36: Maximum Conducted Output Power-5180 MHz-VHT20-MCS0-Ch3

Figure 37: Maximum Conducted Output Power-5200 MHz-VHT20-MCS0-Ch0

Figure 38: Maximum Conducted Output Power-5200 MHz-VHT20-MCS0-Ch1

Figure 39: Maximum Conducted Output Power-5200 MHz-VHT20-MCS0-Ch2

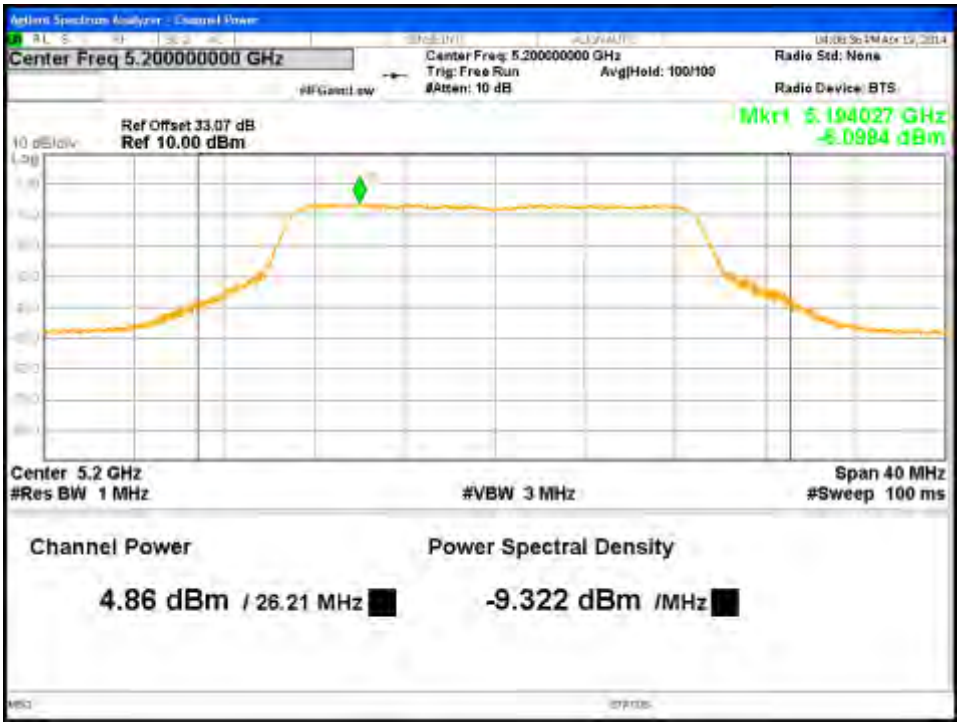


Figure 40: Maximum Conducted Output Power-5200 MHz-VHT20-MCS0-Ch3

Figure 41: Maximum Conducted Output Power-5240 MHz-VHT20-MCS0-Ch0

Figure 42: Maximum Conducted Output Power-5240 MHz-VHT20-MCS0-Ch1

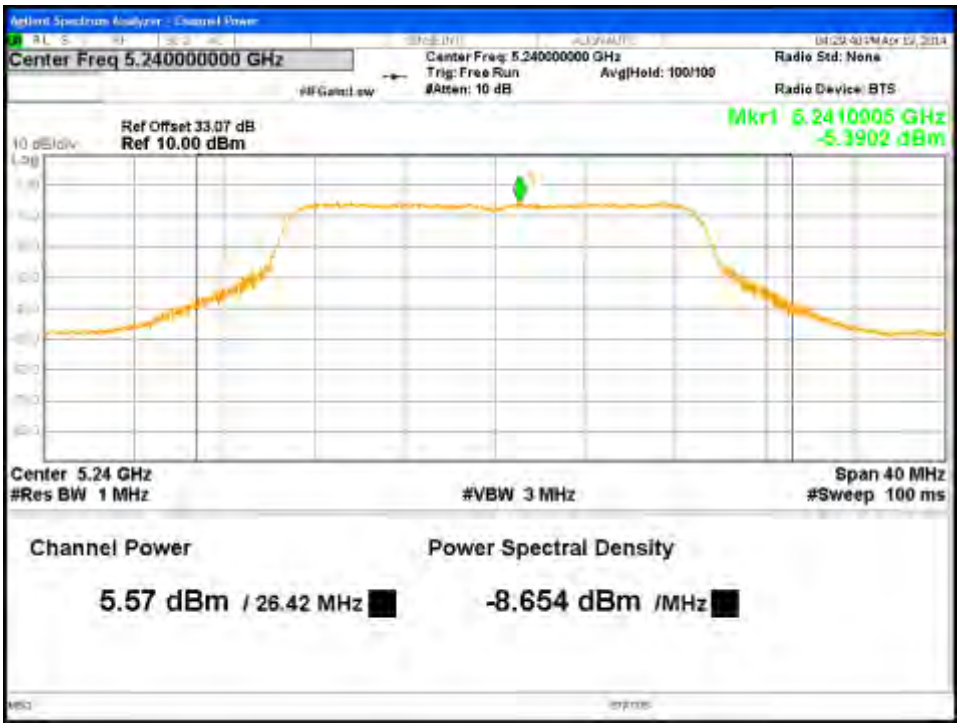


Figure 43: Maximum Conducted Output Power-5240 MHz-VHT20-MCS0-Ch2

Figure 44: Maximum Conducted Output Power-5240 MHz-VHT20-MCS0-Ch3

Figure 45: Maximum Conducted Output Power-5190 MHz-VHT40-MCS0-Ch0

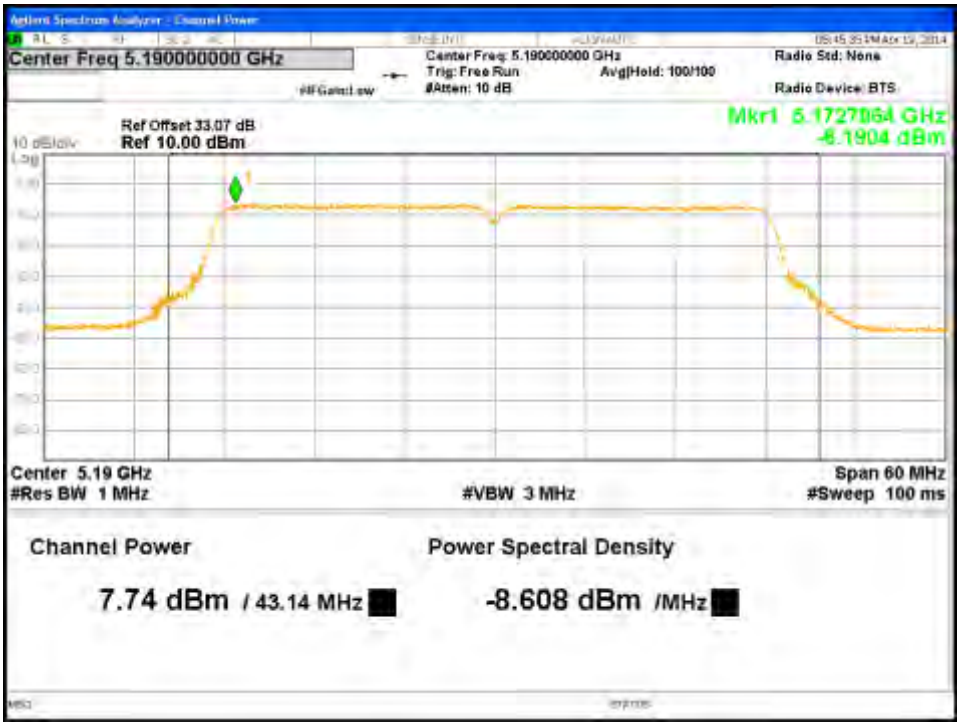


Figure 46: Maximum Conducted Output Power-5190 MHz-VHT40-MCS0-Ch1

Figure 47: Maximum Conducted Output Power-5190 MHz-VHT40-MCS0-Ch2

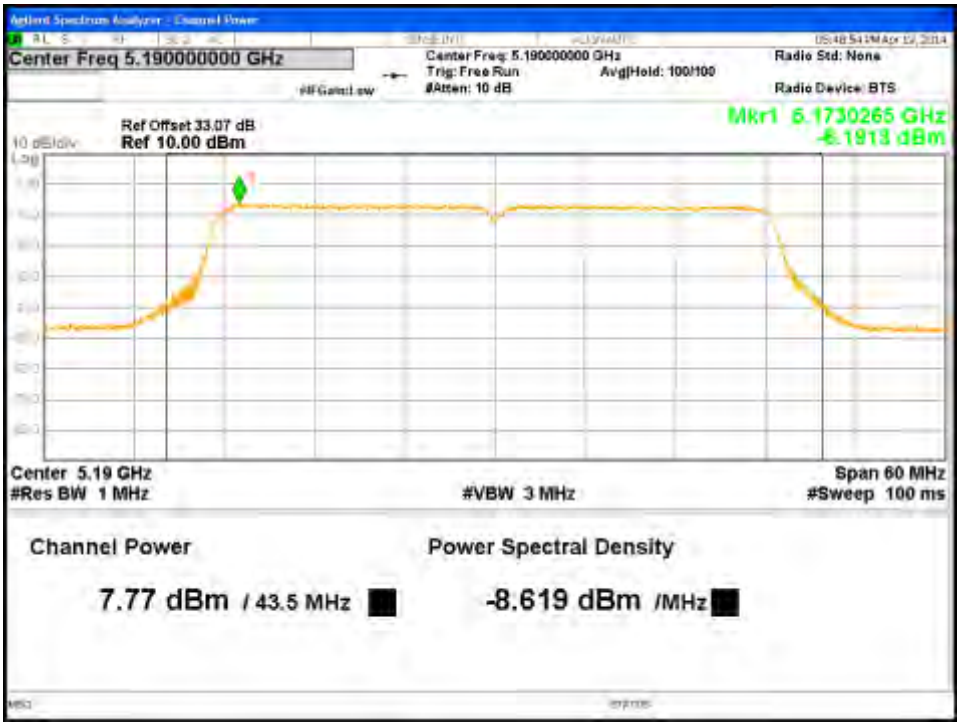


Figure 48: Maximum Conducted Output Power-5190 MHz-VHT40-MCS0-Ch3

Figure 49: Maximum Conducted Output Power-5230 MHz-VHT40-MCS0-Ch0

Figure 50: Maximum Conducted Output Power-5230 MHz-VHT40-MCS0-Ch1

Figure 51: Maximum Conducted Output Power-5230 MHz-VHT40-MCS0-Ch2

Figure 52: Maximum Conducted Output Power-5230 MHz-VHT40-MCS0-Ch3

Figure 53: Maximum Conducted Output Power-5210 MHz-VHT80-MCS0-Ch0

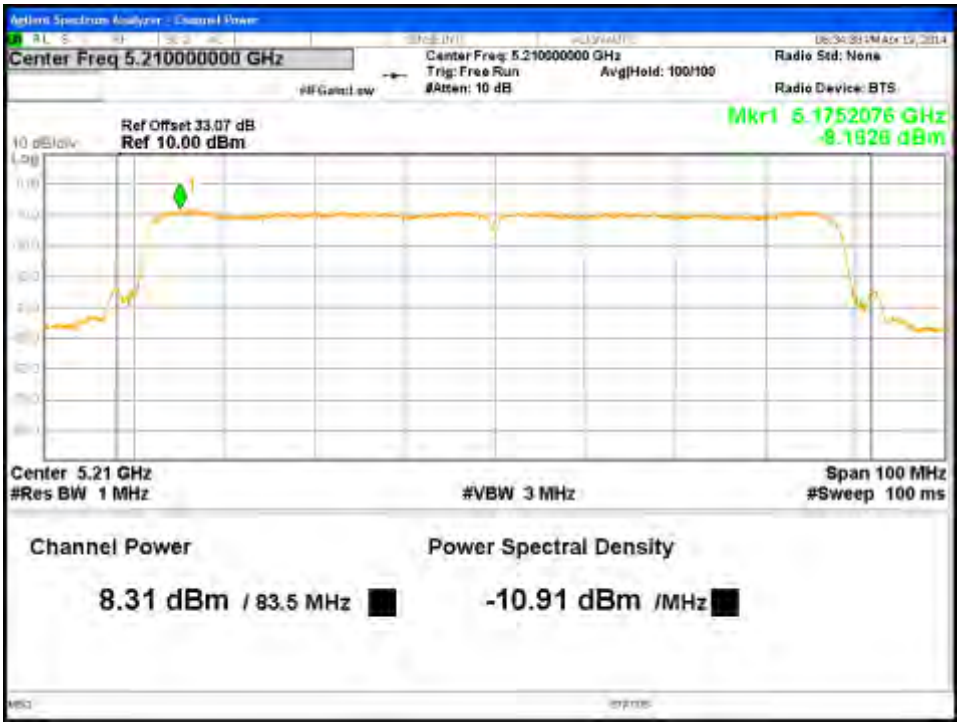


Figure 54: Maximum Conducted Output Power-5210 MHz-VHT80-MCS0-Ch1

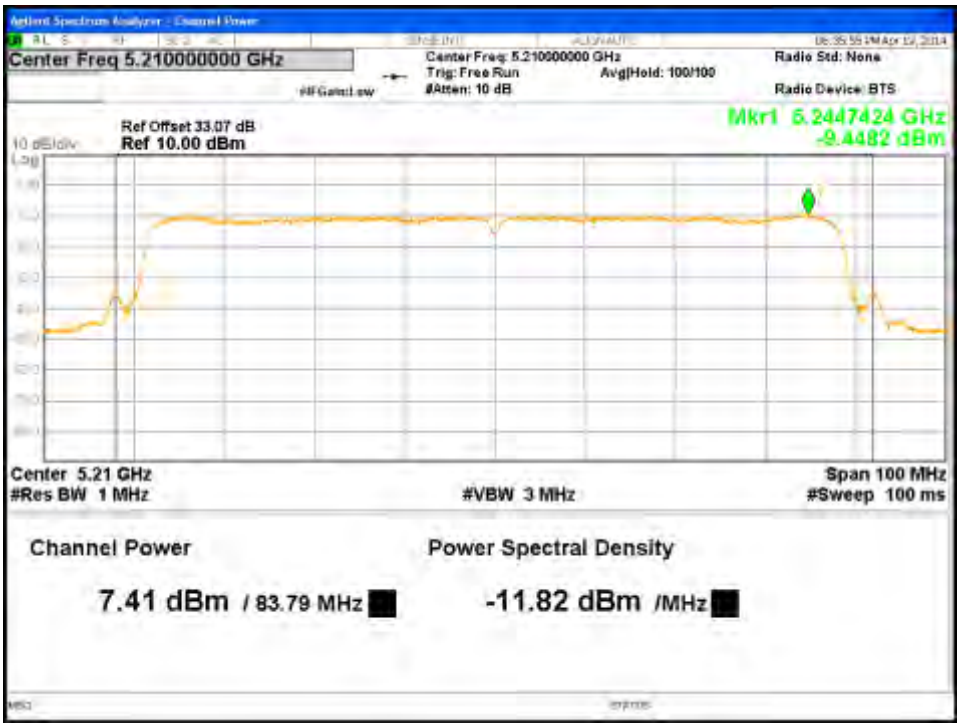


Figure 55: Maximum Conducted Output Power-5210 MHz-VHT80-MCS0-Ch2

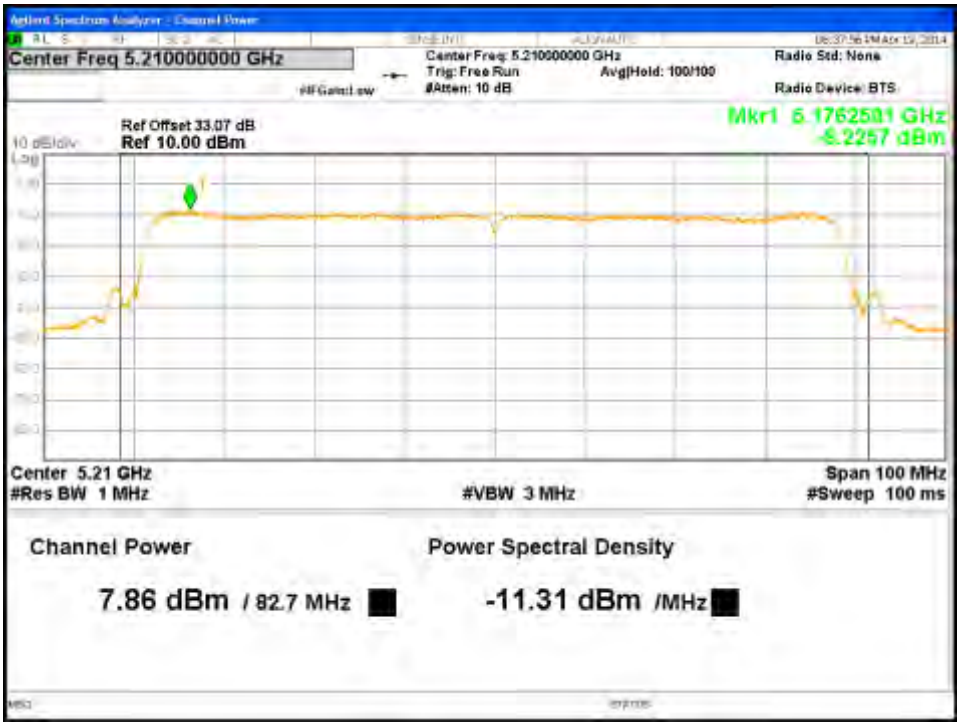


Figure 56: Maximum Conducted Output Power-5210 MHz-VHT80-MCS0-Ch3

4.2 Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

The 26 dB bandwidth is defined the bandwidth of 26 dBr from highest transmitted level of the fundamental frequency.

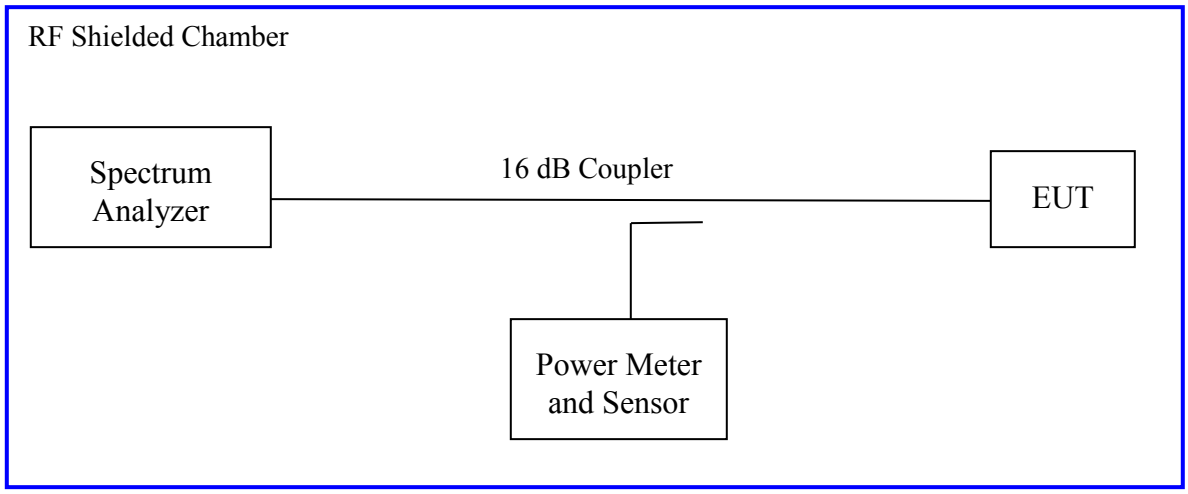
There is no restriction limits for the bandwidth. The 26 dB bandwidth was used to determine the limit for maximum conducted output power per CFR47 Part 15.407(a).

To obtain the tighter limit,

4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth. The measurement was performed with modulation per CFR47 15.407(a) 2012 and RSS Gen Sect. 4.4.1:2010. The preliminary investigation was performed to find the narrowest 26 dB bandwidth for each operational mode at different data rates. This worst finding was performed on 3 channels in each operating frequency range; 5150 MHz to 5250 MHz on the sample, S/N 121404000111. The results indicated below.

Test Setup:



4.2.2 Results

These occupied bandwidth measurements were taken for references only.

Table 4: Occupied Bandwidth – Test Results

Test Conditions: Conducted Measurement					**Test Date:** March 30, 2014			
Antenna Type: Integrated					**Power Setting:** See test plan			
Directional Antenna Gain: + 8.08 dBi					**Signal State:** Modulated			
Ambient Temp.: 23 °C					**Relative Humidity:**33%			
Bandwidth for 802.11a								
Freq. (MHz)	**99% Bandwidth (MHz)**				**26dB Bandwidth (MHz)**			
	Ch0	**Ch1**	**Ch2**	**Ch3**	**Ch0**	**Ch1**	**Ch2**	**Ch3**
5180	16.93	16.97	16.92	17.09	22.96	23.42	22.74	23.43
5200	16.95	16.97	16.94	17.00	23.14	23.52	22.95	23.17
5240	16.95	17.00	16.95	16.61	22.98	23.60	23.29	22.21
Note: The bandwidth was measured at 6Mbps for 802.11a mode.								
Bandwidth for 802.11n HT20								
Freq. (MHz)	**99% Bandwidth (MHz)**				**26dB Bandwidth (MHz)**			
	Ch0	**Ch1**	**Ch2**	**Ch3**	**Ch0**	**Ch1**	**Ch2**	**Ch3**
5180	18.23	18.23	18.24	18.11	24.45	24.67	24.35	24.24
5200	18.24	18.25	18.26	18.14	24.51	24.73	24.50	24.32
5240	18.24	18.25	18.24	18.21	24.44	24.50	24.34	24.14
Note: The bandwidth was measured at 802.11n HT20, MCS0								
Bandwidth for 802.11n HT40								
Freq. (MHz)	**99% Bandwidth (MHz)**				**26dB Bandwidth (MHz)**			
	Ch0	**Ch1**	**Ch2**	**Ch3**	**Ch0**	**Ch1**	**Ch2**	**Ch3**
5190	36.48	36.55	36.49	36.59	42.46	42.82	42.76	42.71
5230	36.49	36.52	36.49	36.65	42.44	42.92	42.75	43.03
Note: The bandwidth was measured at 802.11n HT40 mode, MCS0								

Bandwidth for 802.11ac VHT20								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5180	18.29	18.21	18.29	18.13	24.48	24.82	24.61	23.90
5200	18.29	18.22	18.31	18.13	24.34	24.68	24.77	24.10
5240	18.29	18.23	18.29	18.17	24.38	24.66	24.52	24.19
Note: The bandwidth was measured at 802.11ac VHT20, MCS0								
Bandwidth for 802.11ac VHT40								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5190	36.50	36.65	36.50	36.66	42.61	43.17	42.58	43.15
5230	36.51	36.63	36.51	36.74	42.83	43.21	42.69	43.15
Note: The bandwidth was measured at 802.11ac VHT40, MCS0								
Bandwidth for 802.11ac VHT80								
Freq. (MHz)	99% Bandwidth (MHz)				26dB Bandwidth (MHz)			
	Ch0	Ch1	Ch2	Ch3	Ch0	Ch1	Ch2	Ch3
5210	75.27	75.36	75.36	75.34	83.86	84.00	83.97	83.51
Note: The bandwidth was measured at 802.11ac VHT80, MCS0								

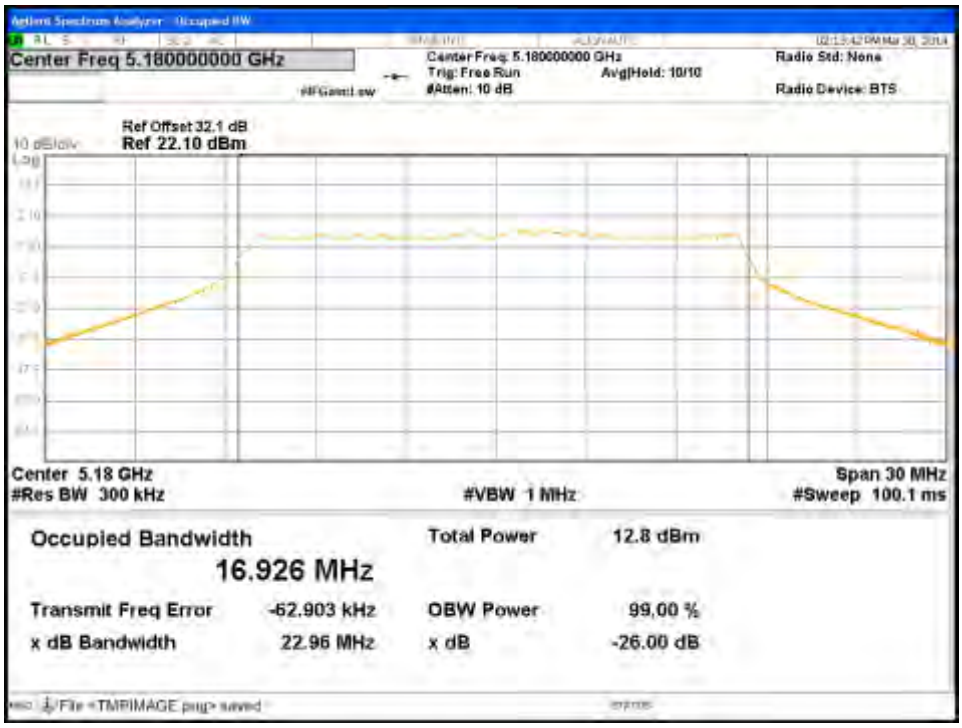


Figure 57: Occupied Bandwidth-5180 MHz-11a-6Mbps-Ch0

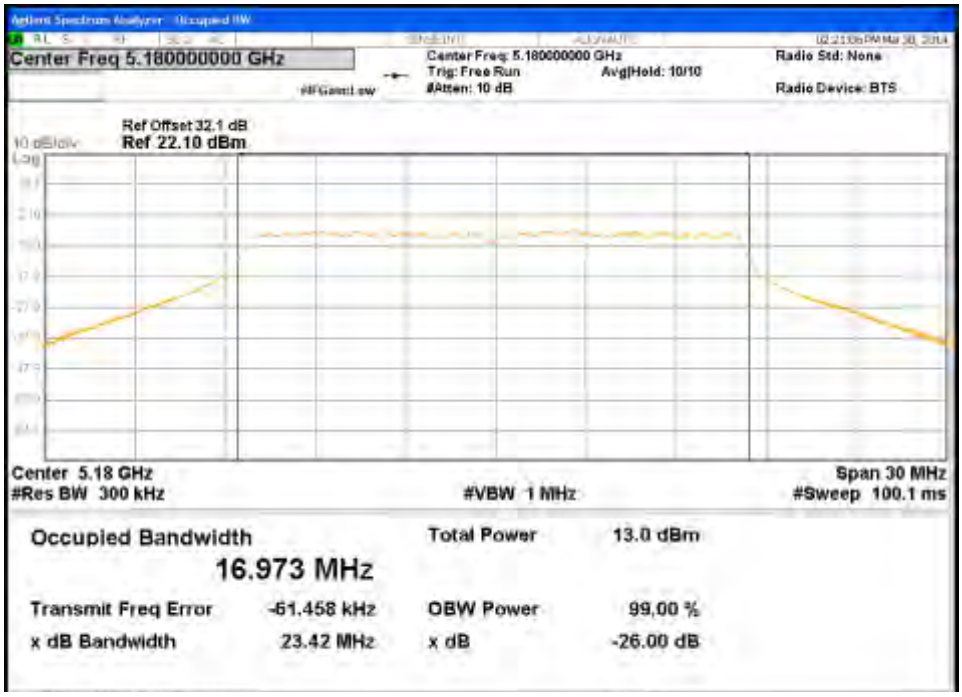


Figure 58: Occupied Bandwidth-5180 MHz-11a-6Mbps-Ch1

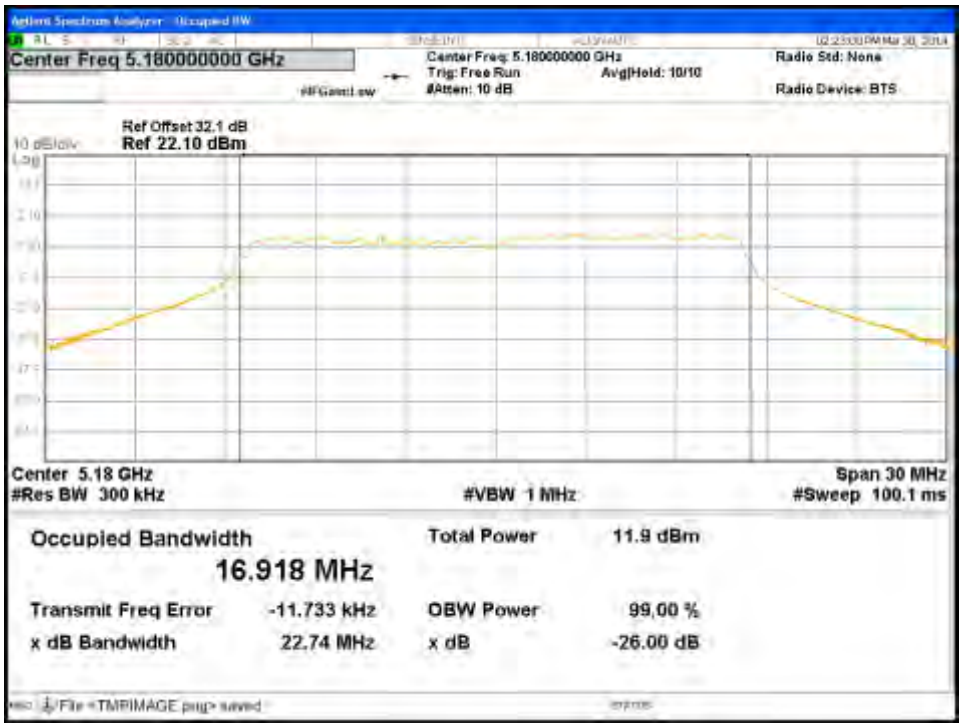


Figure 59: Occupied Bandwidth-5180 MHz-11a-6Mbps-Ch2

Figure 60: Occupied Bandwidth-5180 MHz-11a-6Mbps-Ch3

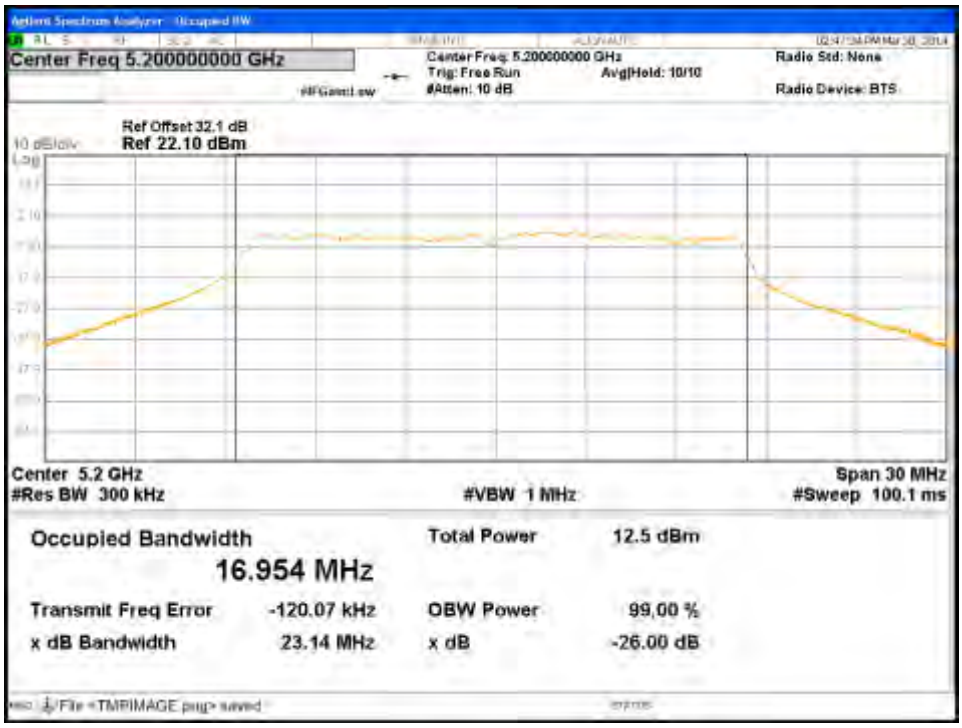


Figure 61: Occupied Bandwidth-5200 MHz-11a-6Mbps-Ch0

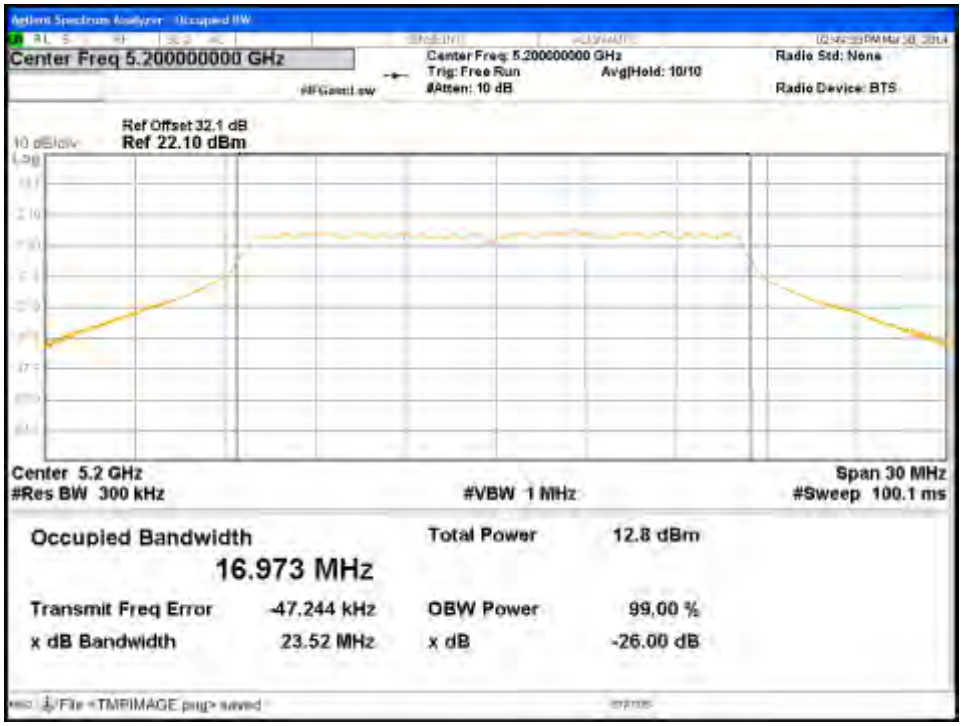


Figure 62: Occupied Bandwidth-5200 MHz-11a-6Mbps-Ch1

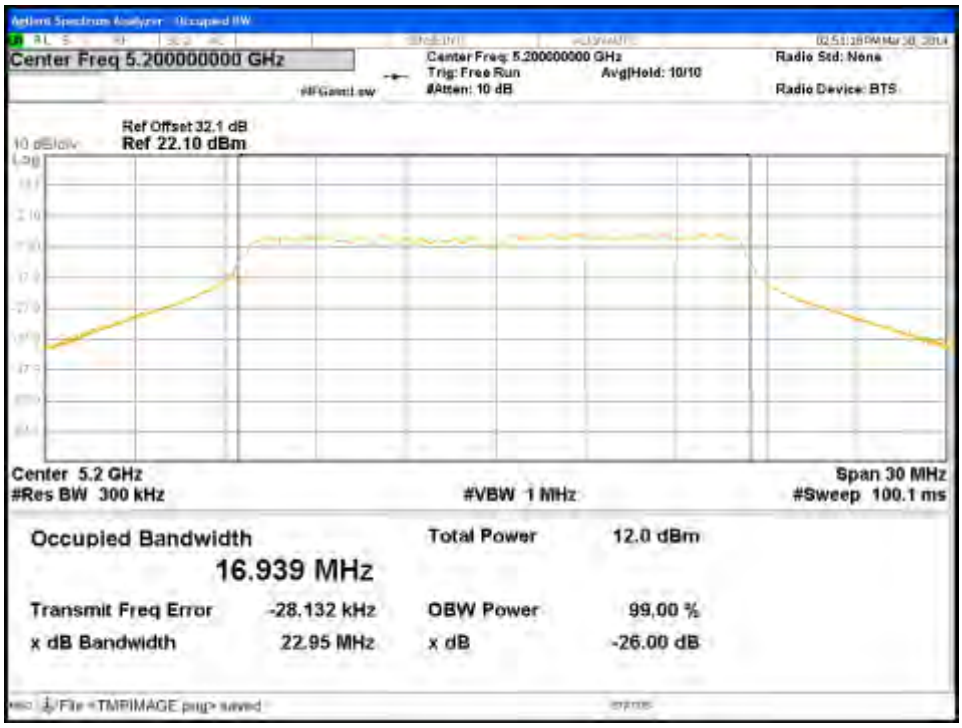


Figure 63: Occupied Bandwidth-5200 MHz-11a-6Mbps-Ch2

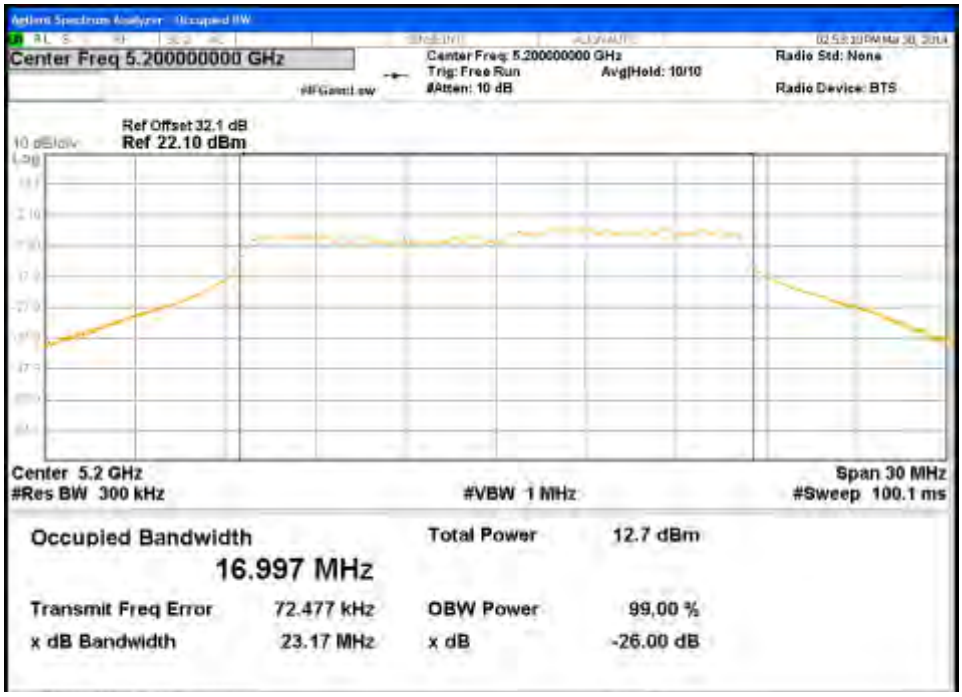


Figure 64: Occupied Bandwidth-5200 MHz-11a-6Mbps-Ch3

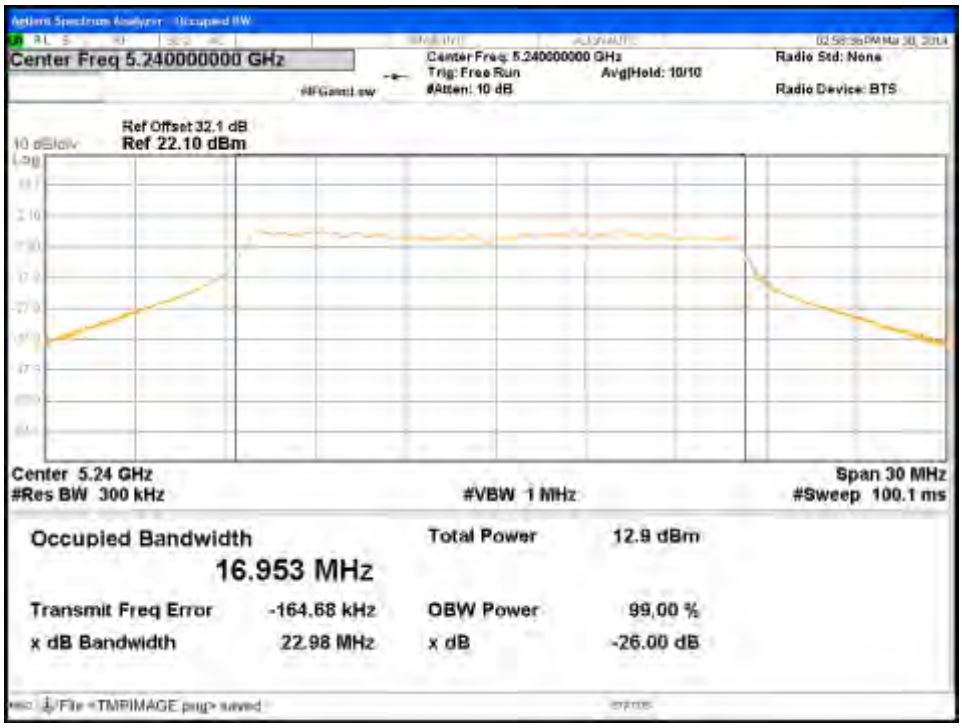


Figure 65: Occupied Bandwidth-5240 MHz-11a-6Mbps-Ch0

Figure 66: Occupied Bandwidth-5240 MHz-11a-6Mbps-Ch1

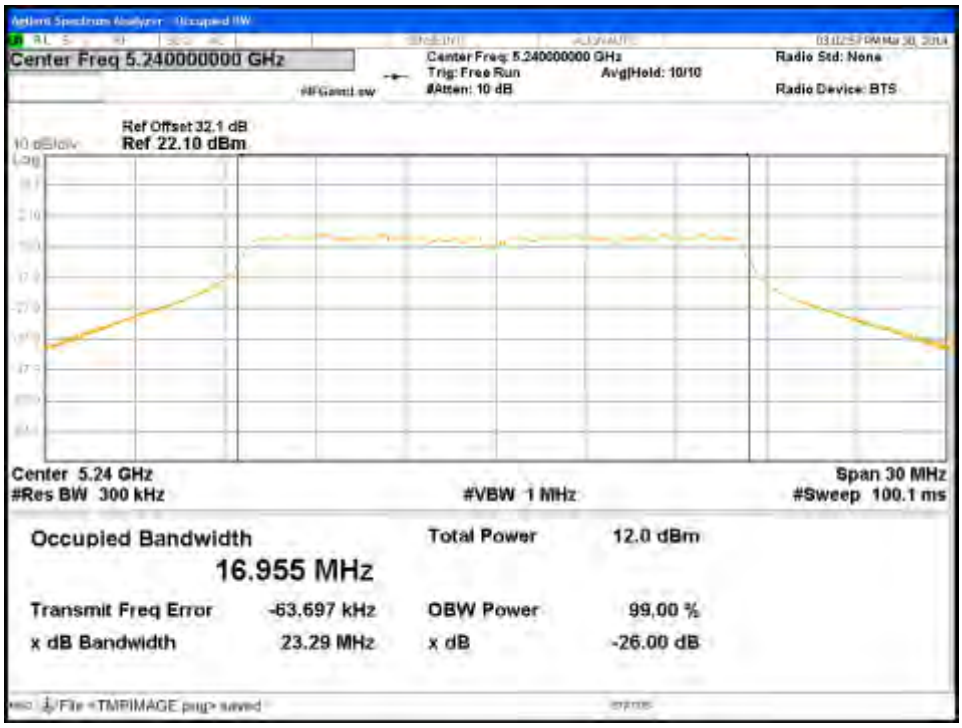


Figure 67: Occupied Bandwidth-5240 MHz-11a-6Mbps-Ch2

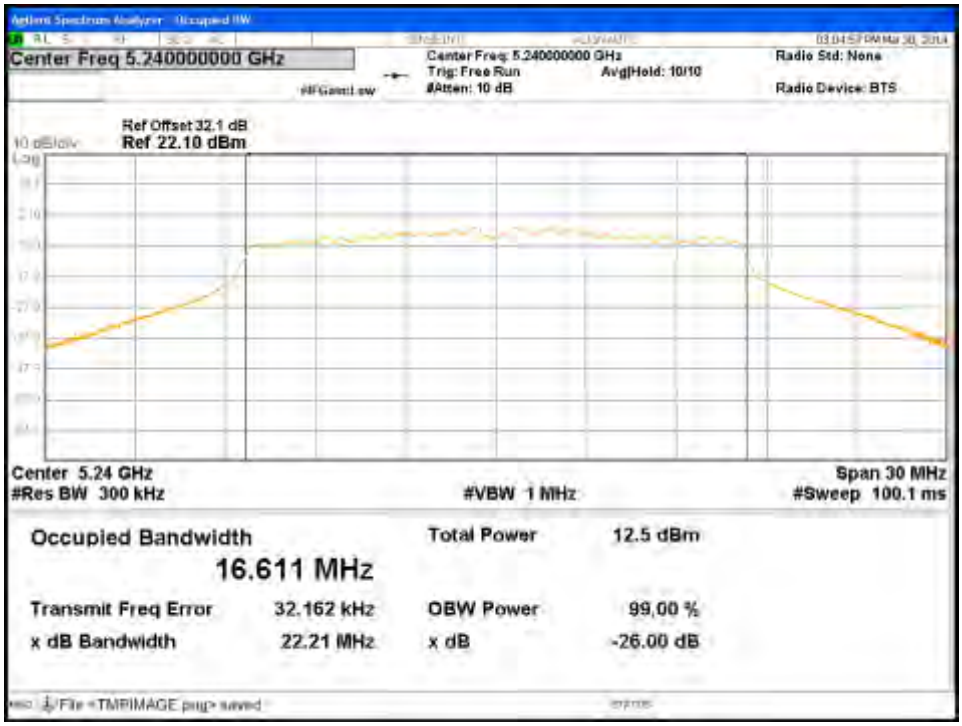


Figure 68: Occupied Bandwidth-5240 MHz-11a-6Mbps-Ch3

Figure 69: Occupied Bandwidth-5180 MHz-HT20-MCS0-Ch0

Figure 70: Occupied Bandwidth-5180 MHz-HT20-MCS0-Ch1

Figure 71: Occupied Bandwidth-5180 MHz-HT20-MCS0-Ch2

Figure 72: Occupied Bandwidth-5180 MHz-HT20-MCS0-Ch3

Figure 73: Occupied Bandwidth-5200 MHz-HT20-MCS0-Ch0

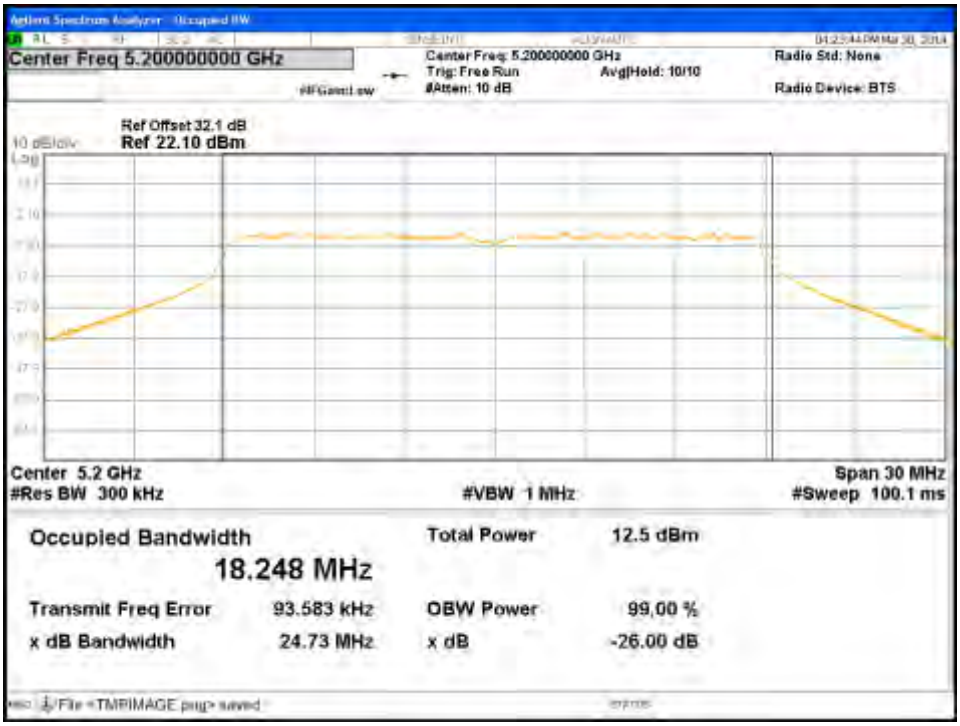


Figure 74: Occupied Bandwidth-5200 MHz-HT20-MCS0-Ch1

Figure 75: Occupied Bandwidth-5200 MHz-HT20-MCS0-Ch2

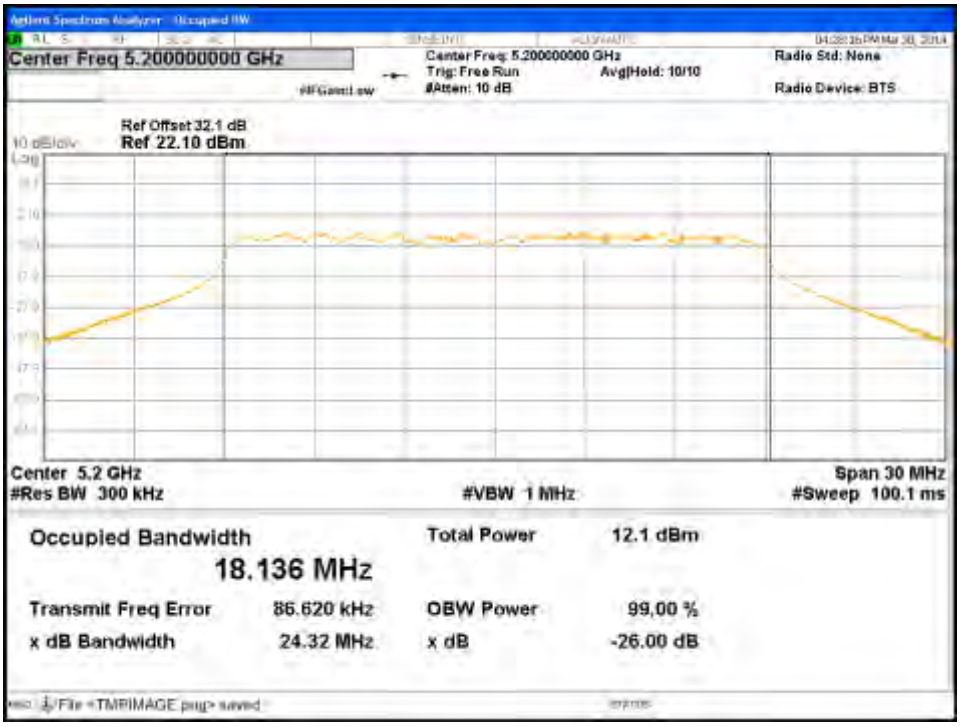


Figure 76: Occupied Bandwidth-5200 MHz-HT20-MCS0-Ch3

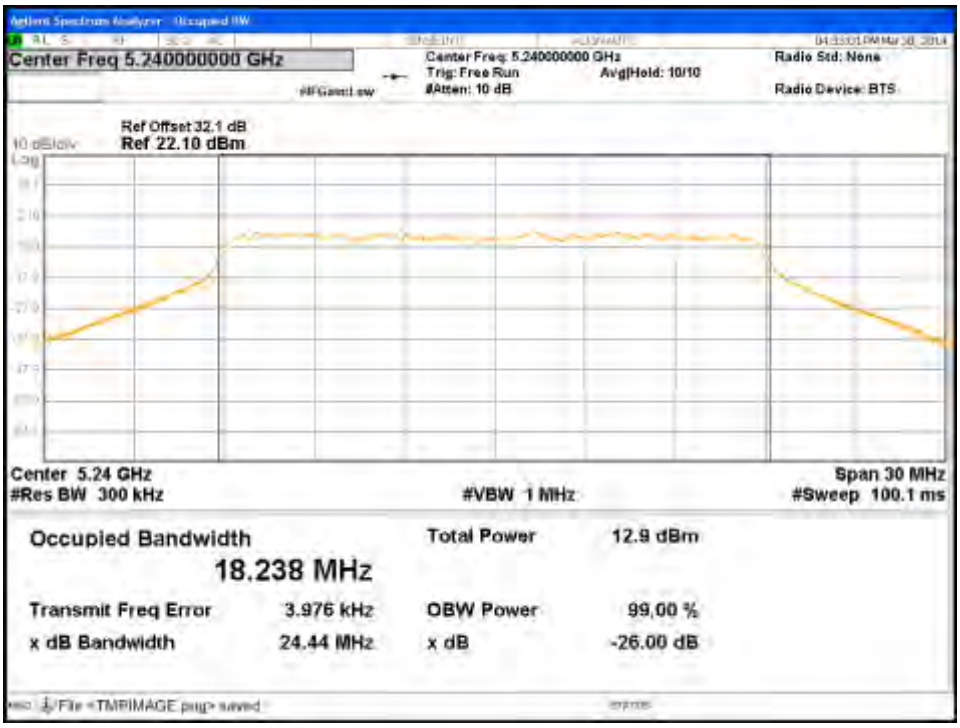


Figure 77: Occupied Bandwidth-5240 MHz-HT20-MCS0-Ch0

Figure 78: Occupied Bandwidth-5240 MHz-HT20-MCS0-Ch1

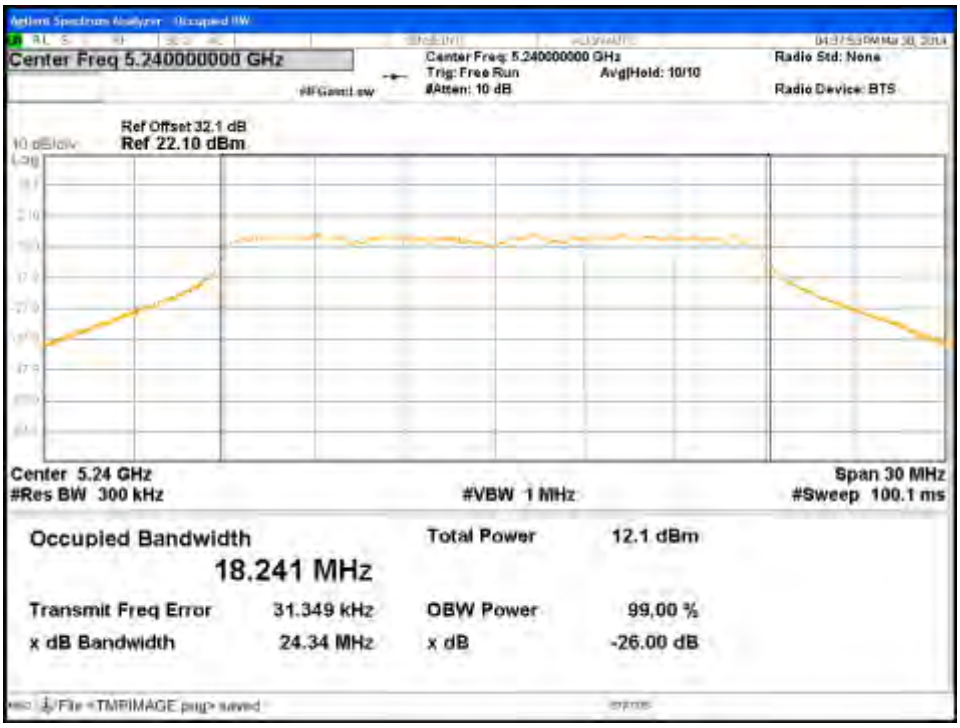


Figure 79: Occupied Bandwidth-5240 MHz-HT20-MCS0-Ch2

Figure 80: Occupied Bandwidth-5240 MHz-HT20-MCS0-Ch3

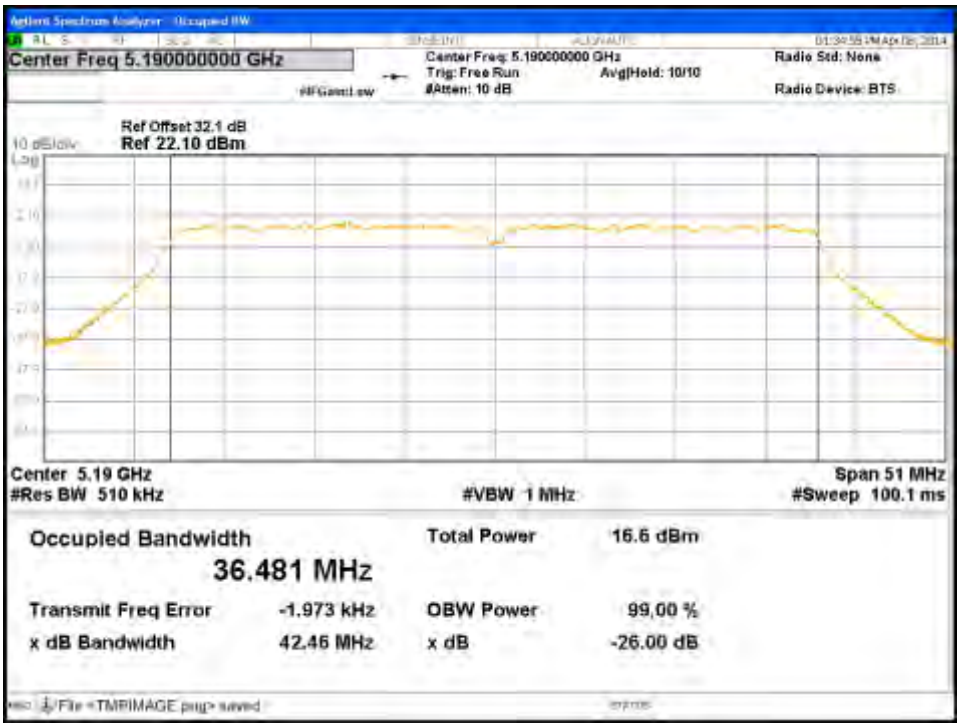


Figure 81: Occupied Bandwidth-5190 MHz-HT40-MCS0-Ch0

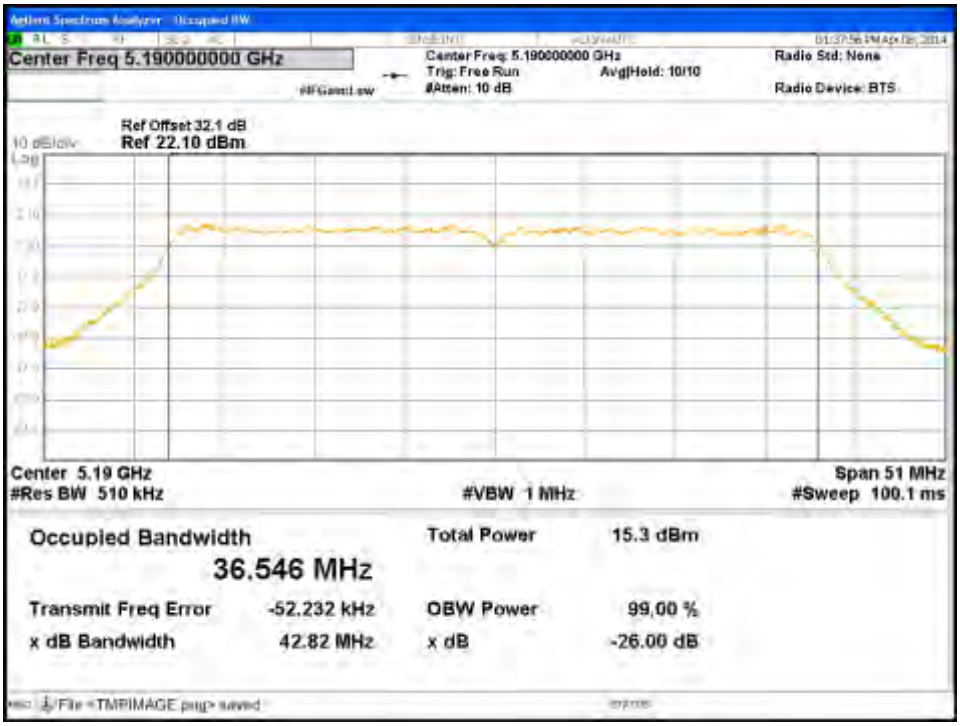


Figure 82: Occupied Bandwidth-5190 MHz-HT40-MCS0-Ch1

Figure 83: Occupied Bandwidth-5190 MHz-HT40-MCS0-Ch2

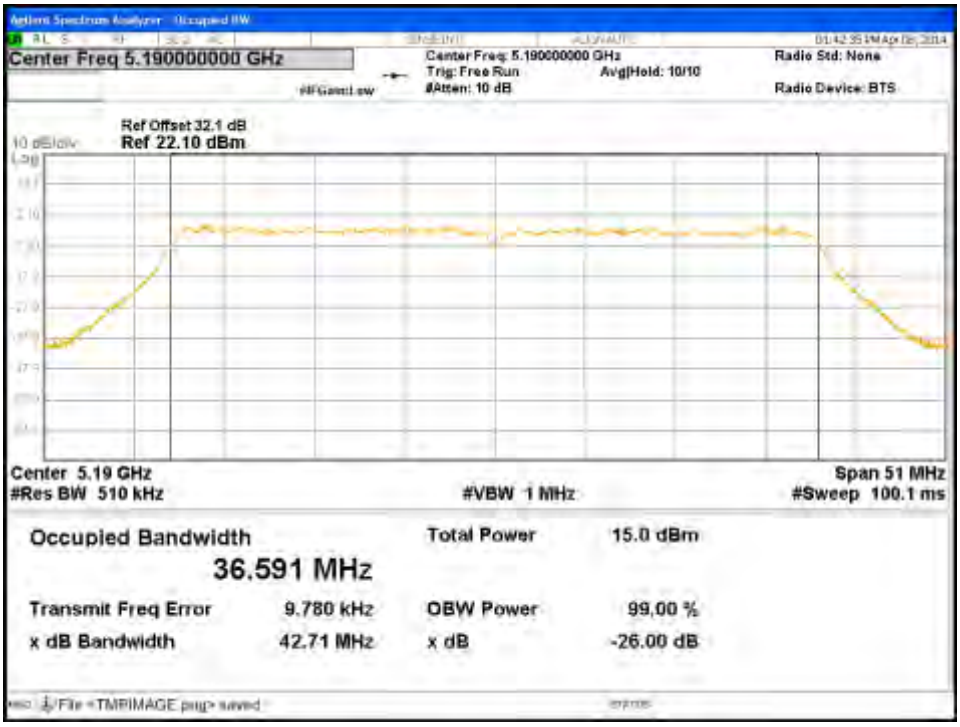


Figure 84: Occupied Bandwidth-5190 MHz-HT40-MCS0-Ch3

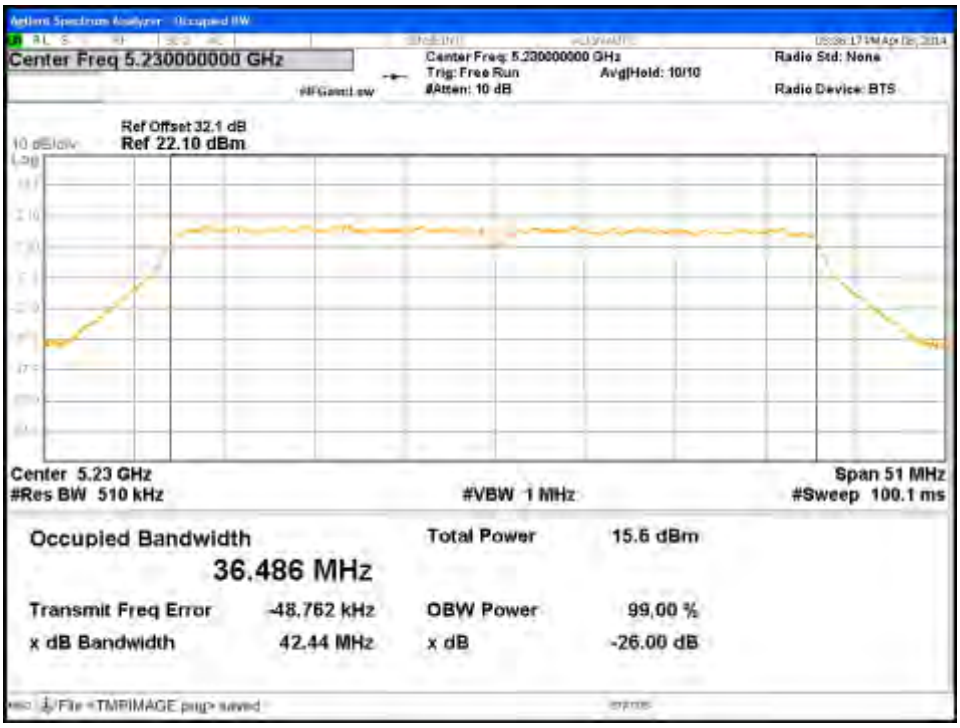


Figure 85: Occupied Bandwidth-5230 MHz-HT40-MCS0-Ch0

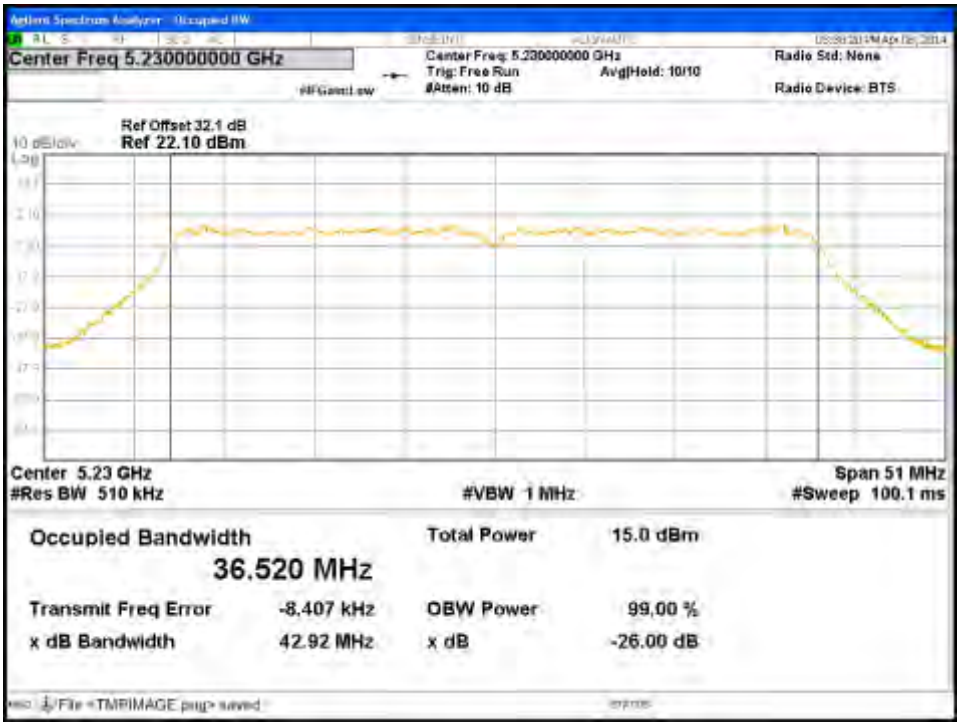


Figure 86: Occupied Bandwidth-5230 MHz-HT40-MCS0-Ch1

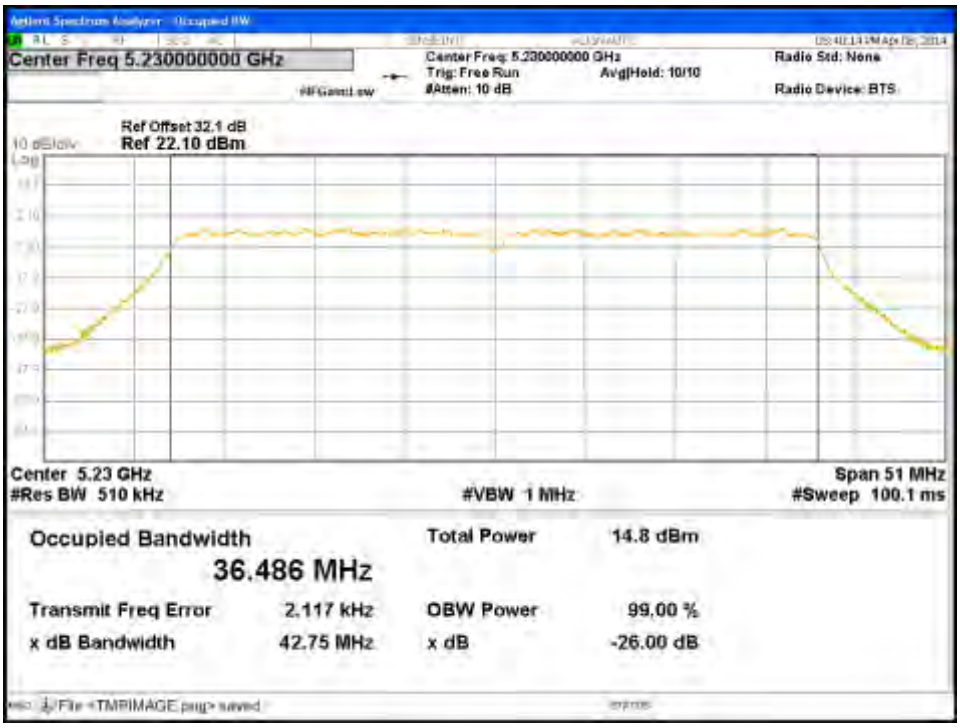


Figure 87: Occupied Bandwidth-5230 MHz-HT40-MCS0-Ch2

Figure 88: Occupied Bandwidth-5230 MHz-HT40-MCS0-Ch3

Figure 89: Occupied Bandwidth-5180 MHz-VHT20-MCS0-Ch0

Figure 90: Occupied Bandwidth-5180 MHz-VHT20-MCS0-Ch1

Figure 91: Occupied Bandwidth-5180 MHz-VHT20-MCS0-Ch2

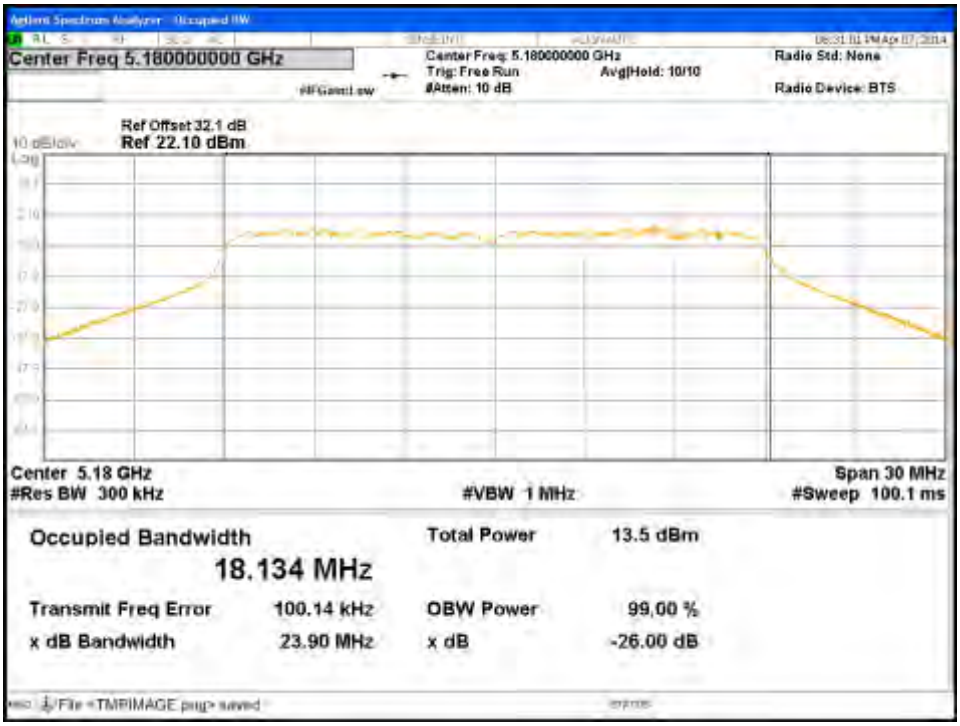


Figure 92: Occupied Bandwidth-5180 MHz-VHT20-MCS0-Ch3

Figure 93: Occupied Bandwidth-5200 MHz-VHT20-MCS0-Ch0

Figure 94: Occupied Bandwidth-5200 MHz-VHT20-MCS0-Ch1

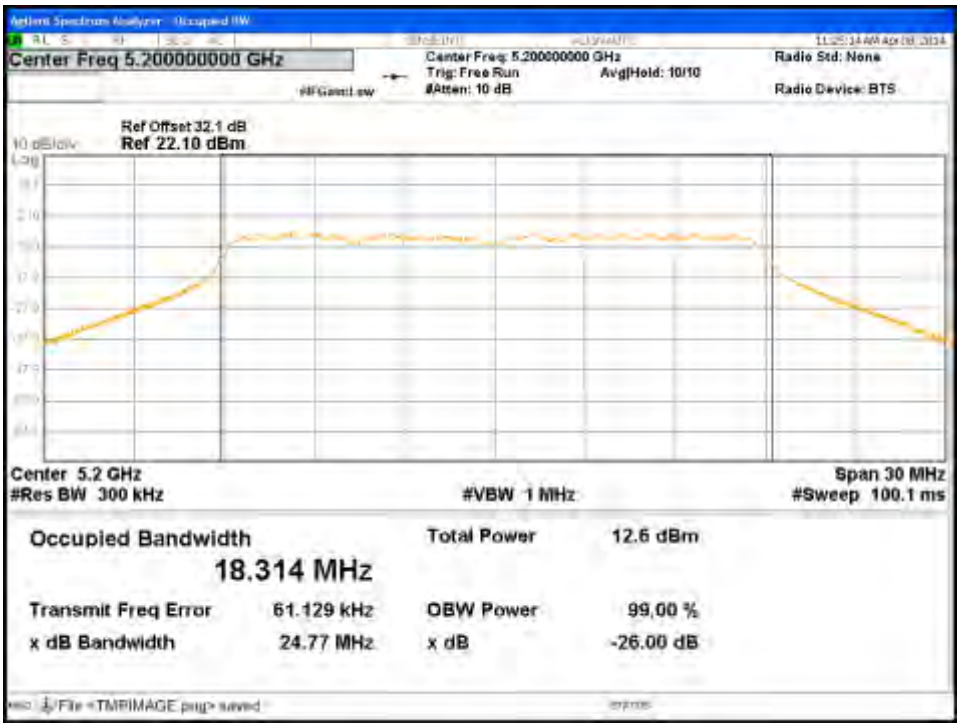


Figure 95: Occupied Bandwidth-5200 MHz-VHT20-MCS0-Ch2

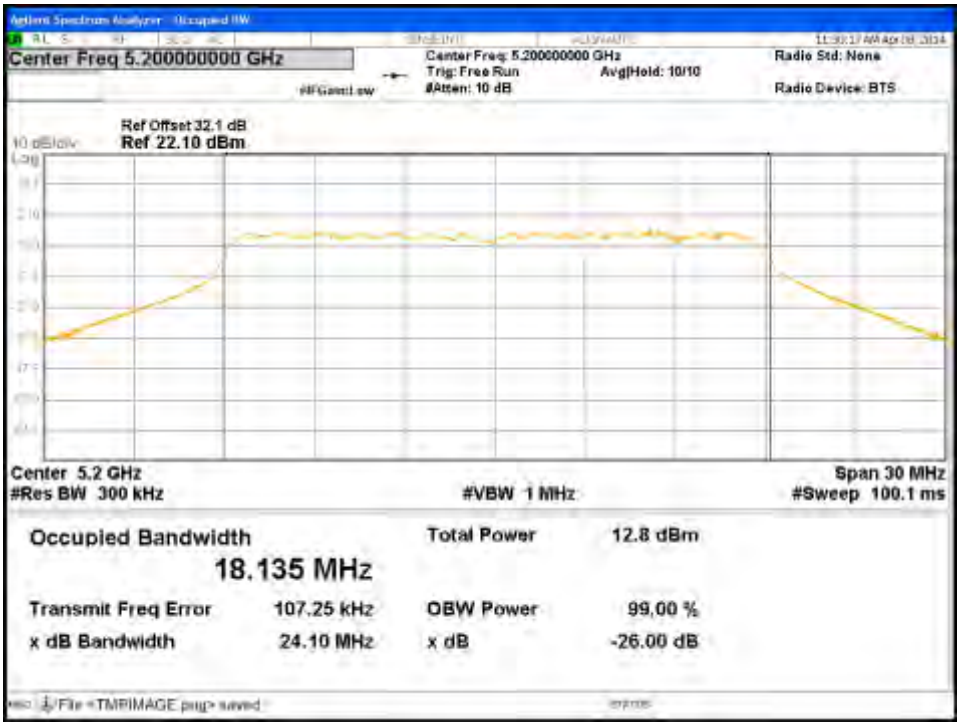


Figure 96: Occupied Bandwidth-5200 MHz-VHT20-MCS0-Ch3

Figure 97: Occupied Bandwidth-5240 MHz-VHT20-MCS0-Ch0

Figure 98: Occupied Bandwidth-5240 MHz-VHT20-MCS0-Ch1

Figure 99: Occupied Bandwidth-5240 MHz-VHT20-MCS0-Ch2

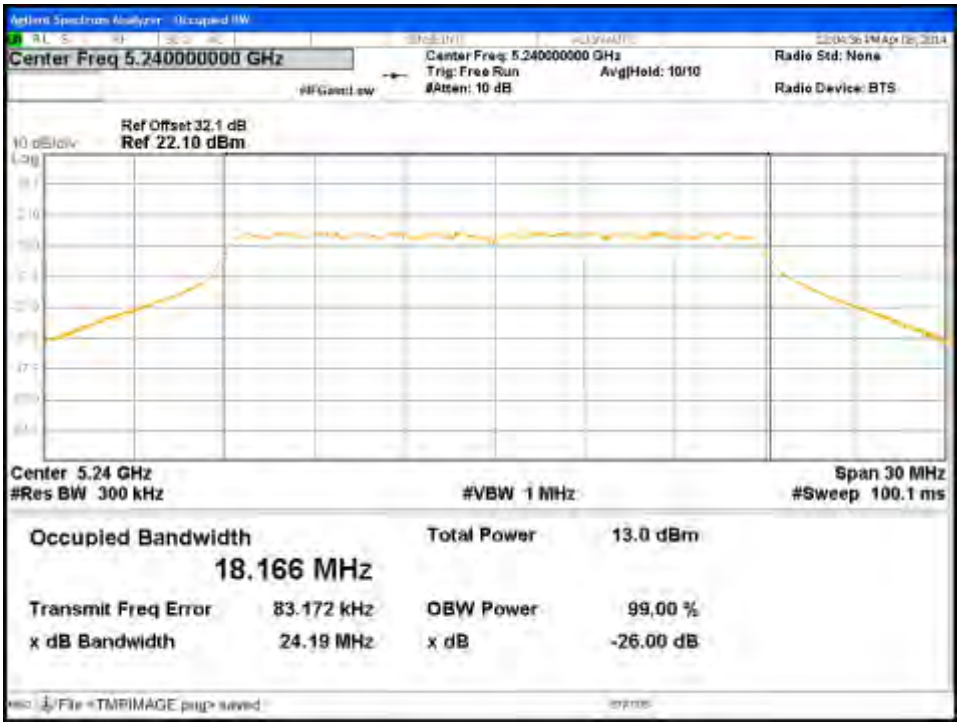


Figure 100: Occupied Bandwidth-5240 MHz-VHT20-MCS0-Ch3

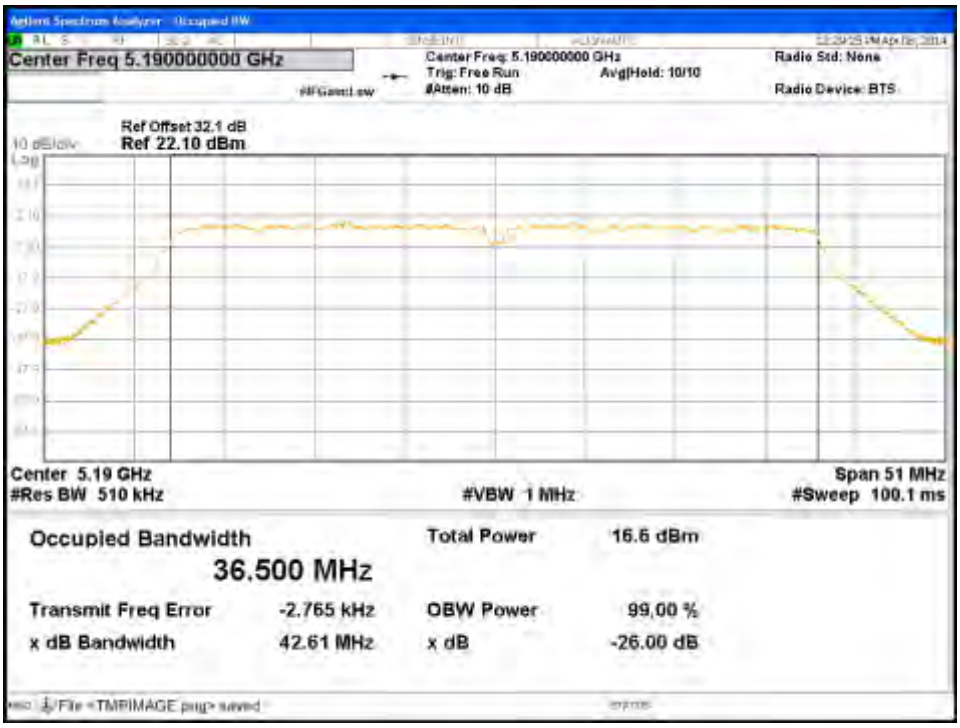


Figure 101: Occupied Bandwidth-5190 MHz-VHT40-MCS0-Ch0

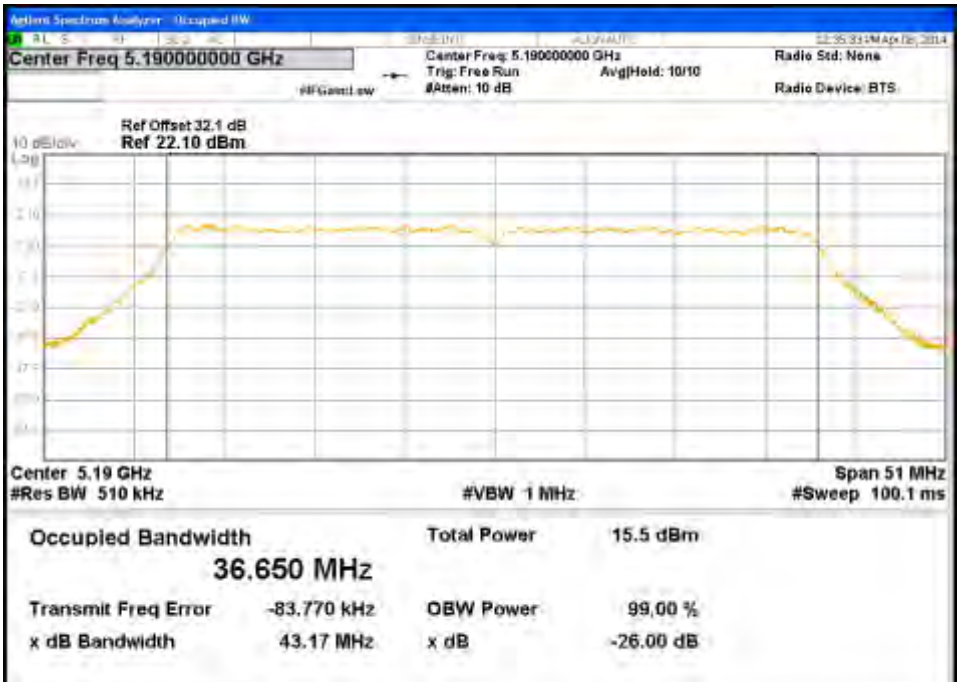


Figure 102: Occupied Bandwidth-5190 MHz-VHT40-MCS0-Ch1

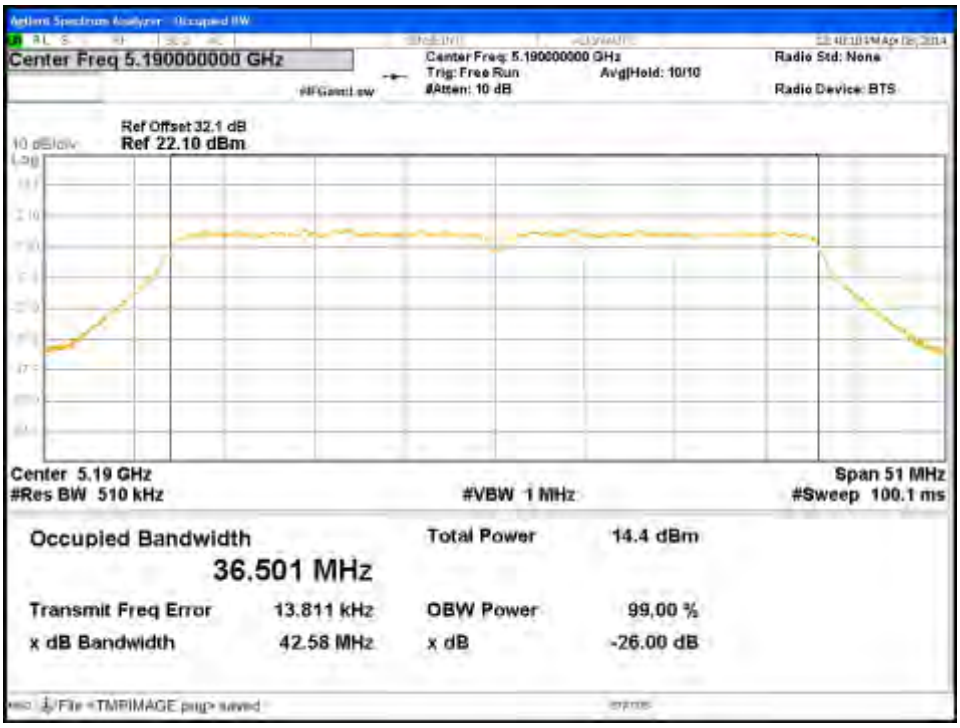


Figure 103: Occupied Bandwidth-5190 MHz-VHT40-MCS0-Ch2

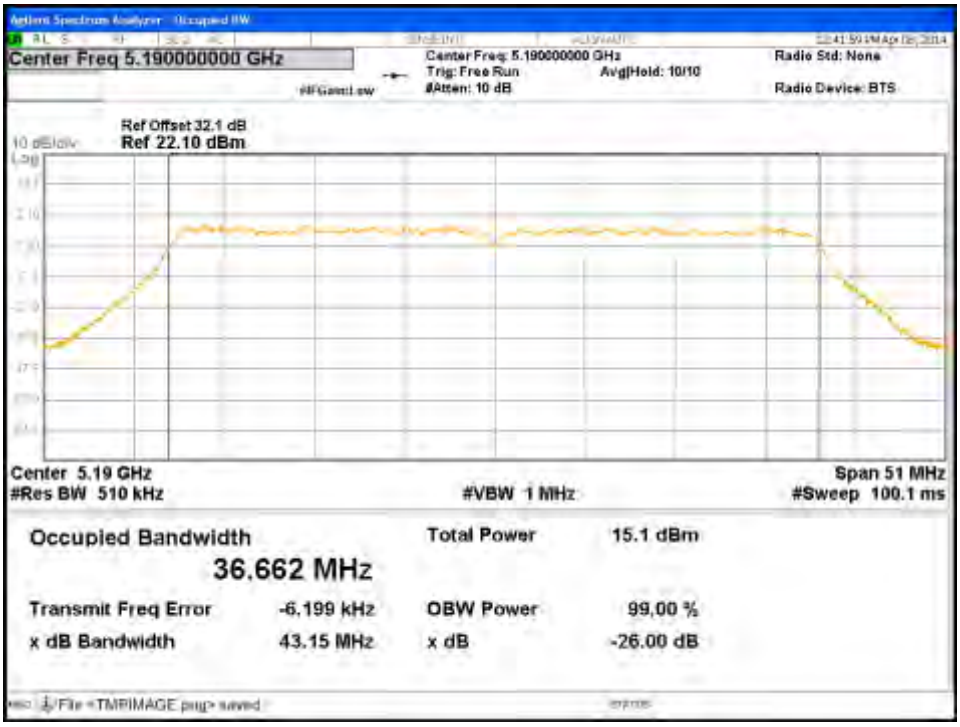


Figure 104: Occupied Bandwidth-5190 MHz-VHT40-MCS0-Ch3

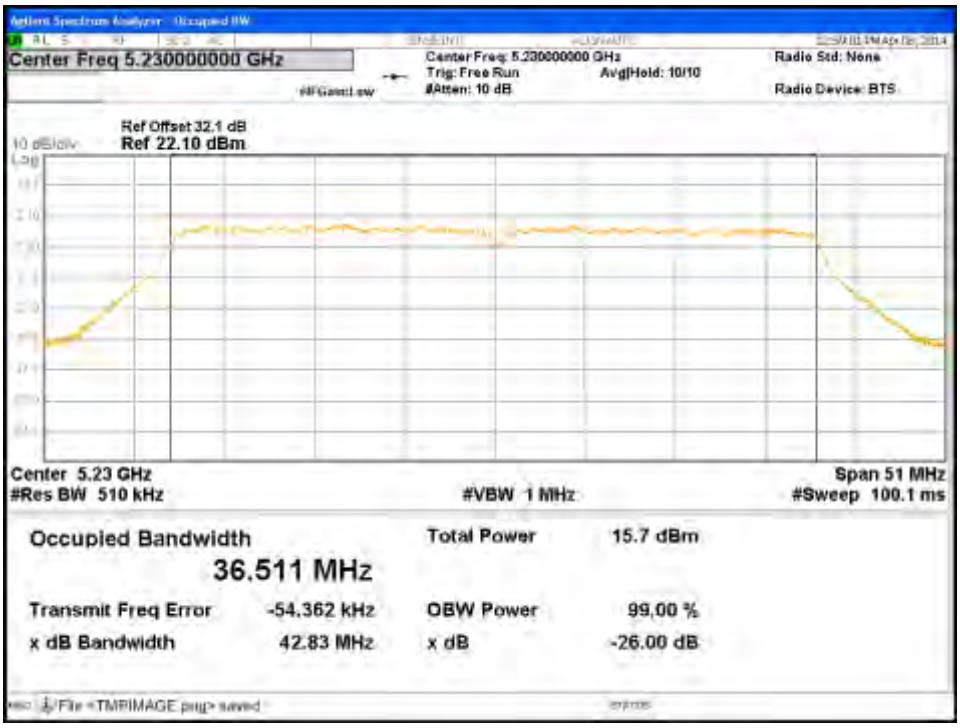


Figure 105: Occupied Bandwidth-5230 MHz-VHT40-MCS0-Ch0

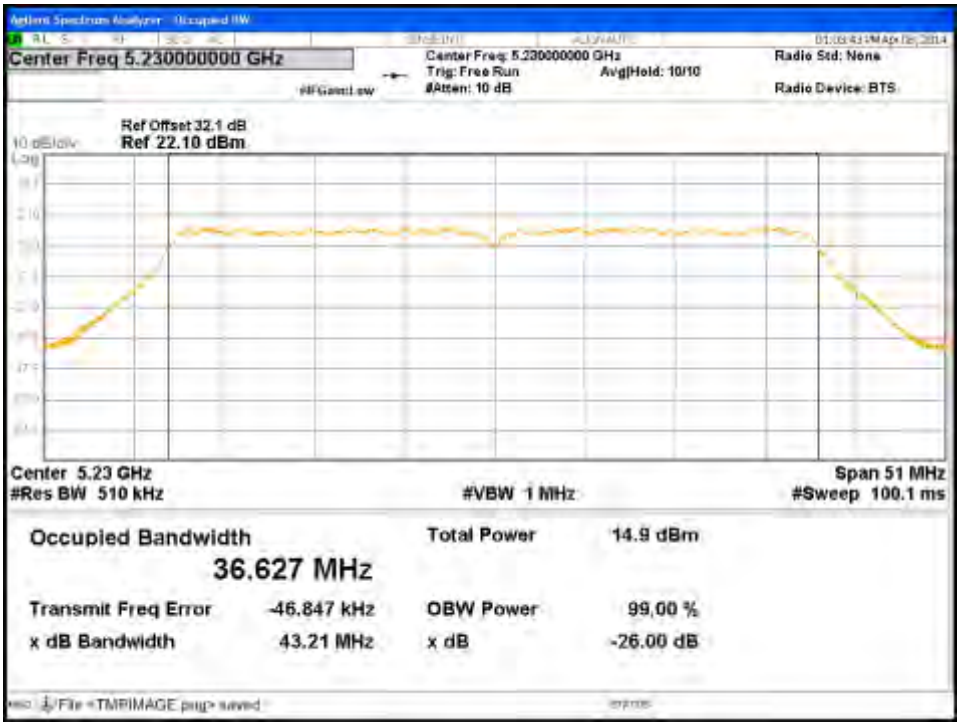


Figure 106: Occupied Bandwidth-5230 MHz-VHT40-MCS0-Ch1

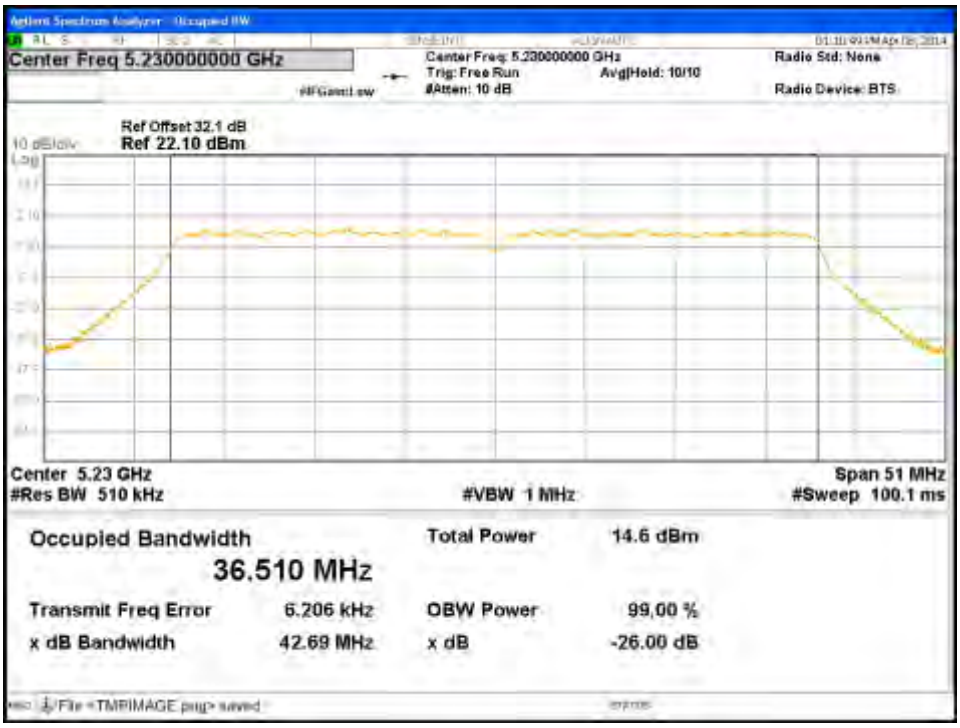


Figure 107: Occupied Bandwidth-5230 MHz-VHT40-MCS0-Ch2

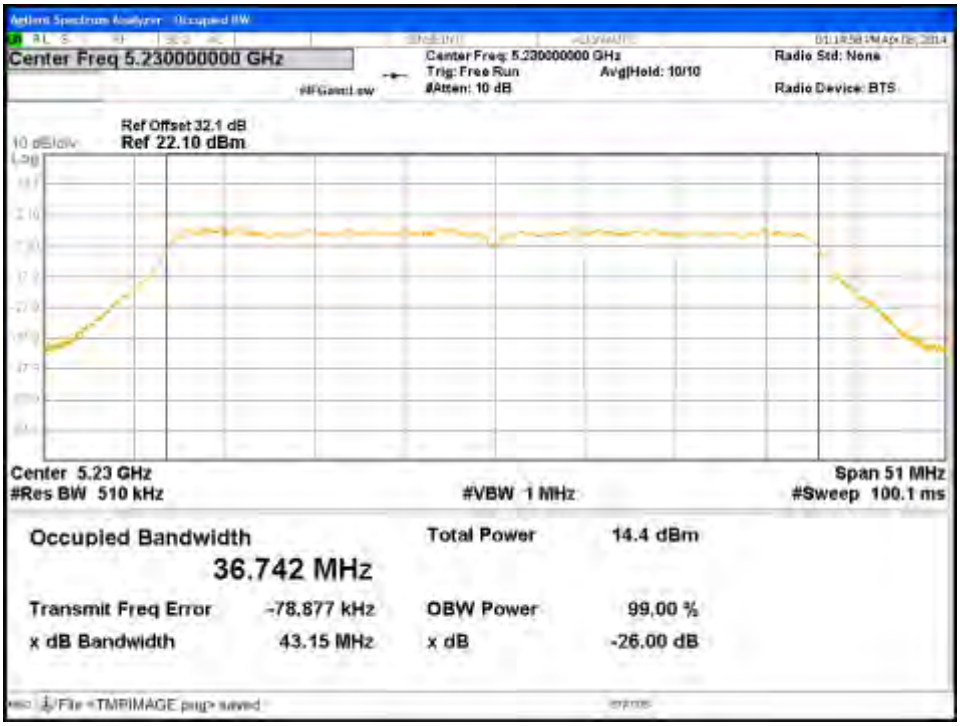


Figure 108: Occupied Bandwidth-5230 MHz-VHT40-MCS0-Ch3

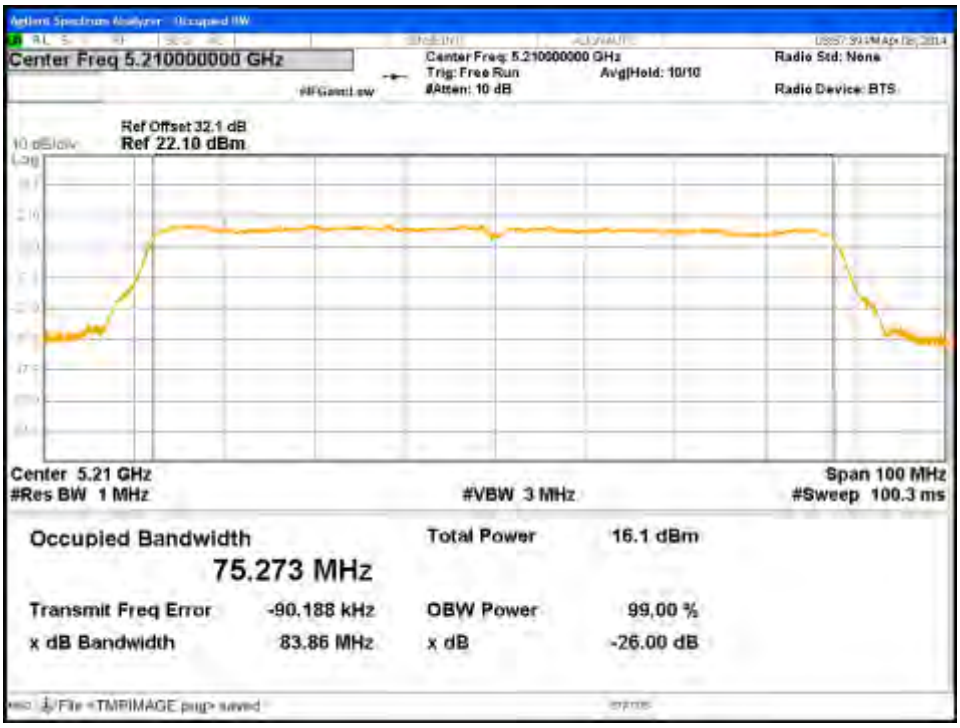


Figure 109: Occupied Bandwidth-5210 MHz-VHT80-MCS0-Ch0

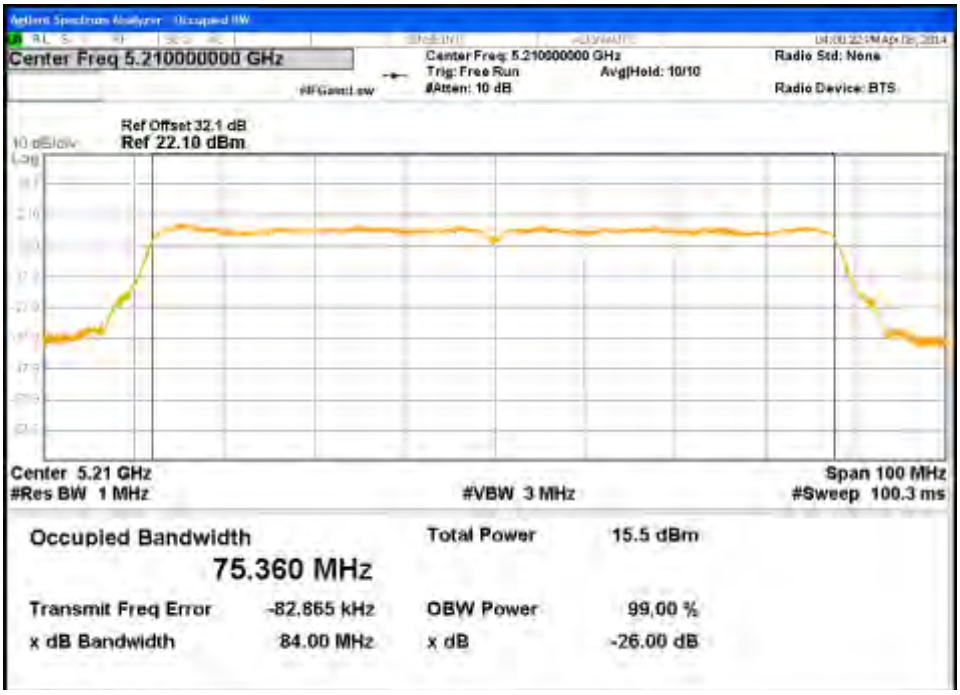


Figure 110: Occupied Bandwidth-5210 MHz-VHT80-MCS0-Ch1

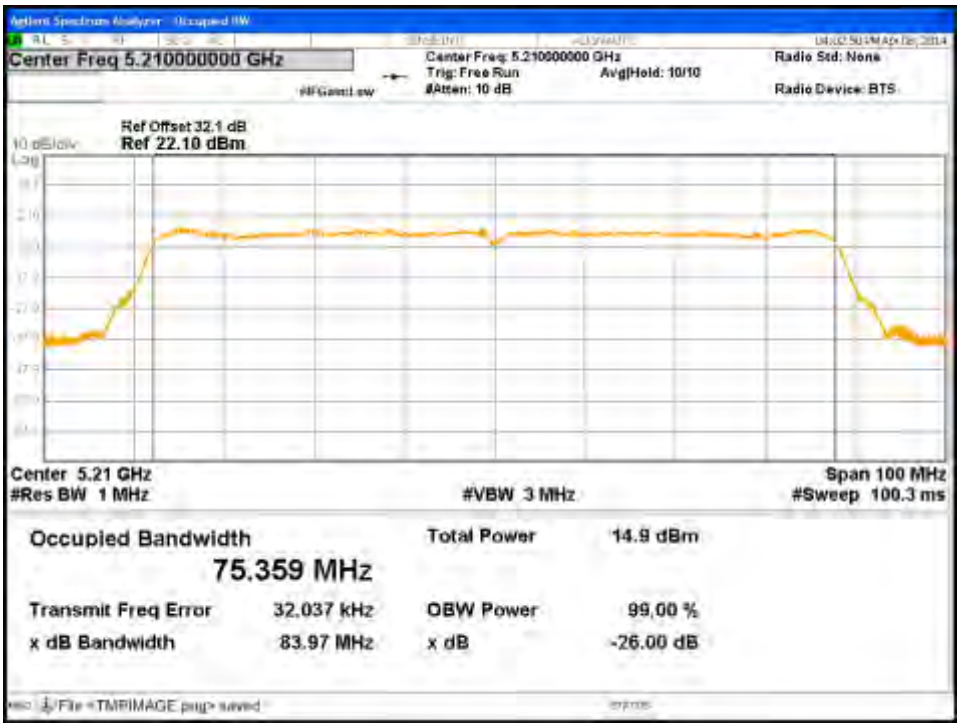


Figure 111: Occupied Bandwidth-5210 MHz-VHT80-MCS0-Ch2

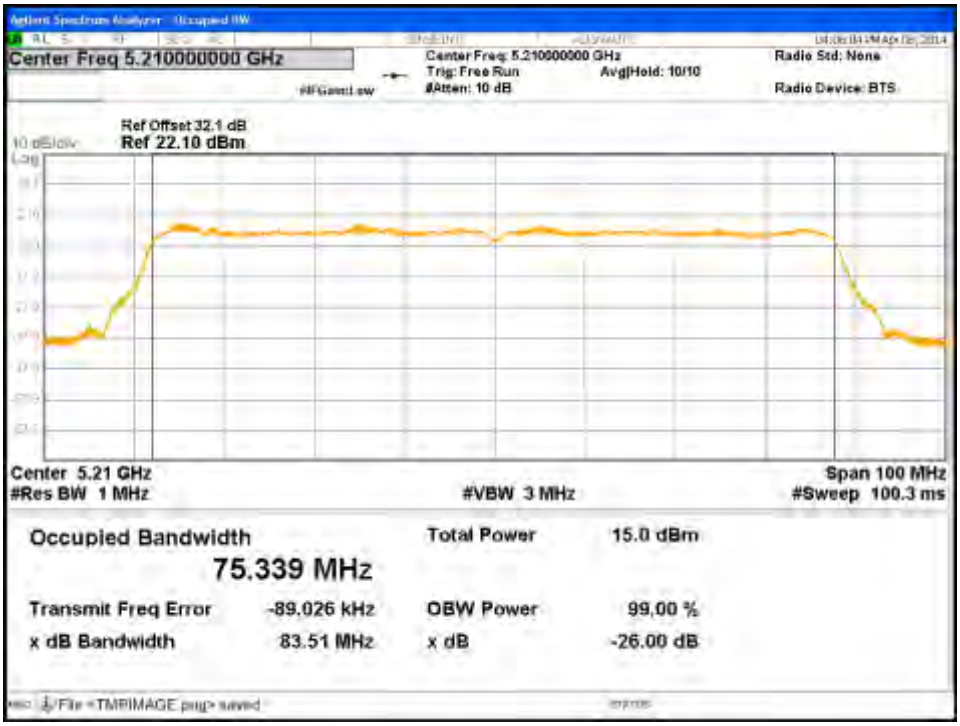


Figure 112: Occupied Bandwidth-5210 MHz-VHT80-MCS0-Ch3

4.3 Peak Excursion

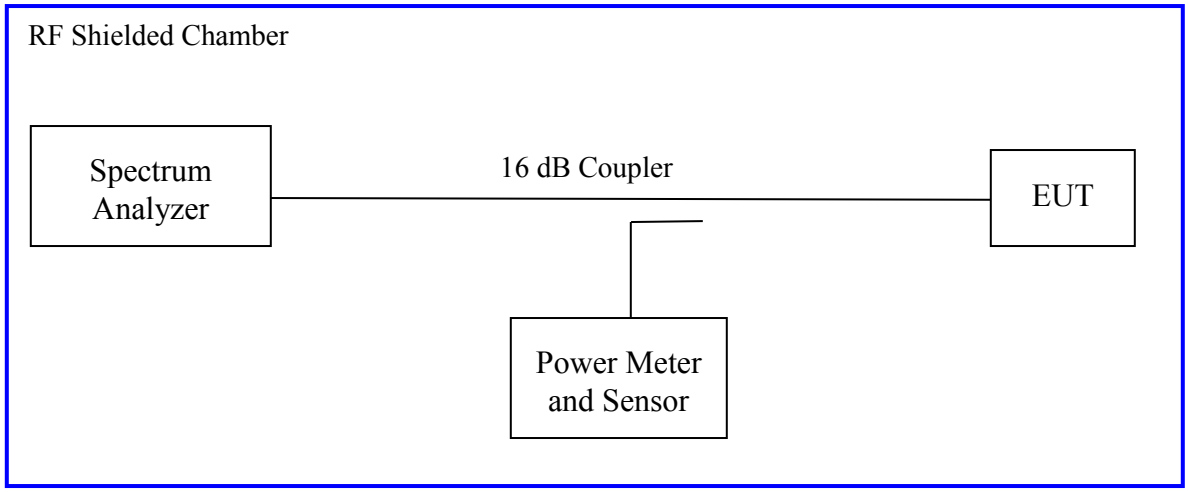
According to the CFR47 Part 15.407:2013 (a)(6), the ratio of the peak excursion of the modulation envelope(measured suing a peak hold function) to the maximum conducted output power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

4.3.1 Test Method

The ANSI C63.10-2009 Section 6.10.4 conducted method was used to measure the peak excursion.

The measurement was performed with modulation per CFR47 Part 15.407 (a) (6). This test was conducted on 3 channels in each operating mode in frequency range 5150 MHz to 5250 MHz on the test sample, S/N 121404000111. The worst sample result indicated below.

Test Setup:



KDB 789033 D01 UNII General Test Procedures v01r03 Section G was used for peak excursion measurement.

4.3.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 5: Peak Excursion – Test Results

Test Conditions: Conducted Measurement			**Test Date:** March 30, 2014			
Antenna Type: Integrated			**Power Setting:** See test plan			
Directional Antenna Gain: + 8.08 dBi			**Signal State:** Modulated			
Ambient Temp.: 23 °C			**Relative Humidity:**33%			
802.11a Mode						
Operating Channel	**Limit [dB]**	**Ch0 [dB]**	**Ch1 [dB]**	**Ch2 [dB]**	**Ch3 [dB]**	**Margin [dB]**
5180	13.0	-6.06	-7.26	-7.73	-7.45	-5.27
5200	13.0	-6.36	-7.25	-7.87	-7.88	-5.12
5240	13.0	-6.26	-6.98	-7.55	-7.12	-5.45
Note: The peak excursion was observed at 802.11a 6Mbps per Data Stream.						
802.11n (HT20) Mode						
Operating Channel	**Limit [dB]**	**Ch0 [dB]**	**Ch1 [dB]**	**Ch2 [dB]**	**Ch3 [dB]**	**Margin [dB]**
5180	13.0	-7.30	-7.56	-7.32	-7.46	-5.44
5200	13.0	-7.01	-7.49	-7.12	-7.24	-5.51
5240	13.0	-7.13	-7.30	-7.19	-7.42	-5.58
Note: The peak excursion was observed at HT20 6.5 Mbps per Data Stream.						
802.11n (HT40) Mode						
Operating Channel	**Limit [dB]**	**Ch0 [dB]**	**Ch1 [dB]**	**Ch2 [dB]**	**Ch3 [dB]**	**Margin [dB]**
5190	13.0	-8.33	-8.10	-8.24	-7.66	-4.67
5230	13.0	-8.02	-8.22	-8.22	-7.04	-4.78
Note: The peak excursion was observed at HT40 13.5 Mbps per Data Stream						

802.11ac (VHT20) Mode						
Operating Channel	**Limit [dB]**	**Ch0 [dB]**	**Ch1 [dB]**	**Ch2 [dB]**	**Ch3 [dB]**	**Margin [dB]**
5180	13.0	-7.53	-7.44	-7.66	-7.44	-5.34
5200	13.0	-7.38	-7.65	-7.38	-7.37	-5.35
5240	13.0	-7.22	-7.42	-7.60	-7.65	-5.35
Note: The peak excursion was observed at VHT20 MCS0						
802.11ac (VHT40) Mode						
Operating Channel	**Limit [dB]**	**Ch0 [dB]**	**Ch1 [dB]**	**Ch2 [dB]**	**Ch3 [dB]**	**Margin [dB]**
5190	13.0	-7.93	-7.72	-8.22	-7.55	-4.78
5230	13.0	-7.73	-7.98	-7.74	-7.60	-5.02
Note: The peak excursion was observed at VHT40 MCS0						
802.11ac (VHT80) Mode						
Operating Channel	**Limit [dB]**	**Ch0 [dB]**	**Ch1 [dB]**	**Ch2 [dB]**	**Ch3 [dB]**	**Margin [dB]**
5210	13.0	-7.77	-6.95	-7.88	-8.44	-4.56
Note: The peak excursion was observed at VHT80 MCS0						

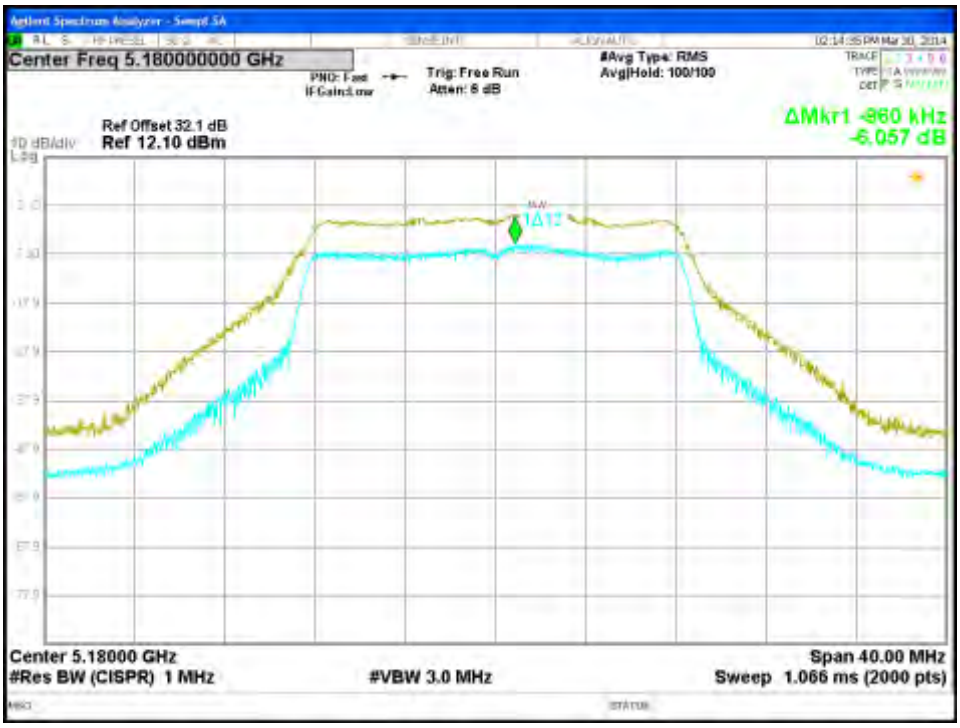


Figure 113: Peak Excursion-5180 MHz-11a-6Mbps-Ch0

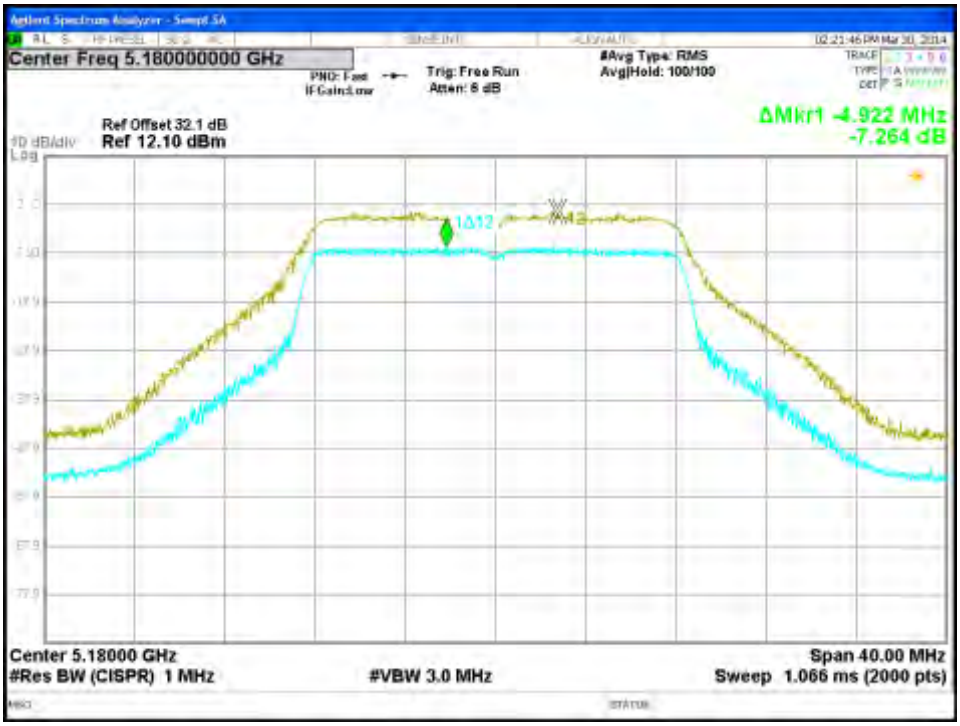


Figure 114: Peak Excursion-5180 MHz-11a-6Mbps-Ch1

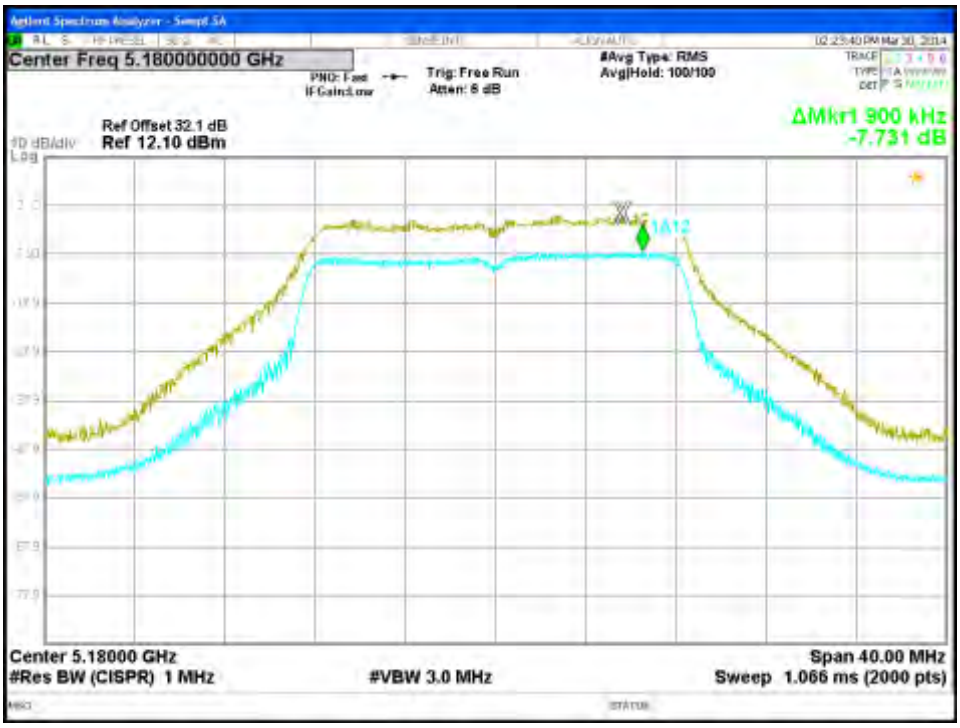


Figure 115: Peak Excursion-5180 MHz-11a-6Mbps-Ch2

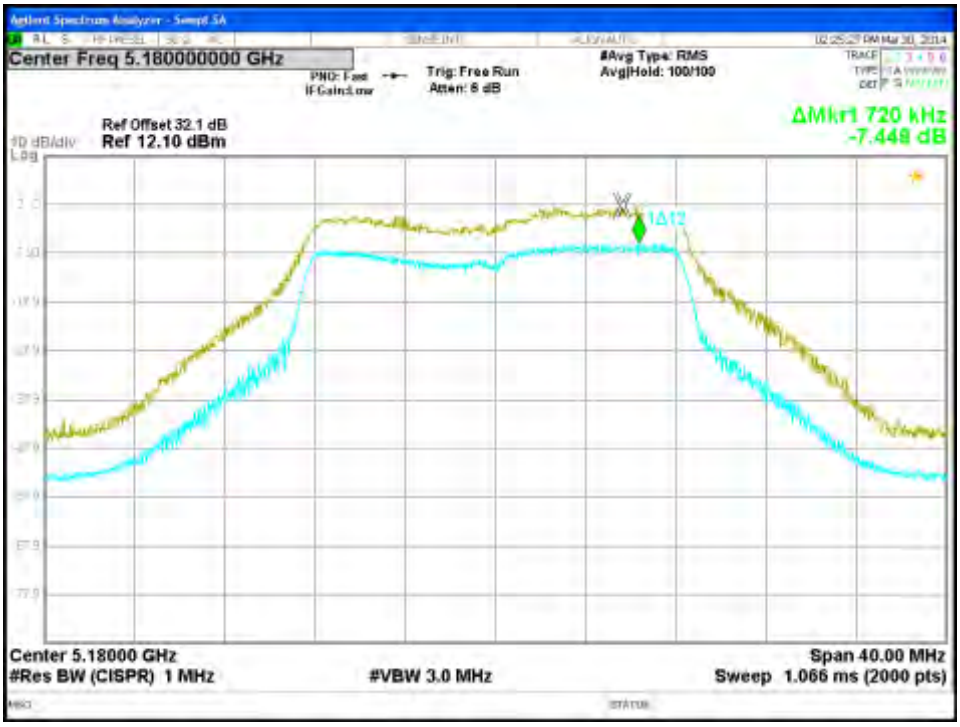


Figure 116: Peak Excursion-5180 MHz-11a-6Mbps-Ch3

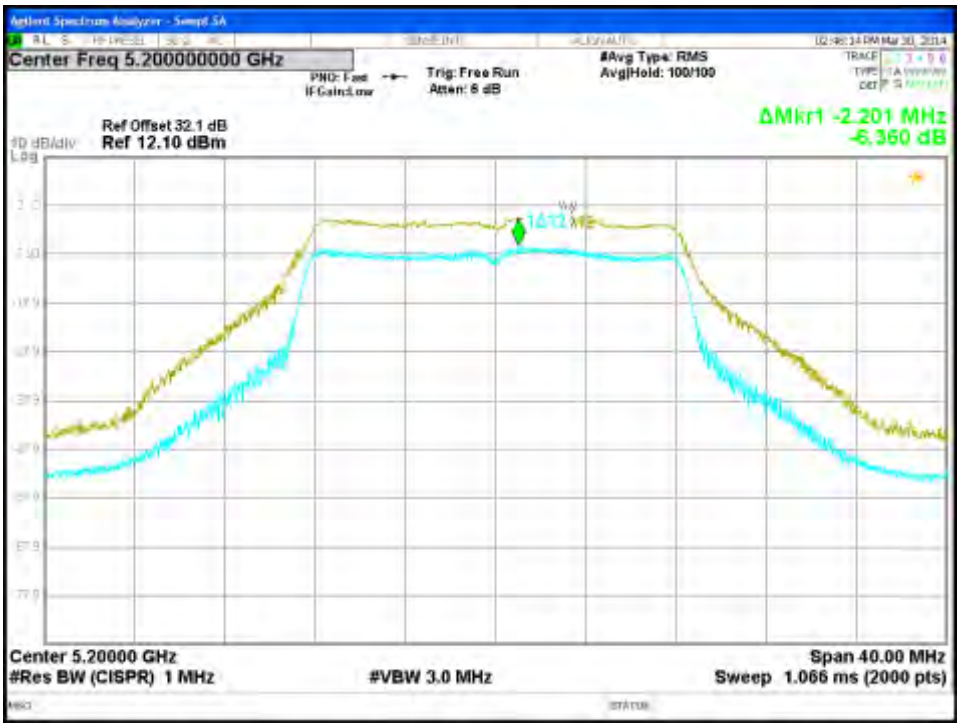


Figure 117: Peak Excursion-5200 MHz-11a-6Mbps-Ch0

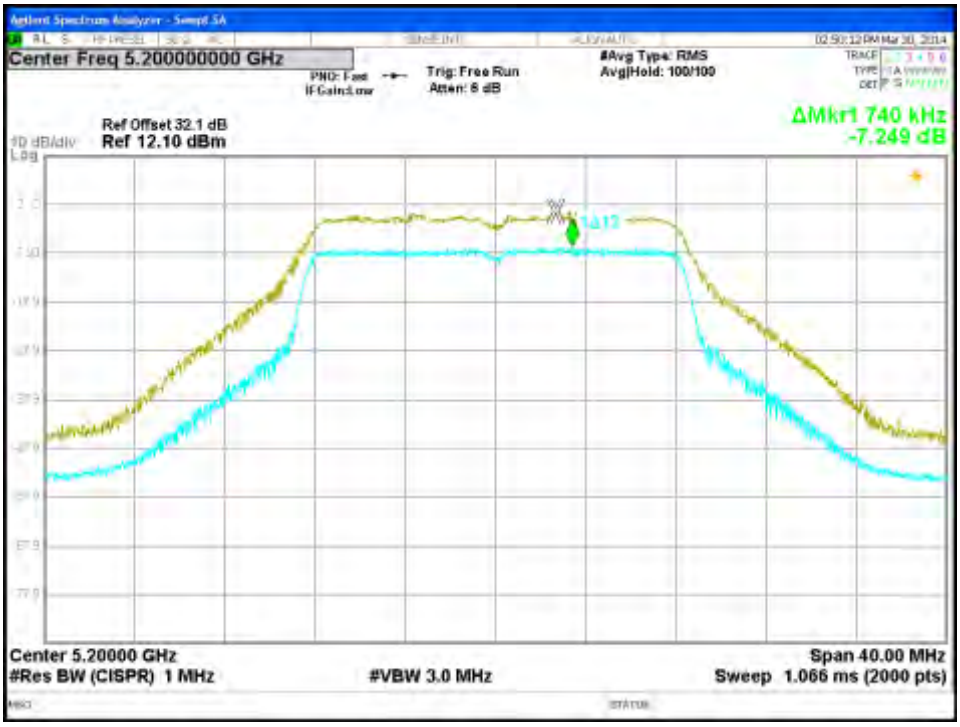


Figure 118: Peak Excursion-5200 MHz-11a-6Mbps-Ch1

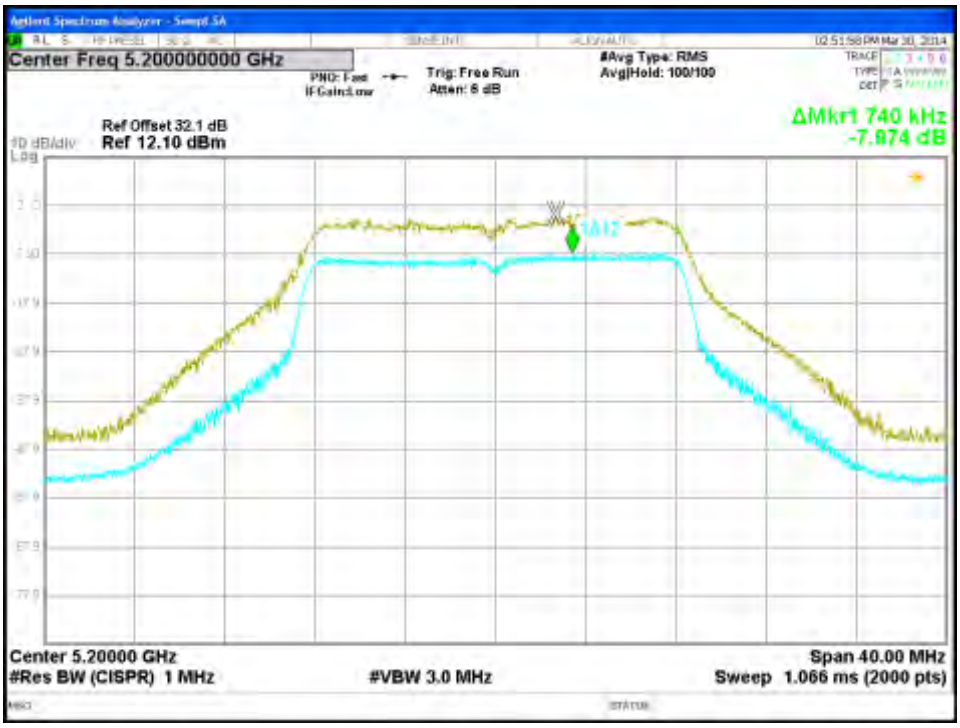


Figure 119: Peak Excursion-5200 MHz-11a-6Mbps-Ch2

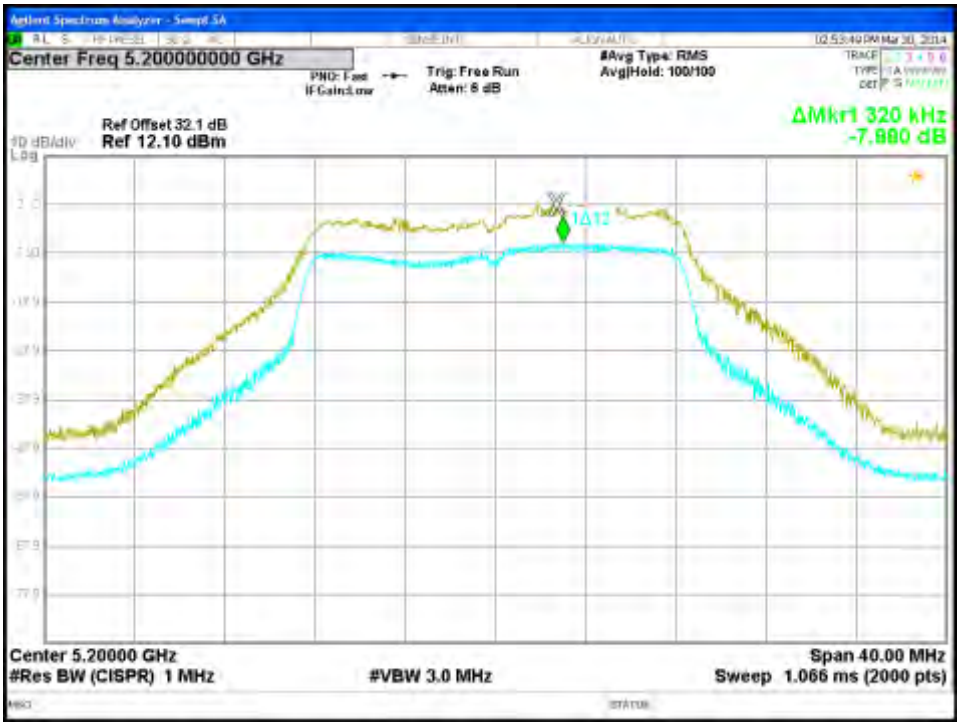


Figure 120: Peak Excursion-5200 MHz-11a-6Mbps-Ch3

Figure 121: Peak Excursion-5240 MHz-11a-6Mbps-Ch0

Figure 122: Peak Excursion-5240 MHz-11a-6Mbps-Ch1

Figure 123: Peak Excursion-5240 MHz-11a-6Mbps-Ch2

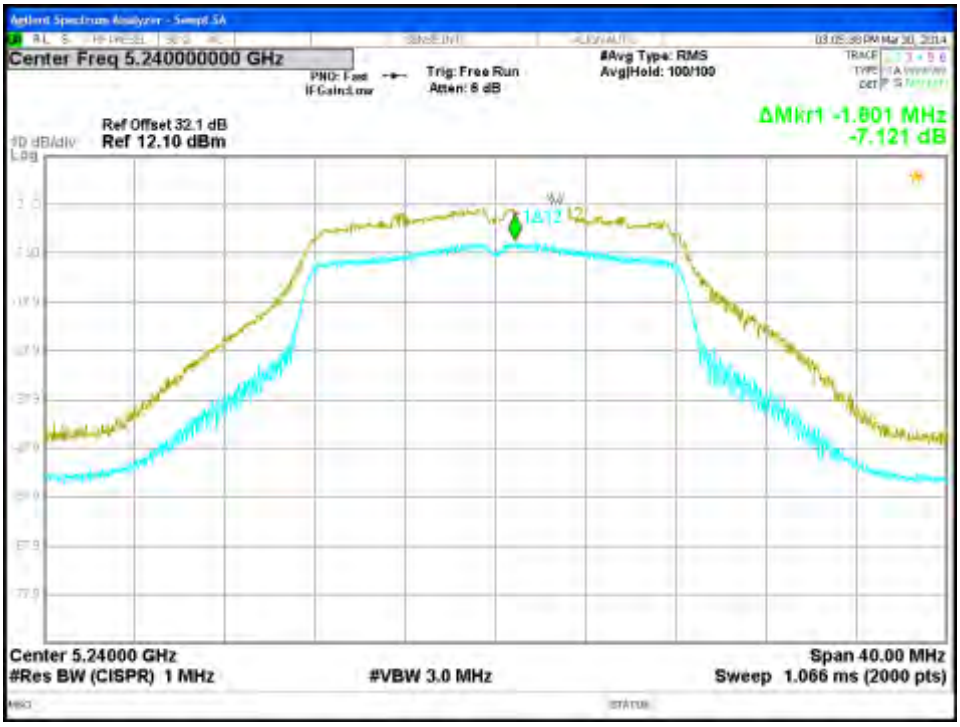


Figure 124: Peak Excursion-5240 MHz-11a-6Mbps-Ch3

Figure 125: Peak Excursion-5180 MHz-HT20-MCS0-Ch0

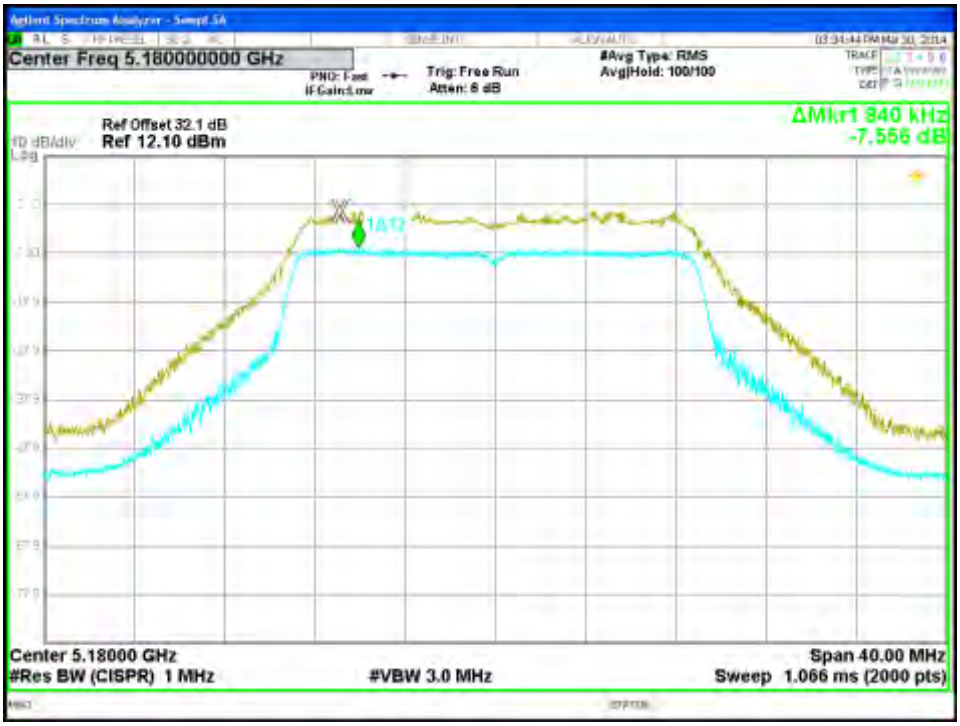


Figure 126: Peak Excursion-5180 MHz-HT20-MCS0-Ch1

Figure 127: Peak Excursion-5180 MHz-HT20-MCS0-Ch2

Figure 128: Peak Excursion-5180 MHz-HT20-MCS0-Ch3

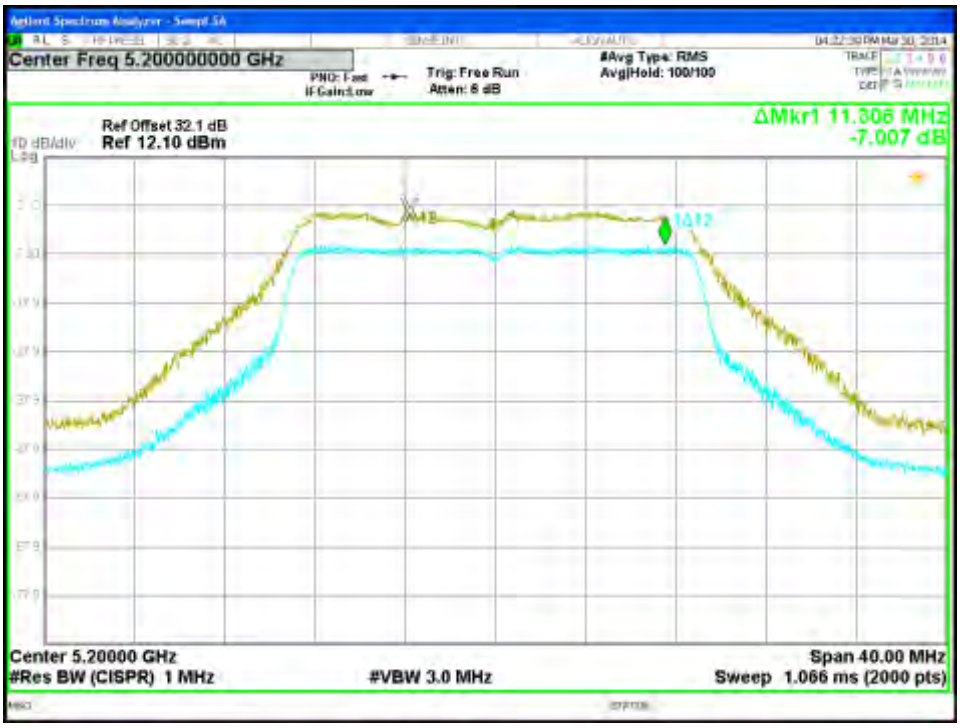


Figure 129: Peak Excursion-5200 MHz-HT20-MCS0-Ch0

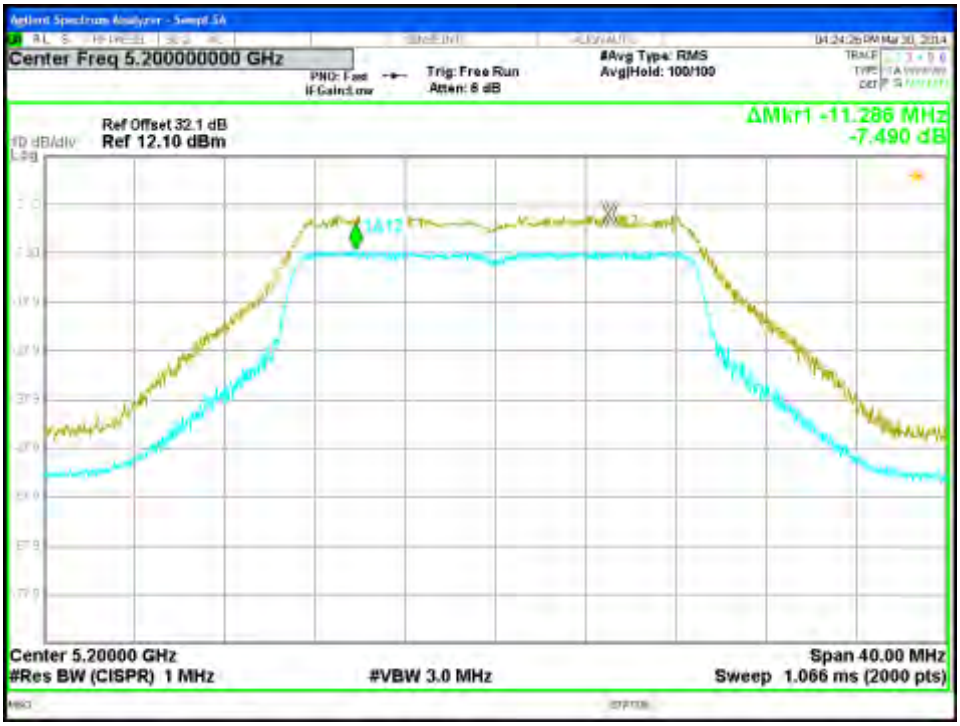


Figure 130: Peak Excursion-5200 MHz-HT20-MCS0-Ch1

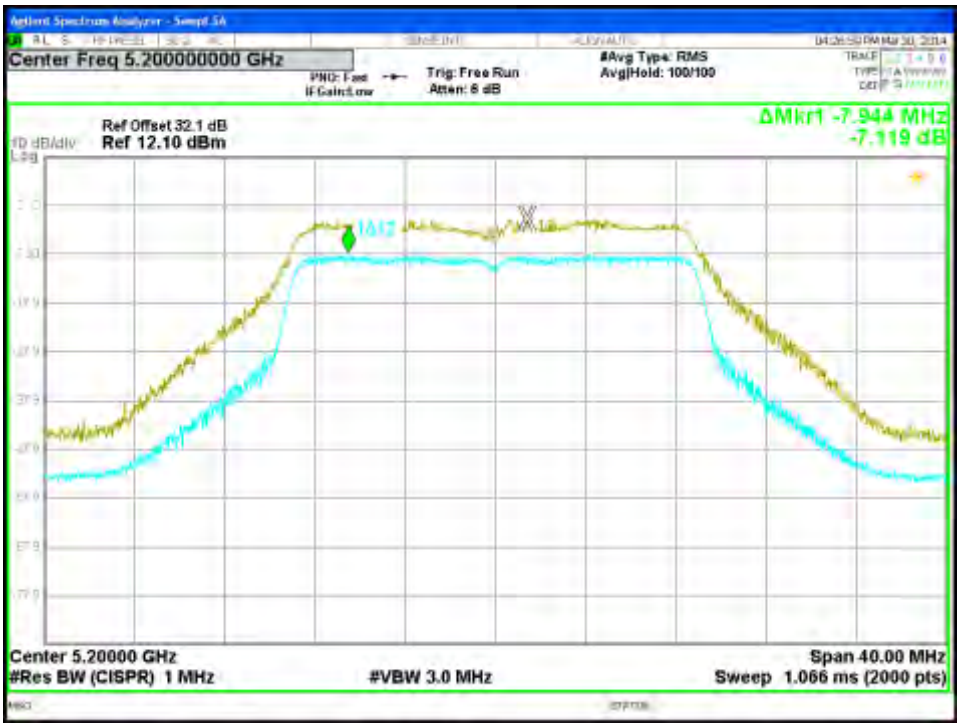


Figure 131: Peak Excursion-5200 MHz-HT20-MCS0-Ch2

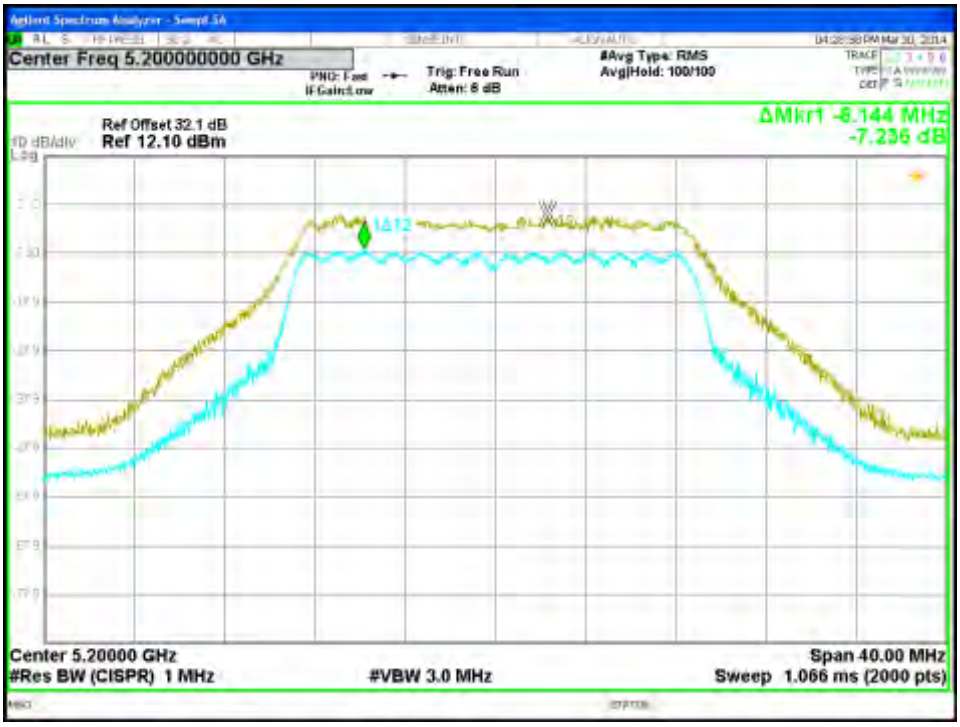


Figure 132: Peak Excursion-5200 MHz-HT20-MCS0-Ch3

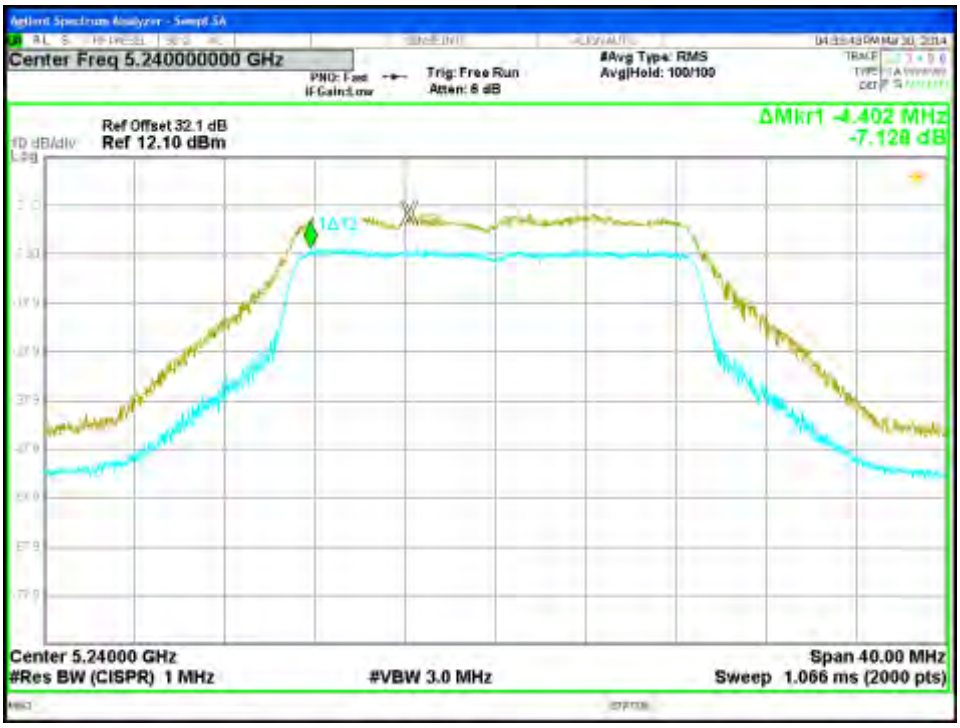


Figure 133: Peak Excursion-5240 MHz-HT20-MCS0-Ch0

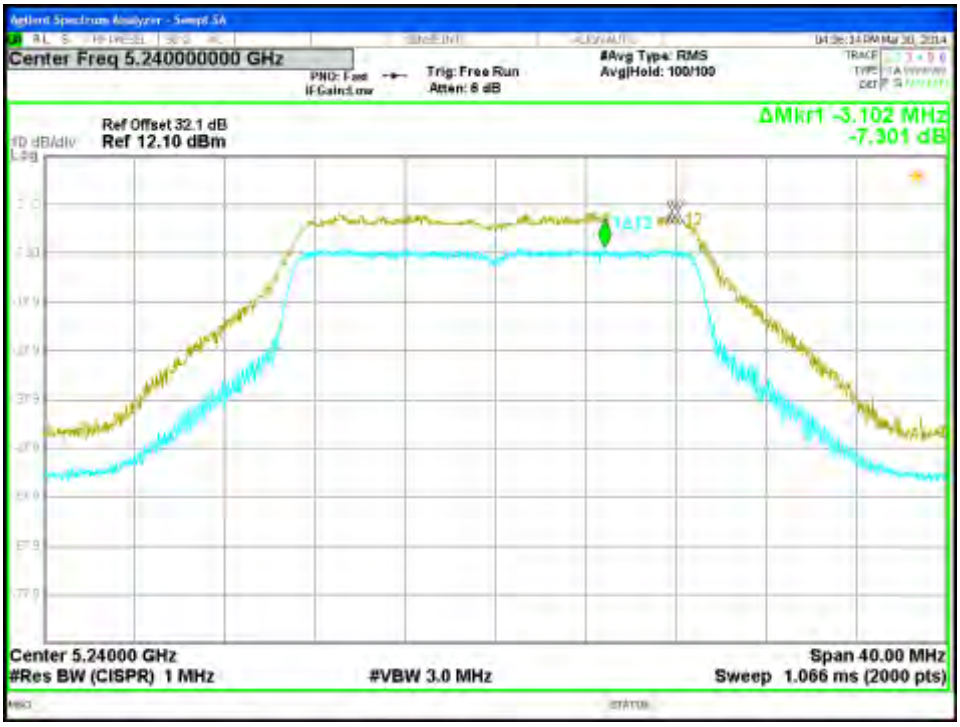


Figure 134: Peak Excursion-5240 MHz-HT20-MCS0-Ch1

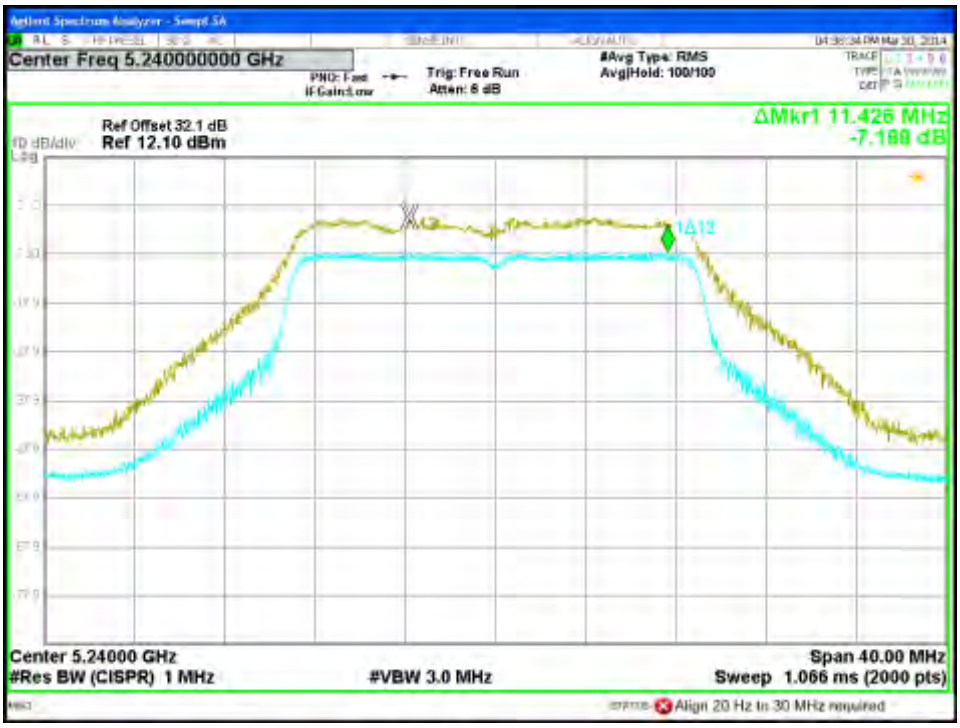


Figure 135: Peak Excursion-5240 MHz-HT20-MCS0-Ch2

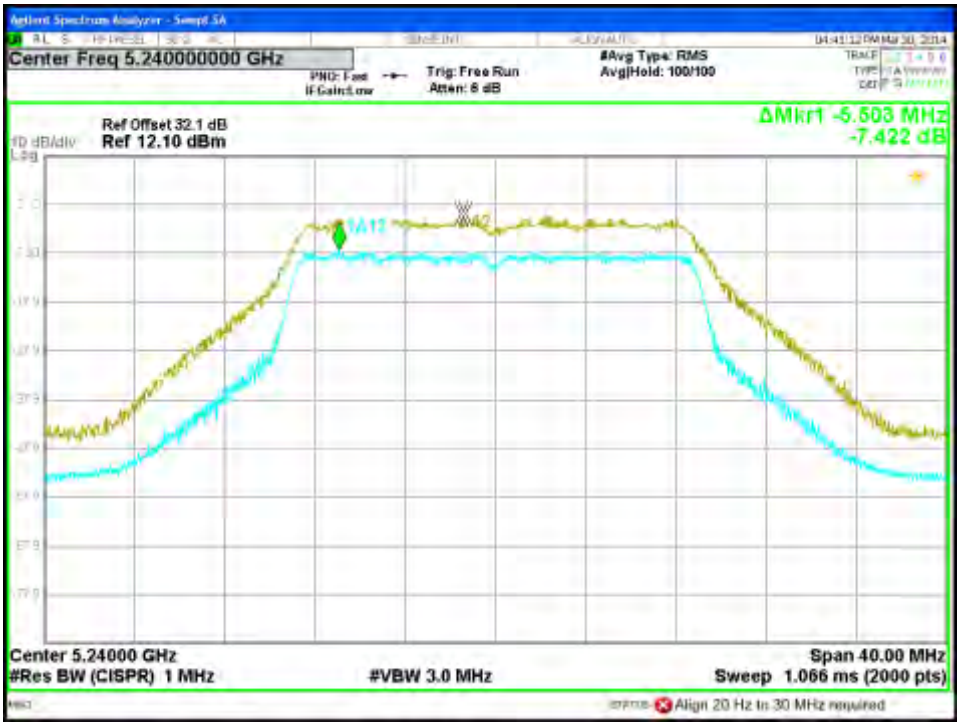


Figure 136: Peak Excursion-5240 MHz-HT20-MCS0-Ch3

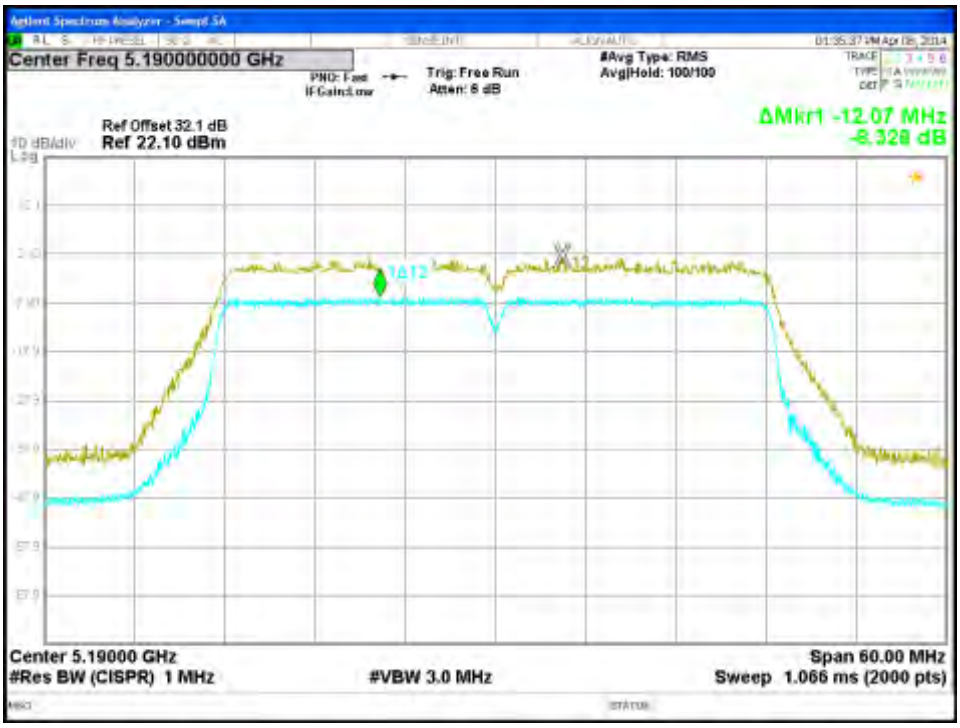


Figure 137: Peak Excursion-5190 MHz-HT40-MCS0-Ch0

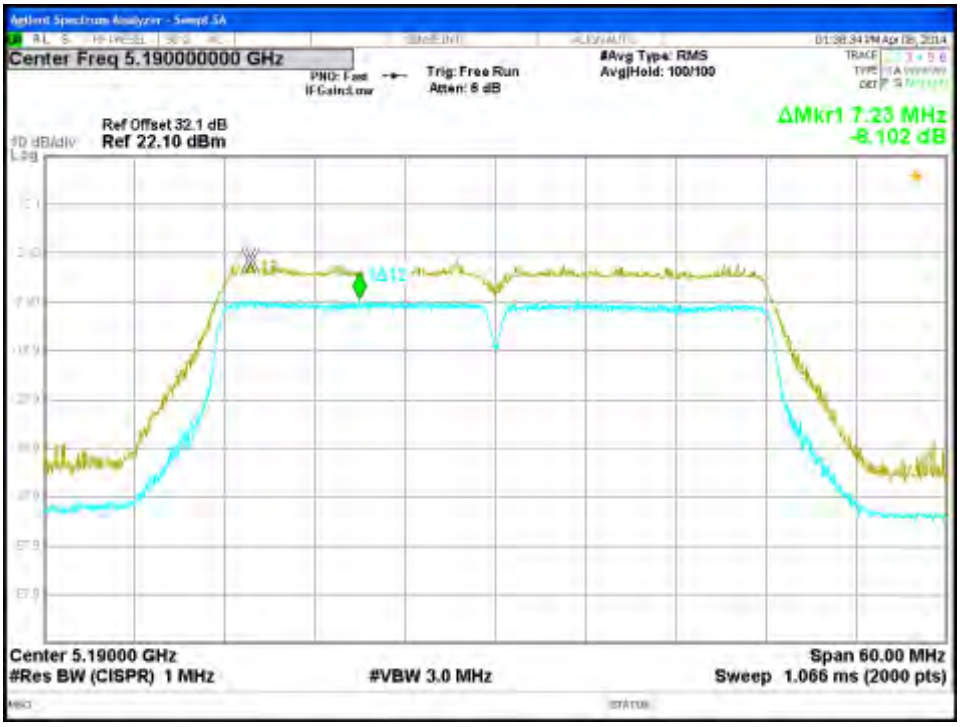


Figure 138: Peak Excursion-5190 MHz-HT40-MCS0-Ch1

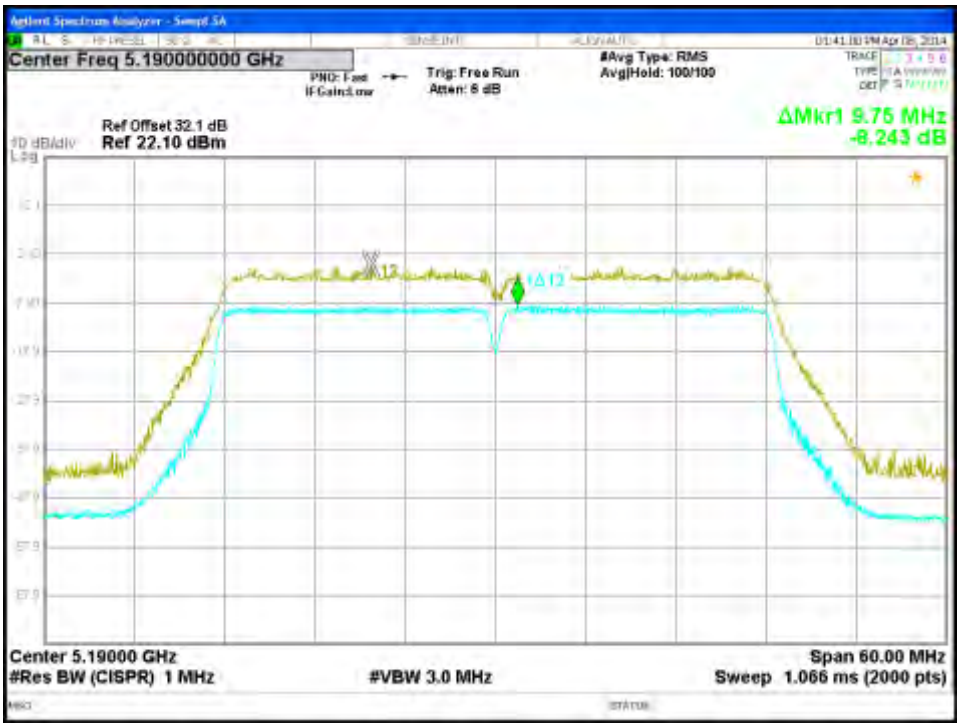


Figure 139: Peak Excursion-5190 MHz-HT40-MCS0-Ch2

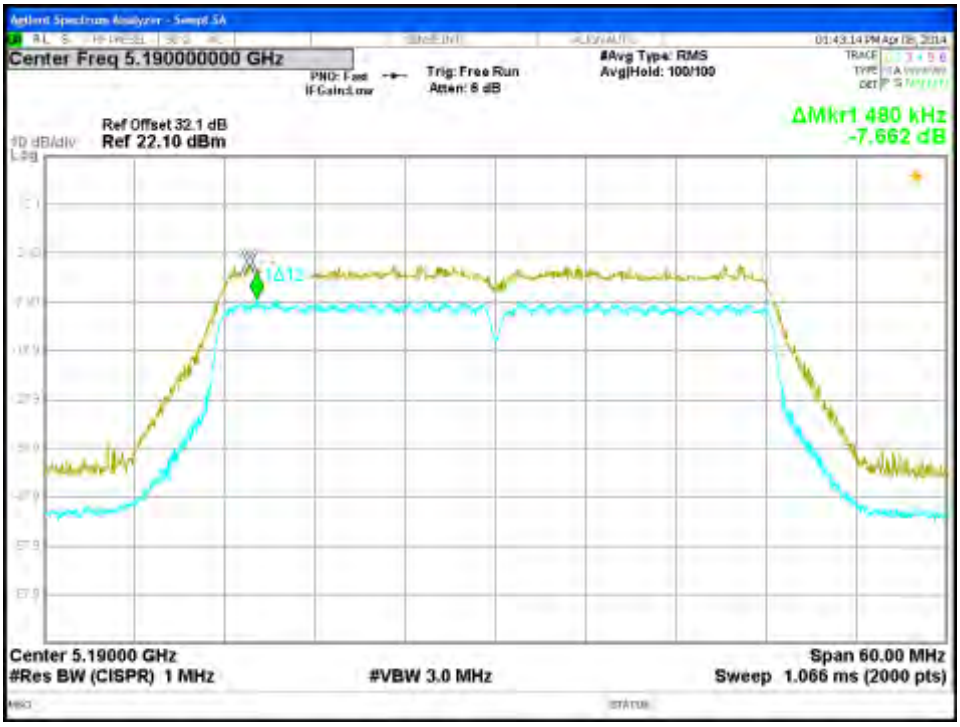


Figure 140: Peak Excursion-5190 MHz-HT40-MCS0-Ch3

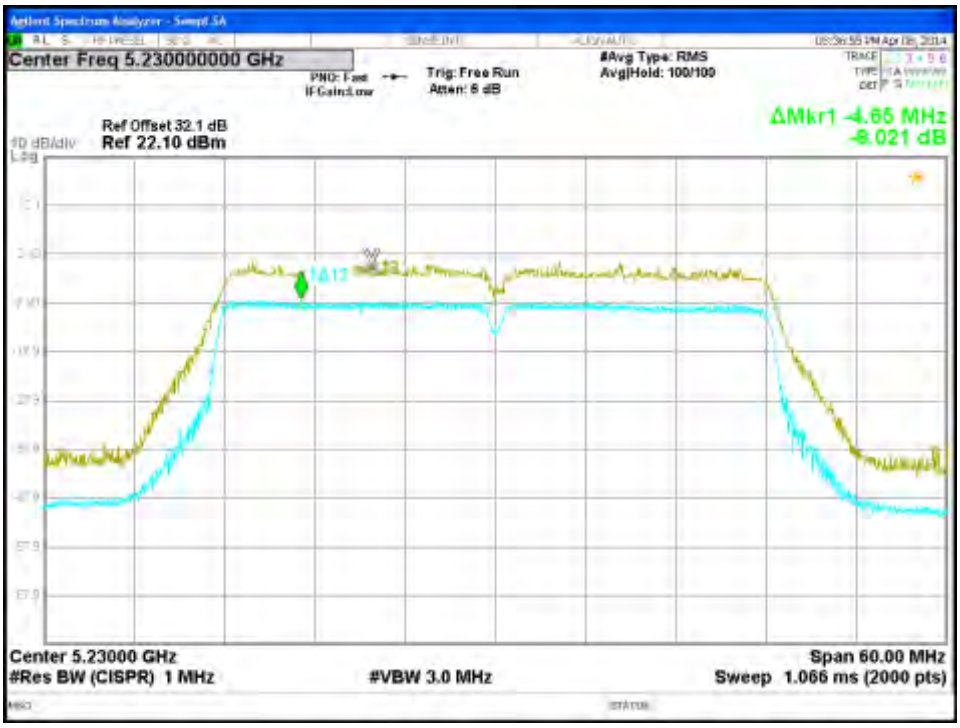


Figure 141: Peak Excursion-5230 MHz-HT40-MCS0-Ch0

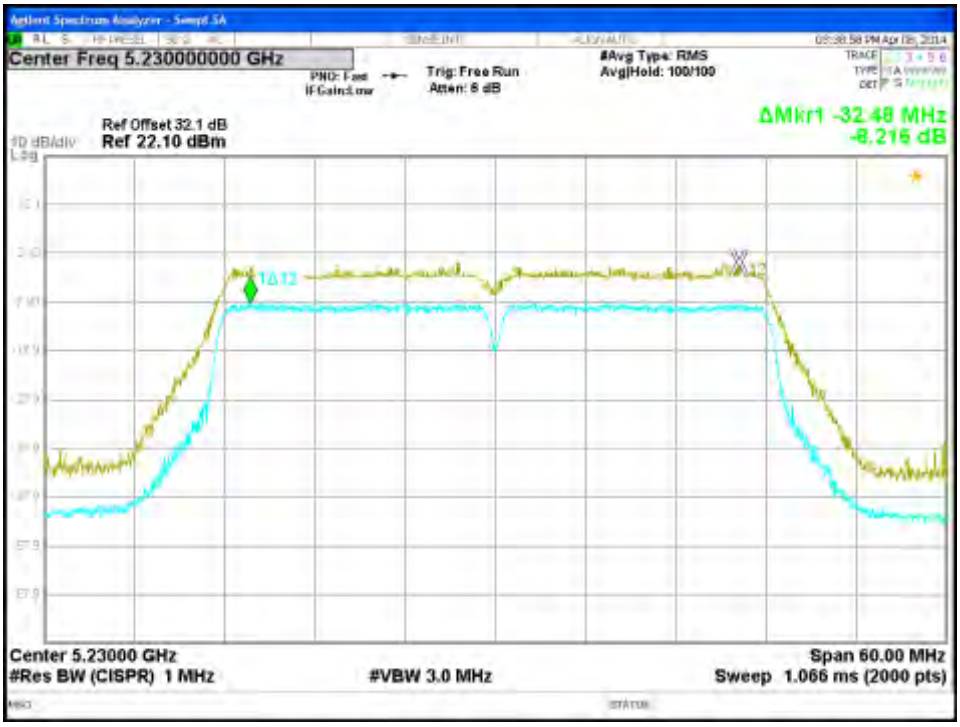


Figure 142: Peak Excursion-5230 MHz-HT40-MCS0-Ch1

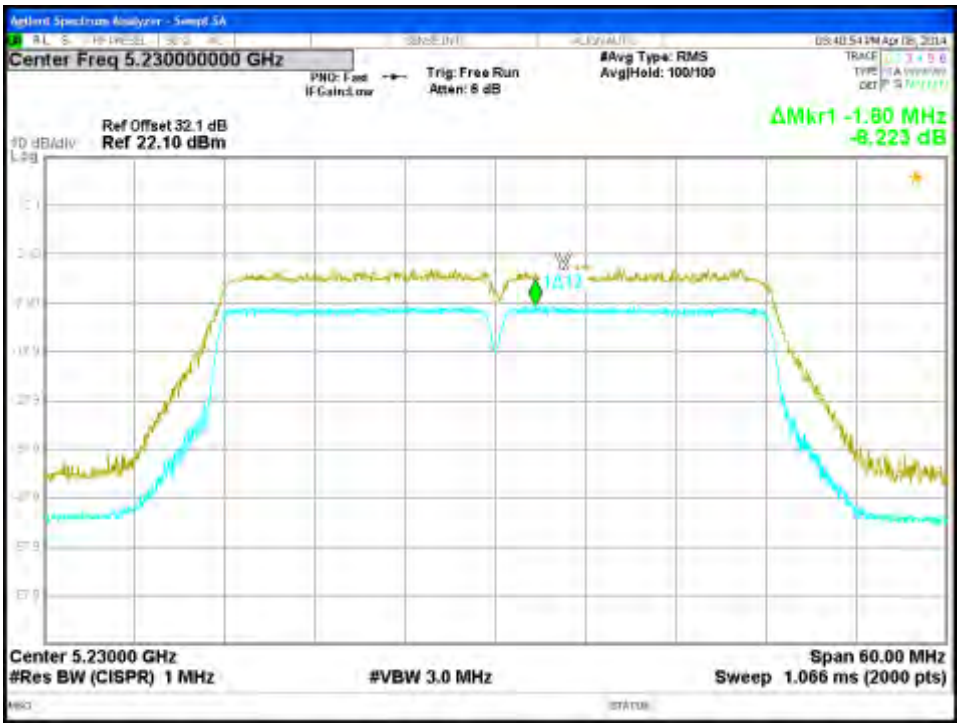


Figure 143: Peak Excursion-5230 MHz-HT40-MCS0-Ch2

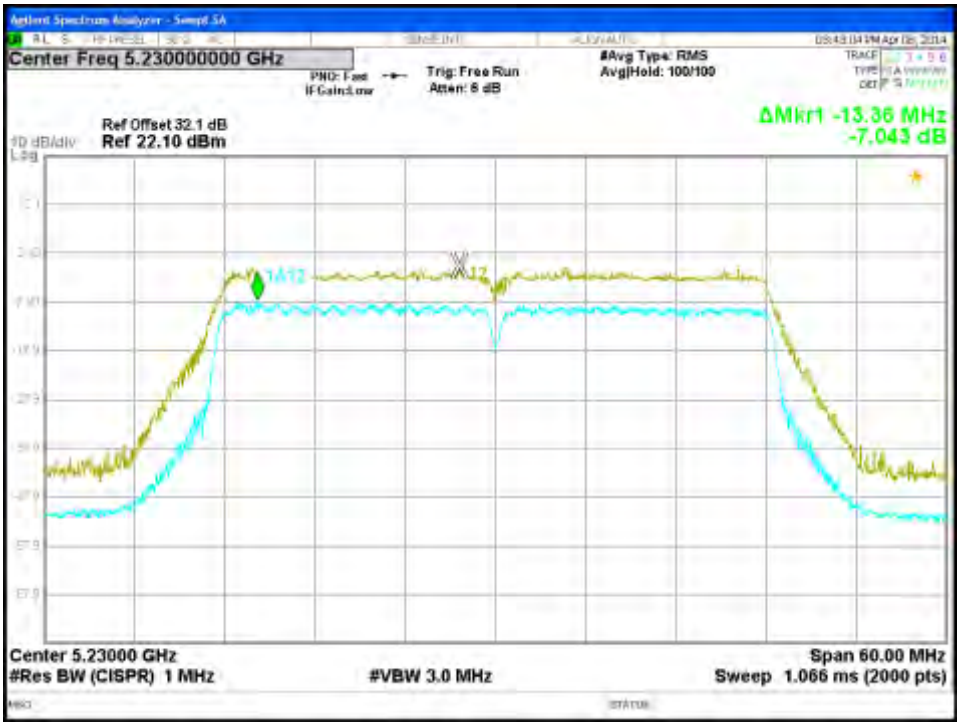


Figure 144: Peak Excursion-5230 MHz-HT40-MCS0-Ch3

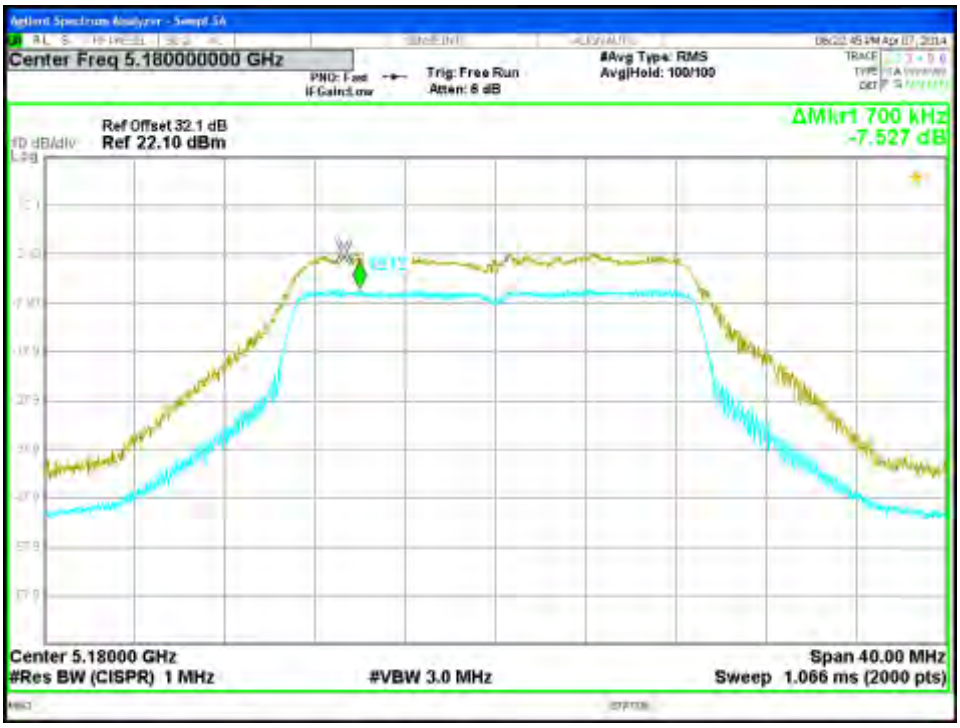


Figure 145: Peak Excursion-5180 MHz-VHT20-MCS0-Ch0

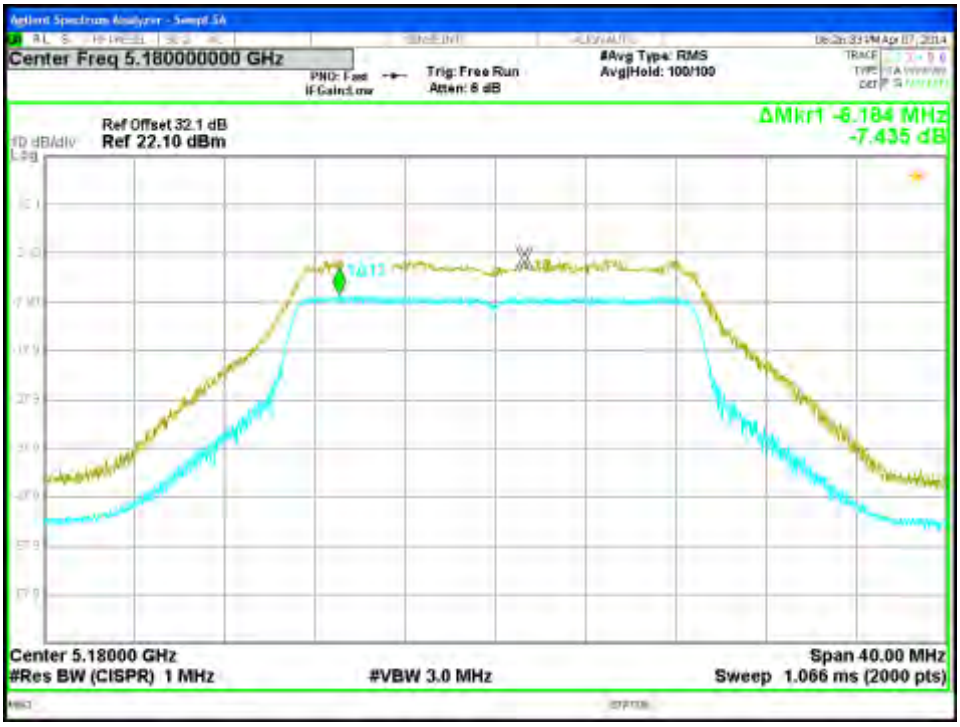


Figure 146: Peak Excursion-5180 MHz-VHT20-MCS0-Ch1

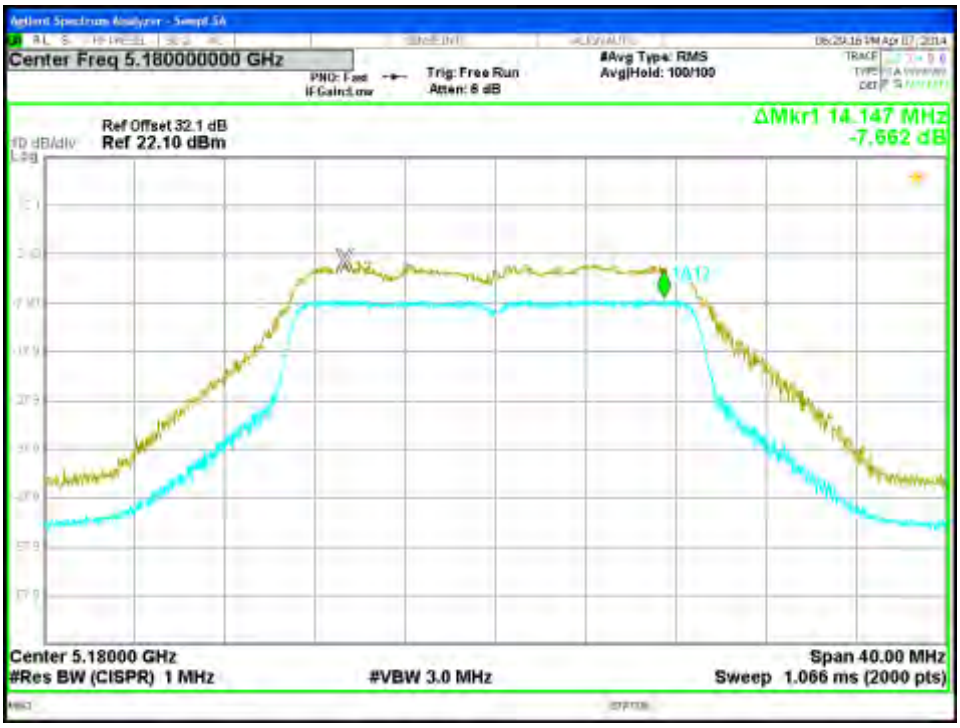


Figure 147: Peak Excursion-5180 MHz-VHT20-MCS0-Ch2

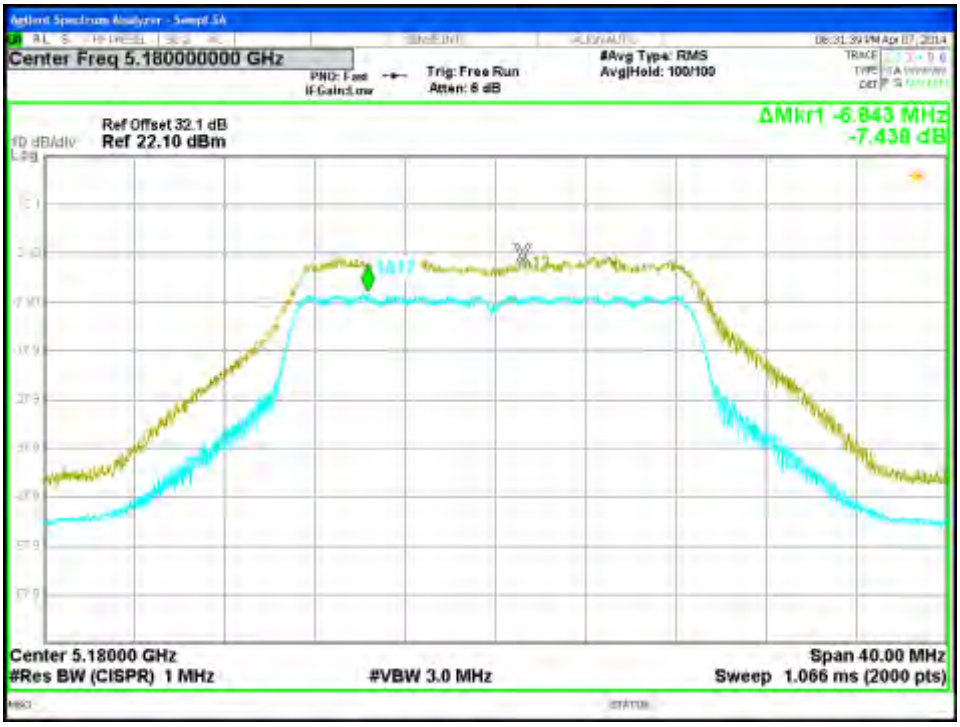


Figure 148: Peak Excursion-5180 MHz-VHT20-MCS0-Ch3

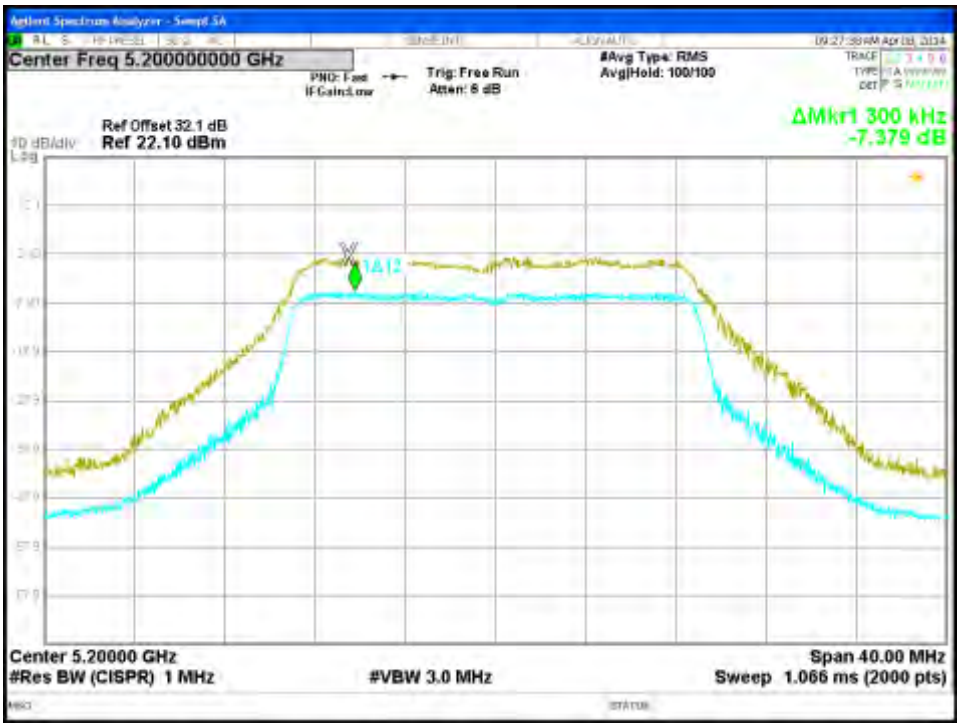


Figure 149: Peak Excursion-5200 MHz-VHT20-MCS0-Ch0

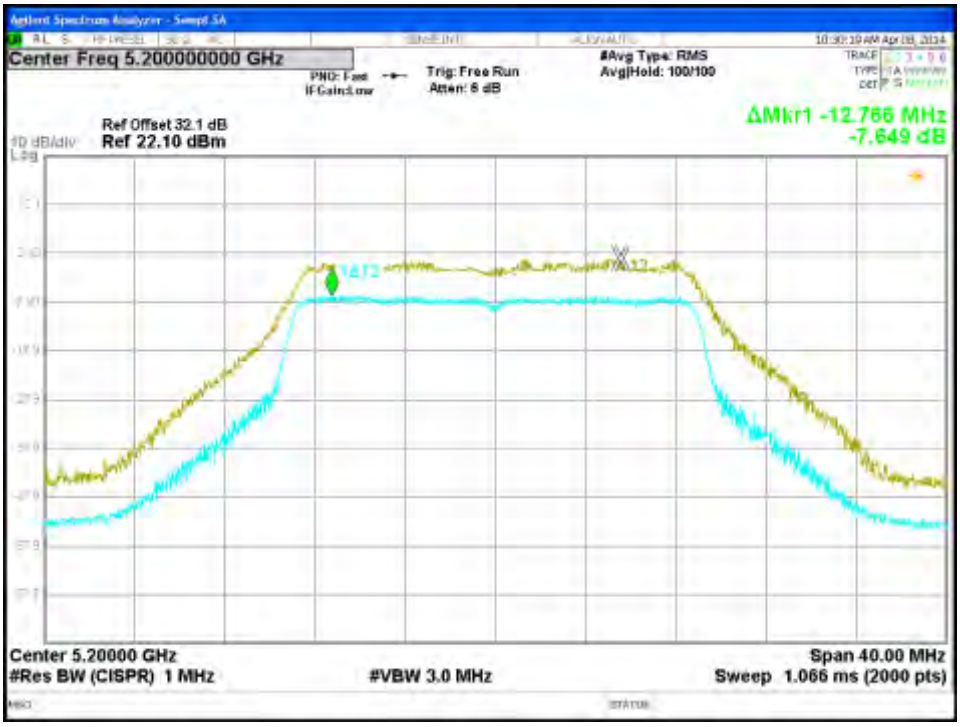


Figure 150: Peak Excursion-5200 MHz-VHT20-MCS0-Ch1

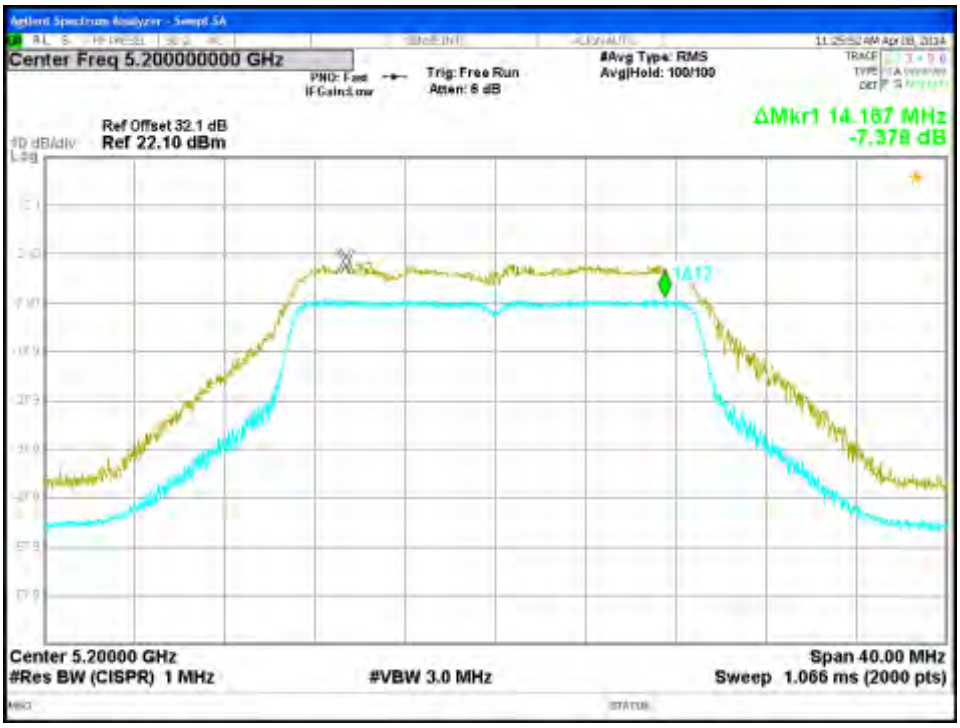


Figure 151: Peak Excursion-5200 MHz-VHT20-MCS0-Ch2

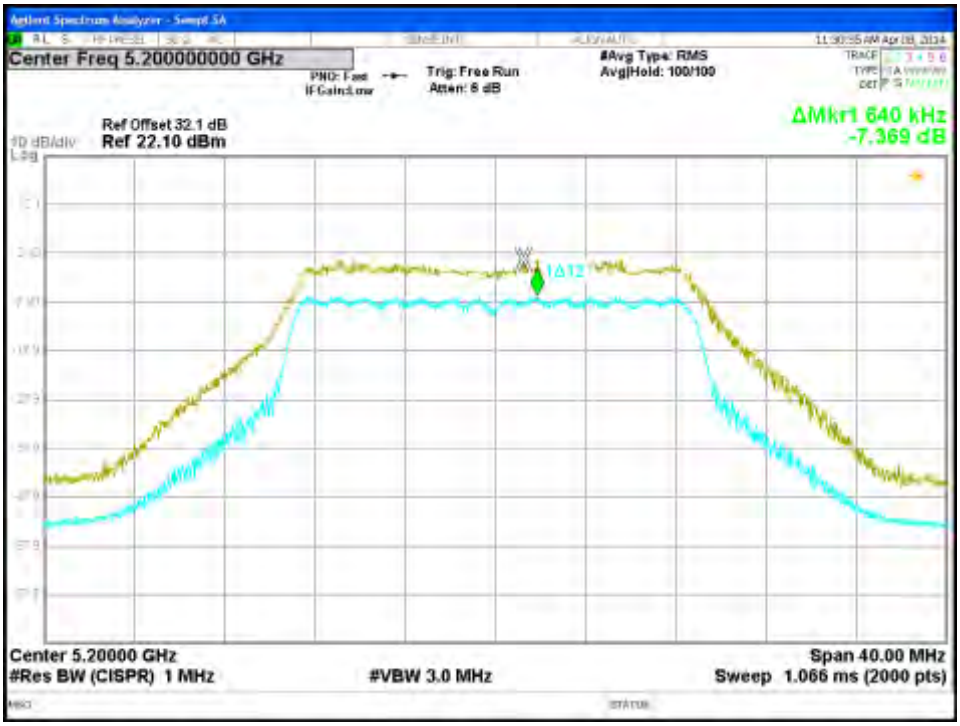


Figure 152: Peak Excursion-5200 MHz-VHT20-MCS0-Ch3

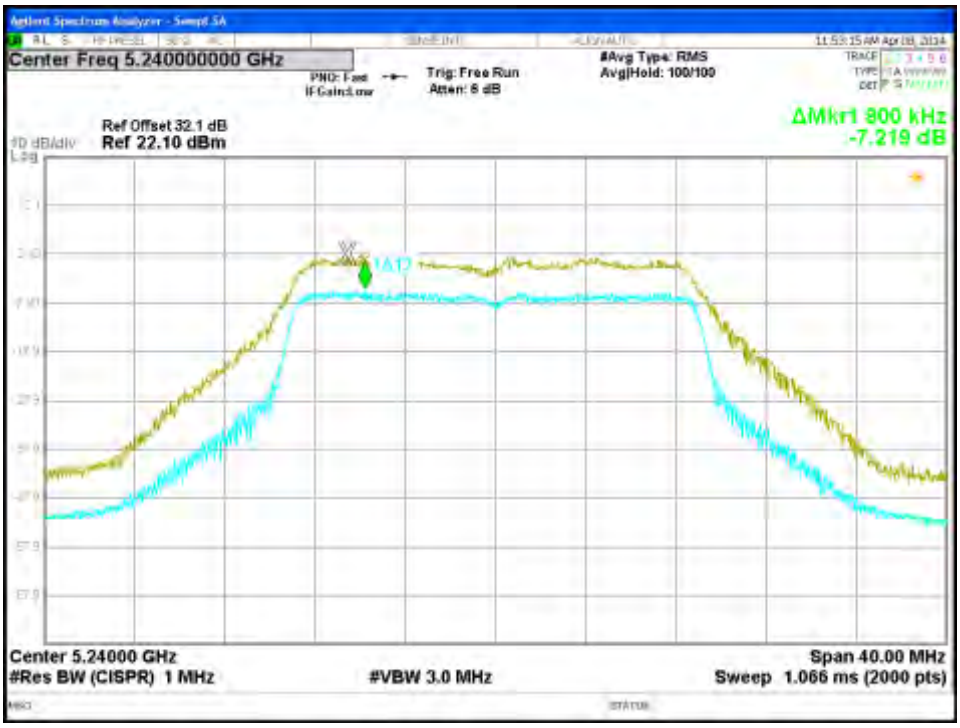


Figure 153: Peak Excursion-5240 MHz-VHT20-MCS0-Ch0

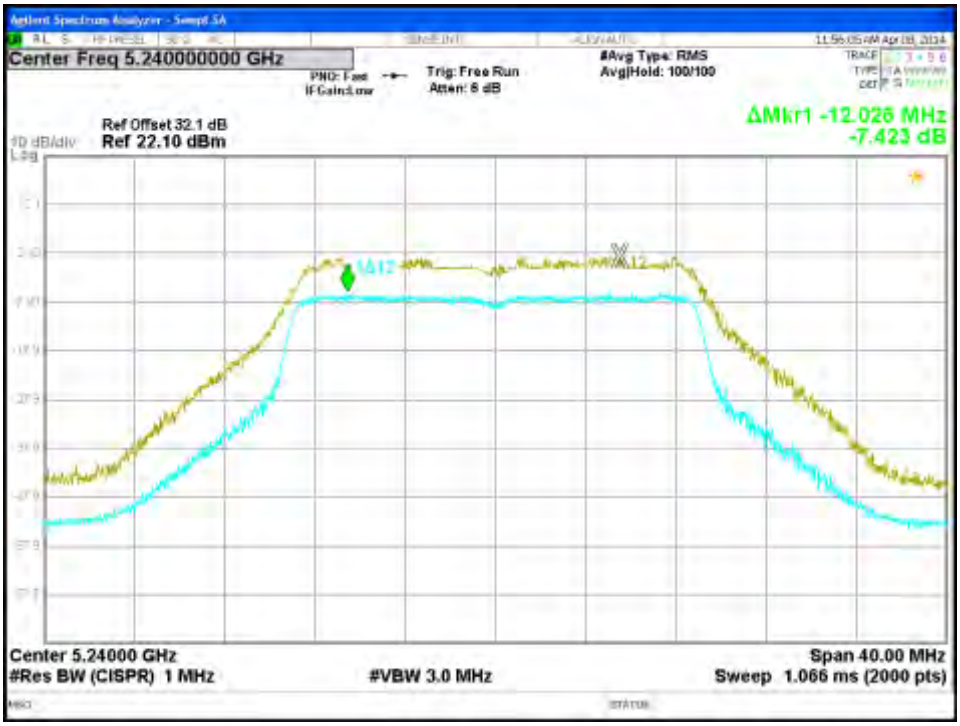


Figure 154: Peak Excursion-5240 MHz-VHT20-MCS0-Ch1

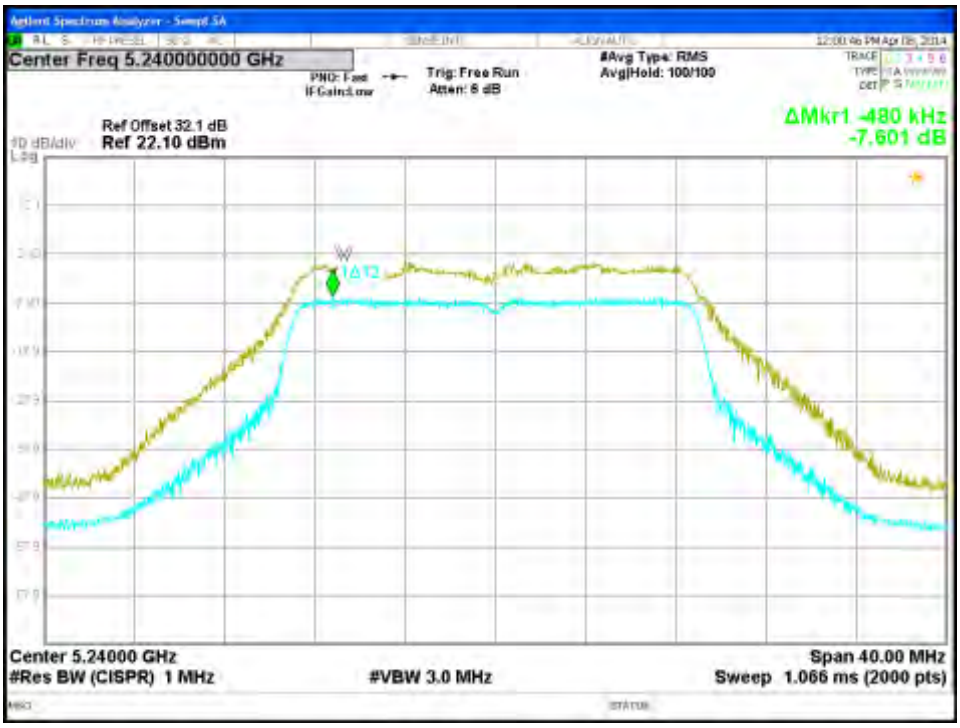


Figure 155: Peak Excursion-5240 MHz-VHT20-MCS0-Ch2

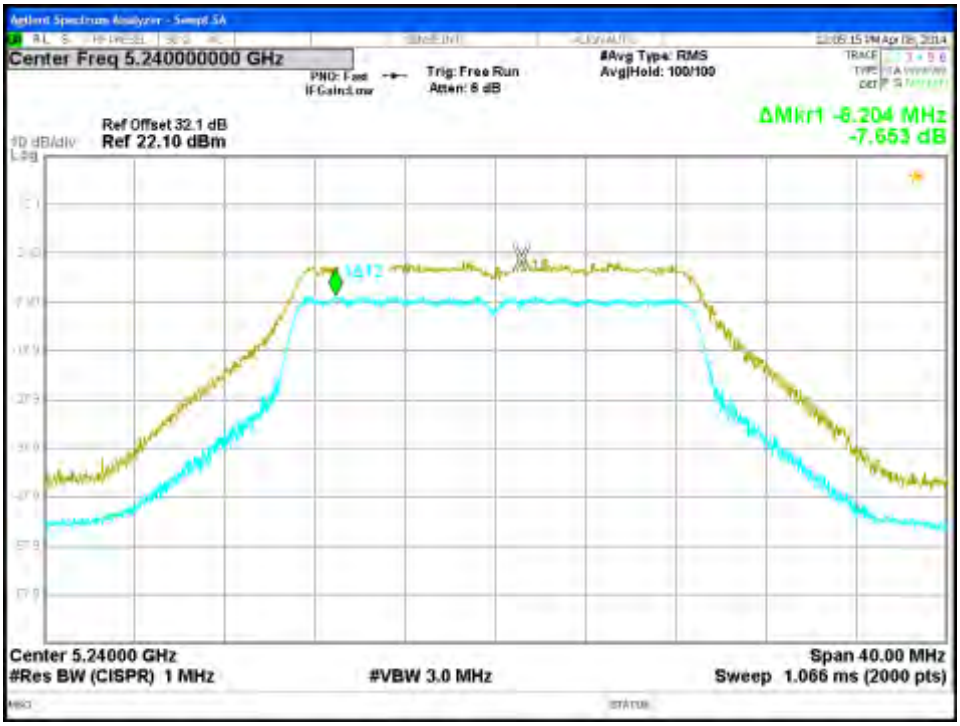


Figure 156: Peak Excursion-5240 MHz-VHT20-MCS0-Ch3

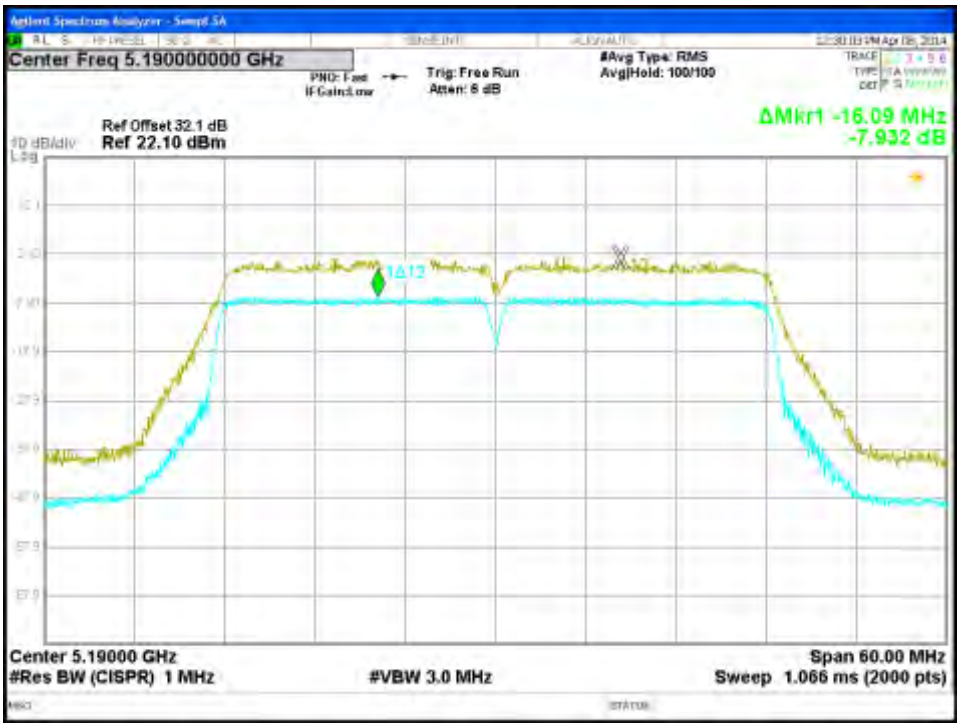


Figure 157: Peak Excursion-5190 MHz-VHT40-MCS0-Ch0

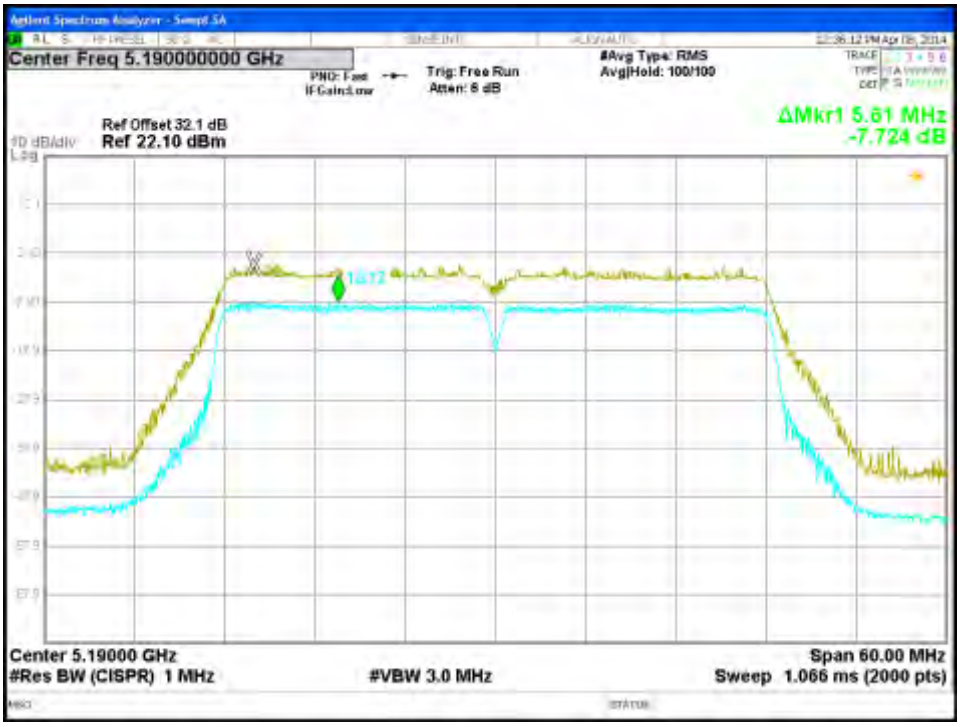


Figure 158: Peak Excursion-5190 MHz-VHT40-MCS0-Ch1

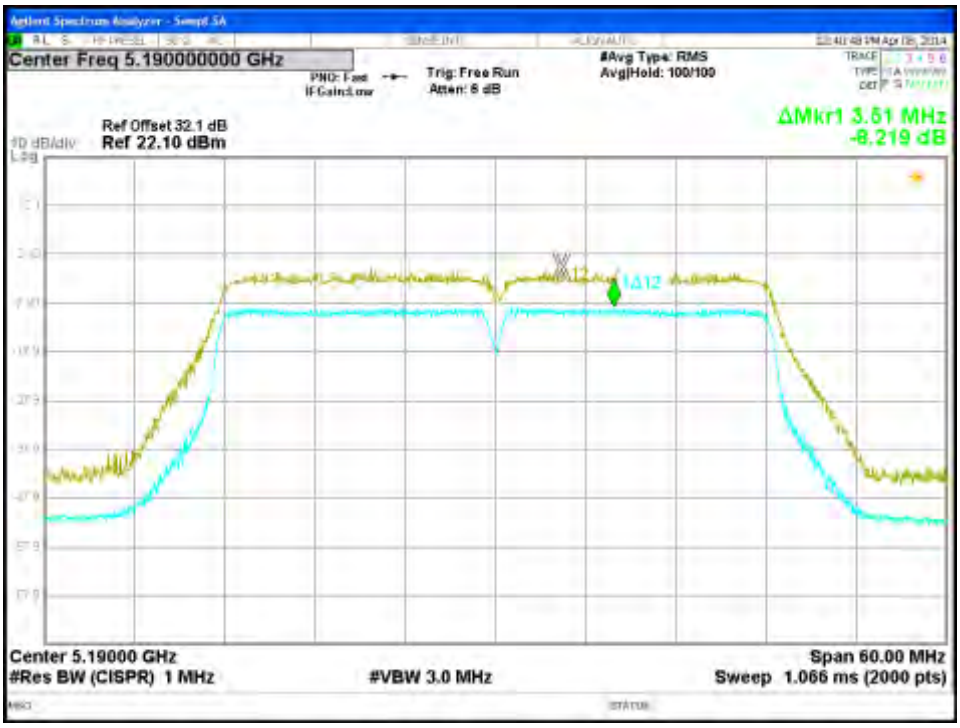


Figure 159: Peak Excursion-5190 MHz-VHT40-MCS0-Ch2

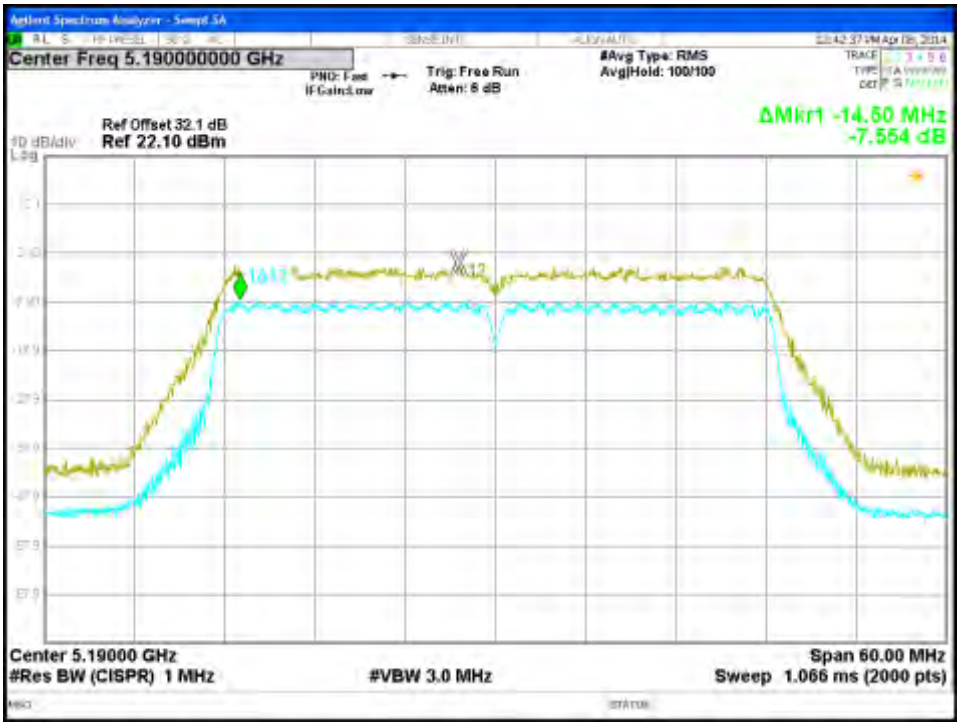


Figure 160: Peak Excursion-5190 MHz-VHT40-MCS0-Ch3

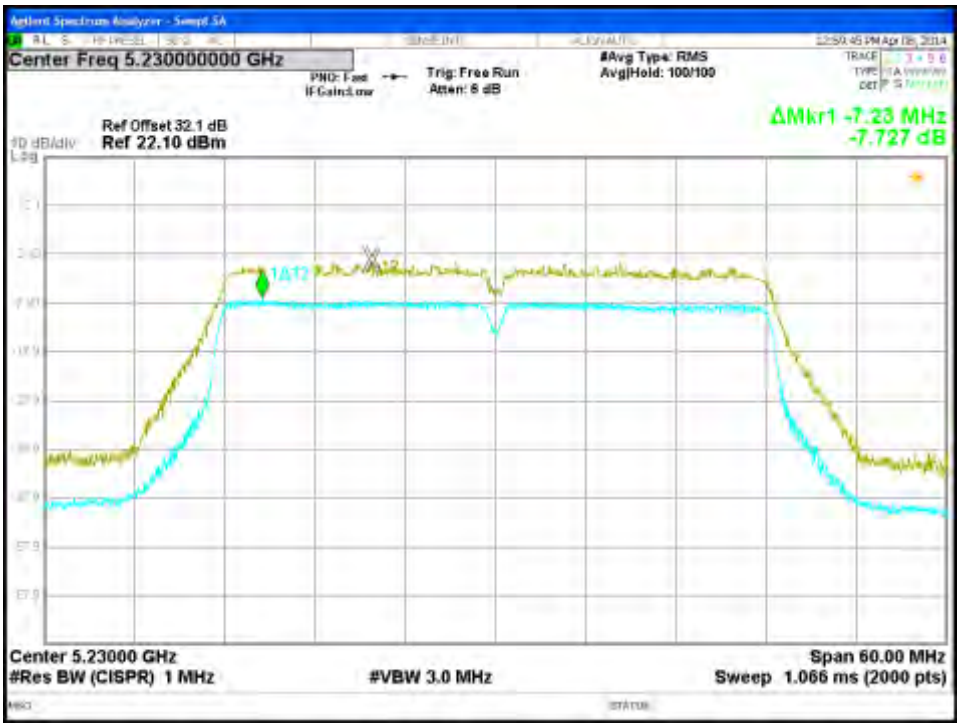


Figure 161: Peak Excursion-5230 MHz-VHT40-MCS0-Ch0

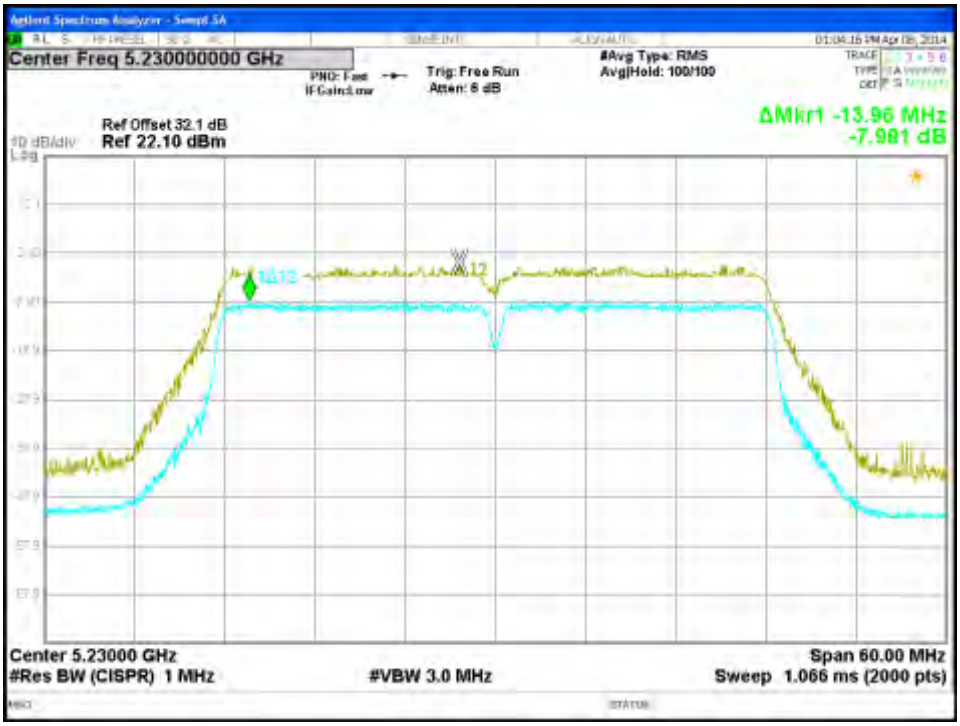


Figure 162: Peak Excursion-5230 MHz-VHT40-MCS0-Ch1

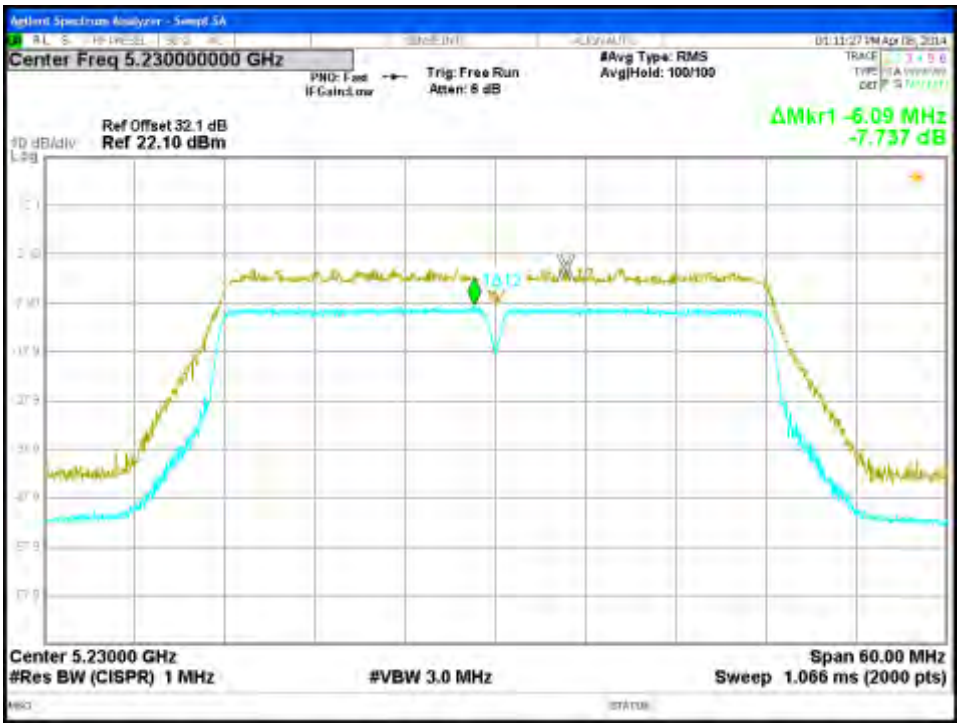


Figure 163: Peak Excursion-5230 MHz-VHT40-MCS0-Ch2

Figure 164: Peak Excursion-5230 MHz-VHT40-MCS0-Ch3

Figure 165: Peak Excursion-5210 MHz-VHT80-MCS0-Ch0

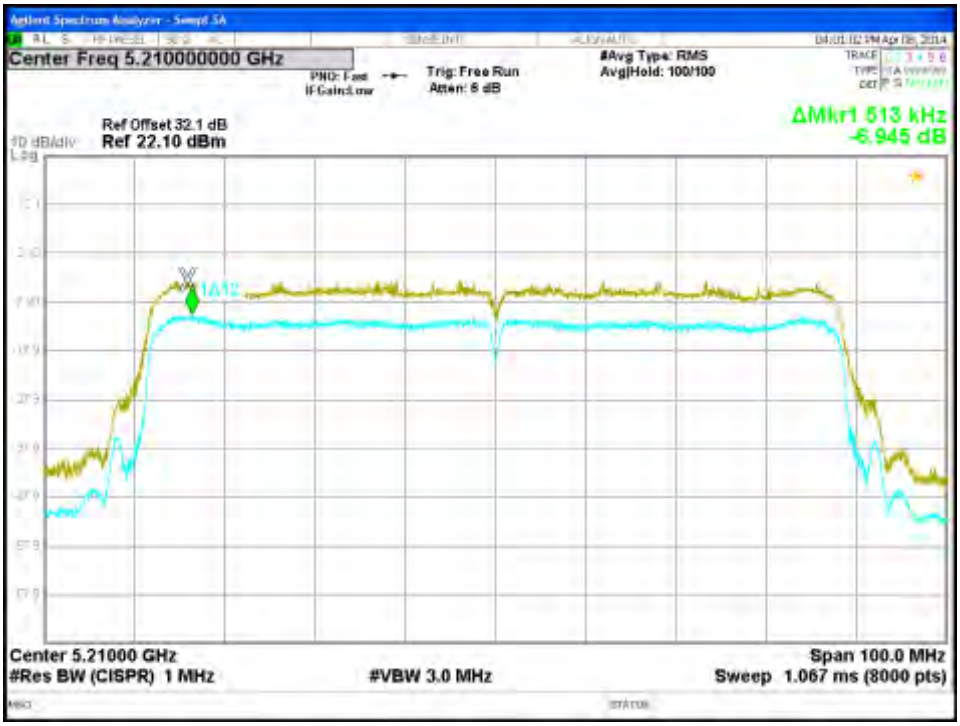


Figure 166: Peak Excursion-5210 MHz-VHT80-MCS0-Ch1

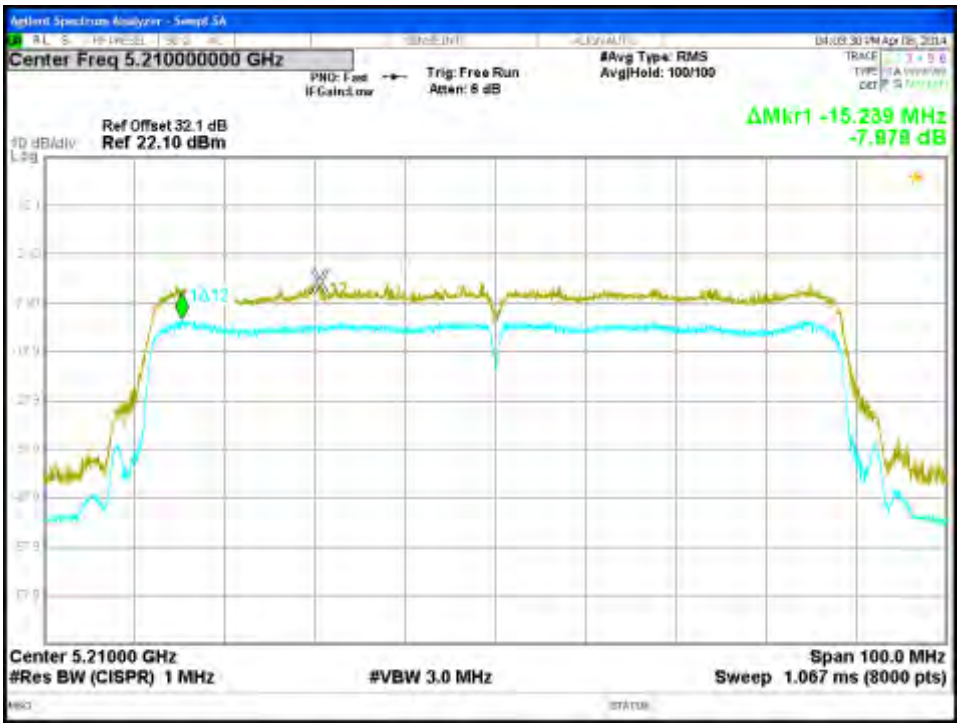


Figure 167: Peak Excursion-5210 MHz-VHT80-MCS0-Ch2

Figure 168: Peak Excursion-5210 MHz-VHT80-MCS0-Ch3

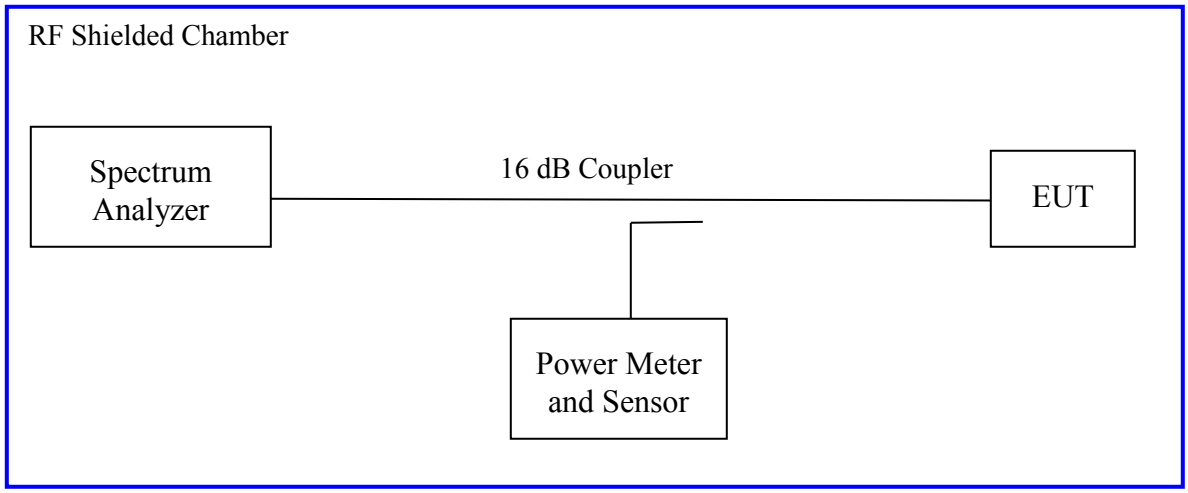
4.4 Peak Power Spectral Density

According to the CFR47 Part 15.407 (a) and RSS-210 (A9.2), the spectral power density output of the antenna port shall be less than 4 dBm in any 1 MHz band during any time interval of continuous transmission.

4.4.1 Test Method

The conducted method was used to measure the peak power spectral density per ANSI C63.10-2009 Section 6.11.2. The measurement was performed with modulation per CFR47 Part 15.407 (a) and RSS-210 (A9.2). The pre-evaluation was performed to find the worst modes. The worst findings were conducted on 3 channels in frequency range of 5150 MHz to 5250 MHz for the test sample, S/N 121404000111. The result indicated below.

Test Setup:



KDB 789033 D01 UNII General Test Procedures v01r03 Section F applies for measuring peak power spectral density with duty cycle less than 100%. The duty cycle correction factor was applied, CF = 10Log(1/duty cycle).

Since all transmit chains of the EUT will be on at all time and beam performing, power spectral densities were summed the spectra bins across the all output chains per KDB 662911.

The limit is reduced for every dBi gain exceeding 6 dBi per CFR47 Part 15.407 (a). The adjusted limit is 1.92 dBm since the total directional gain is 8.08 dBi.

4.4.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 6: Peak Power Spectral Density – Test Results

Test Conditions: Conducted Measurement			**Test Date:** April 19, 2014		
Antenna Type: Integrated			**Power Setting:** See test plan		
Directional Antenna Gain: + 8.08 dBi			**Signal State:** Modulated		
Ambient Temp.: 23 °C			**Relative Humidity:**33%		
Peak Power Spectral Density					
802.11a Mode					
Freq. [MHz]	**Limit [dBm]**	**Spectra Σ [dBm]**	**CF [dB]**	**Total Spectra Σ [dBm]**	**Margin [dB]**
5180	1.92	0.79	0.04	0.83	-1.09
5200	1.92	0.61	0.04	0.65	-1.27
5240	1.92	0.36	0.04	0.40	-1.52
Note: The highest peak output power was observed at 802.11a 6 Mbps per data stream at 99% duty cycle.					
802.11n (HT20) Mode					
Freq. [MHz]	**Limit [dBm]**	**Spectra Σ [dBm]**	**CF [dB]**	**Total Spectra Σ [dBm]**	**Margin [dB]**
5180	1.92	0.27	0.09	0.36	-1.56
5200	1.92	0.09	0.09	0.18	-1.74
5240	1.92	0.10	0.09	0.19	-1.73
Note: The highest peak output power was observed at HT20 MCS0 per data stream at 98% duty cycle.					

802.11n (HT40) Mode					
Freq. [MHz]	**Limit [dBm]**	**Spectra Σ [dBm]**	**CF [dB]**	**Total Spectra Σ [dBm]**	**Margin [dB]**
5190	1.92	-0.35	0.18	-0.18	-2.10
5230	1.92	-0.49	0.18	-0.31	-2.23
Note: The highest peak output power was observed at HT40 MCS0 per data stream at 96% duty cycle.					
802.11ac (VHT20) Mode					
Freq. [MHz]	**Limit [dBm]**	**Spectra Σ [dBm]**	**CF [dB]**	**Total Spectra Σ [dBm]**	**Margin [dB]**
5180	1.92	0.20	0.09	0.28	-1.63
5200	1.92	-0.06	0.09	0.03	-1.89
5240	1.92	-0.21	0.09	-0.12	-2.04
Note: The highest peak output power was observed at VHT20 MCS0 per data stream at 98% duty cycle.					
802.11ac (VHT40) Mode					
Freq. [MHz]	**Limit [dBm]**	**Spectra Σ [dBm]**	**CF [dB]**	**Total Spectra Σ [dBm]**	**Margin [dB]**
5190	1.92	-0.56	0.13	-0.43	-2.35
5230	1.92	-0.22	0.13	-0.09	-2.00
Note: The highest peak output power was observed at VHT40 MCS0 per data stream at 97% duty cycle.					

802.11ac (VHT80) Mode					
Freq. [MHz]	**Limit [dBm]**	**Spectra Σ [dBm]**	**CF [dB]**	**Total Spectra Σ [dBm]**	**Margin [dB]**
5210	1.92	-2.87	0.32	-2.55	-4.47
Note: The highest peak output power was observed at HT80 MCS0 per data stream at 93% duty cycle.					

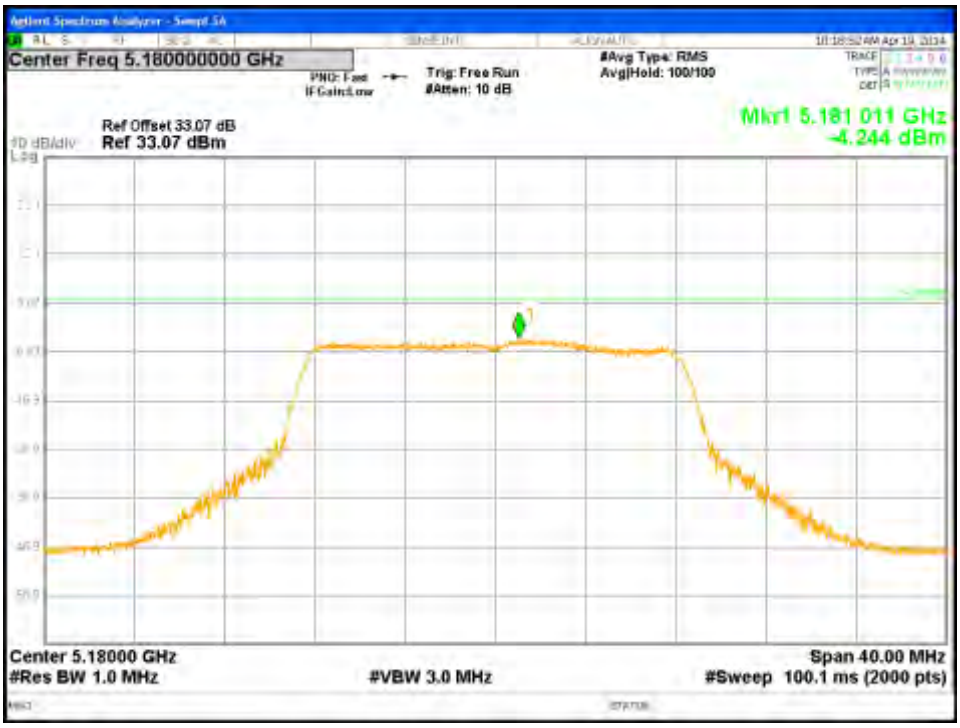


Figure 169: Maximum Power Spectral Density-5180 MHz-11a-6Mbps-Ch0

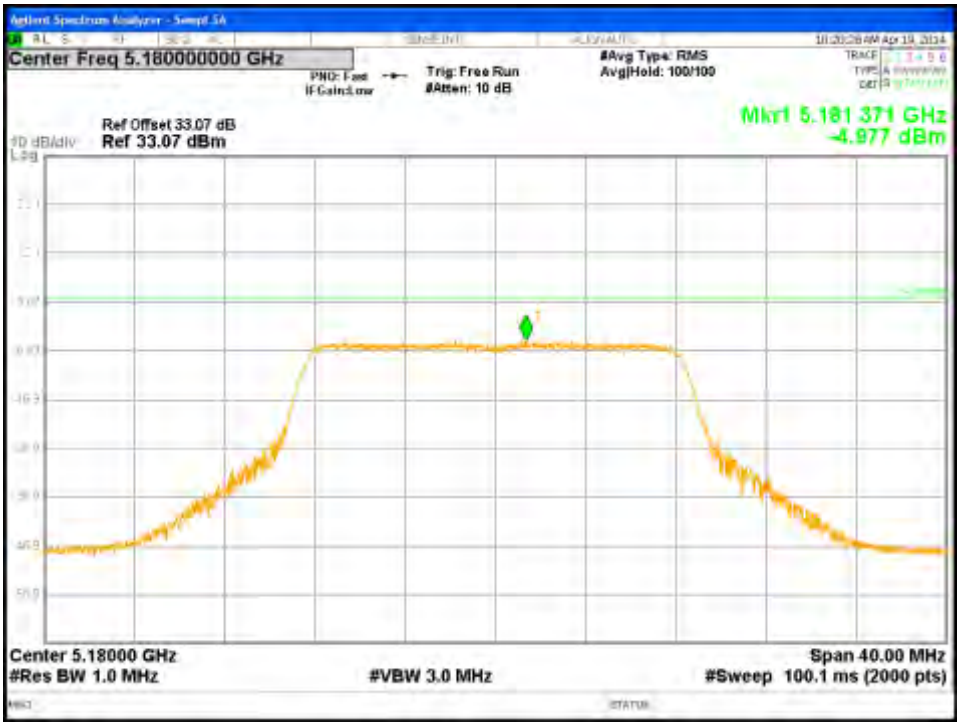


Figure 170: Maximum Power Spectral Density-5180 MHz-11a-6Mbps-Ch1

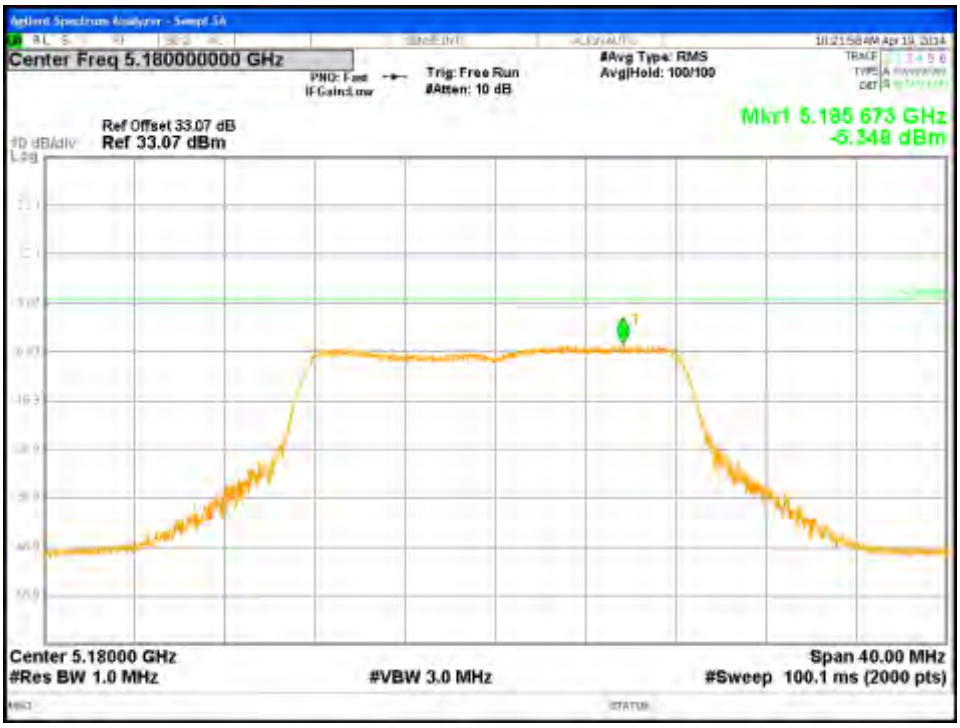


Figure 171: Maximum Power Spectral Density-5180 MHz-11a-6Mbps-Ch2

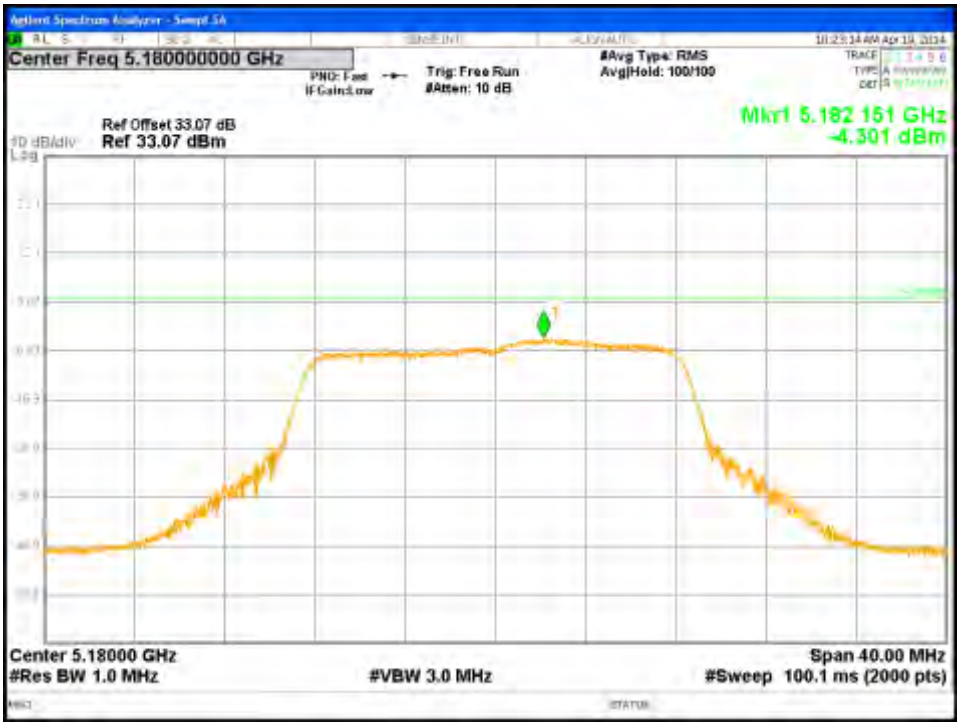


Figure 172: Maximum Power Spectral Density-5180 MHz-11a-6Mbps-Ch3

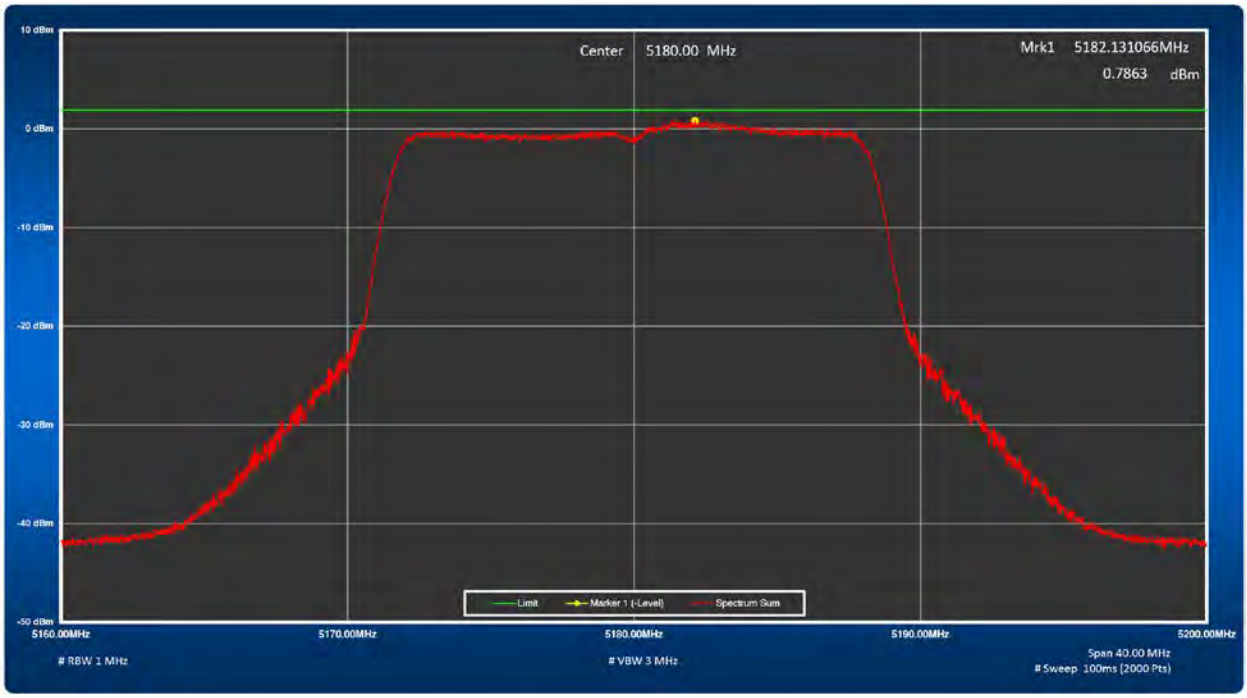


Figure 173: Total Power Spectral Density, 5180 MHz at 802.11a

Figure 174: Maximum Power Spectral Density-5200 MHz-11a-6Mbps-Ch0

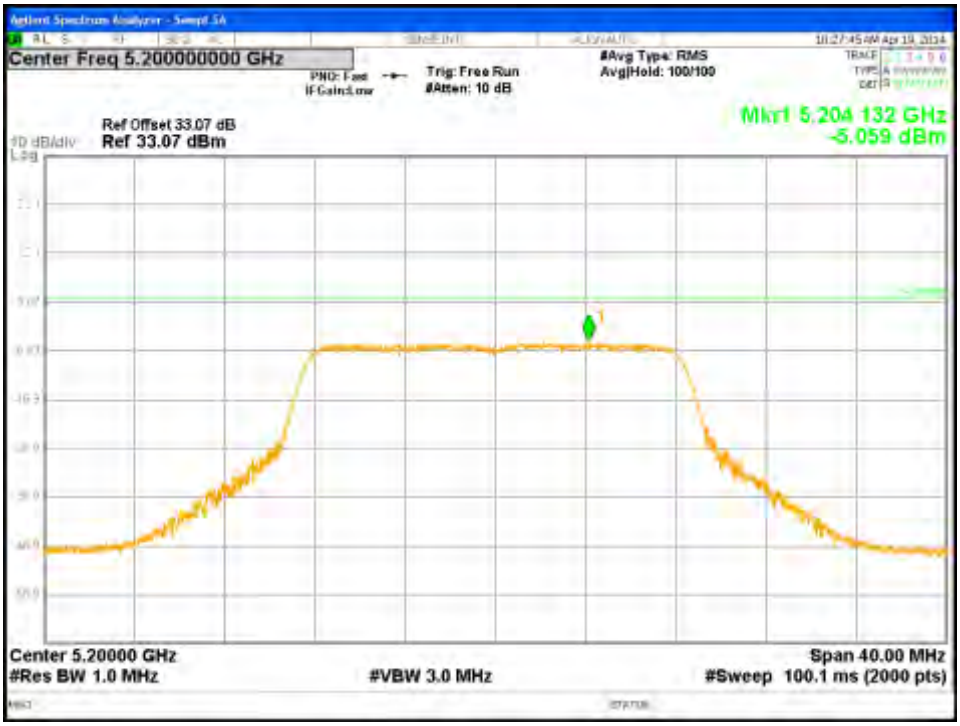


Figure 175: Maximum Power Spectral Density-5200 MHz-11a-6Mbps-Ch1

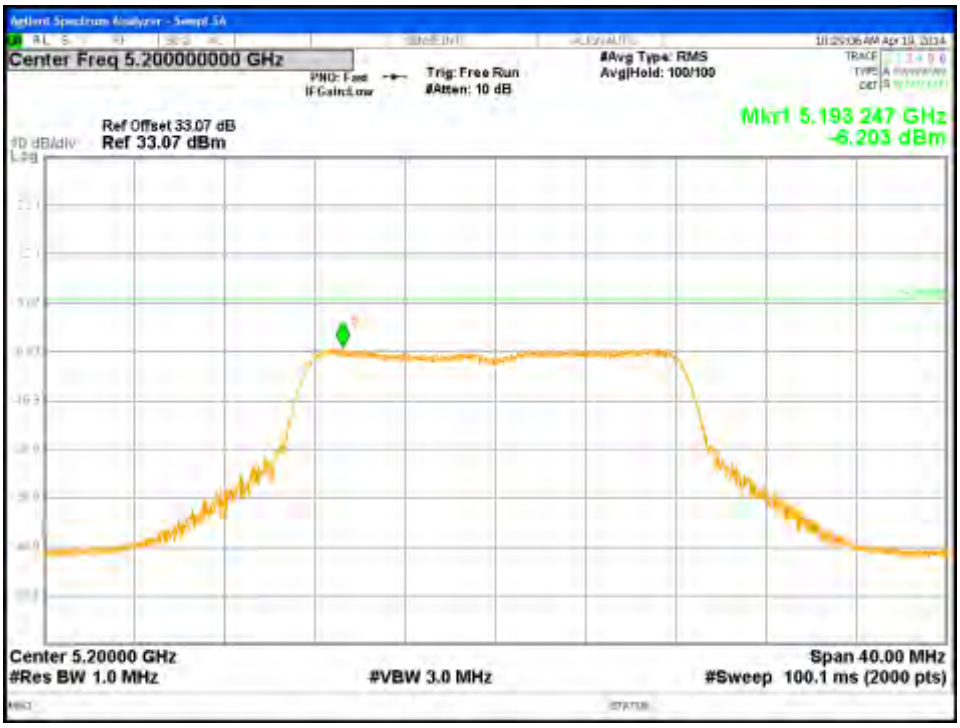


Figure 176: Maximum Power Spectral Density-5200 MHz-11a-6Mbps-Ch2

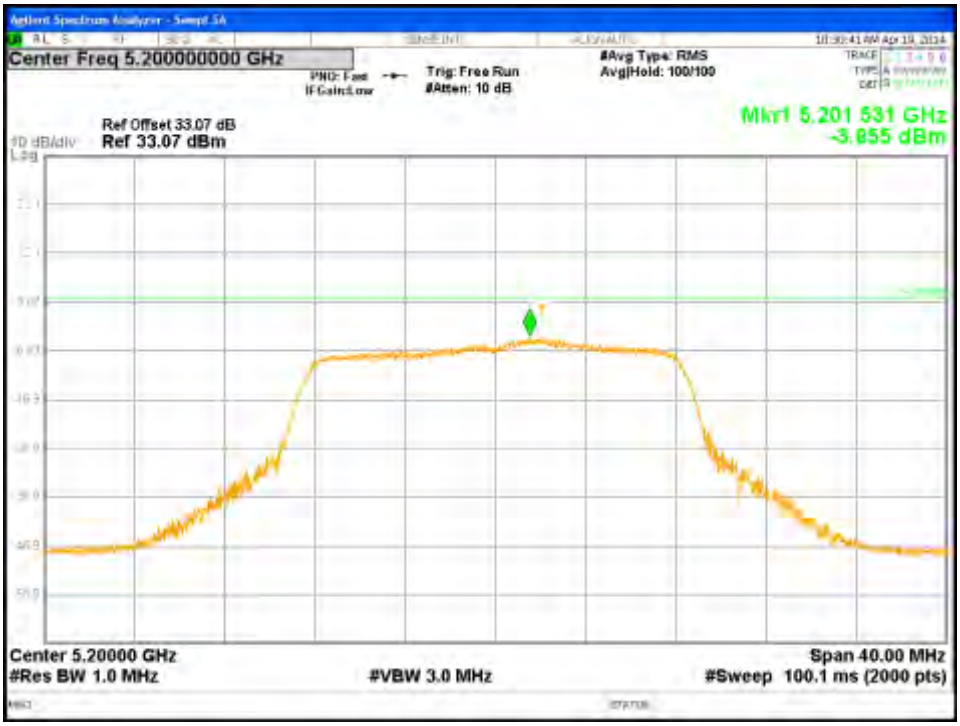


Figure 177: Maximum Power Spectral Density-5200 MHz-11a-6Mbps-Ch3

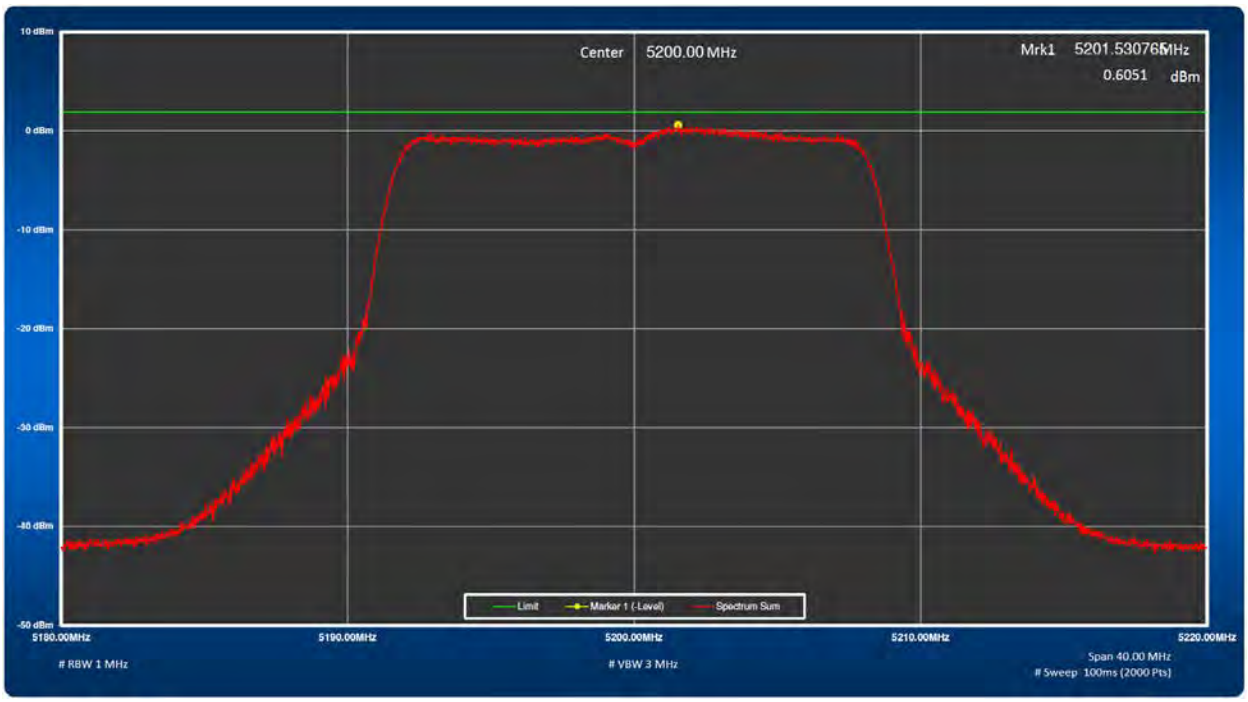


Figure 178: Total Power Spectral Density, 5200 MHz at 802.11a

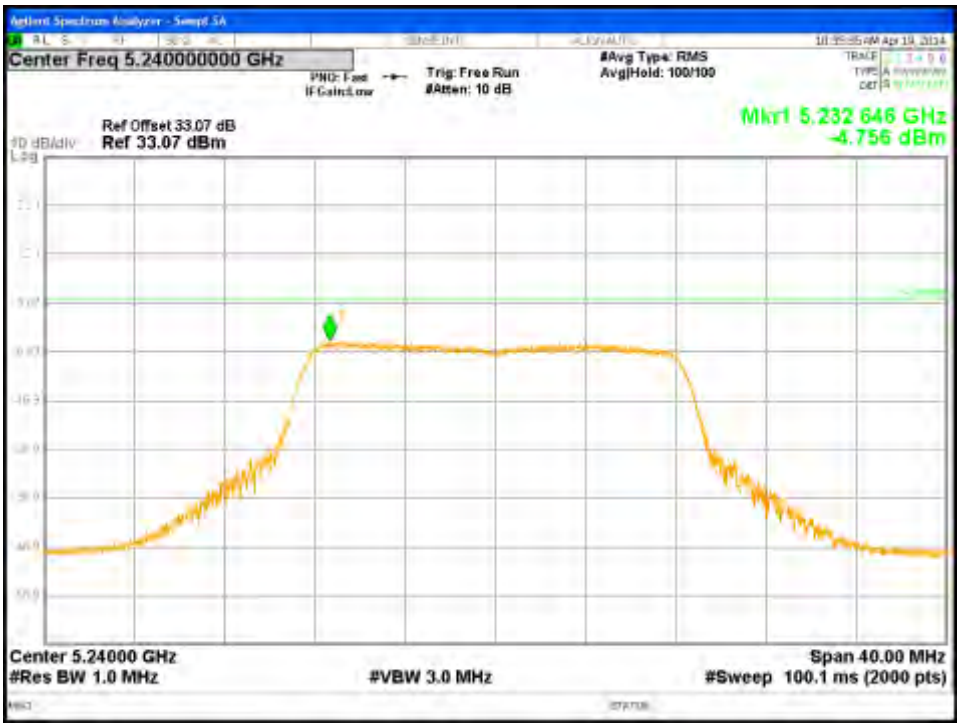


Figure 179: Maximum Power Spectral Density-5240 MHz-11a-6Mbps-Ch0

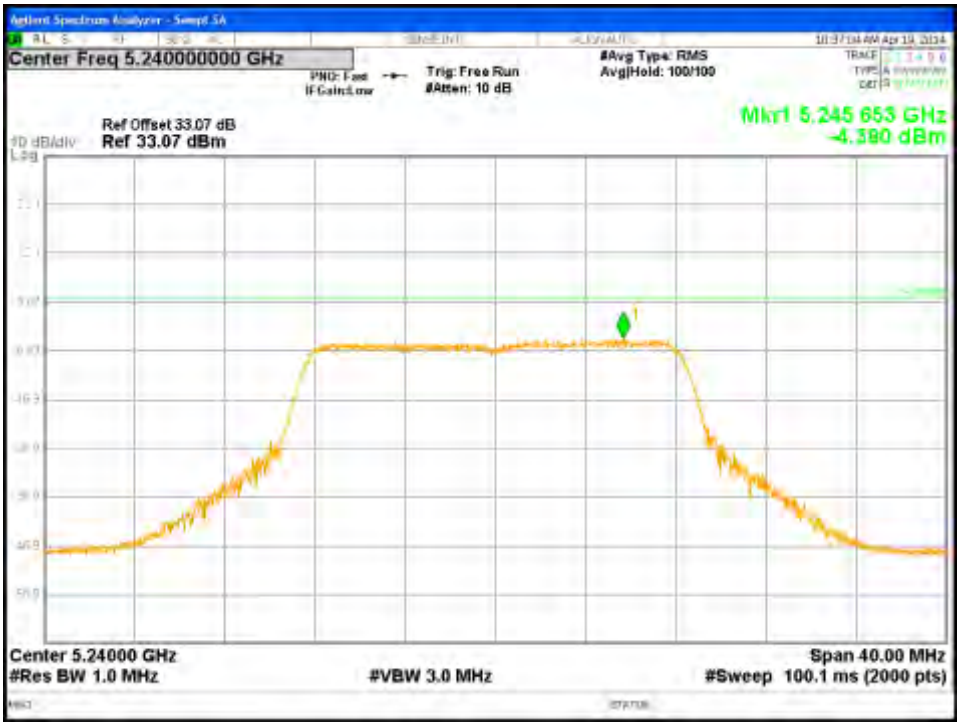


Figure 180: Maximum Power Spectral Density-5240 MHz-11a-6Mbps-Ch1

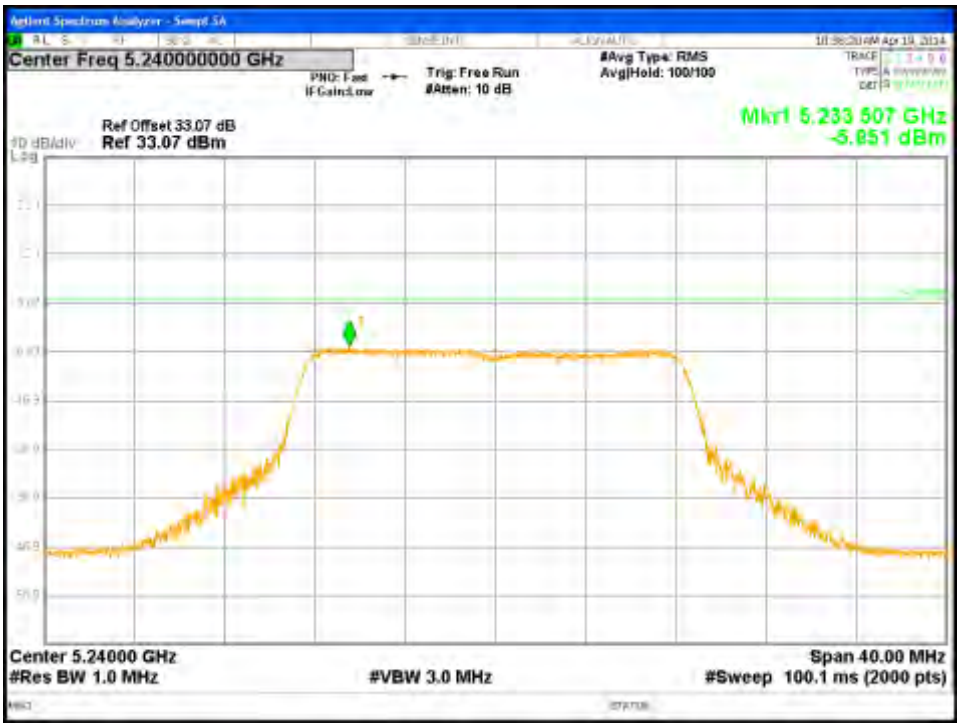


Figure 181: Maximum Power Spectral Density-5240 MHz-11a-6Mbps-Ch2

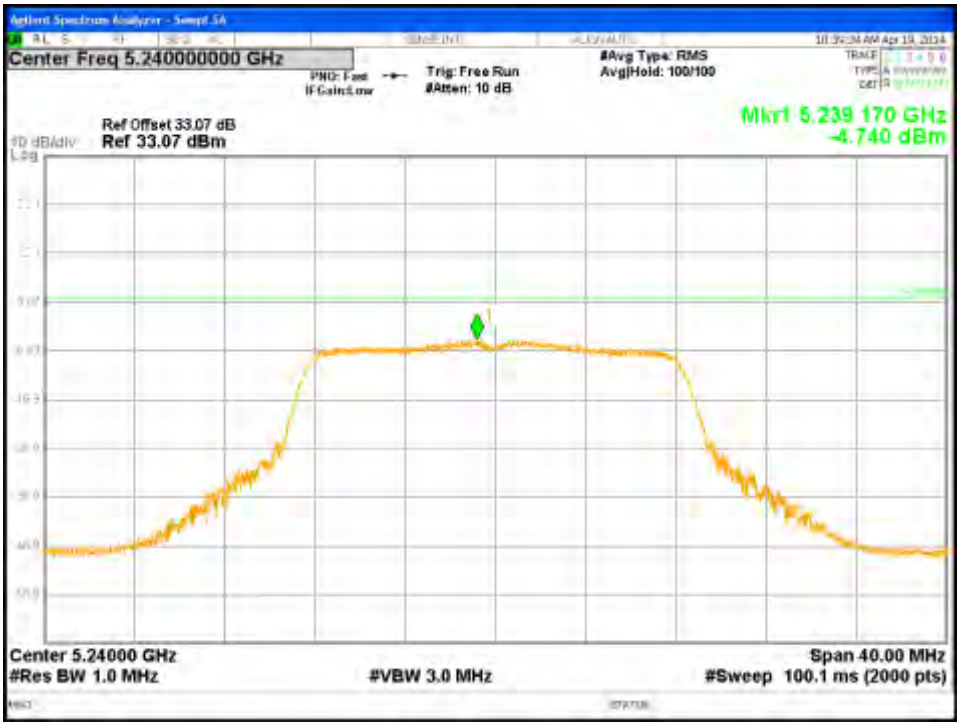


Figure 182: Maximum Power Spectral Density-5240 MHz-11a-6Mbps-Ch3

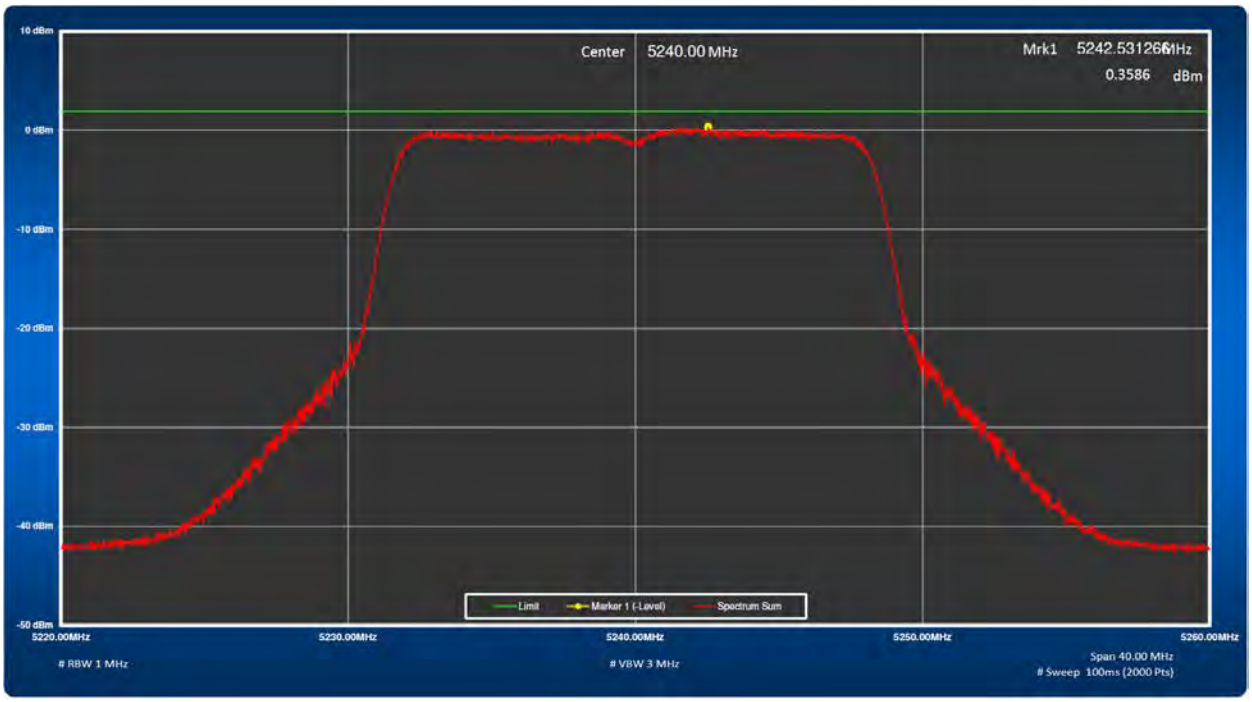


Figure 183: Total Power Spectral Density, 5240 MHz at 802.11a

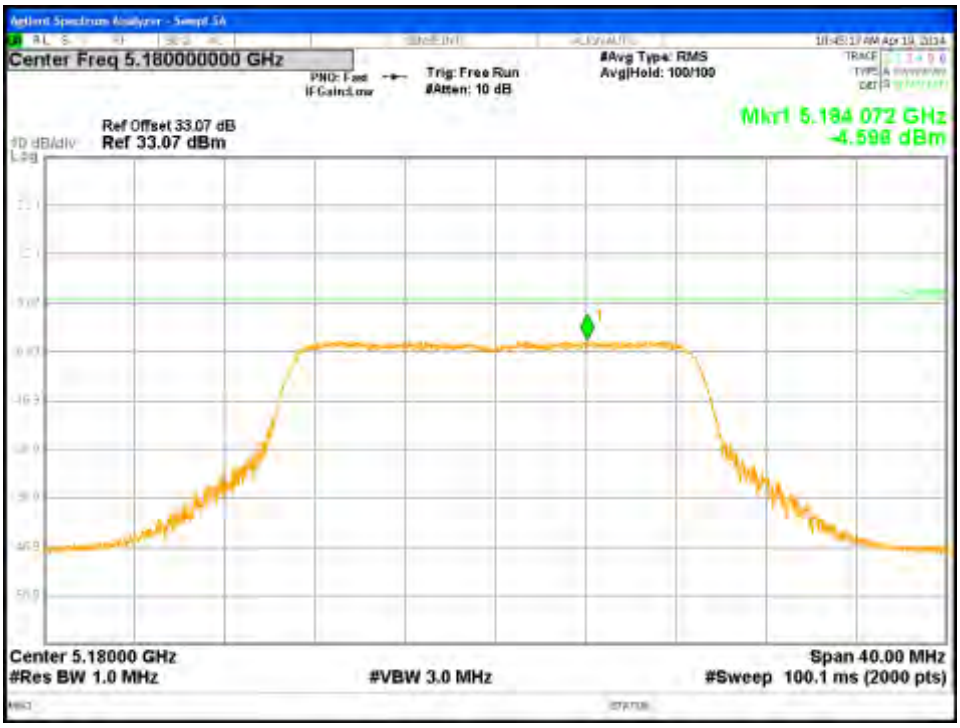


Figure 184: Maximum Power Spectral Density-5180 MHz-HT20-MCS0-Ch0

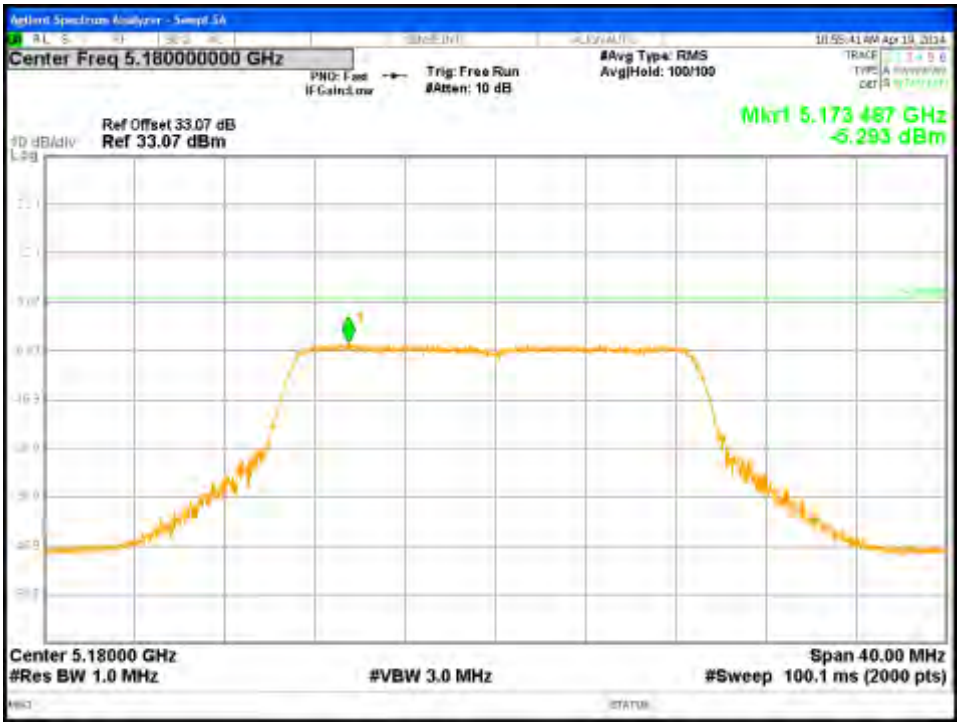


Figure 185: Maximum Power Spectral Density-5180 MHz-HT20-MCS0-Ch1

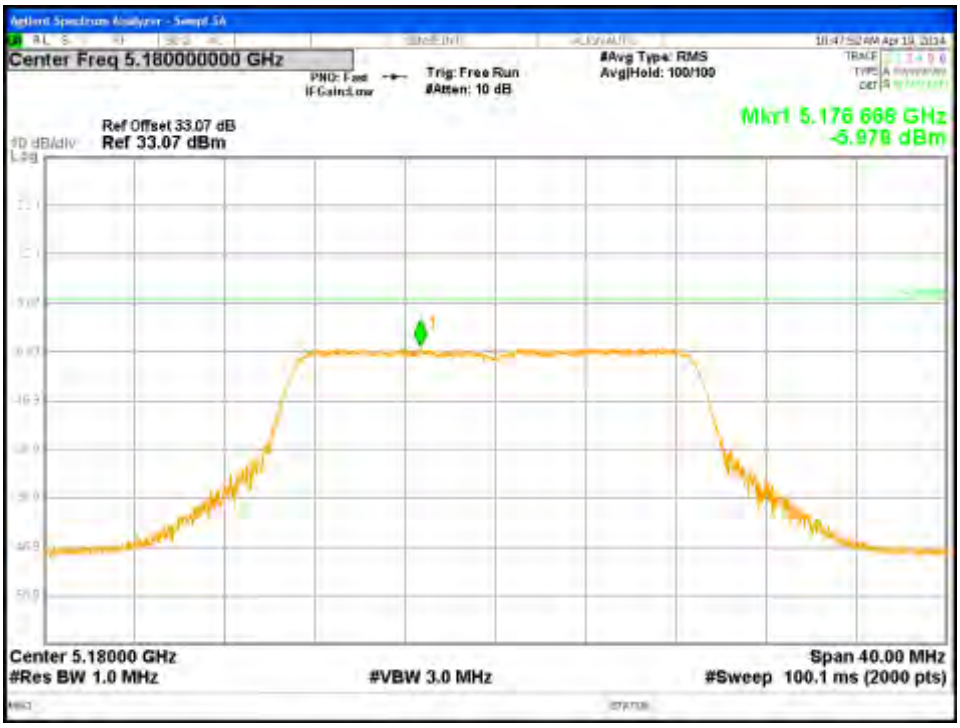


Figure 186: Maximum Power Spectral Density-5180 MHz-HT20-MCS0-Ch2

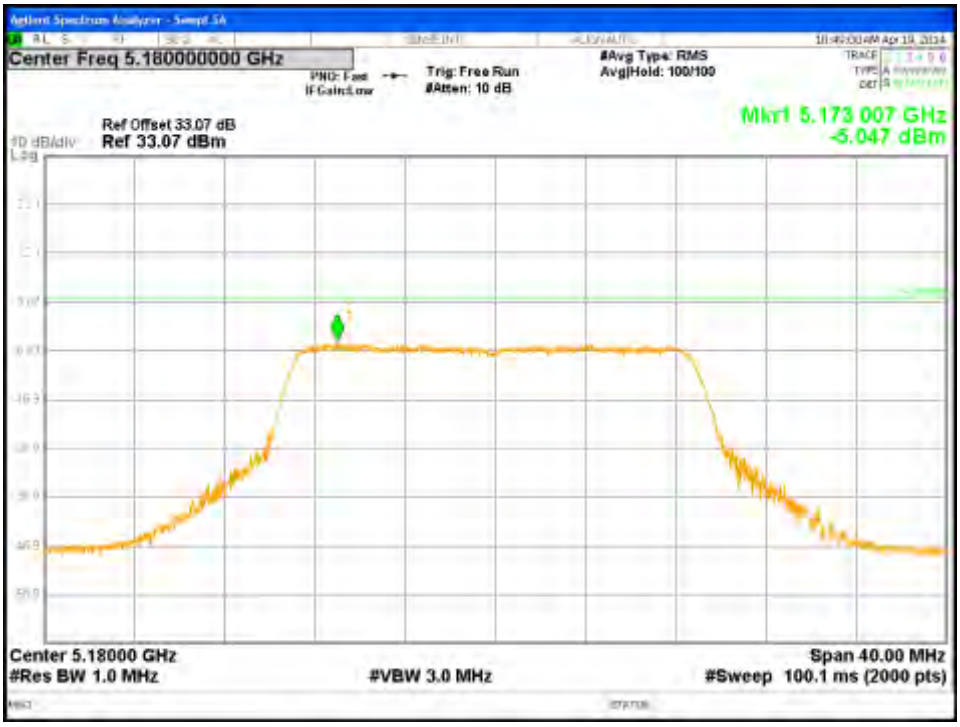


Figure 187: Maximum Power Spectral Density-5180 MHz-HT20-MCS0-Ch3

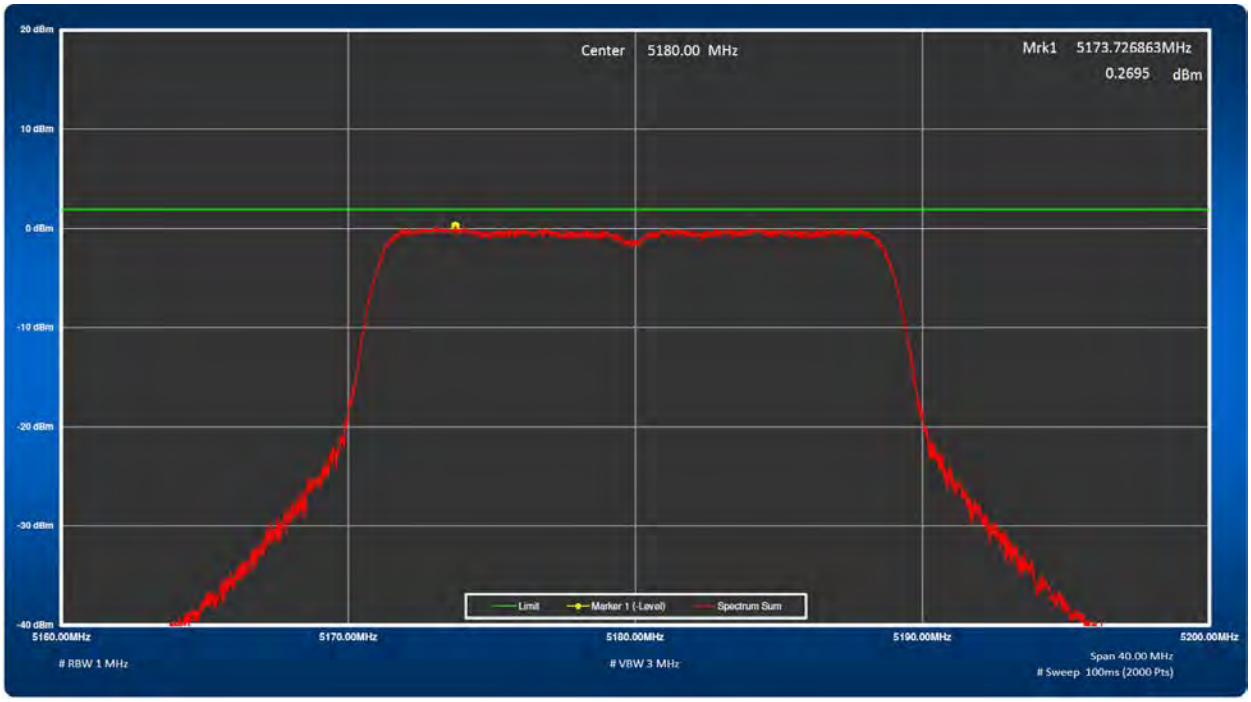


Figure 188: Total Power Spectral Density, 5180 MHz at 802.11n HT20

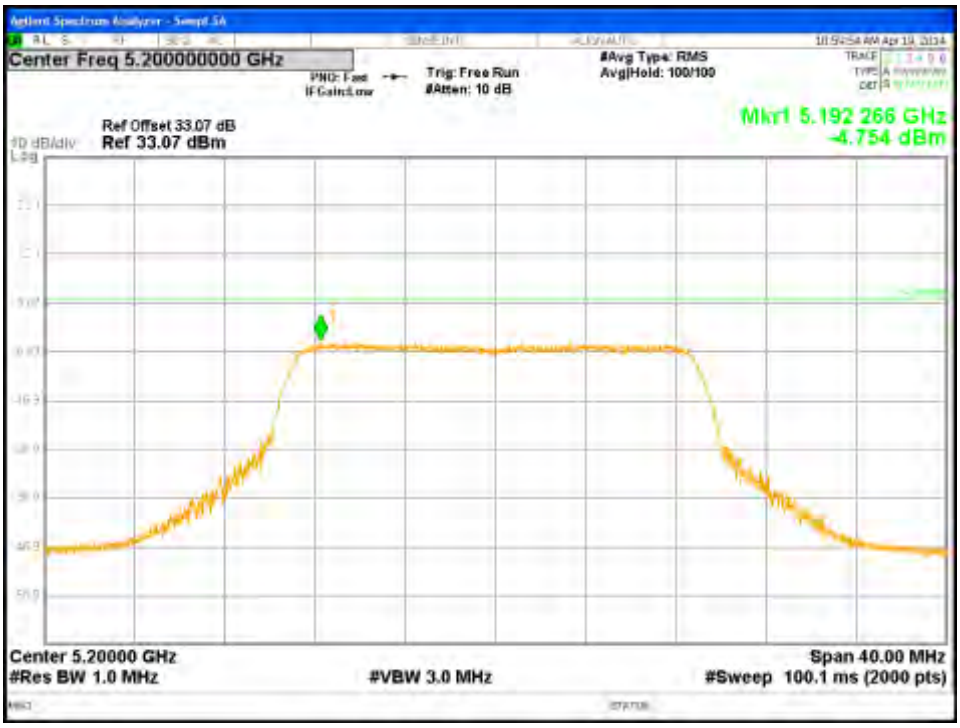


Figure 189: Maximum Power Spectral Density-5200 MHz-HT20-MCS0-Ch0

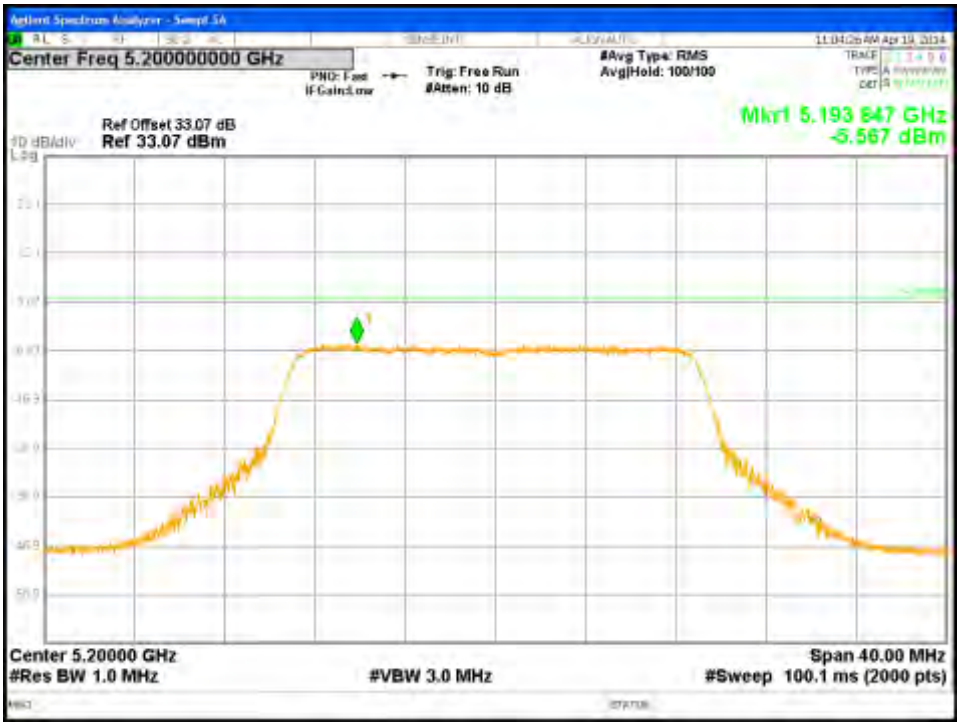


Figure 190: Maximum Power Spectral Density-5200 MHz-HT20-MCS0-Ch1

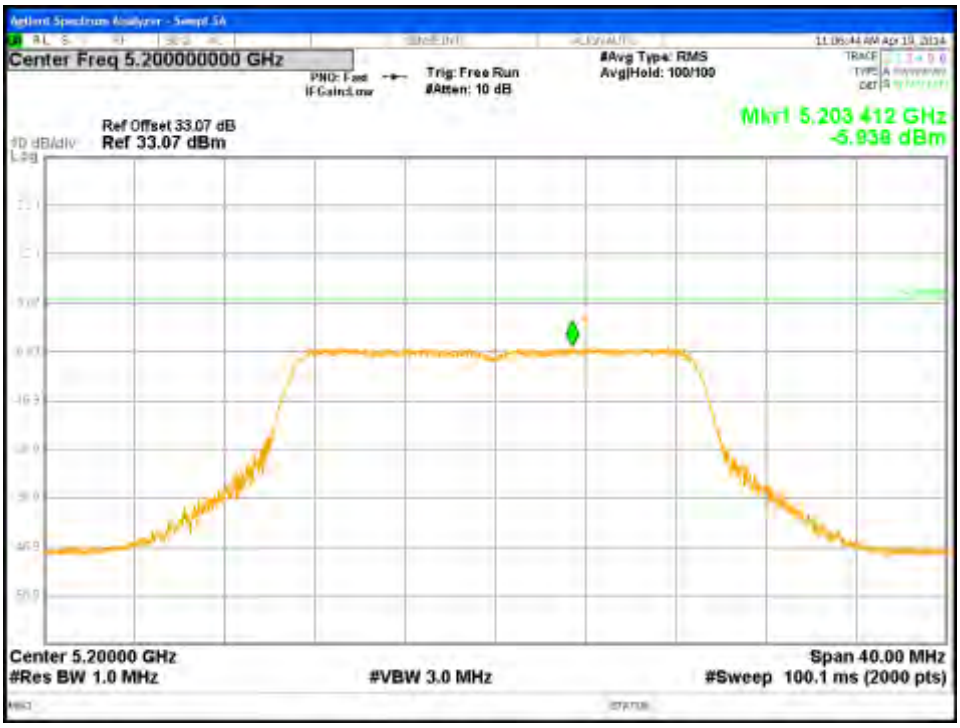


Figure 191: Maximum Power Spectral Density-5200 MHz-HT20-MCS0-Ch2

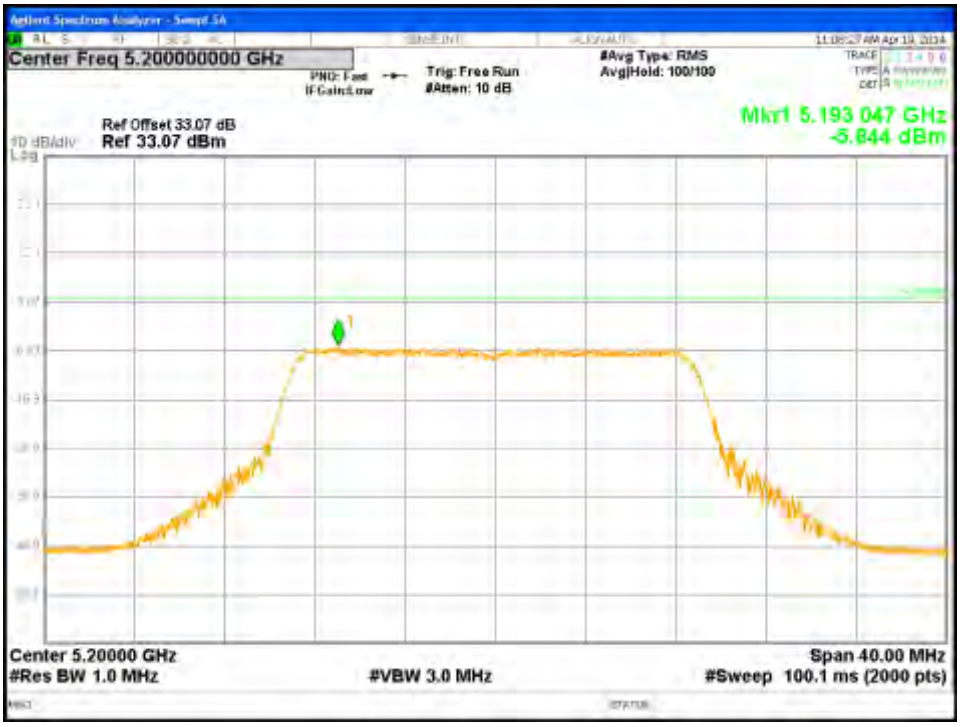


Figure 192: Maximum Power Spectral Density-5200 MHz-HT20-MCS0-Ch3

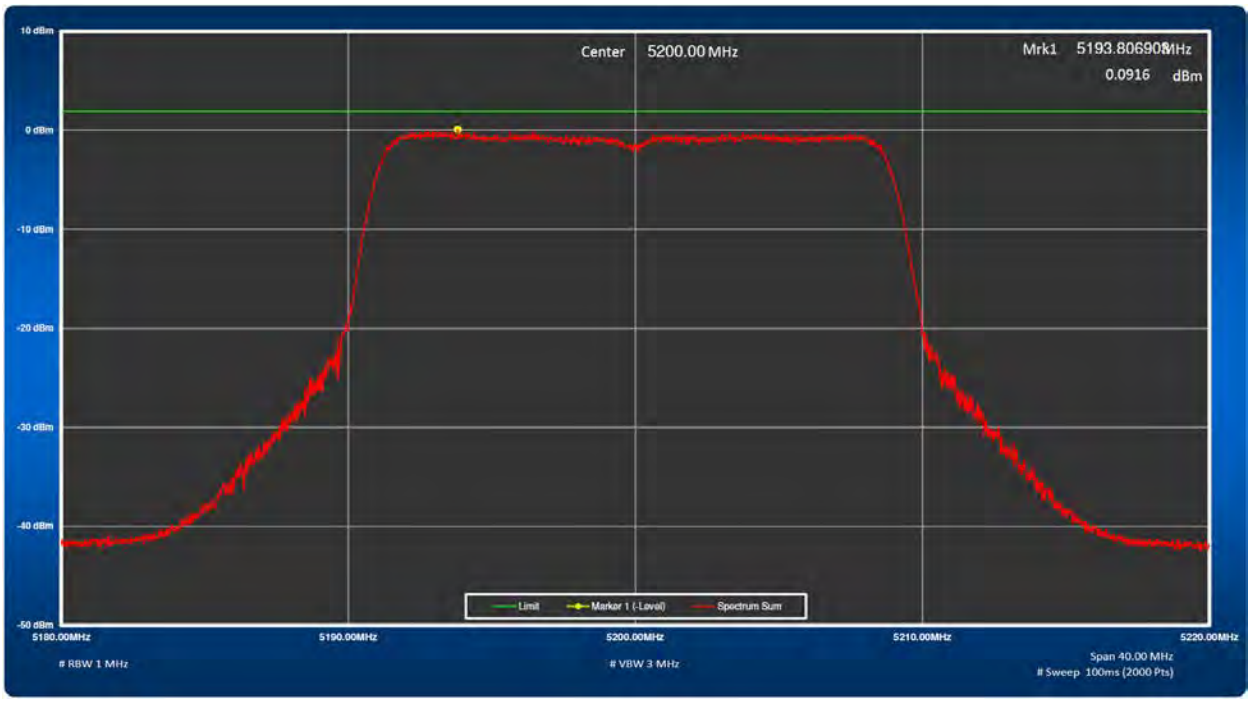


Figure 193: Total Power Spectral Density, 5200 MHz at 802.11n HT20

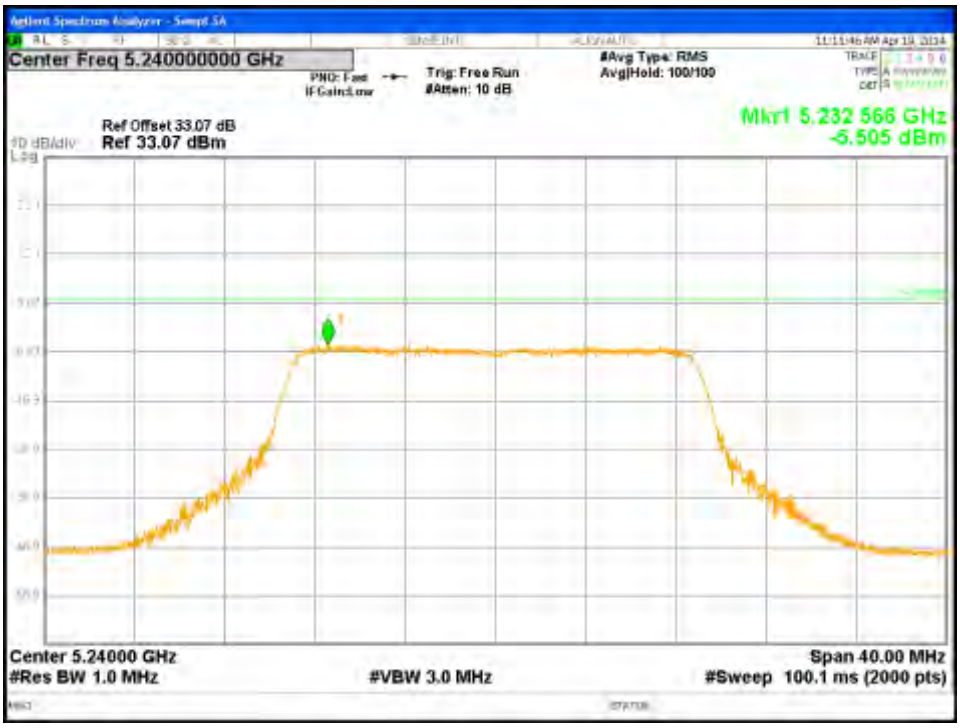


Figure 194: Maximum Power Spectral Density-5240 MHz-HT20-MCS0-Ch0

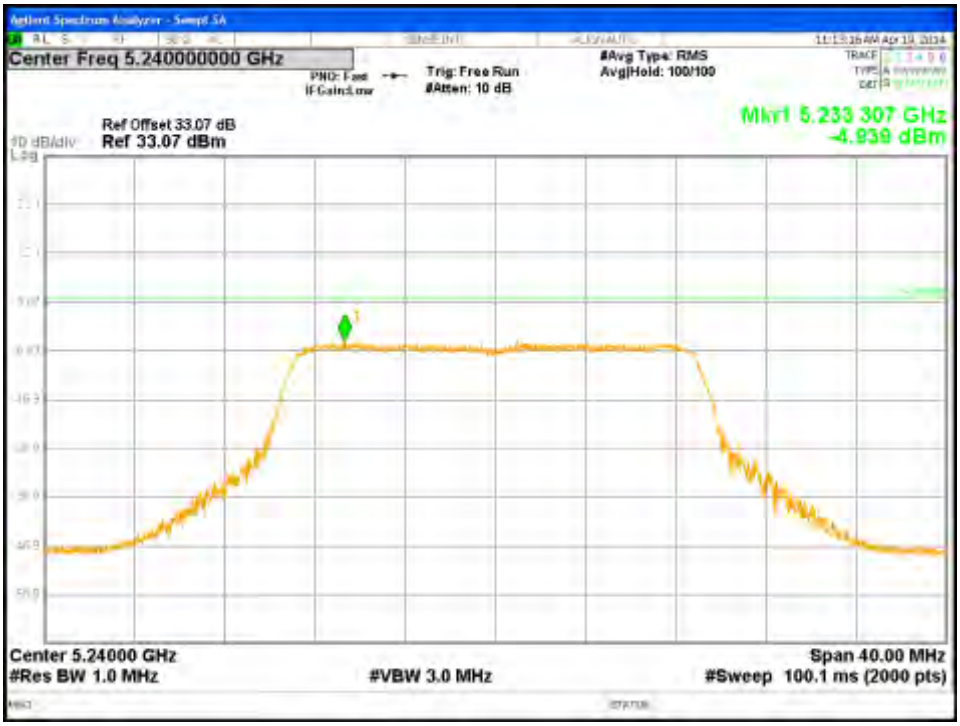


Figure 195: Maximum Power Spectral Density-5240 MHz-HT20-MCS0-Ch1

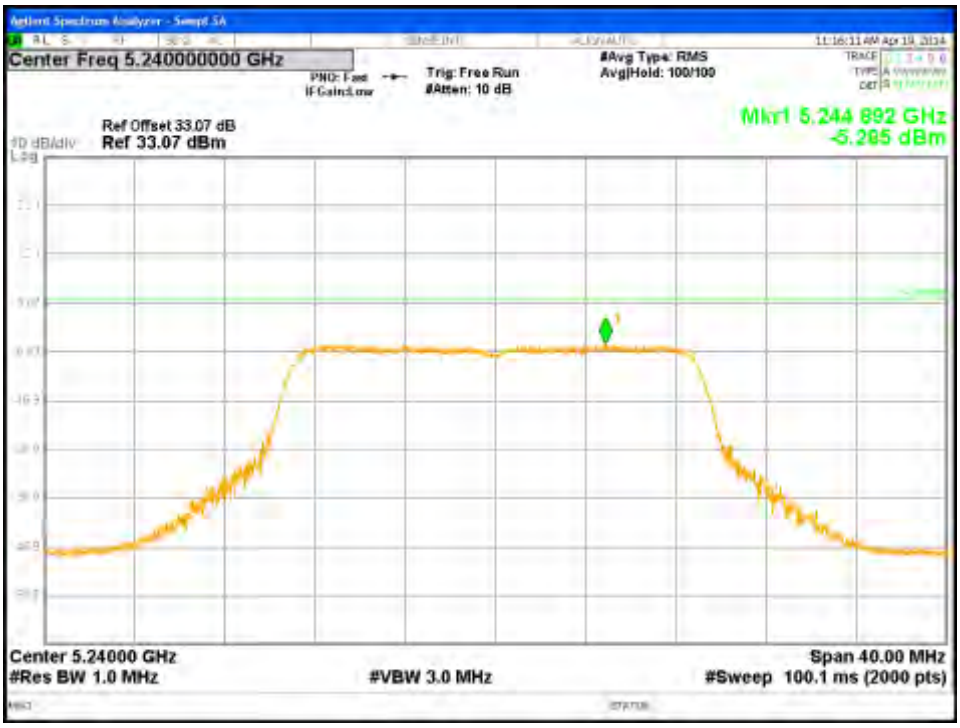


Figure 196: Maximum Power Spectral Density-5240 MHz-HT20-MCS0-Ch2

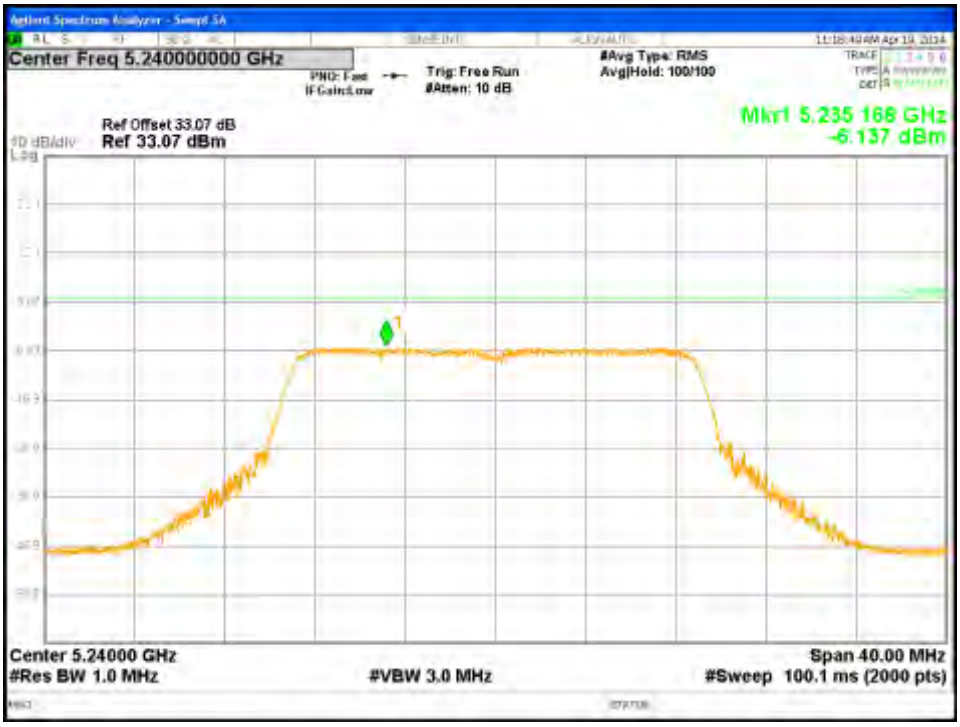


Figure 197: Maximum Power Spectral Density-5240 MHz-HT20-MCS0-Ch3

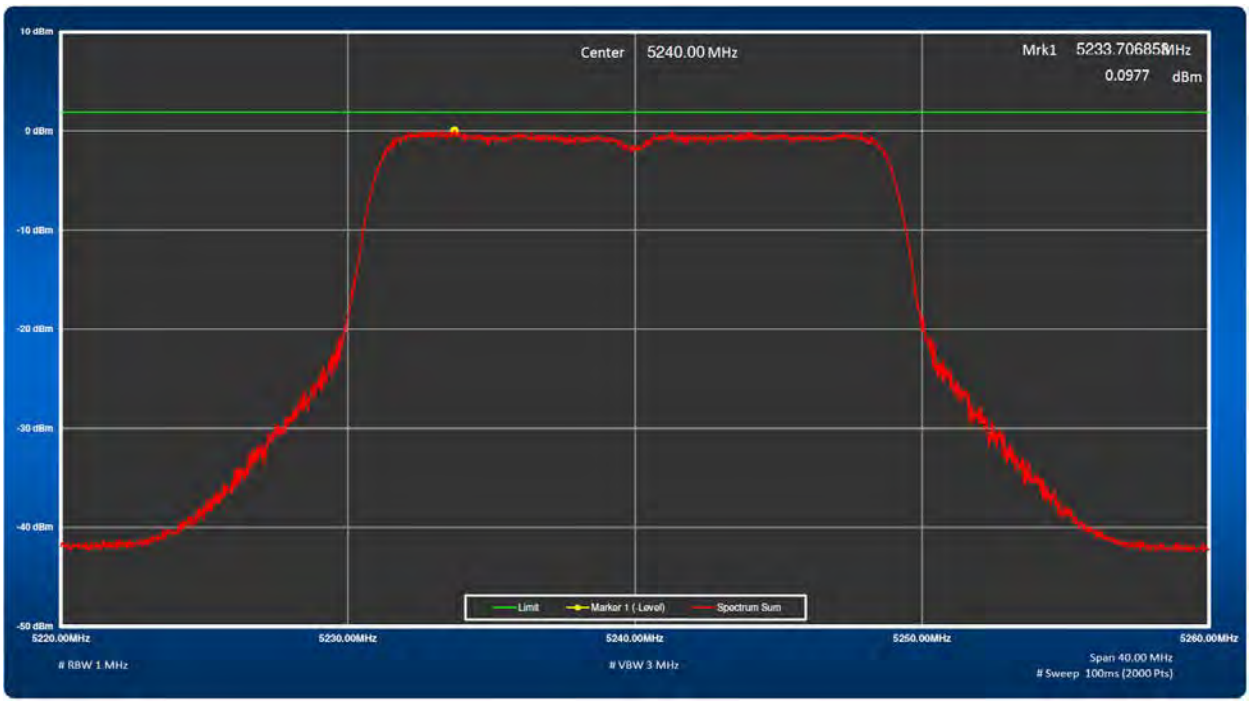


Figure 198: Total Power Spectral Density, 5240 MHz at 802.11n HT20

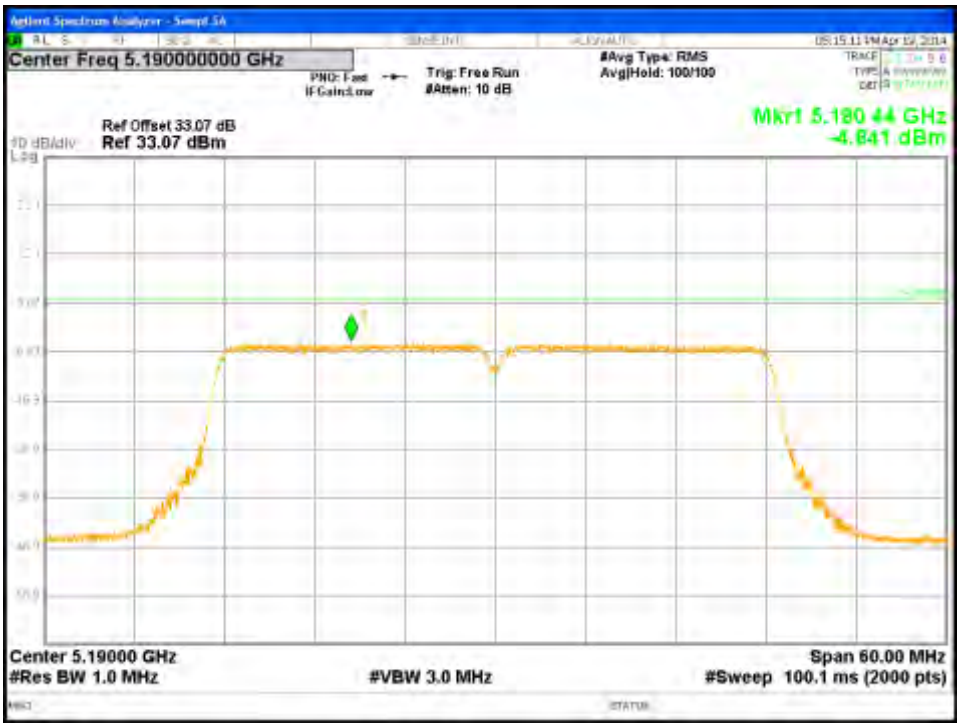


Figure 199: Maximum Power Spectral Density-5190 MHz-HT40-MCS0-Ch0

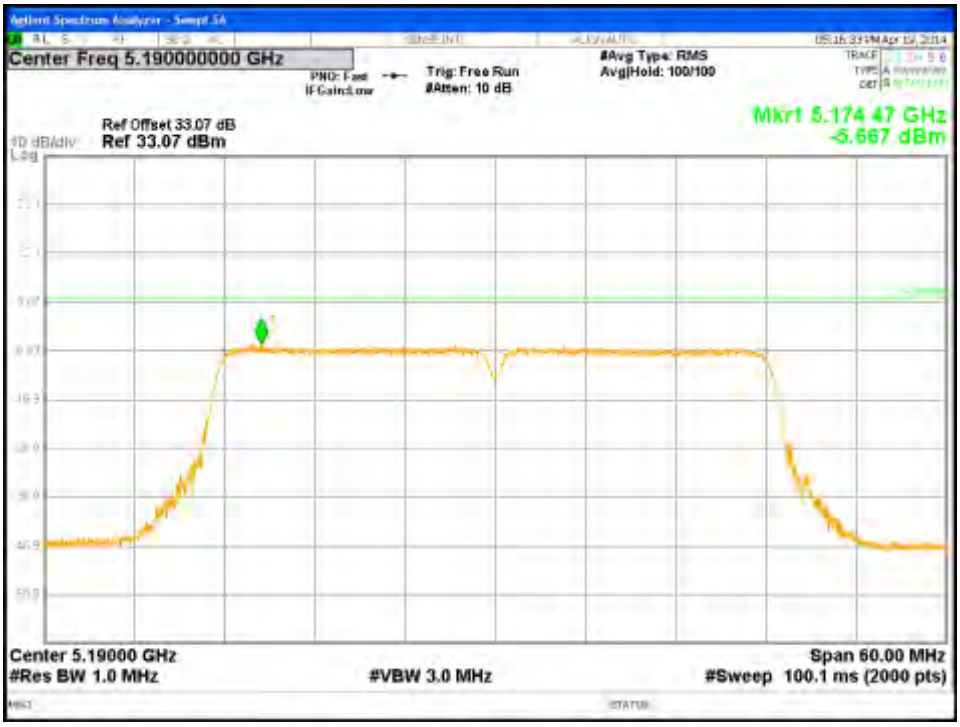


Figure 200: Maximum Power Spectral Density-5190 MHz-HT40-MCS0-Ch1

Figure 201: Maximum Power Spectral Density-5190 MHz-HT40-MCS0-Ch2

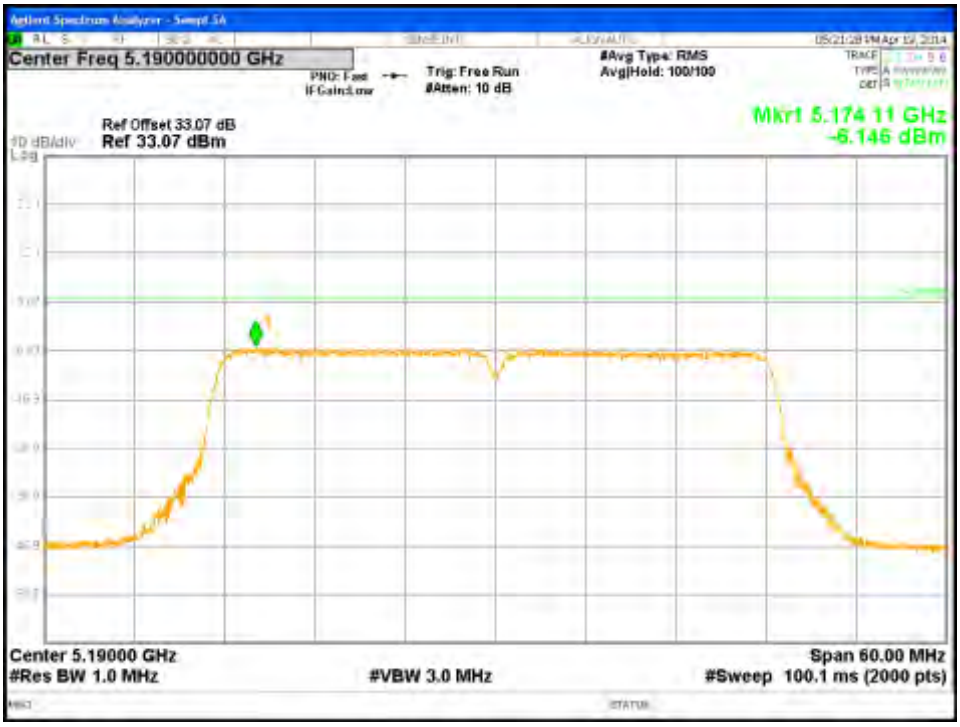


Figure 202: Maximum Power Spectral Density-5190 MHz-HT40-MCS0-Ch3

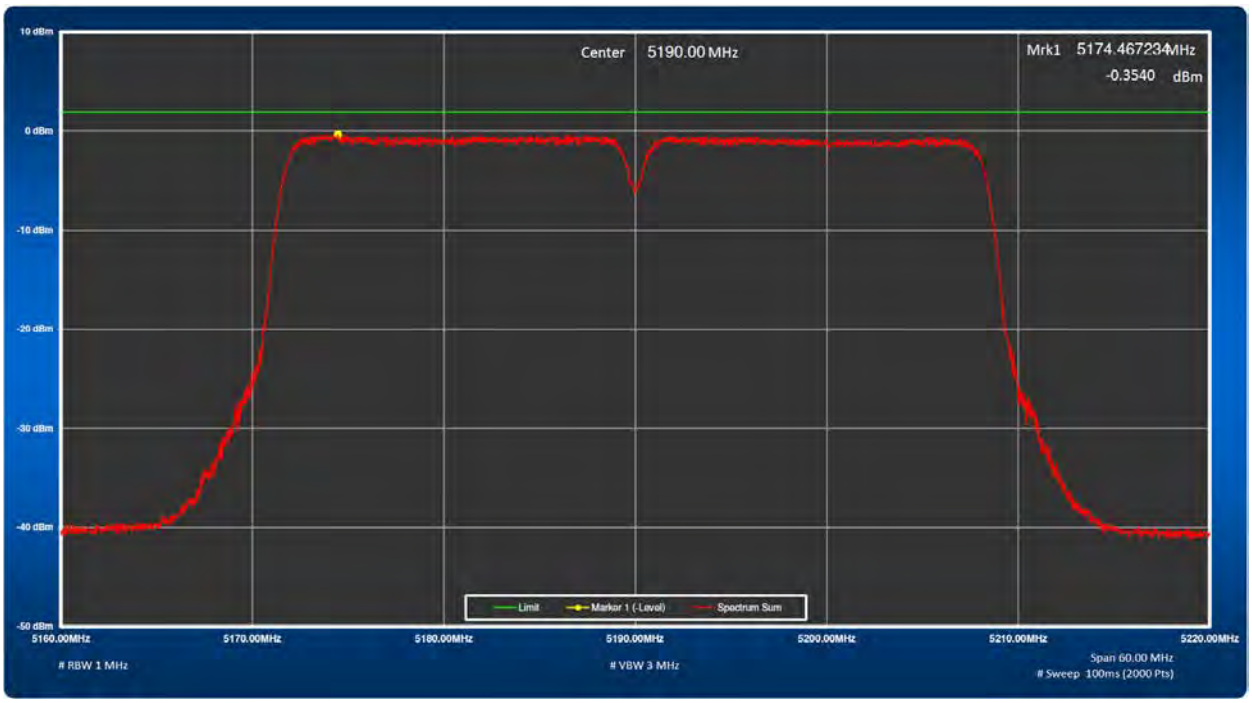


Figure 203: Total Power Spectral Density, 5190 MHz at 802.11n HT40

Figure 204: Maximum Power Spectral Density-5230 MHz-HT40-MCS0-Ch0

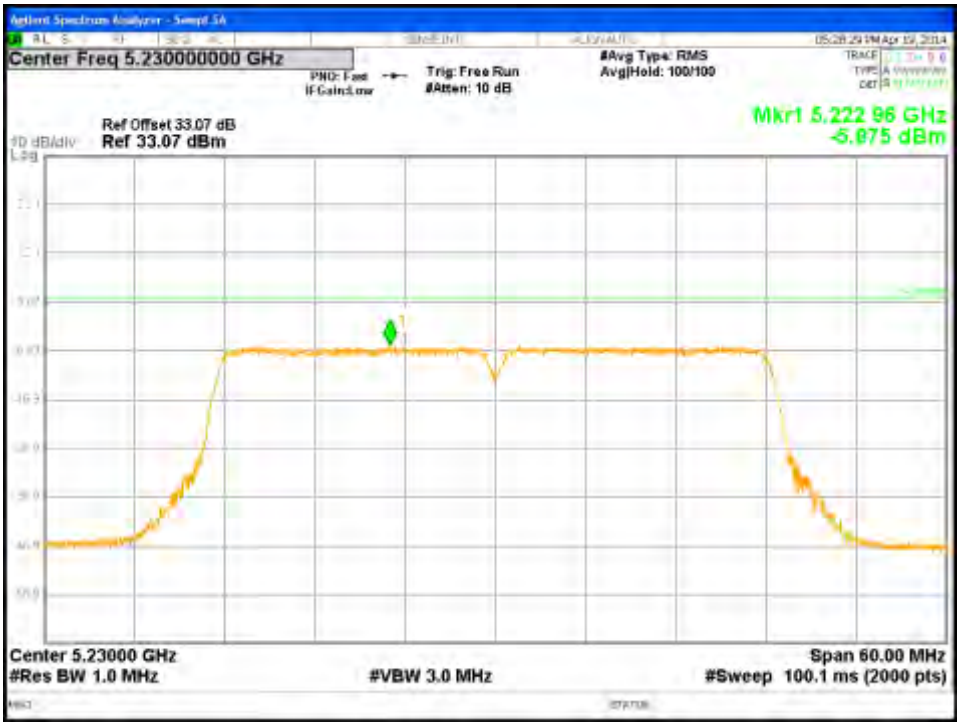


Figure 205: Maximum Power Spectral Density-5230 MHz-HT40-MCS0-Ch1

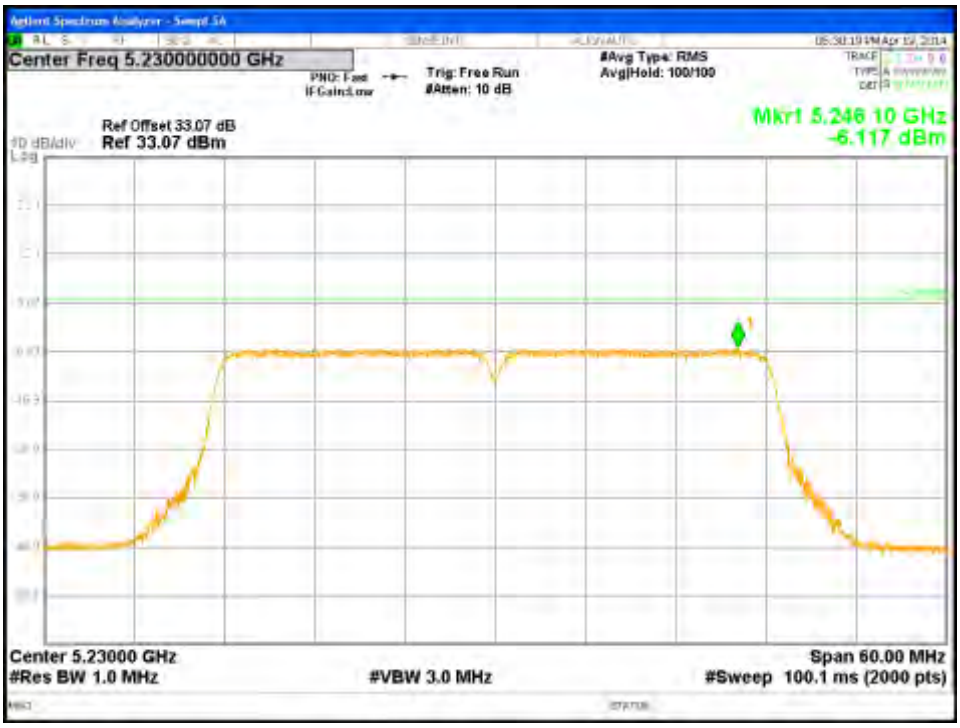


Figure 206: Maximum Power Spectral Density-5230 MHz-HT40-MCS0-Ch2

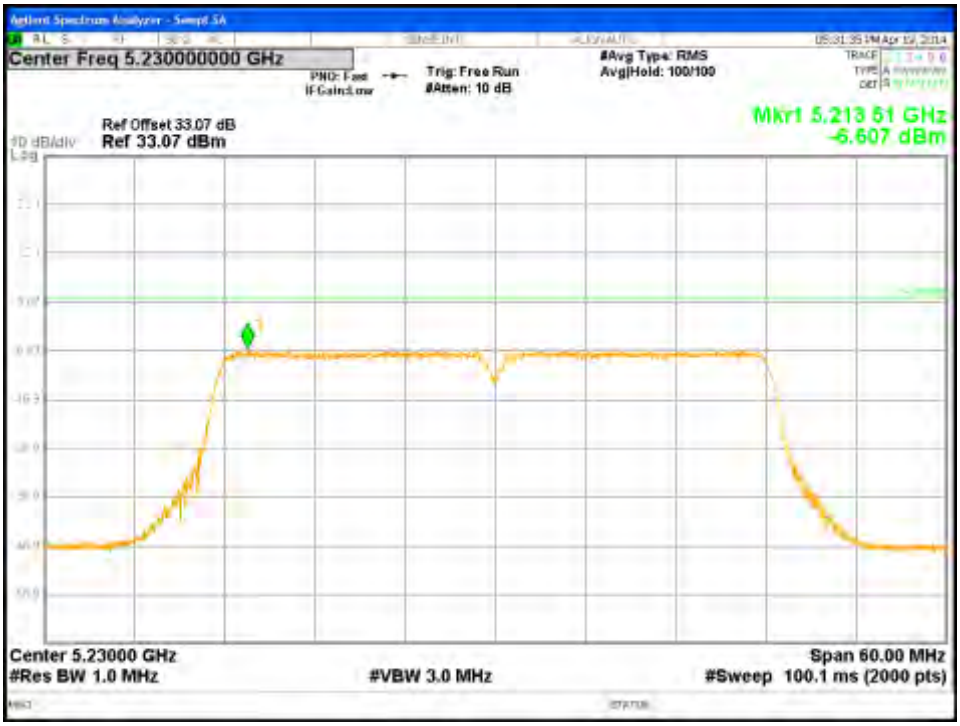


Figure 207: Maximum Power Spectral Density-5230 MHz-HT40-MCS0-Ch3

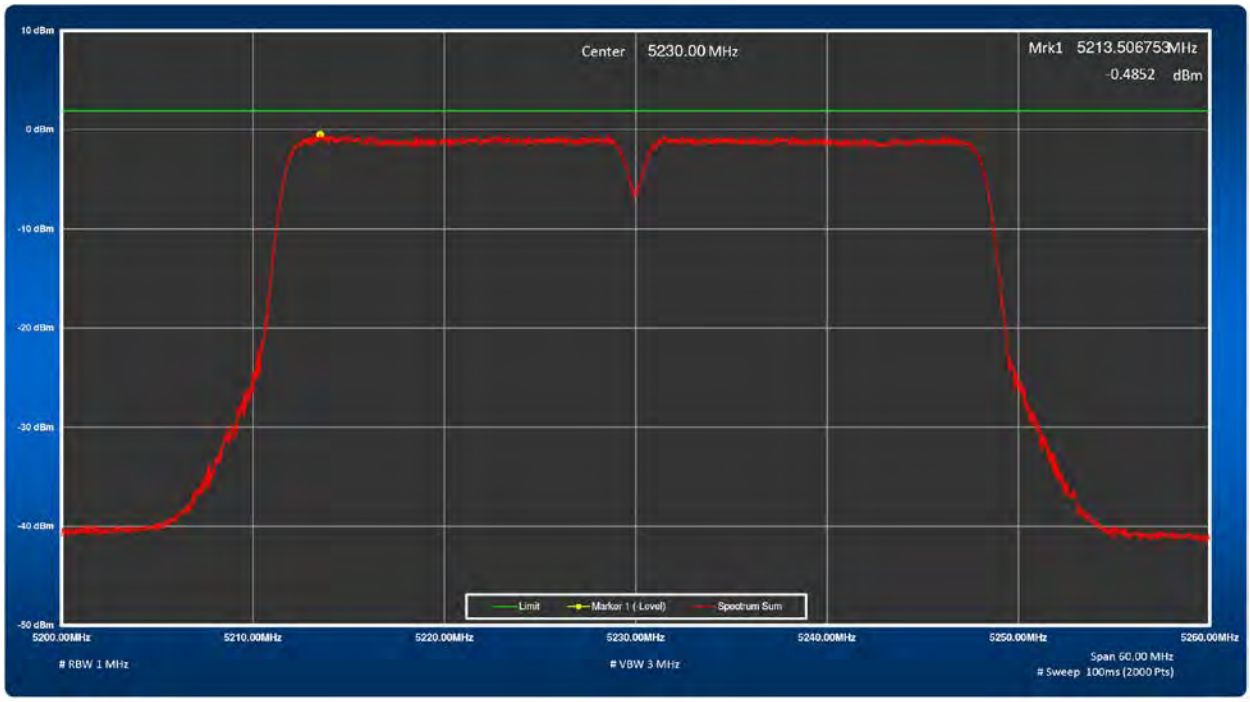


Figure 208: Total Power Spectral Density, 5230 MHz at 802.11n HT40

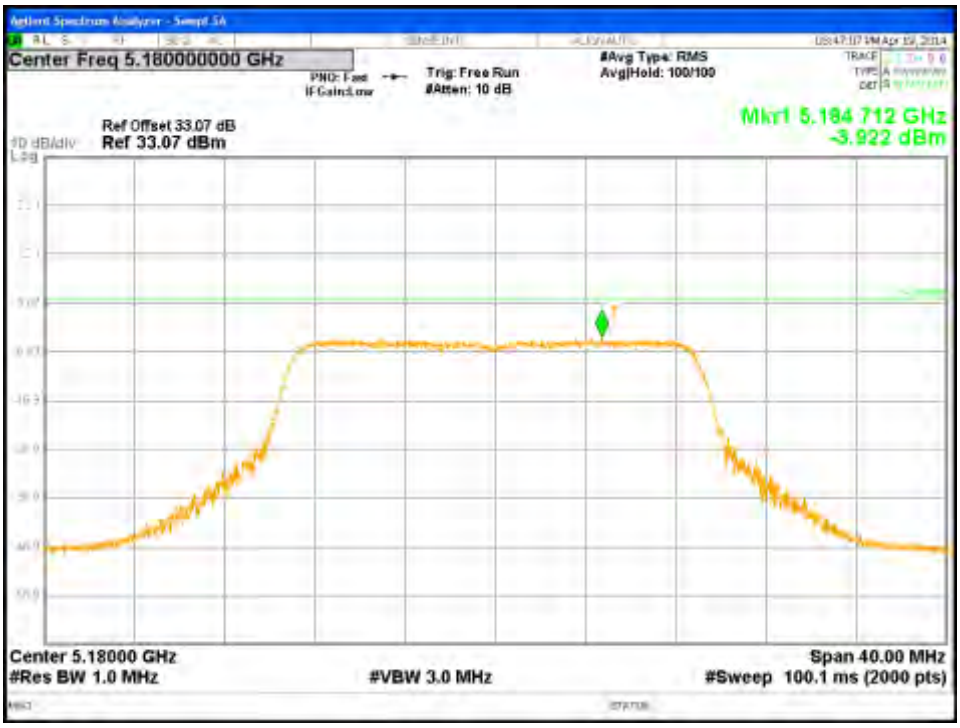


Figure 209: Maximum Power Spectral Density-5180 MHz-VHT20-MCS0-Ch0

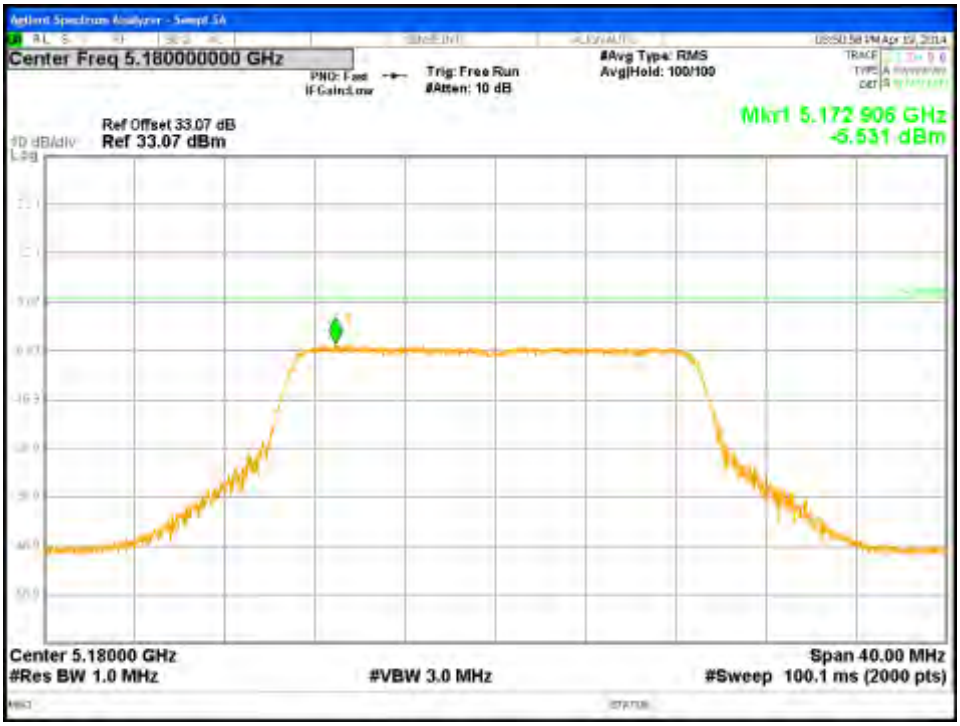


Figure 210: Maximum Power Spectral Density-5180 MHz-VHT20-MCS0-Ch1

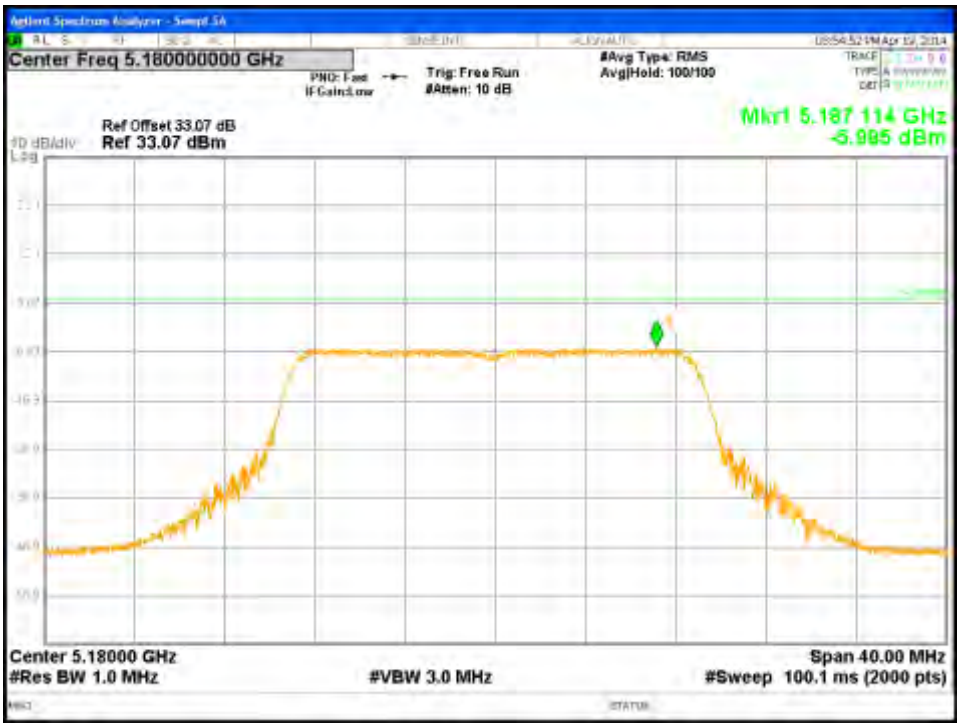


Figure 211: Maximum Power Spectral Density-5180 MHz-VHT20-MCS0-Ch2

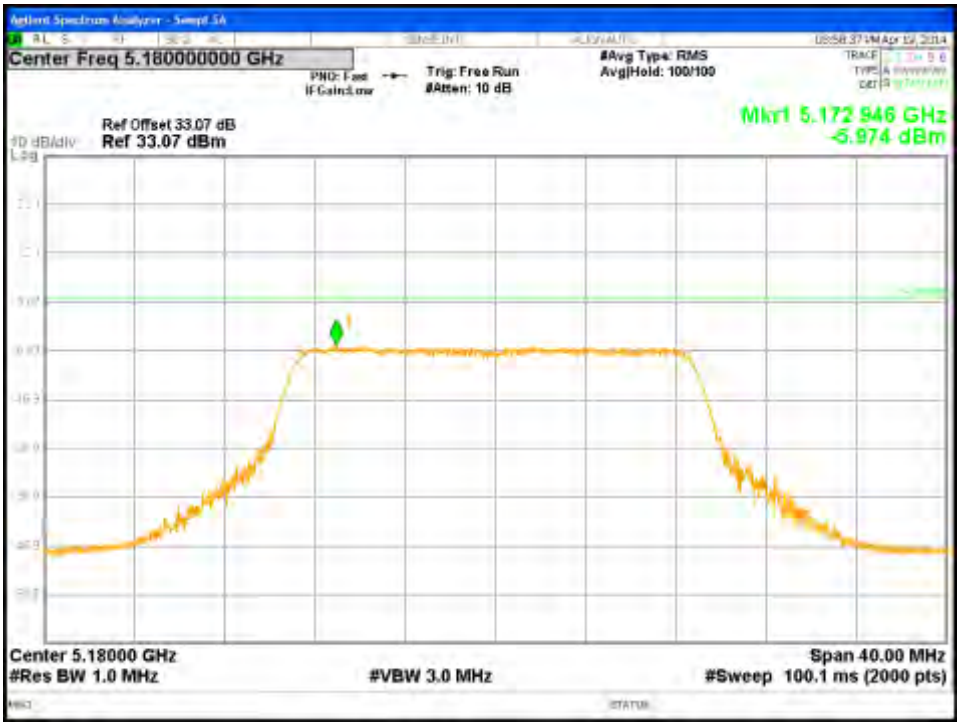


Figure 212: Maximum Power Spectral Density-5180 MHz-VHT20-MCS0-Ch3

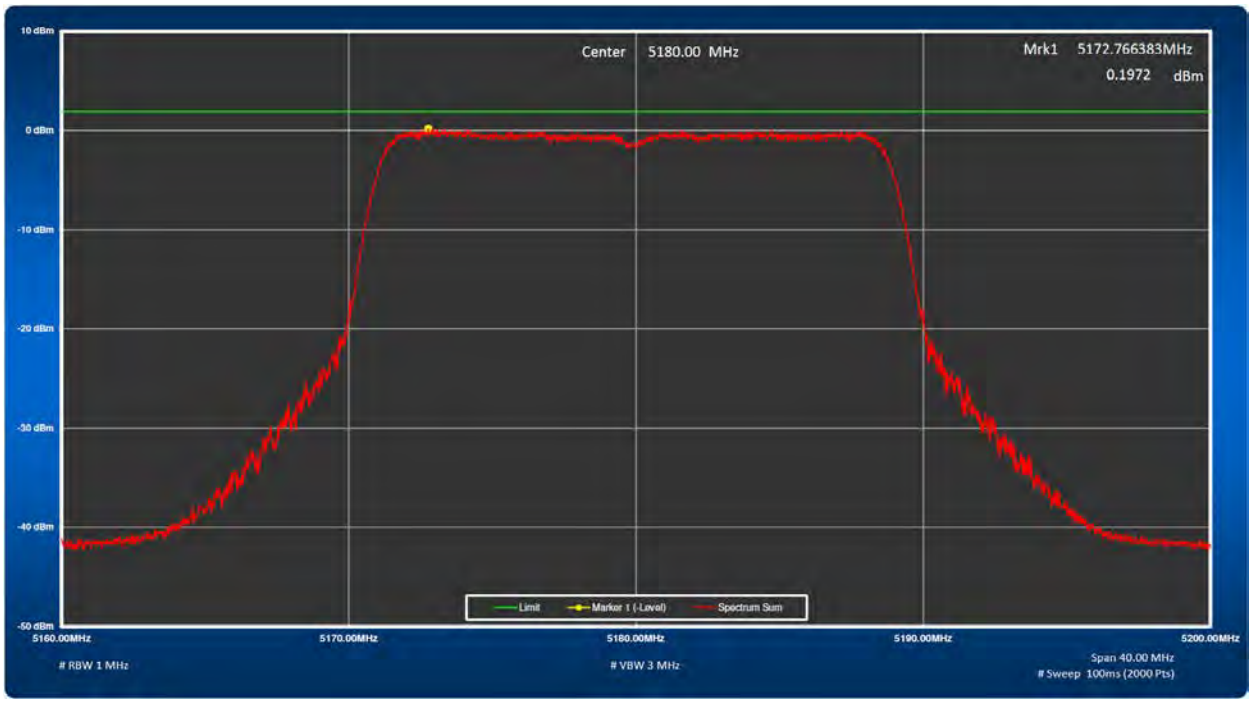


Figure 213: Total Power Spectral Density, 5180 MHz at 802.11ac VHT20

Figure 214: Maximum Power Spectral Density-5200 MHz-VHT20-MCS0-Ch0

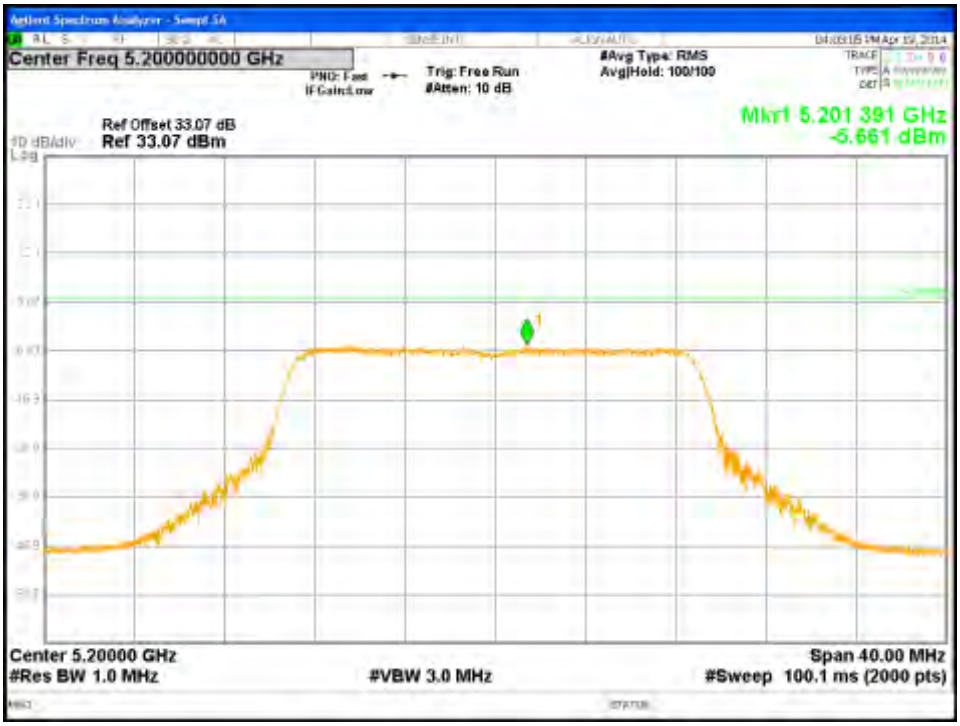


Figure 215: Maximum Power Spectral Density-5200 MHz-VHT20-MCS0-Ch1

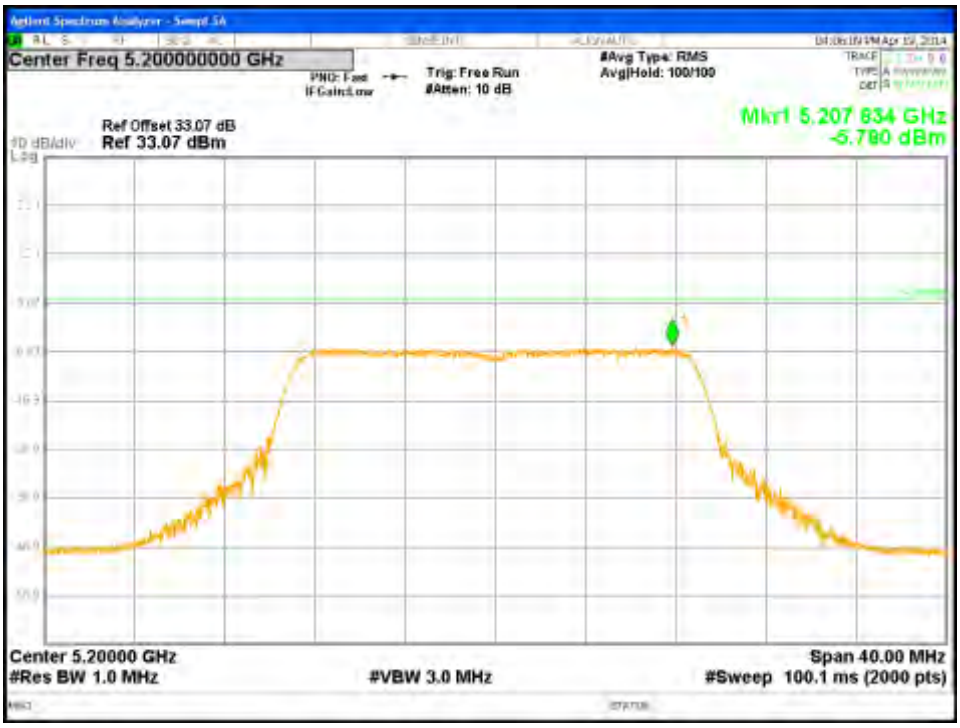


Figure 216: Maximum Power Spectral Density-5200 MHz-VHT20-MCS0-Ch2

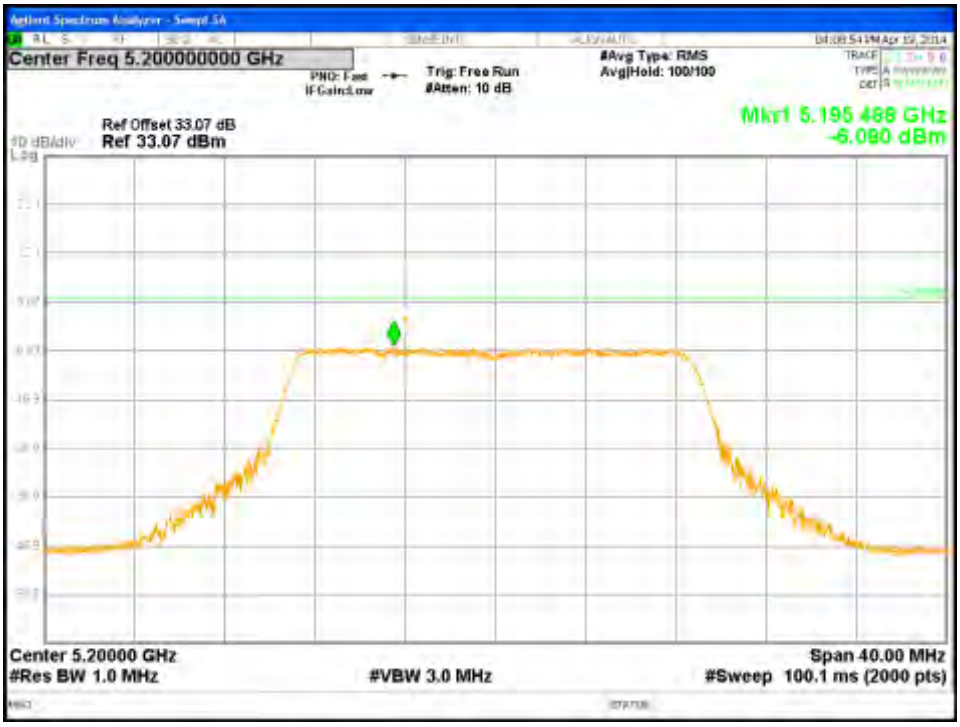


Figure 217: Maximum Power Spectral Density-5200 MHz-VHT20-MCS0-Ch3

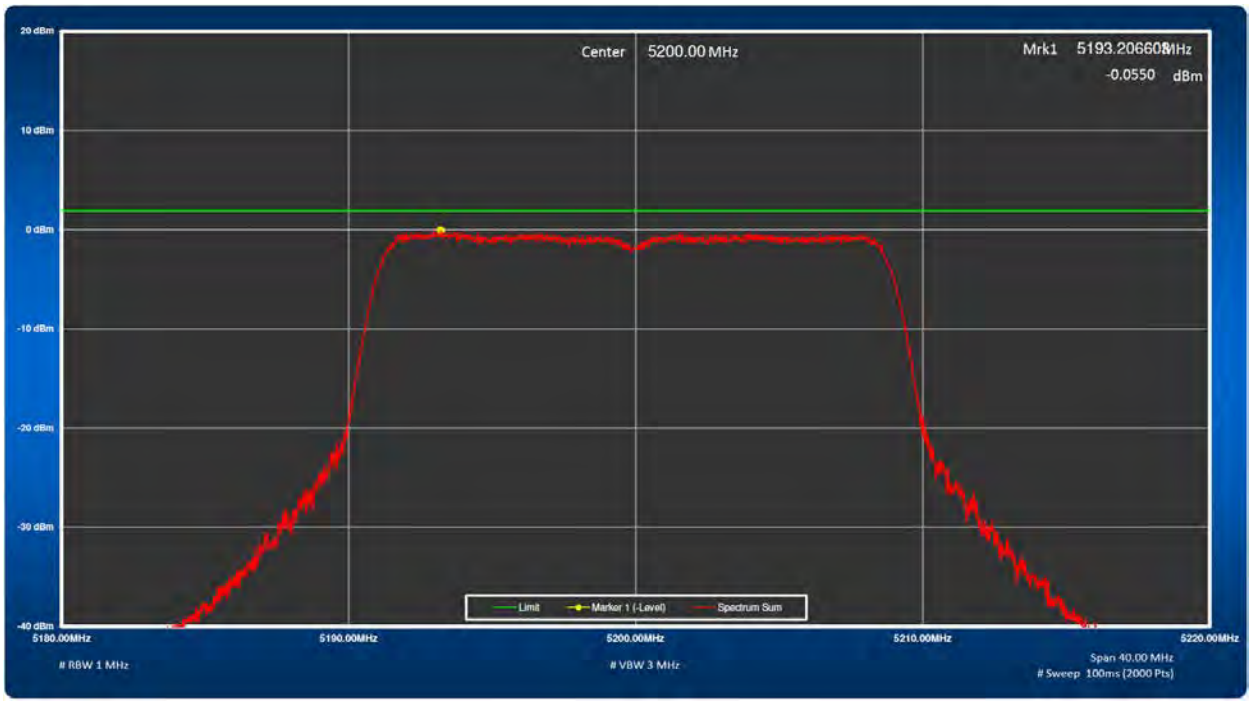


Figure 218: Total Power Spectral Density, 5200 MHz at 802.11ac VHT20

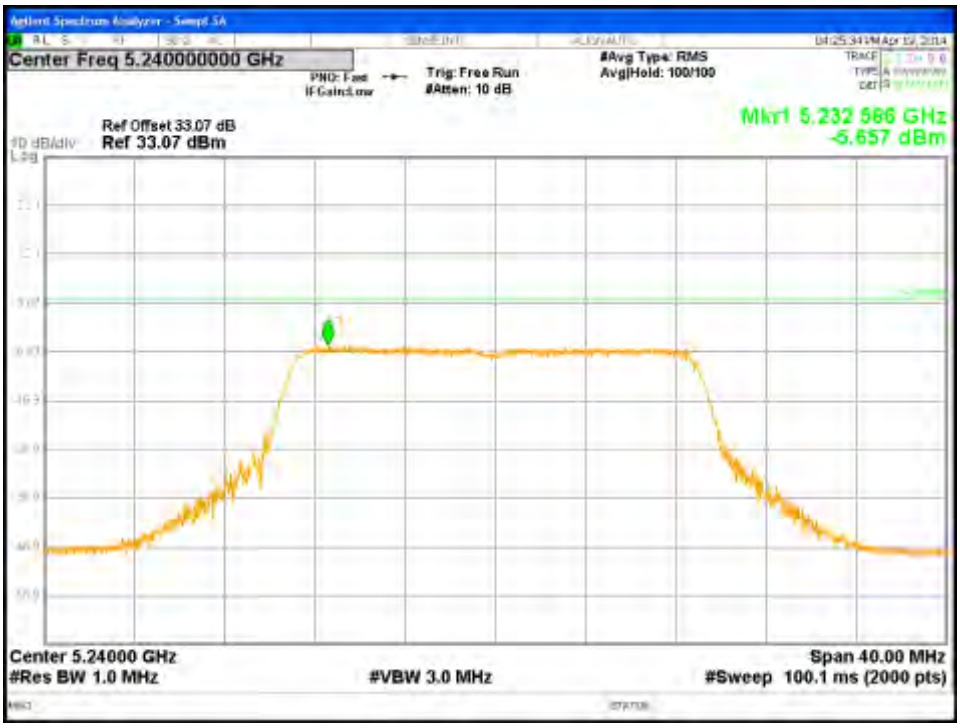


Figure 219: Maximum Power Spectral Density-5240 MHz-VHT20-MCS0-Ch0

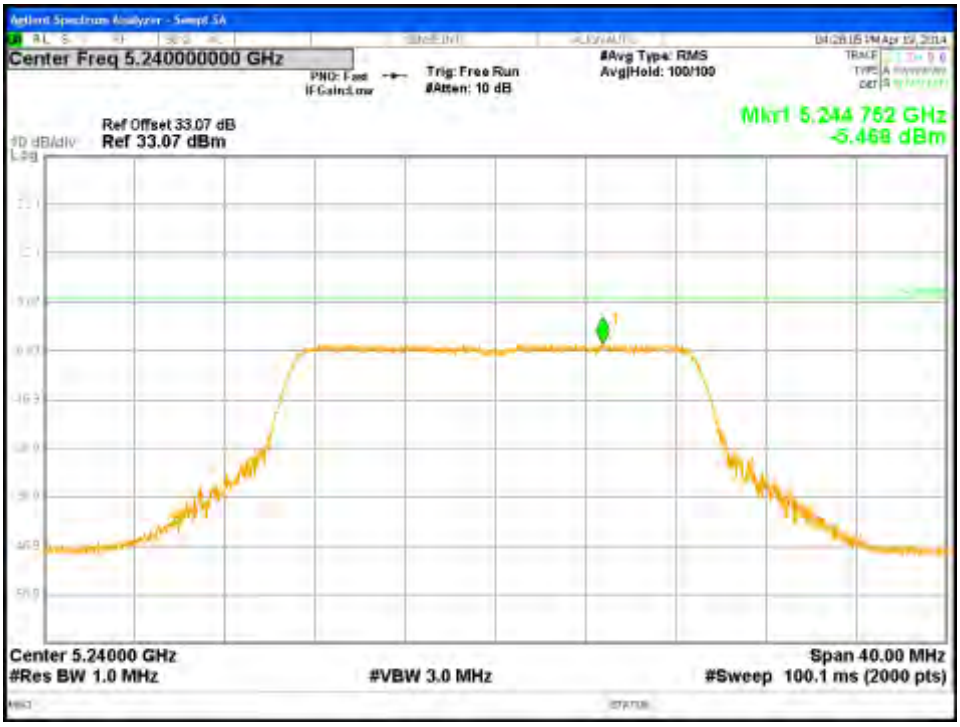


Figure 220: Maximum Power Spectral Density-5240 MHz-VHT20-MCS0-Ch1

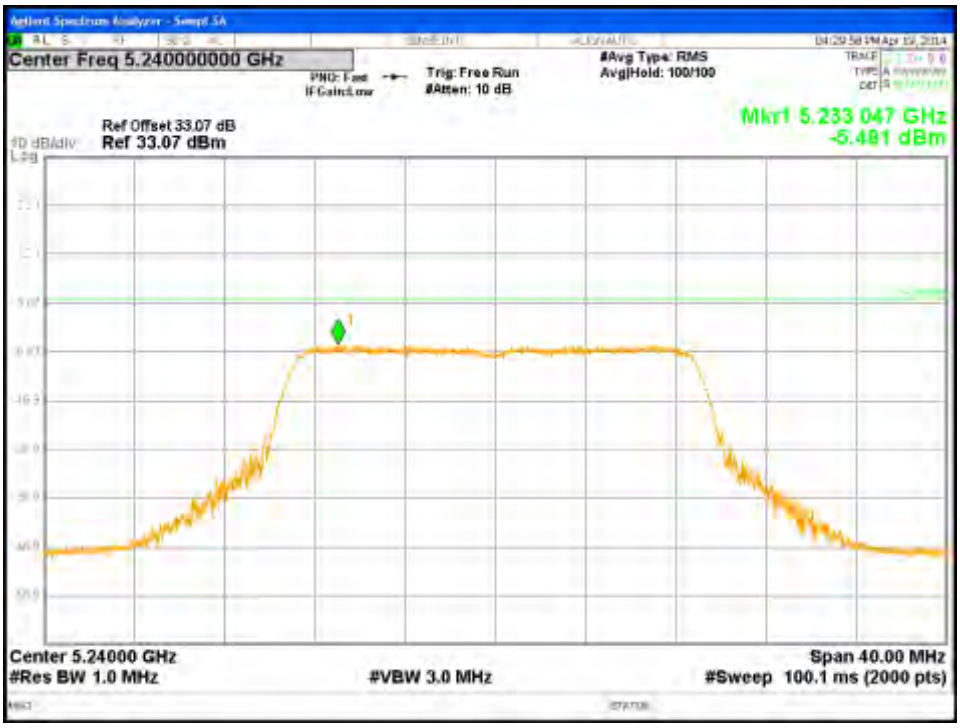


Figure 221: Maximum Power Spectral Density-5240 MHz-VHT20-MCS0-Ch2

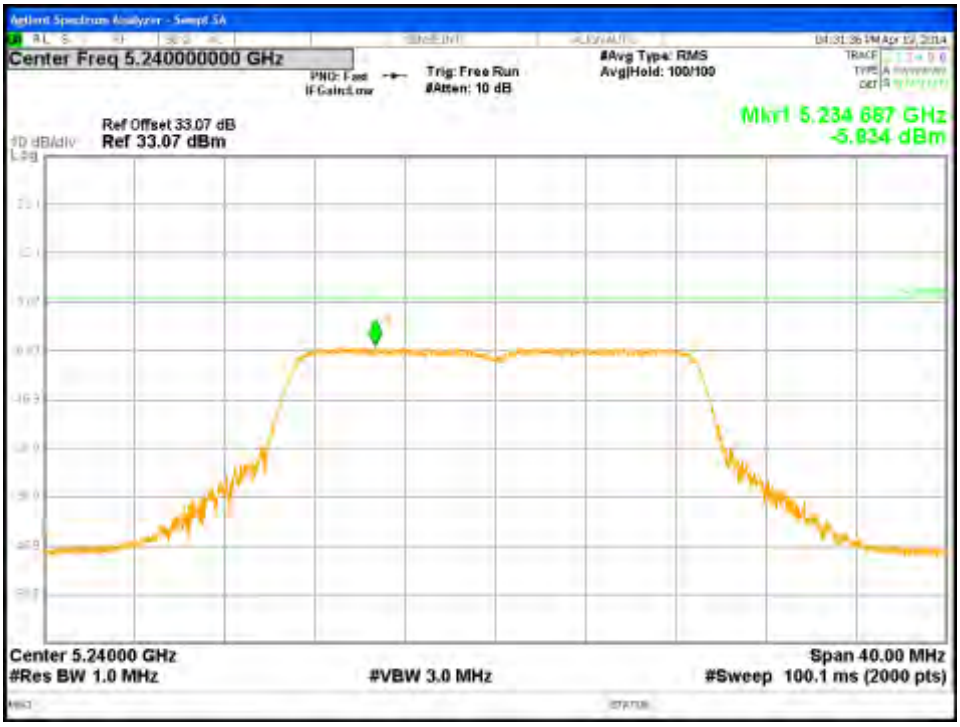


Figure 222: Maximum Power Spectral Density-5240 MHz-VHT20-MCS0-Ch3

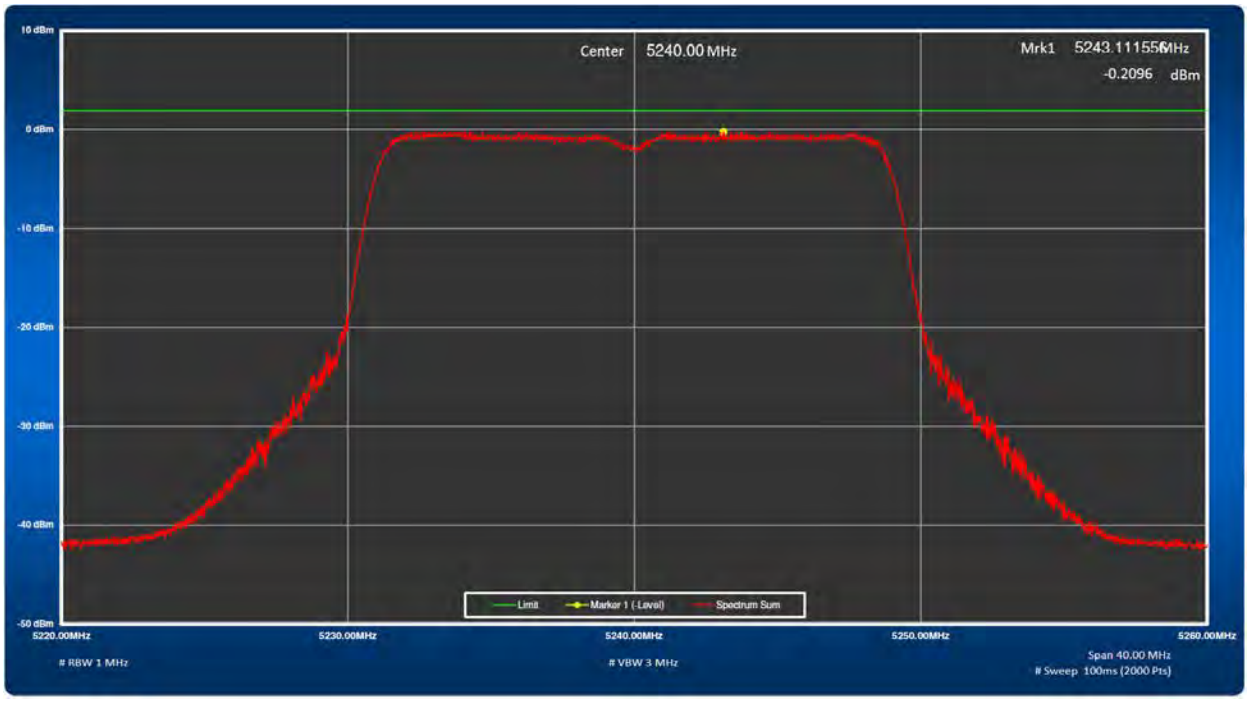


Figure 223: Total Power Spectral Density, 5240 MHz at 802.11ac VHT20

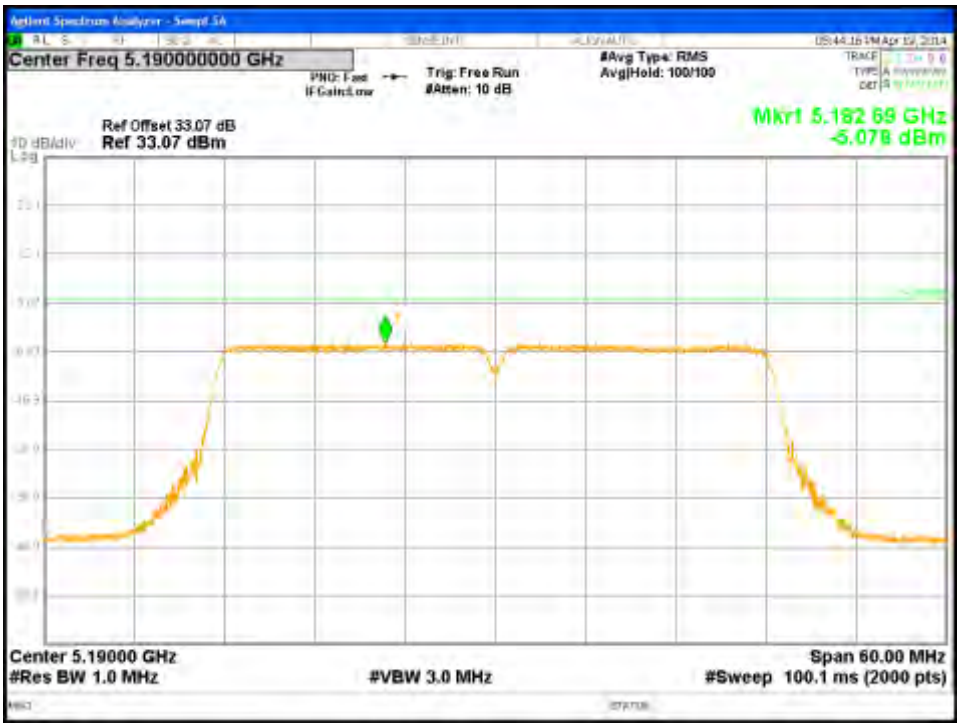


Figure 224: Maximum Power Spectral Density-5190 MHz-VHT40-MCS0-Ch0

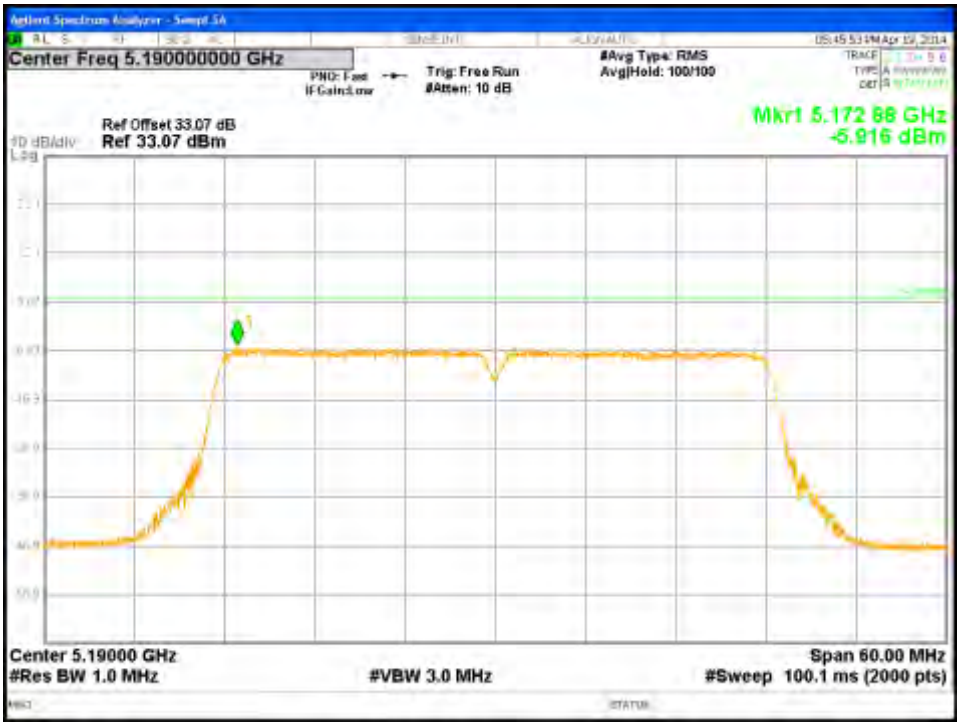


Figure 225: Maximum Power Spectral Density-5190 MHz-VHT40-MCS0-Ch1

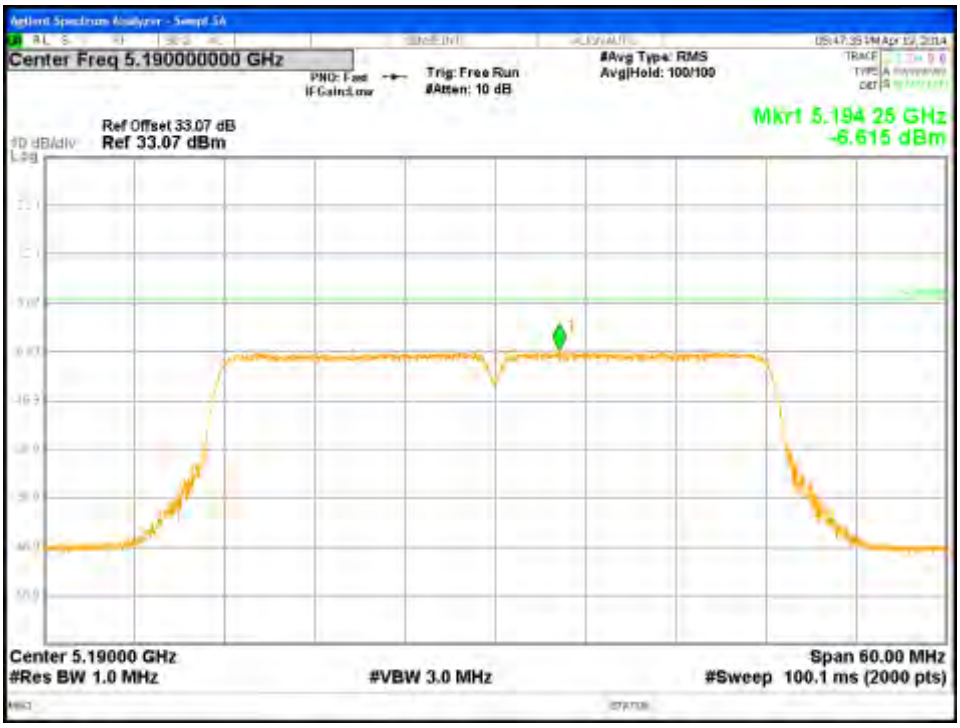


Figure 226: Maximum Power Spectral Density-5190 MHz-VHT40-MCS0-Ch2

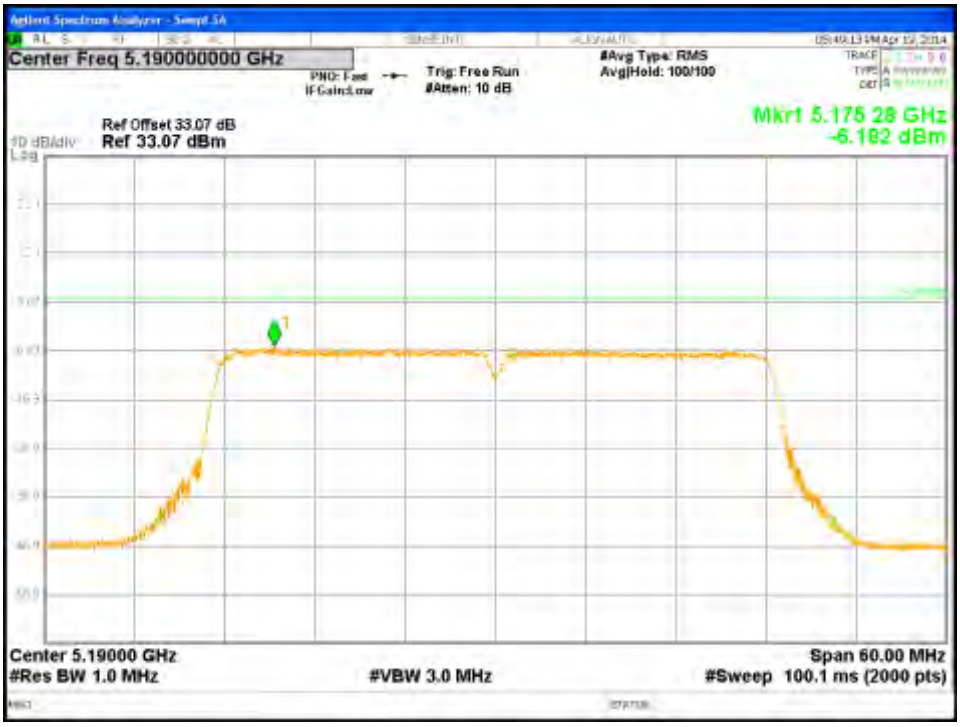


Figure 227: Maximum Power Spectral Density-5190 MHz-VHT40-MCS0-Ch3

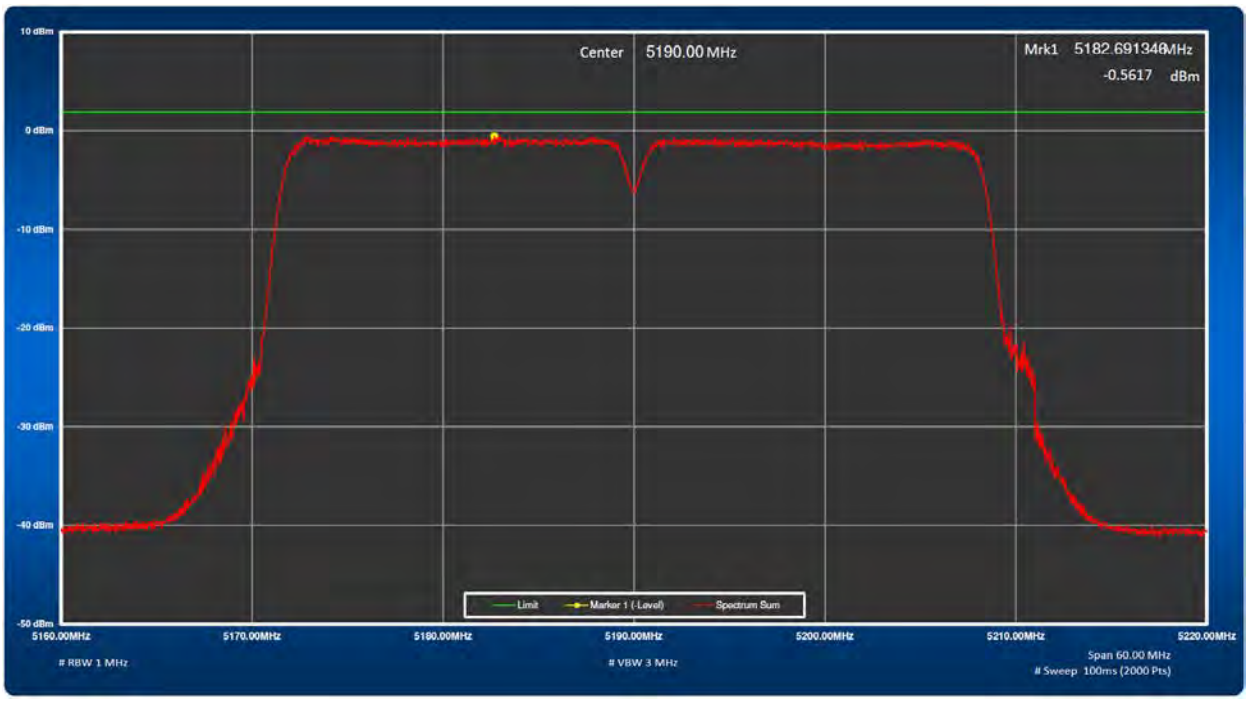


Figure 228: Total Power Spectral Density, 5190 MHz at 802.11ac VHT40

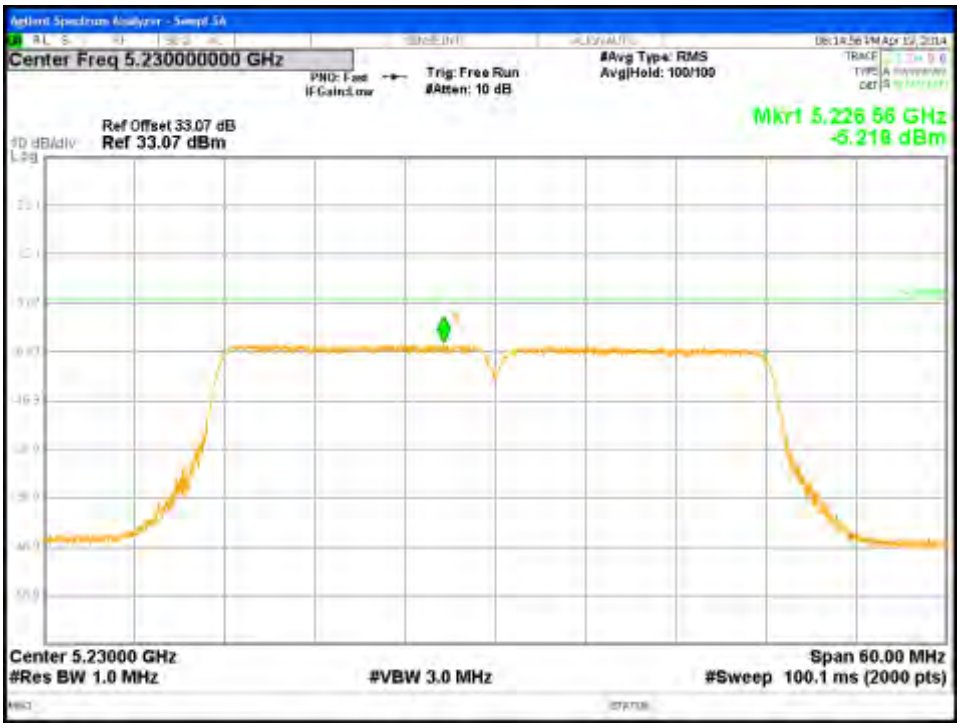


Figure 229: Maximum Power Spectral Density-5230 MHz-VHT40-MCS0-Ch0

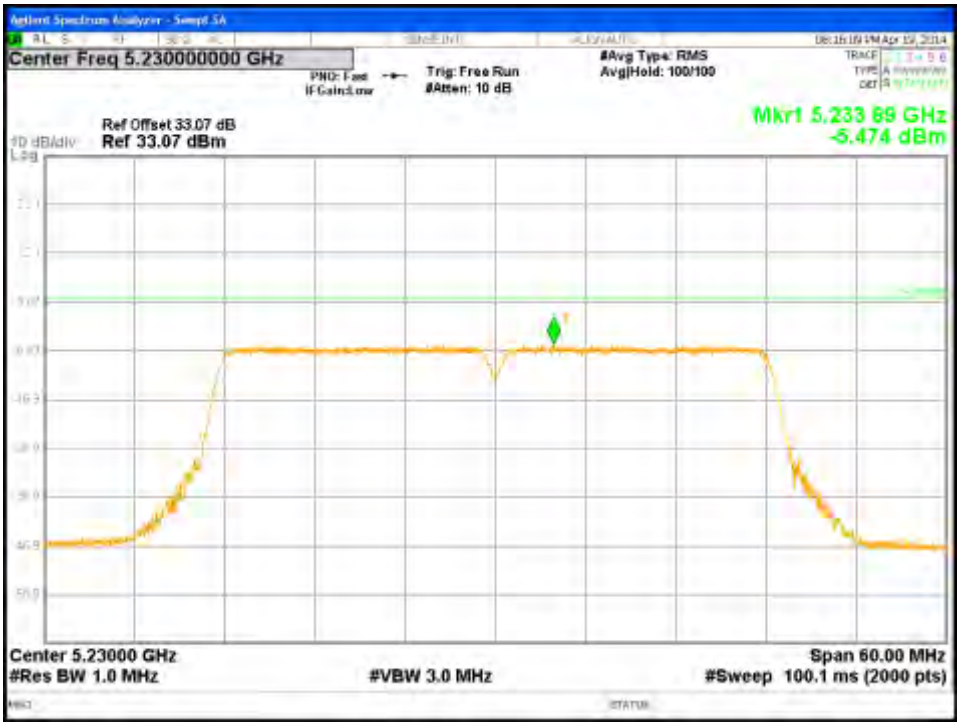


Figure 230: Maximum Power Spectral Density-5230 MHz-VHT40-MCS0-Ch1

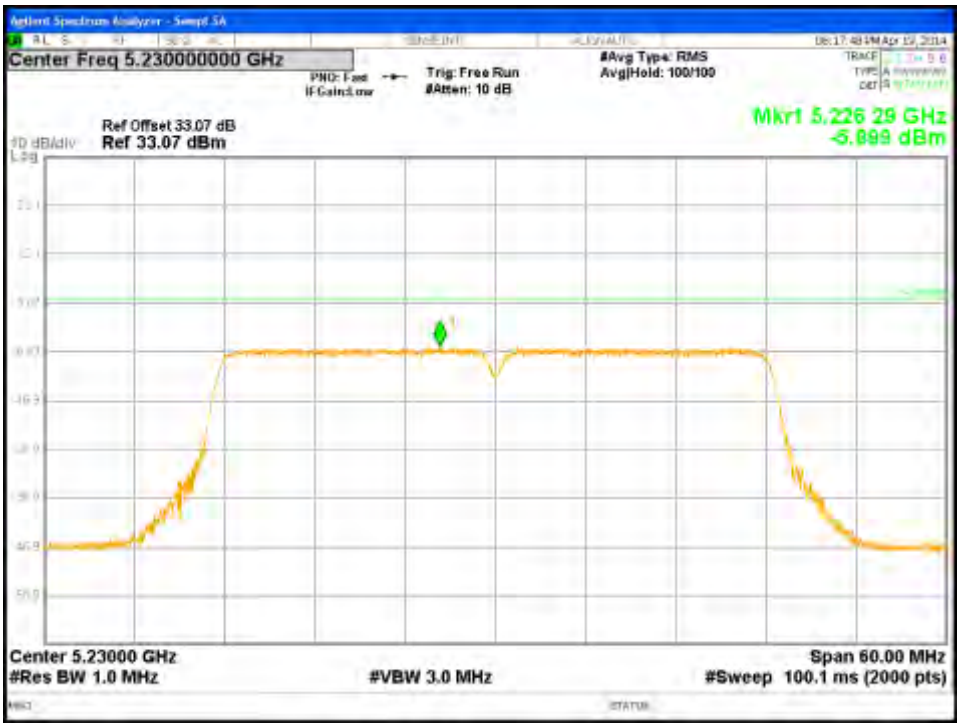


Figure 231: Maximum Power Spectral Density-5230 MHz-VHT40-MCS0-Ch2

Figure 232: Maximum Power Spectral Density-5230 MHz-VHT40-MCS0-Ch3

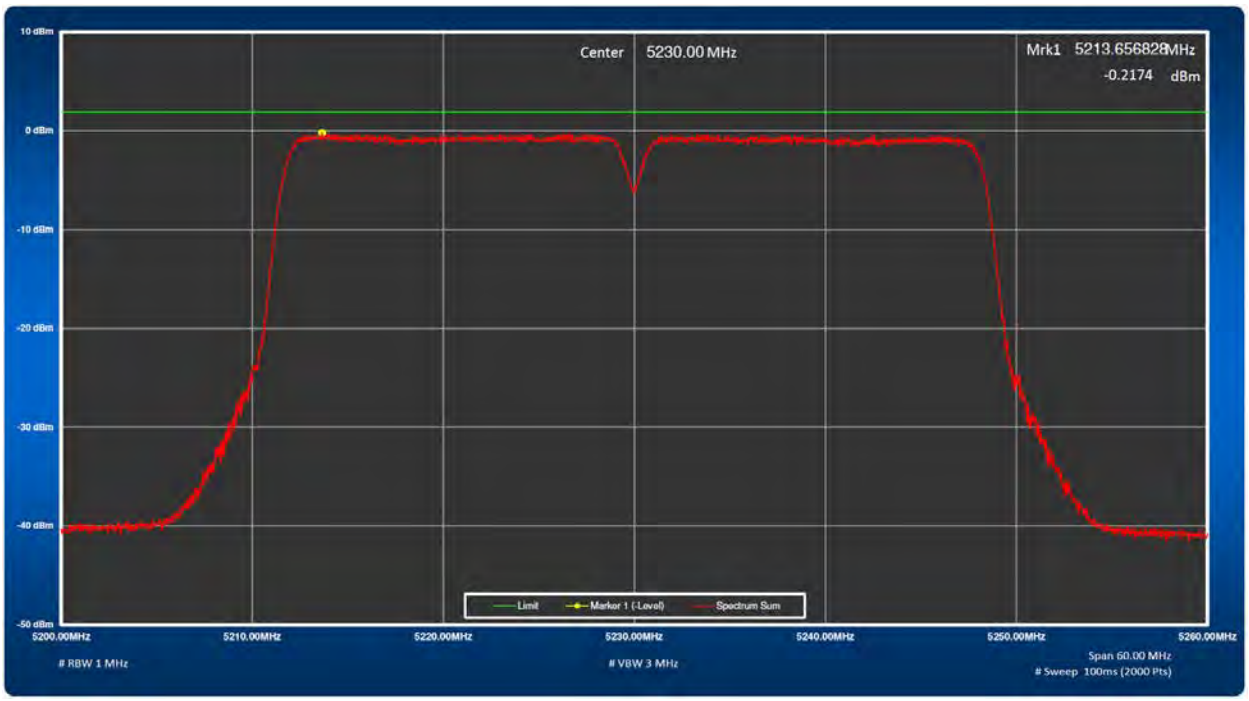


Figure 233: Total Power Spectral Density, 5230 MHz at 802.11ac VHT40

Figure 234: Maximum Power Spectral Density-5210 MHz-VHT80-MCS0-Ch0

Figure 235: Maximum Power Spectral Density-5210 MHz-VHT80-MCS0-Ch1

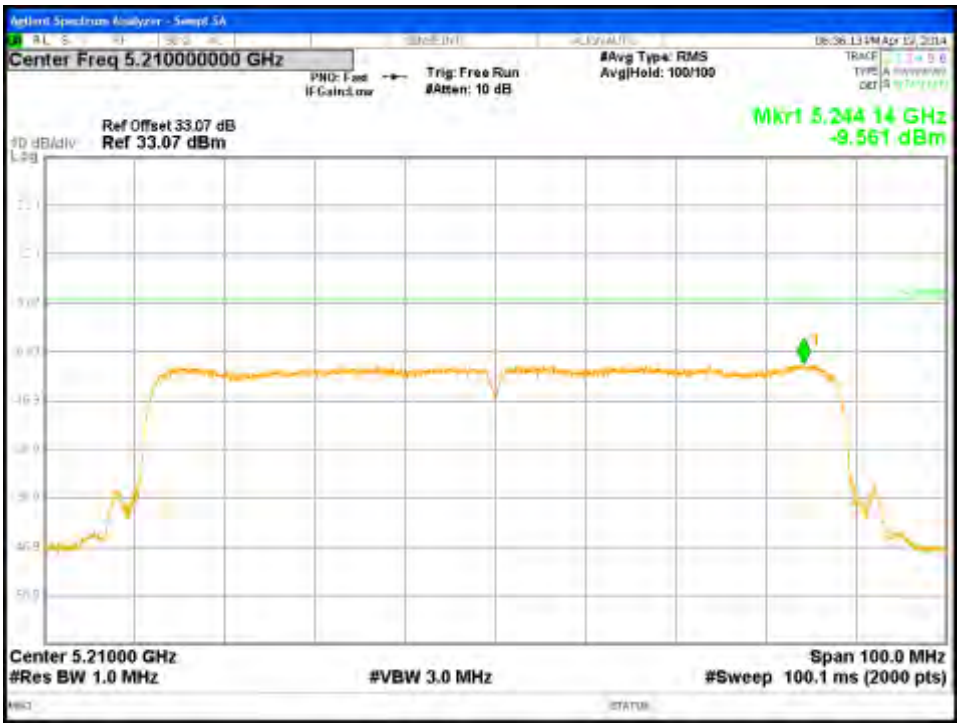


Figure 236: Maximum Power Spectral Density-5210 MHz-VHT80-MCS0-Ch2

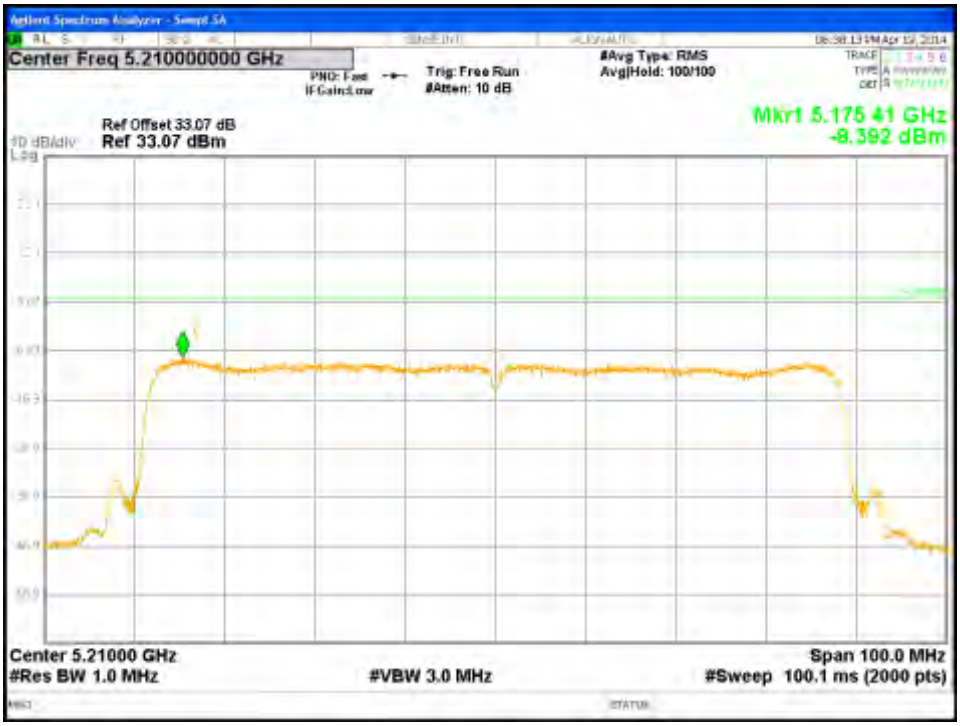


Figure 237: Maximum Power Spectral Density-5210 MHz-VHT80-MCS0-Ch3

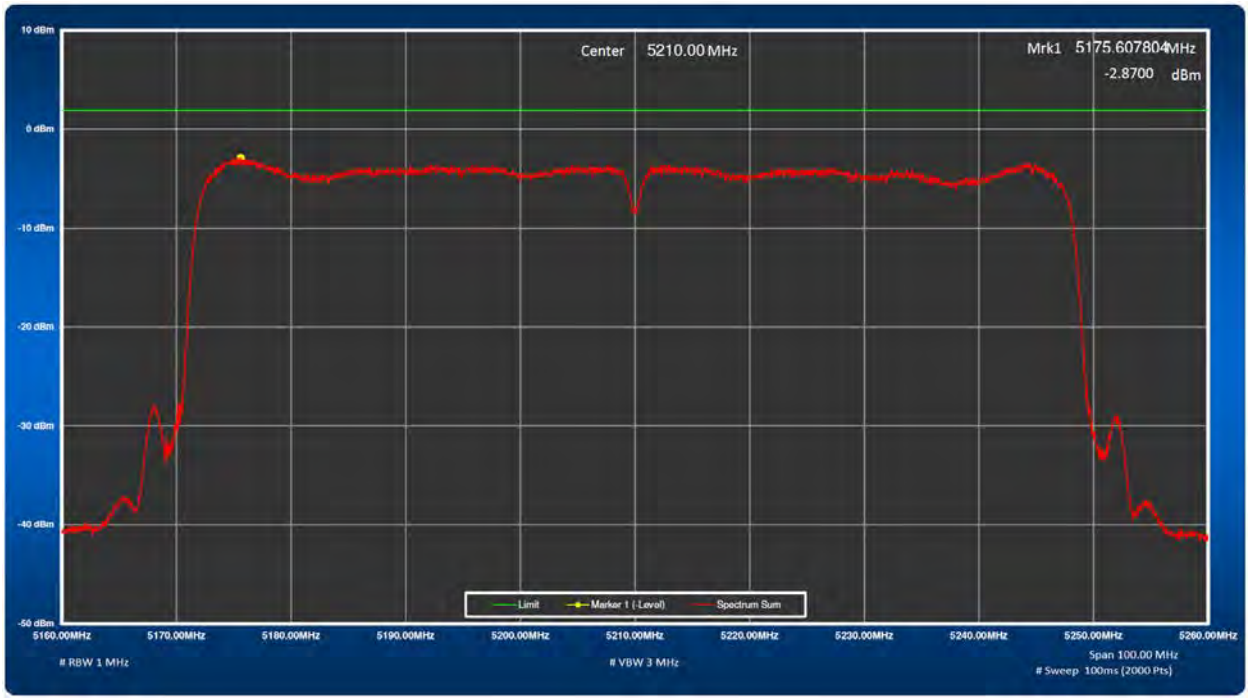


Figure 238: Total Power Spectral Density, 5210 MHz at 802.11ac VHT80

4.5 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.407(b), RSS-210 Sect. A.9.2

4.5.1 Test Methodology

4.5.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

Pres-scans were performed to determine the worst axis, data rate/ chains.

4.5.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

The final scans performed on the worst axis, Y-Axis, for three operating channels;

6 Mbps for 802.11a Mode: 5180 MHz, 5200 MHz, 5240 MHz

MCS0 for 802.11n HT20 Mode: 5180 MHz, 5200 MHz, 5240 MHz

MCS0 for 802.11n HT40 Mode: 5190 MHz, 5230 MHz

MCS0 for 802.11ac VHT20 Mode: 5180 MHz, 5200 MHz, 5240 MHz

MCS0 for 802.11a VHT40 Mode: 5190 MHz, 5230 MHz

MCS0 for 802.11a VHT80 Mode: 5210 MHz.

4.5.1.3 Deviations

None.

4.5.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2013 and RSS-210 A1.1.2 2010.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

According to CFR47 15.407 (b), all harmonics and spurious emissions which are outside the 5150 MHz - 5250 MHz, 5250 MHz – 5350 MHz, or 5470 MHz – 5725MHz shall not exceed -27 dBm/MHz. This is equivalent to 68.2 dBuV/m at 3 meter distance.

4.5.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 7: Transmit Spurious Emission at Band-Edge Requirements

Test Conditions: Radiated Measurement				**Test Date:** March 25, 2014				
Antenna Type: Integrated				**Power Setting:** See test plan				
Max. Antenna Gain: +8.08 dBi				**Signal State:** Modulated				
Ambient Temp.: 23 °C				**Relative Humidity:**33%				
Band-Edge Results								
Freq. (MHz)	Level (dBuV/m)	Polarity (H/V)	Limit (dBuV/m)	Margin (dB)	Det.	Table Deg.	Tower (cm)	Note
5150.00	64.66	H	74.00	−9.34	Pk	202	146	5180 MHz-11a-6Mbps-11 dBm
5150.00	47.60	H	54.00	−6.40	Ave	202	146	5180 MHz-11a-6Mbps-11 dBm
5150.00	61.29	V	74.00	−12.71	Pk	162	278	5180 MHz-11a-6Mbps-11 dBm
5150.00	45.66	V	54.00	−8.34	Ave	162	278	5180 MHz-11a-6Mbps-11 dBm
5150.00	62.35	H	74.00	−11.65	Pk	268	153	5240 MHz-11a-6Mbps-11 dBm
5150.00	44.90	H	54.00	−9.10	Ave	268	153	5240 MHz-11a-6Mbps-11 dBm
5150.00	53.97	V	74.00	−20.03	Pk	15	196	5240 MHz-11a-6Mbps-11 dBm
5150.00	44.08	V	54.00	−9.92	Ave	15	196	5240 MHz-11a-6Mbps-11 dBm
5150.00	62.37	H	74.00	−11.63	Pk	102	260	5180 MHz-HT20-MCS0-11 dBm
5150.00	45.42	H	54.00	−8.58	Ave	102	260	5180 MHz-HT20-MCS0-11 dBm
5150.00	62.61	V	74.00	−11.39	Pk	291	230	5180 MHz-HT20-MCS0-11 dBm
5150.00	47.40	V	54.00	−6.60	Ave	291	230	5180 MHz-HT20-MCS0-11 dBm
5150.00	62.25	H	74.00	−11.75	Pk	72	254	5240 MHz-HT20-MCS0-11 dBm
5150.00	45.66	H	54.00	−8.34	Ave	72	254	5240 MHz-HT20-MCS0-11 dBm
5150.00	62.14	V	74.00	−11.86	Pk	265	275	5240 MHz-HT20-MCS0-11 dBm
5150.00	43.78	V	54.00	−10.22	Ave	265	275	5240 MHz-HT20-MCS0-11 dBm
5150.00	63.63	H	74.00	−10.37	Pk	285	185	5190 MHz-HT40-MCS0-11 dBm
5150.00	51.06	H	54.00	−2.94	Ave	285	185	5190 MHz-HT40-MCS0-11 dBm
5150.00	64.02	V	74.00	−9.98	Pk	293	339	5190 MHz-HT40-MCS0-11 dBm
5150.00	48.34	V	54.00	−5.66	Ave	293	339	5190 MHz-HT40-MCS0-11 dBm
5150.00	62.88	H	74.00	−11.12	Pk	66	233	5230 MHz-HT40-MCS0-11 dBm
5150.00	46.13	H	54.00	−7.87	Ave	66	233	5230 MHz-HT40-MCS0-11 dBm
5150.00	61.95	V	74.00	−12.05	Pk	99	229	5230 MHz-HT40-MCS0-11 dBm
5150.00	44.36	V	54.00	−9.64	Ave	99	229	5230 MHz-HT40-MCS0-11 dBm
5150.00	62.49	H	74.00	−11.51	Pk	53	251	5180 MHz-VHT20-MCS0-11 dBm
5150.00	47.79	H	54.00	−6.21	Ave	53	251	5180 MHz-VHT20-MCS0-11 dBm
5150.00	63.50	V	74.00	−10.50	Pk	−3	369	5180 MHz-VHT20-MCS0-11 dBm
5150.00	45.66	V	54.00	−8.34	Ave	−3	369	5180 MHz-VHT20-MCS0-11 dBm
5150.00	62.71	H	74.00	−11.29	Pk	316	274	5240 MHz-VHT20-MCS0-11 dBm
5150.00	44.36	H	54.00	−9.64	Ave	316	274	5240 MHz-VHT20-MCS0-11 dBm
5150.00	61.44	V	74.00	−12.56	Pk	−7	266	5240 MHz-VHT20-MCS0-11 dBm

5150.00	44.08	V	54.00	−9.92	Ave	−7	266	5240 MHz-VHT20-MCS0-11 dBm
5150.00	63.03	H	74.00	−10.97	Pk	266	158	5190 MHz-VHT40-MCS0-11 dBm
5150.00	50.93	H	54.00	−3.07	Ave	266	158	5190 MHz-VHT40-MCS0-11 dBm
5150.00	59.73	V	74.00	−14.27	Pk	1	351	5190 MHz-VHT40-MCS0-11 dBm
5150.00	49.65	V	54.00	−4.35	Ave	1	351	5190 MHz-VHT40-MCS0-11 dBm
5150.00	62.88	H	74.00	−11.12	Pk	310	298	5230 MHz-VHT40-MCS0-11 dBm
5150.00	44.90	H	54.00	−9.10	Ave	310	298	5230 MHz-VHT40-MCS0-11 dBm
5150.00	61.93	V	74.00	−12.07	Pk	1	136	5230 MHz-VHT40-MCS0-11 dBm
5150.00	44.90	V	54.00	−9.10	Ave	1	136	5230 MHz-VHT40-MCS0-11 dBm
5150.00	67.62	H	74.00	−6.38	Pk	105	144	5210 MHz-VHT80-MCS0-11 dBm
5150.00	53.75	H	54.00	−0.25	Ave	105	144	5210 MHz-VHT80-MCS0-11 dBm
5150.00	60.24	V	74.00	−13.76	Pk	178	229	5210 MHz-VHT80-MCS0-11 dBm
5150.00	45.95	V	54.00	−8.05	Ave	178	229	5210 MHz-VHT80-MCS0-11 dBm

Note: 1. Band-edge frequencies were taken at 5150 MHz since 5250-5350 MHz band is not a restricted band.

2. All the band-edge measurements met the restricted band requirements of CFR47 15.205.

3. It is also complied with the -27 dBm/MHz (68.2dBuV/m at 3m) requirements as stated in CFR47 15.407 (b) (1) to 15.407 (b) (3).

4. It is also confirm that the 20dBr point of the highest channel in each mode is within the 5150-5250 MHz range.

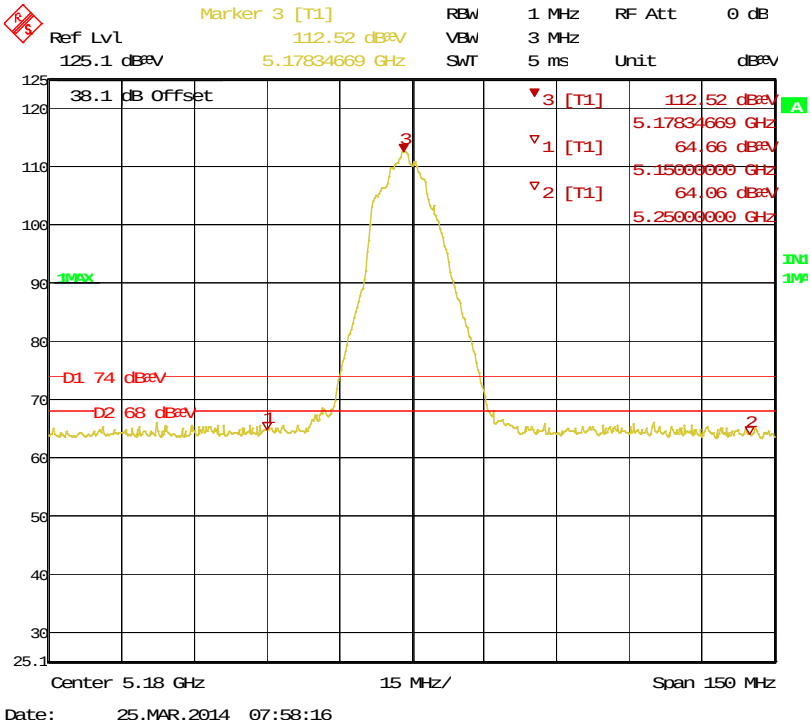


Figure 239: Bandedge-5180 MHz-11a-MCS0-11 dBm-H-Pk

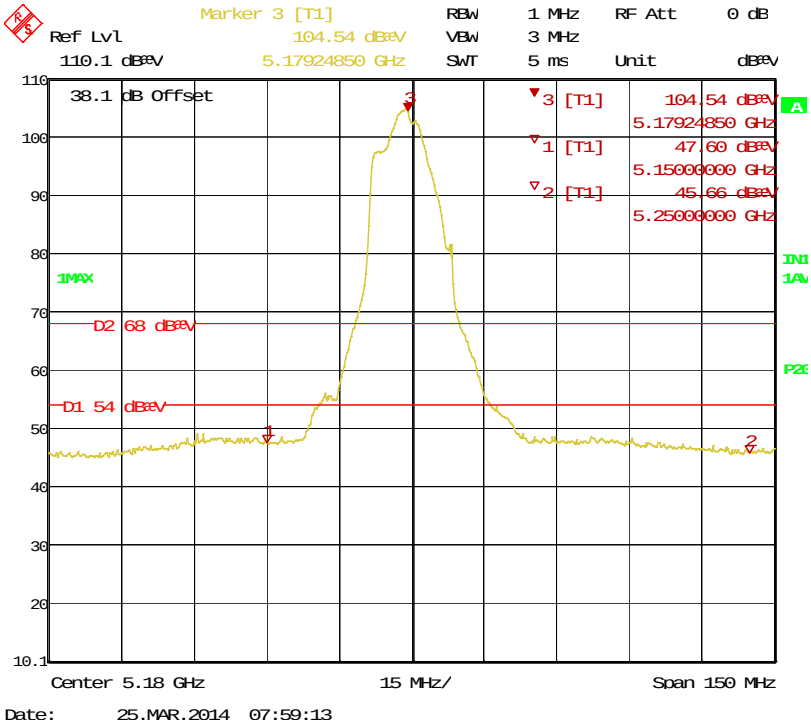


Figure 240: Bandedge-5180 MHz-11a-MCS0-11 dBm-H-Ave

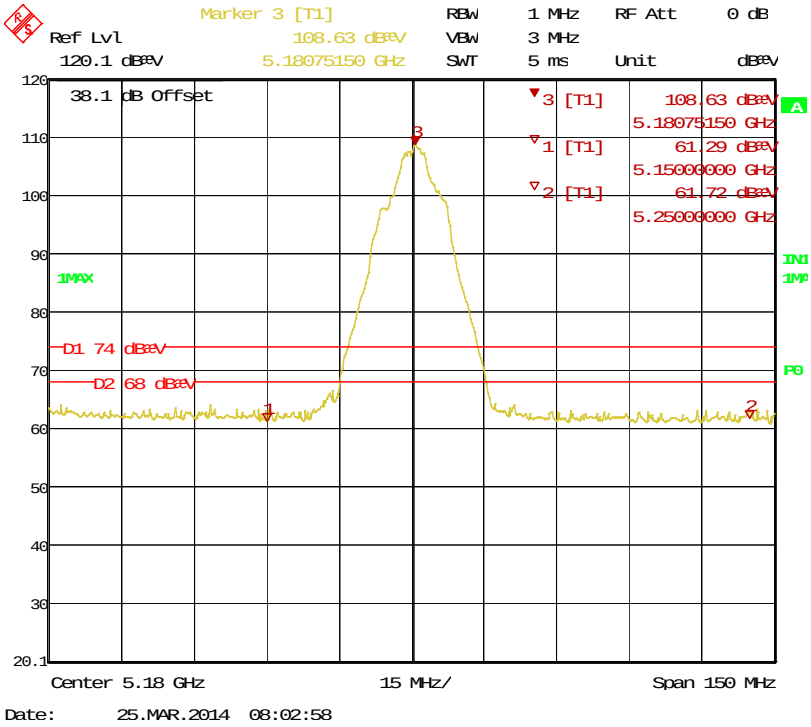


Figure 241: Bandedge-5180 MHz-11a-MCS0-11 dBm-V-Pk

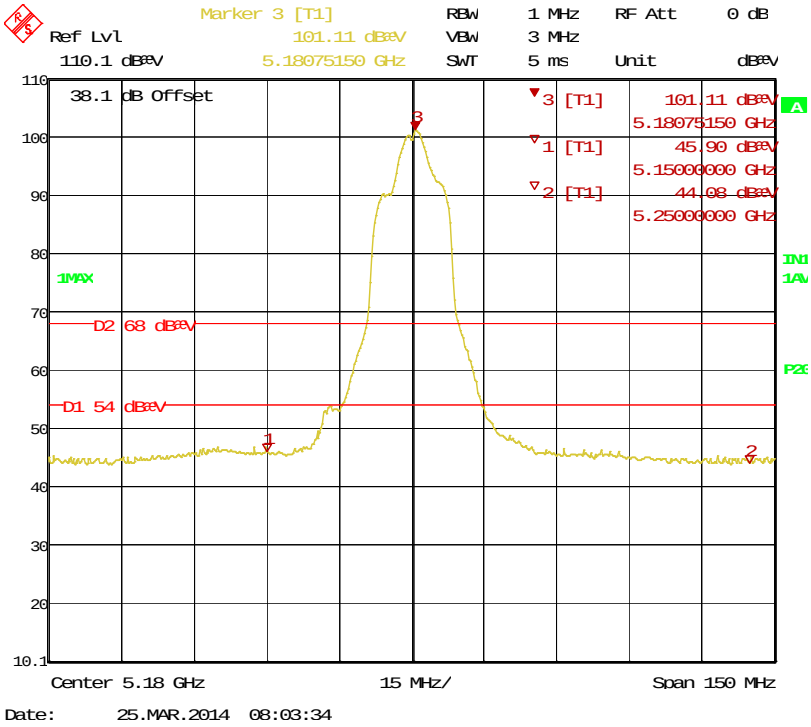


Figure 242: Bandedge-5180 MHz-11a-MCS0-11 dBm-V-Ave

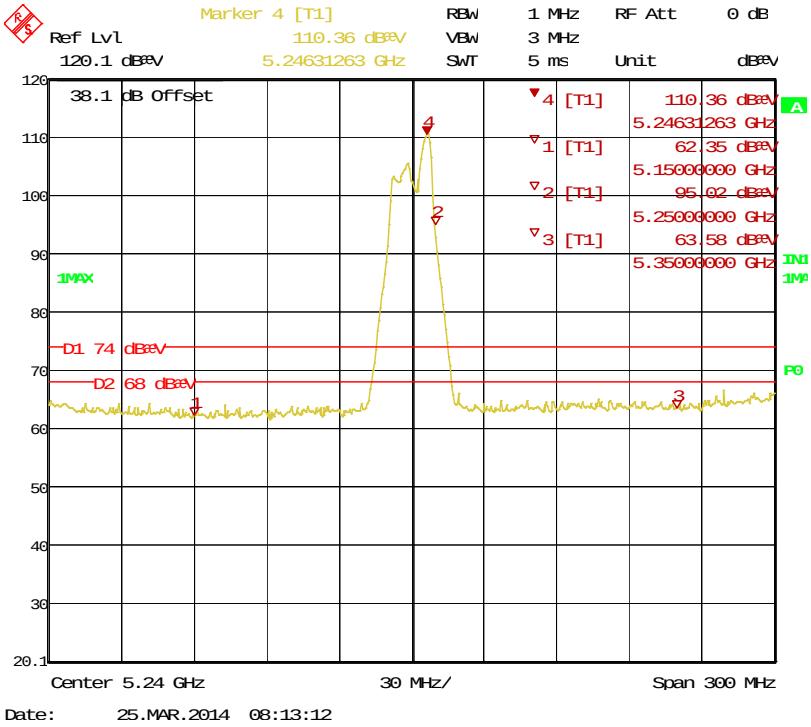


Figure 243: Bandedge-5240 MHz-11a-MCS0-11 dBm-H-pk

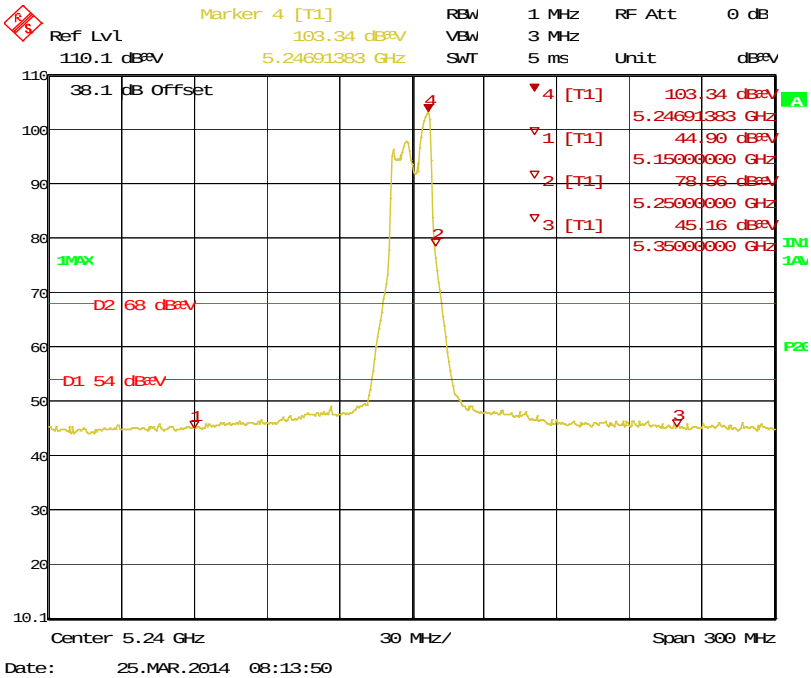


Figure 244: Bandedge-5240 MHz-11a-MCS0-11 dBm-H-ave

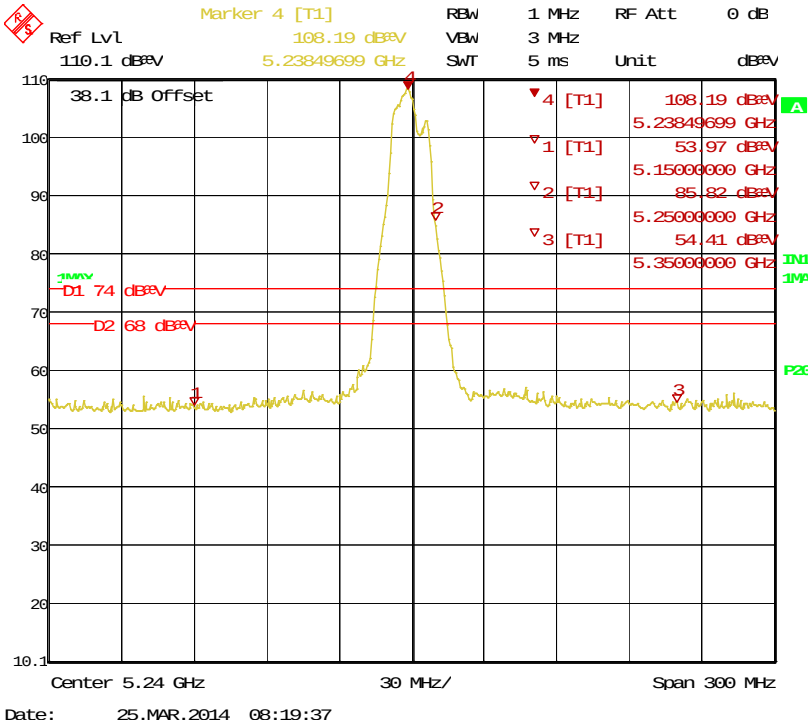


Figure 245: Bandedge-5240 MHz-11a-MCS0-11 dBm-V-pk

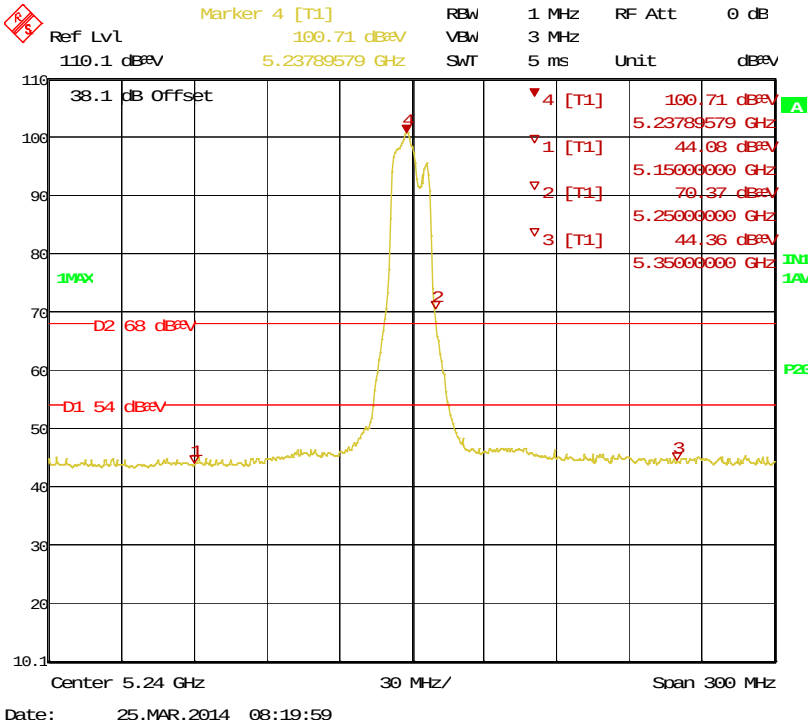


Figure 246: Bandedge-5240 MHz-11a-MCS0-11 dBm-V-Ave

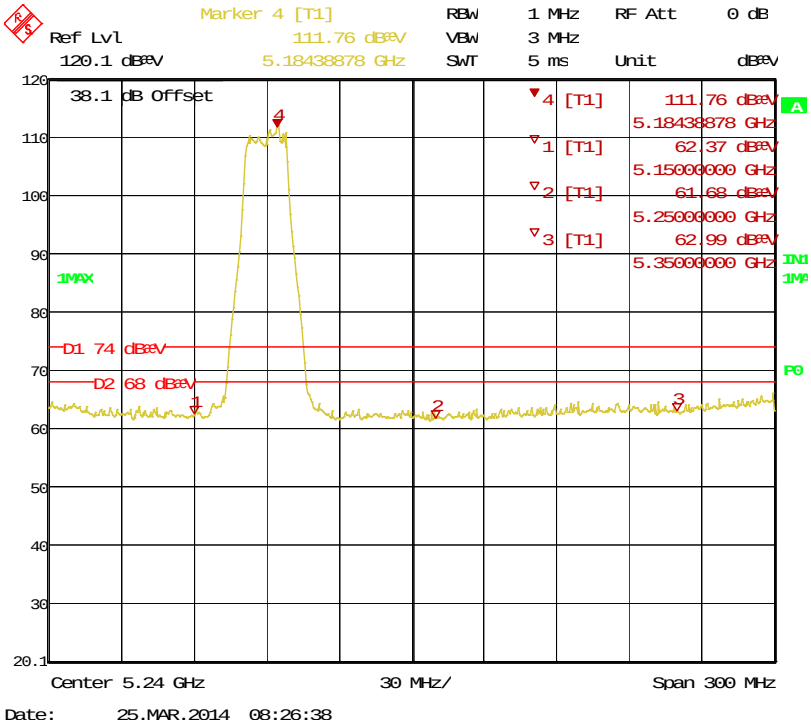


Figure 247: Bandedge-5180 MHz-HT20-MCS0-11 dBm-H-Pk

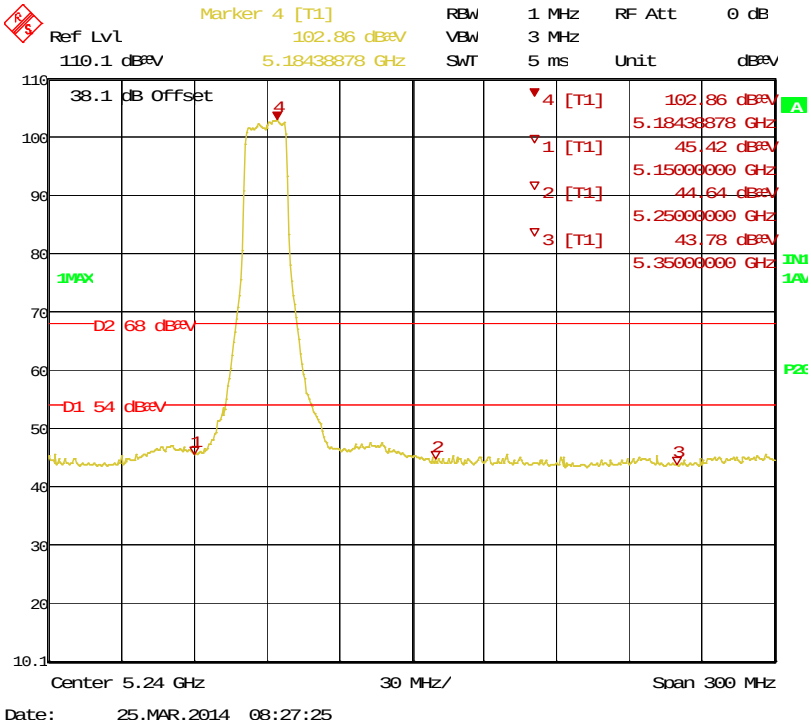


Figure 248: Bandedge-5180 MHz-HT20-MCS0-11 dBm-H-Ave

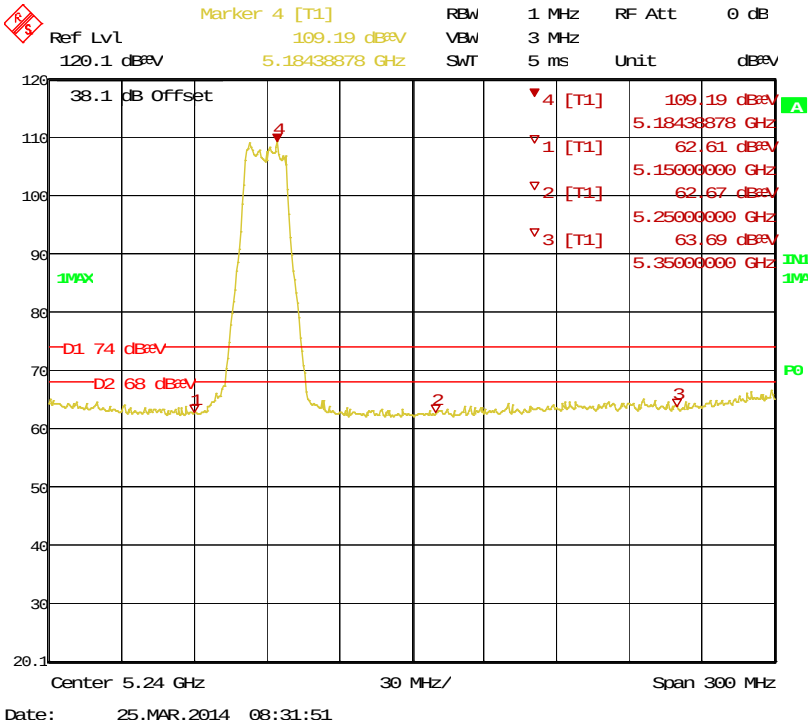


Figure 249: Bandedge-5180 MHz-HT20-MCS0-11 dBm-V-Pk

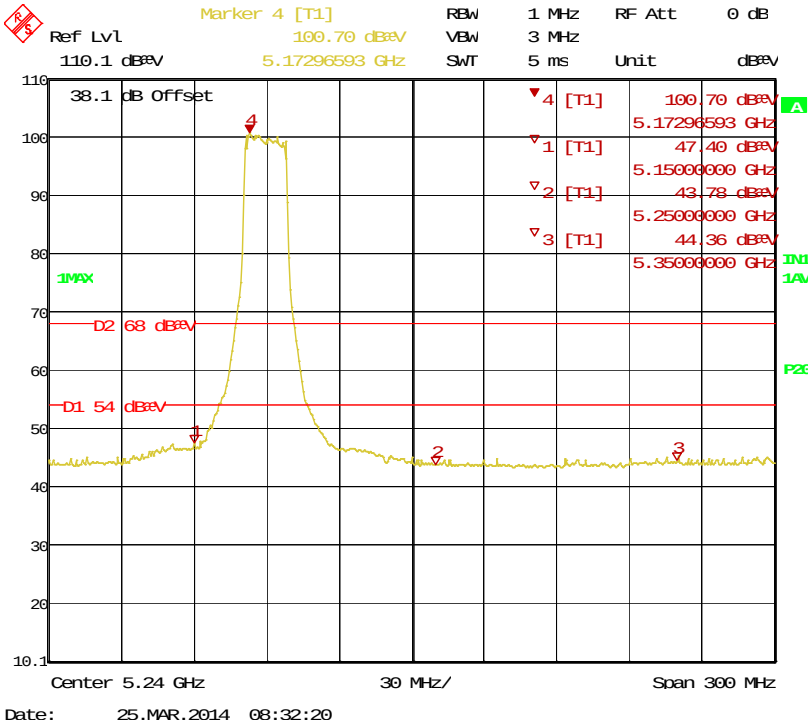


Figure 250: Bandedge-5180 MHz-HT20-MCS0-11 dBm-V-Ave

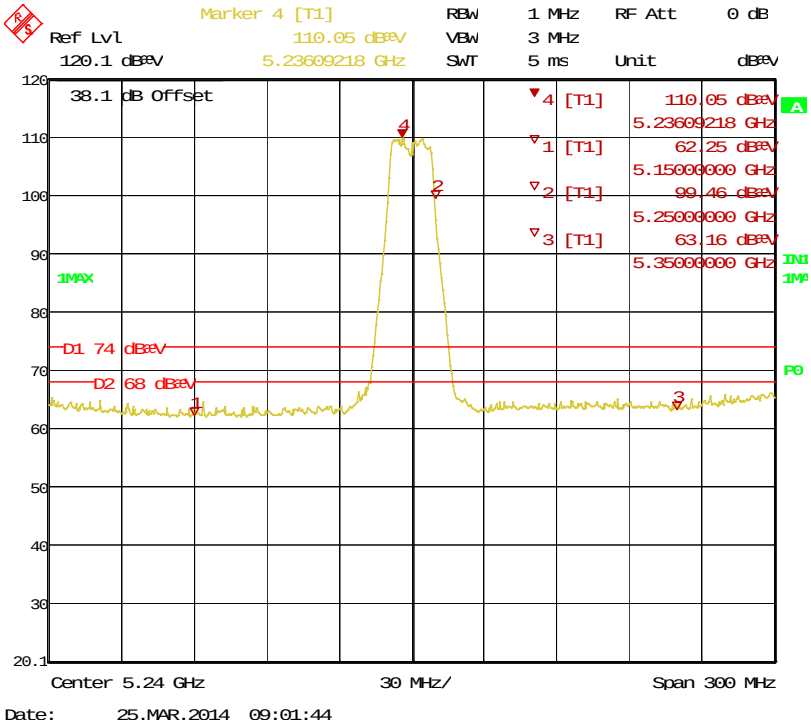


Figure 251: Bandedge-5240 MHz-HT20-MCS0-11 dBm-H-Pk

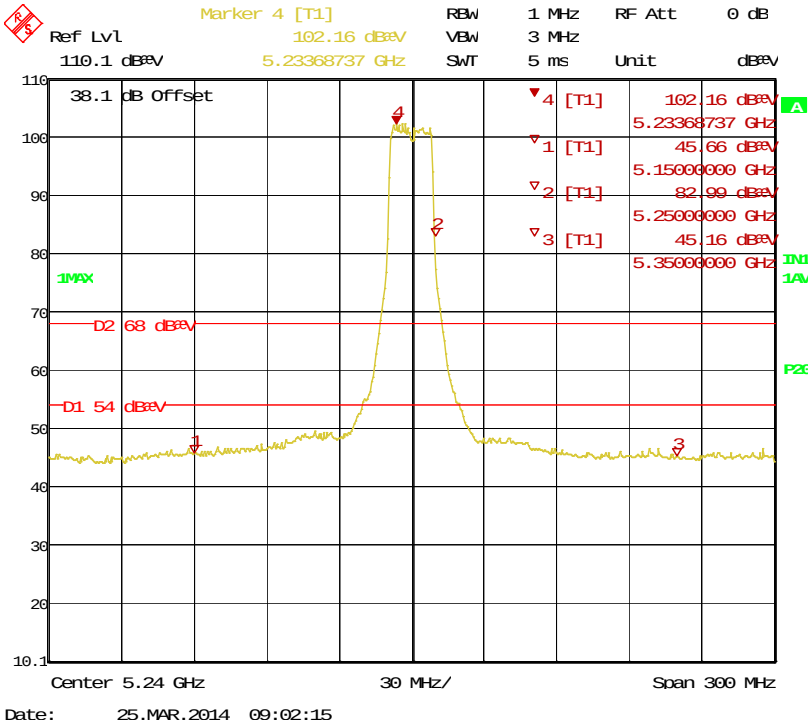


Figure 252: Bandedge-5240 MHz-HT20-MCS0-11 dBm-H-Ave

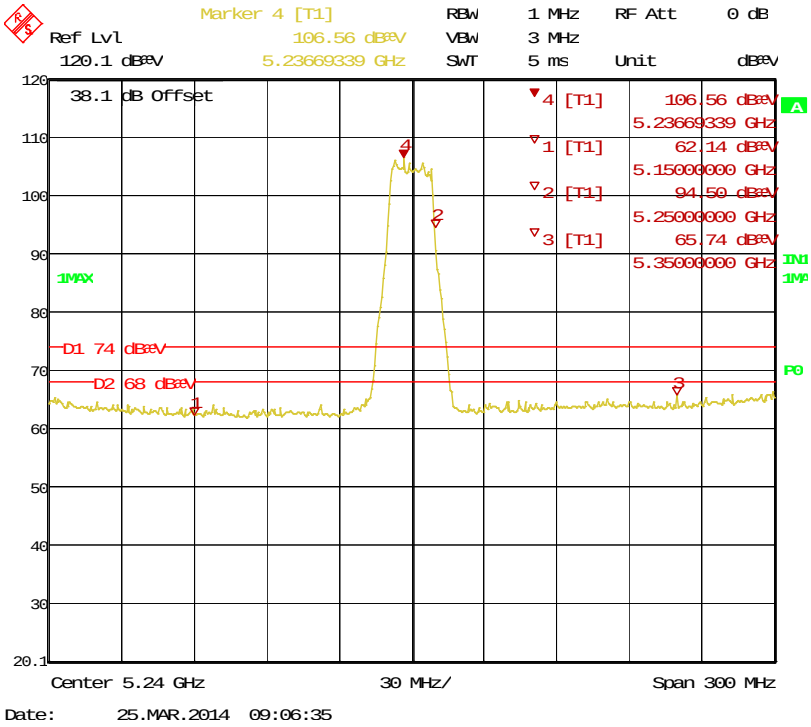


Figure 253: Bandedge-5240 MHz-HT20-MCS0-11 dBm-V-Pk

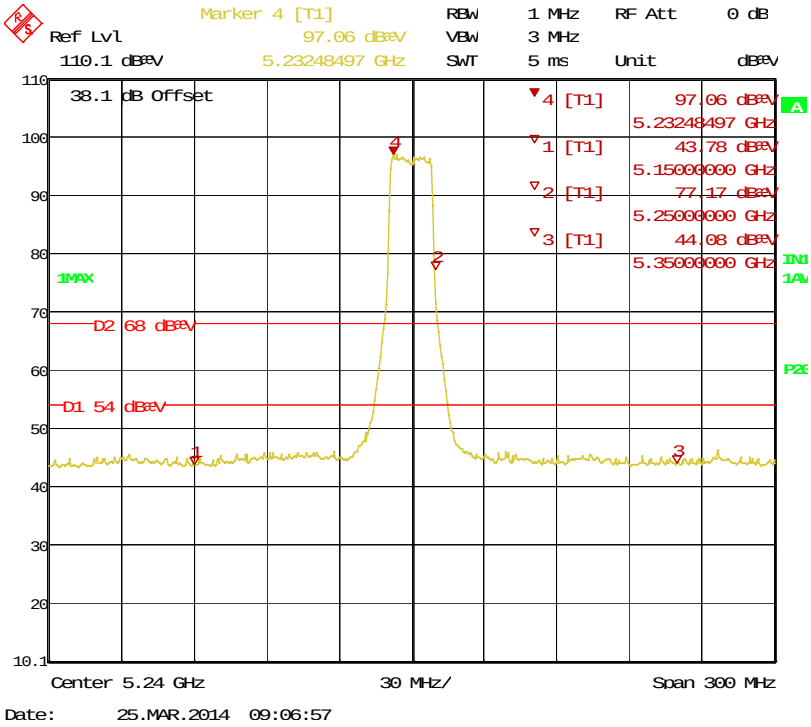


Figure 254: Bandedge-5240 MHz-HT20-MCS0-11 dBm-V-Ave

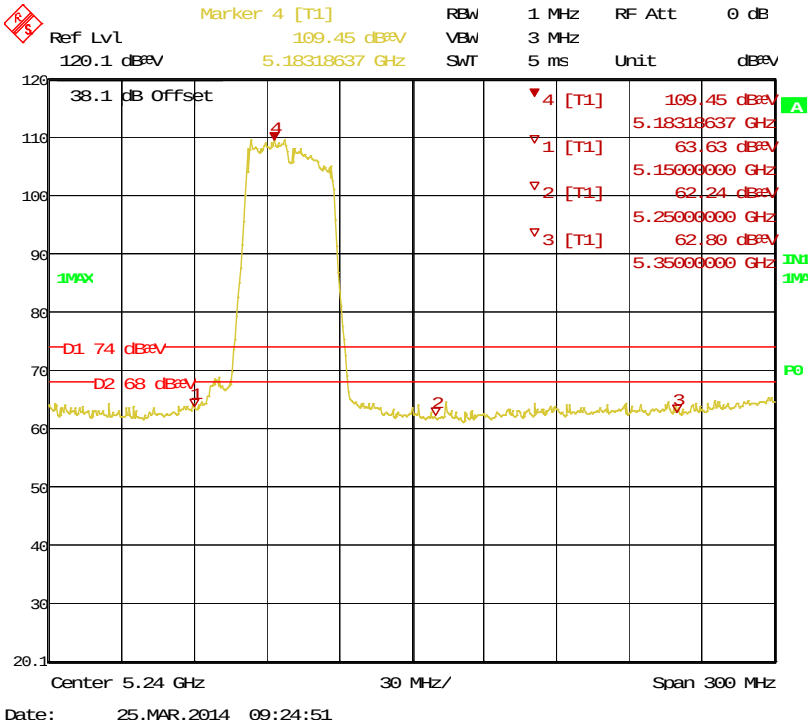


Figure 255: Bandedge-5190 MHz-HT40-MCS0-11 dBm-H-Pk

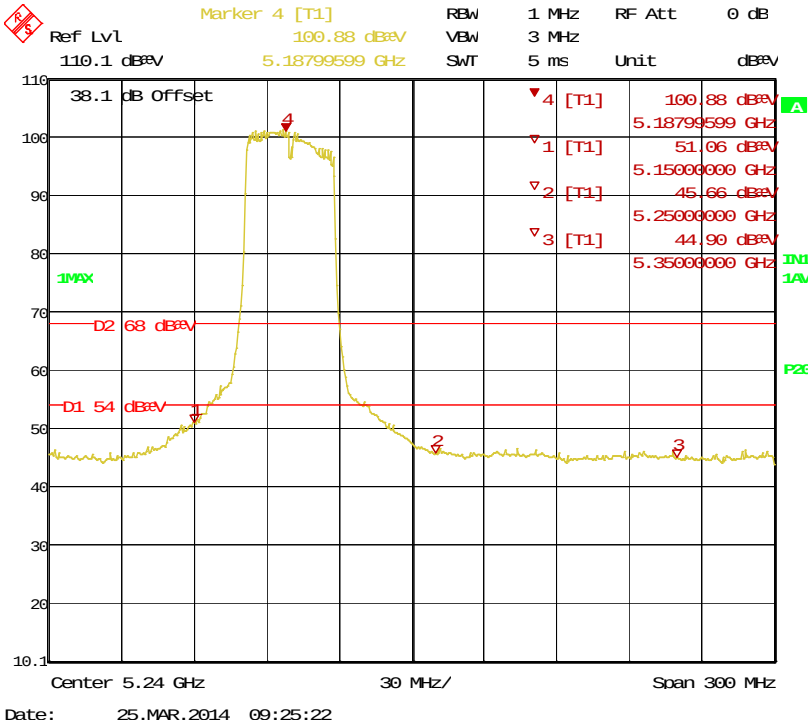


Figure 256: Bandedge-5190 MHz-HT40-MCS0-11 dBm-H-Ave

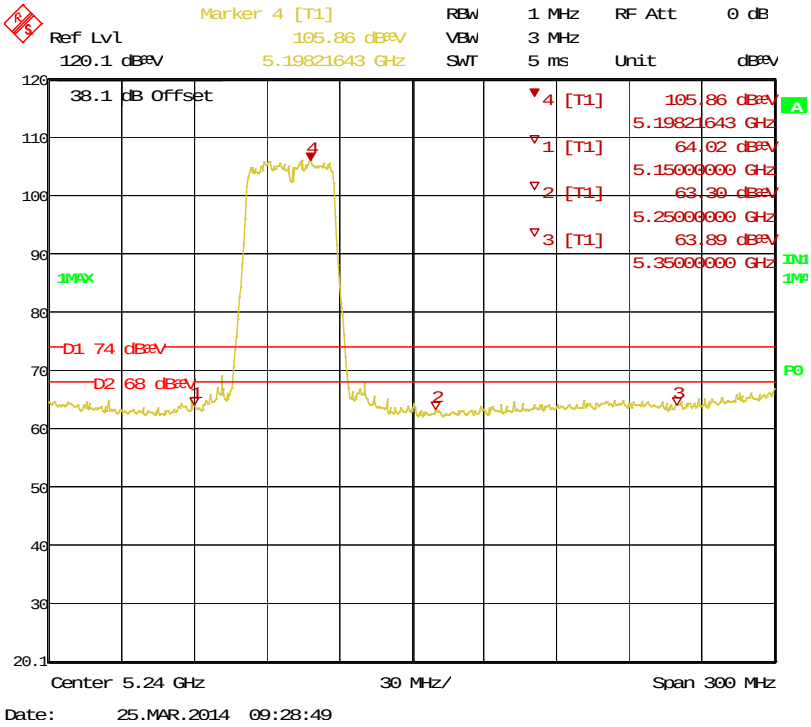


Figure 257: Bandedge-5190 MHz-HT40-MCS0-11 dBm-V-Pk

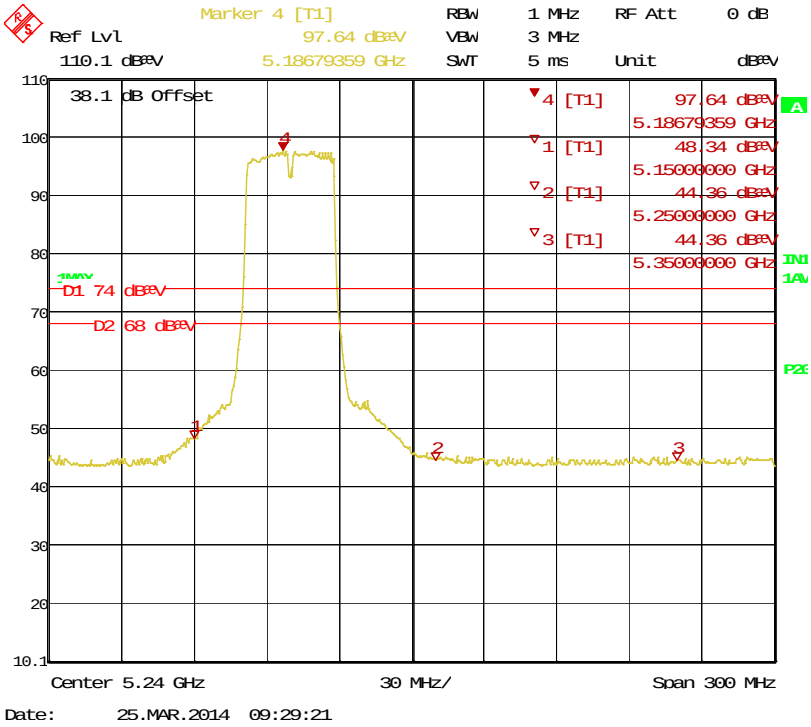


Figure 258: Bandedge-5190 MHz-HT40-MCS0-11 dBm-V-Ave

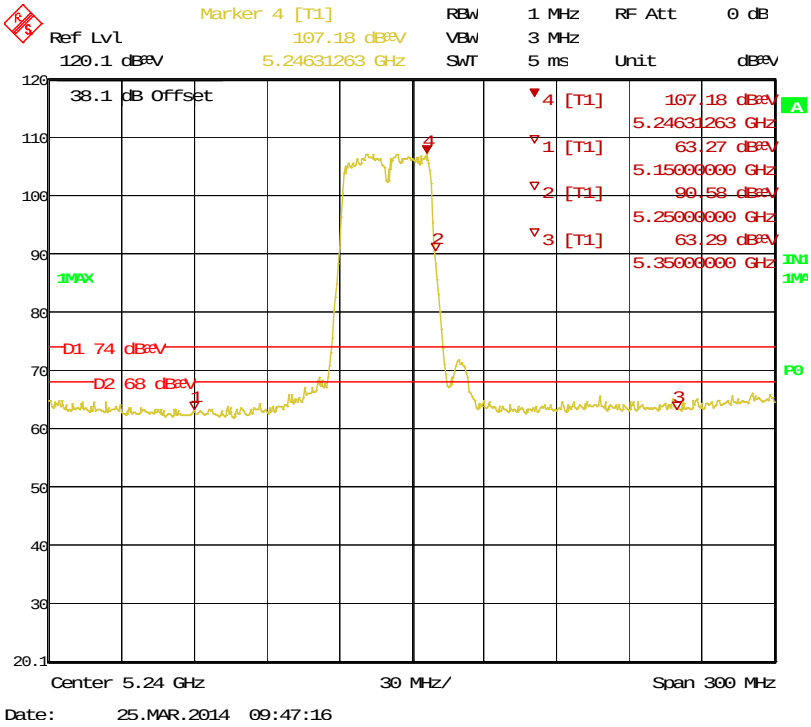


Figure 259: Bandedge-5230 MHz-HT40-MCS0-11 dBm-H-Pk

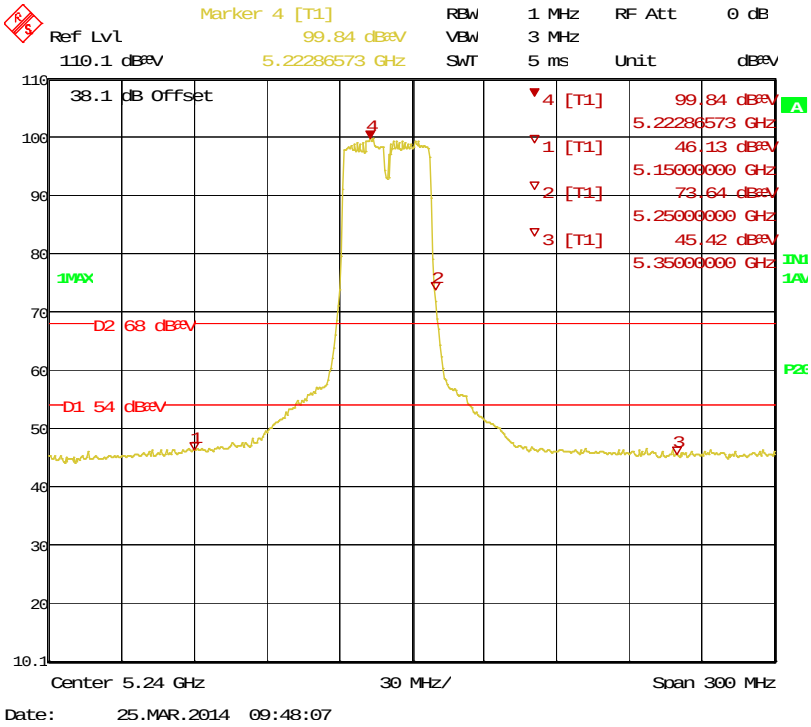


Figure 260: Bandedge-5230 MHz-HT40-MCS0-11 dBm-H-Ave

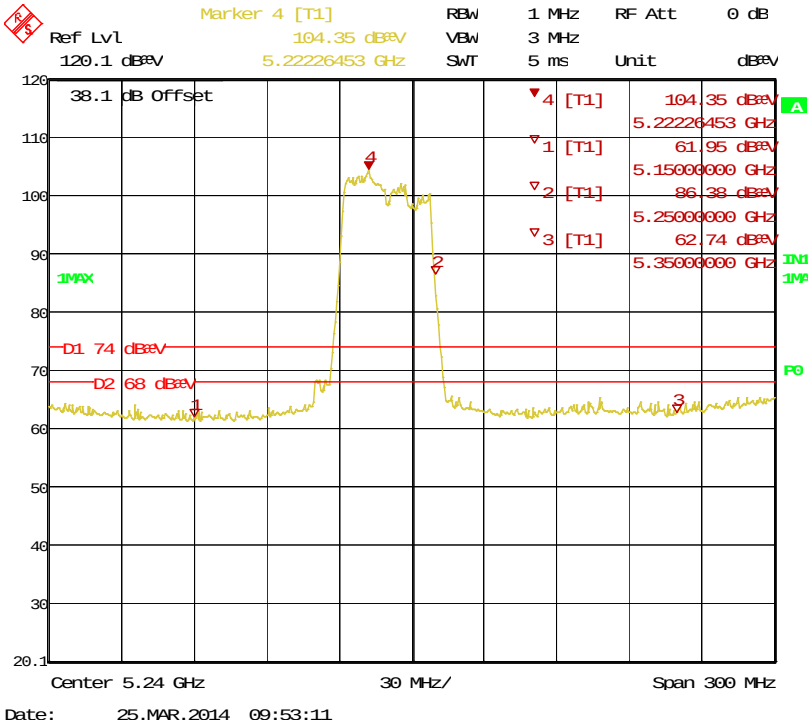


Figure 261: Bandedge-5230 MHz-HT40-MCS0-11 dBm-V-Pk

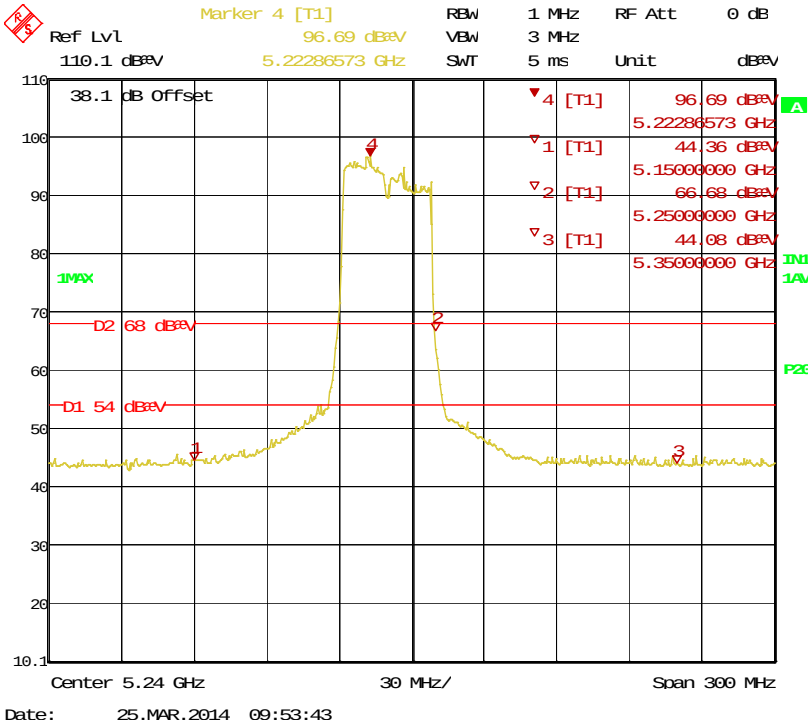


Figure 262: Bandedge-5230 MHz-HT40-MCS0-11 dBm-V-Ave

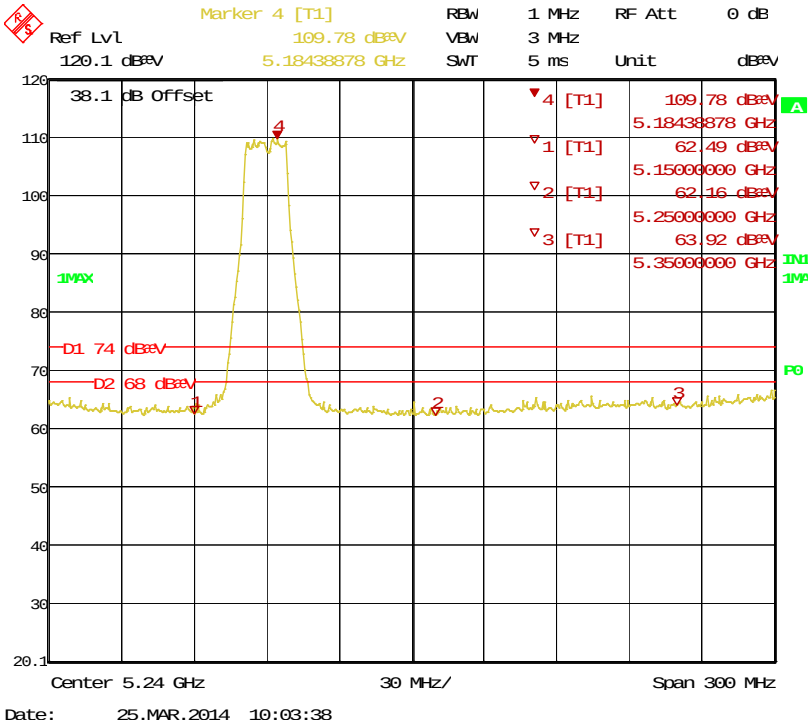


Figure 263: Bandedge-5180 MHz-VHT20-MCS0-11 dBm-H-Pk

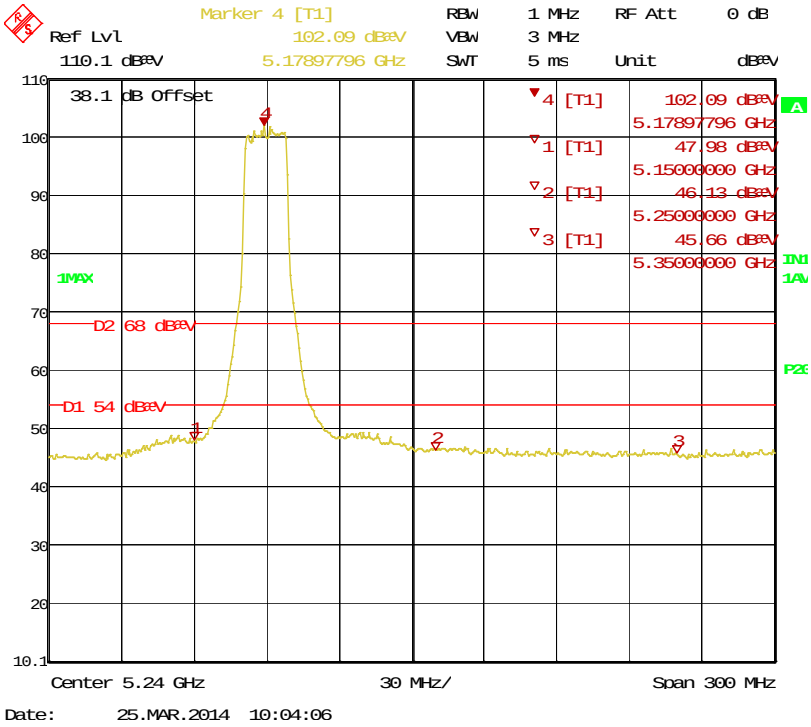


Figure 264: Bandedge-5180 MHz-VHT20-MCS0-11 dBm-H-Ave

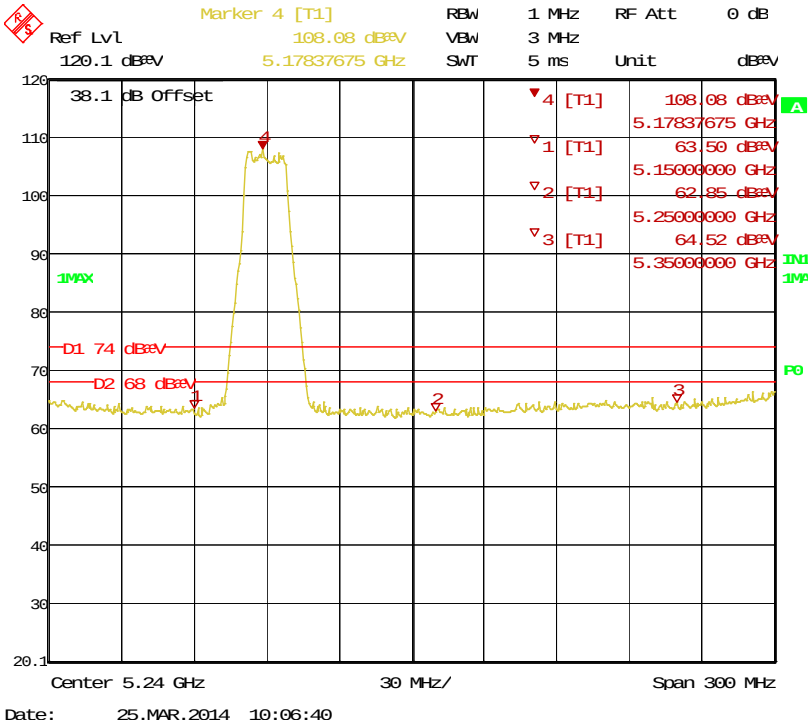


Figure 265: Bandedge-5180 MHz-VHT20-MCS0-11 dBm-V-pk

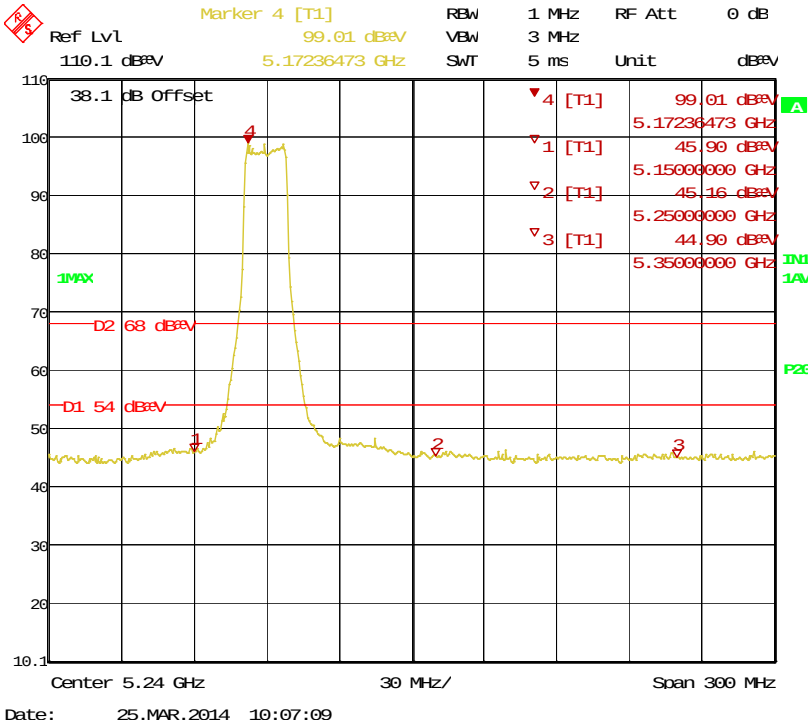


Figure 266: Bandedge-5180 MHz-VHT20-MCS0-11 dBm-V-ave

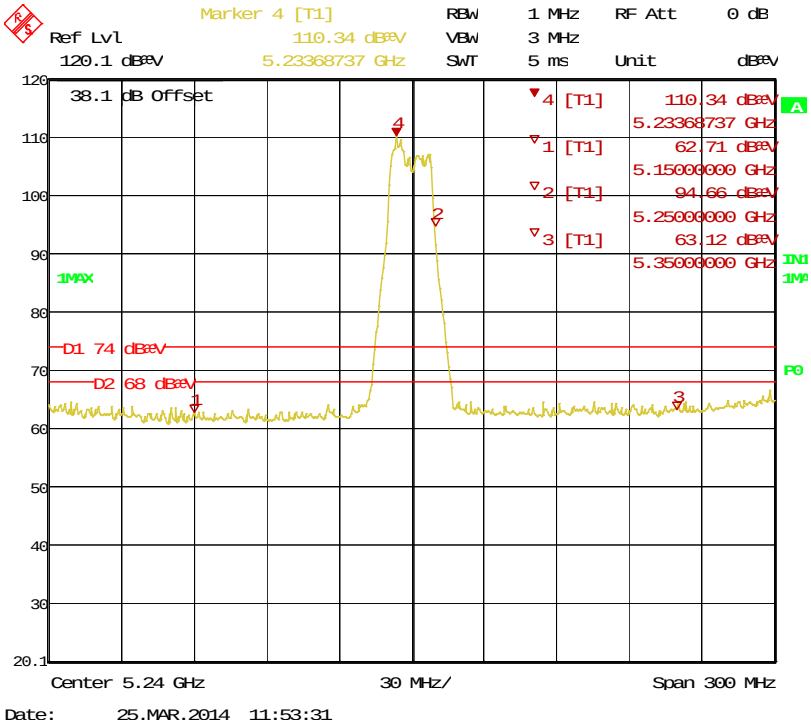


Figure 267: Bandedge-5240 MHz-VHT20-MCS0-11 dBm-H-Pk

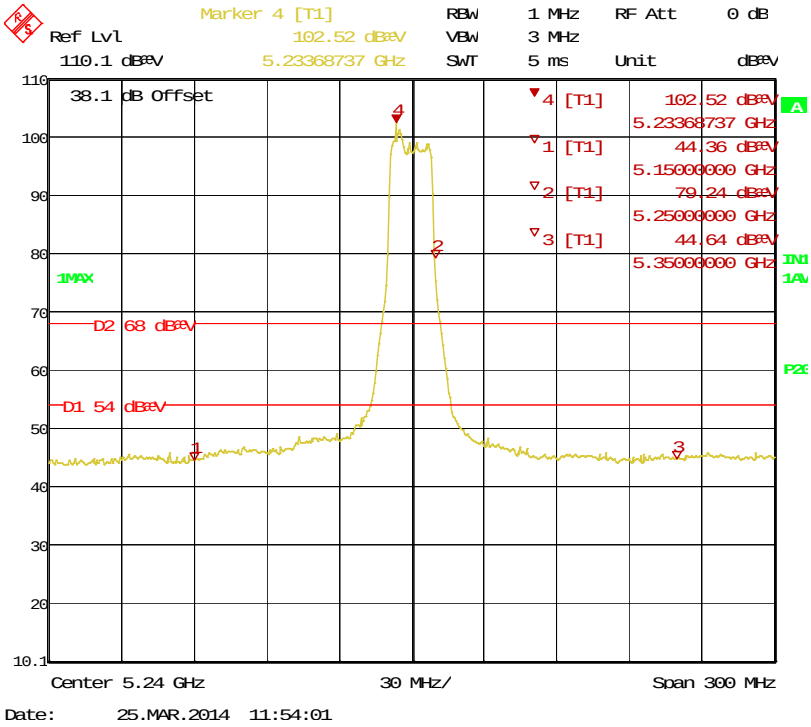


Figure 268: Bandedge-5240 MHz-VHT20-MCS0-11 dBm-H-Ave

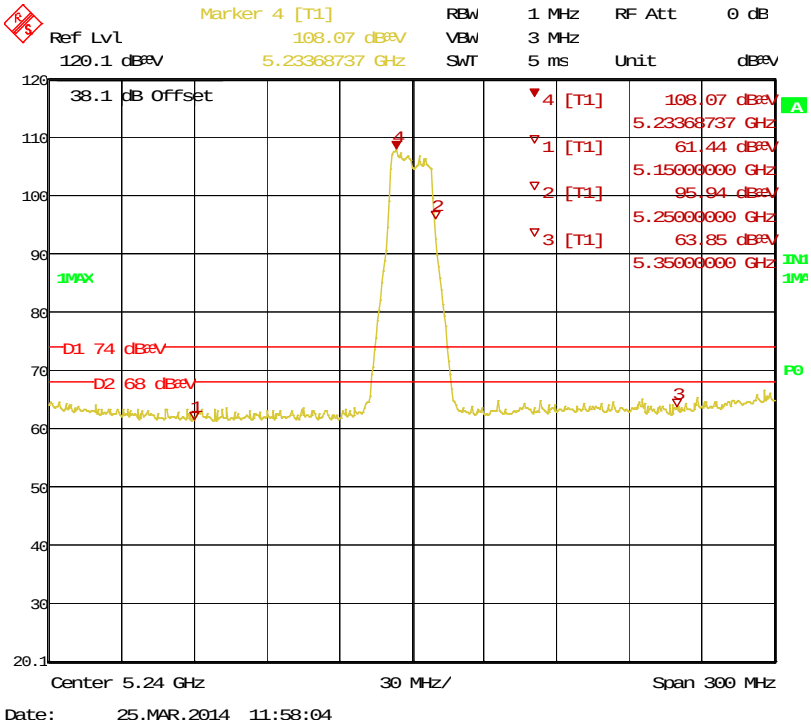


Figure 269: Bandedge-5240 MHz-VHT20-MCS0-11 dBm-V-Pk

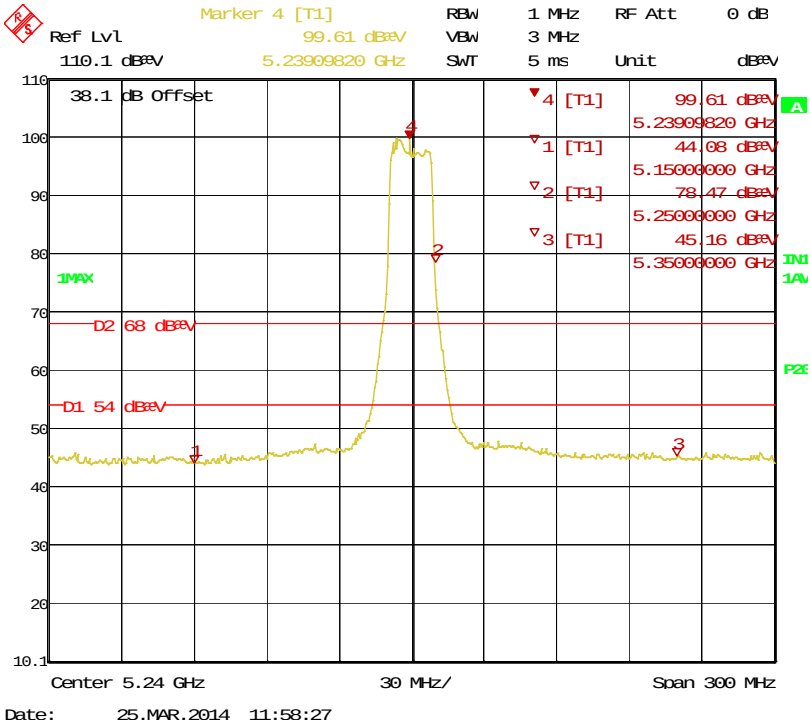


Figure 270: Bandedge-5240 MHz-VHT20-MCS0-11 dBm-V-Ave

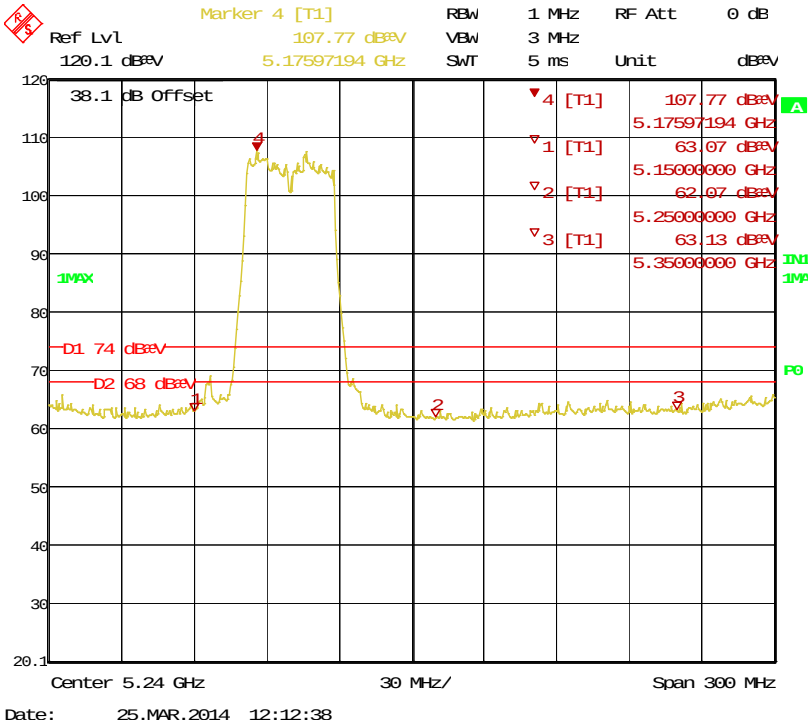


Figure 271: Bandedge-5190 MHz-VHT40-MCS0-11 dBm-H-pk

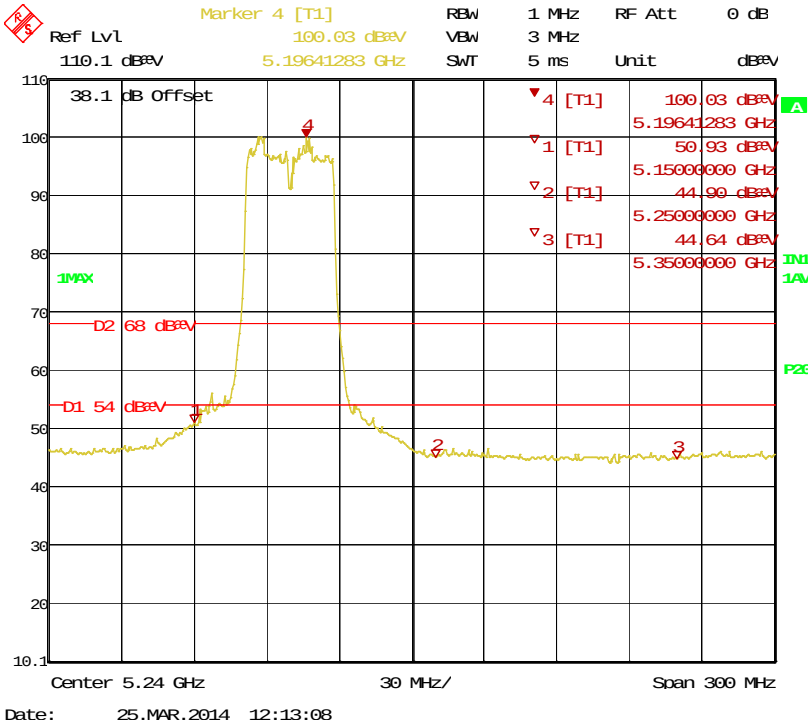


Figure 272: Bandedge-5190 MHz-VHT40-MCS0-11 dBm-H-Ave

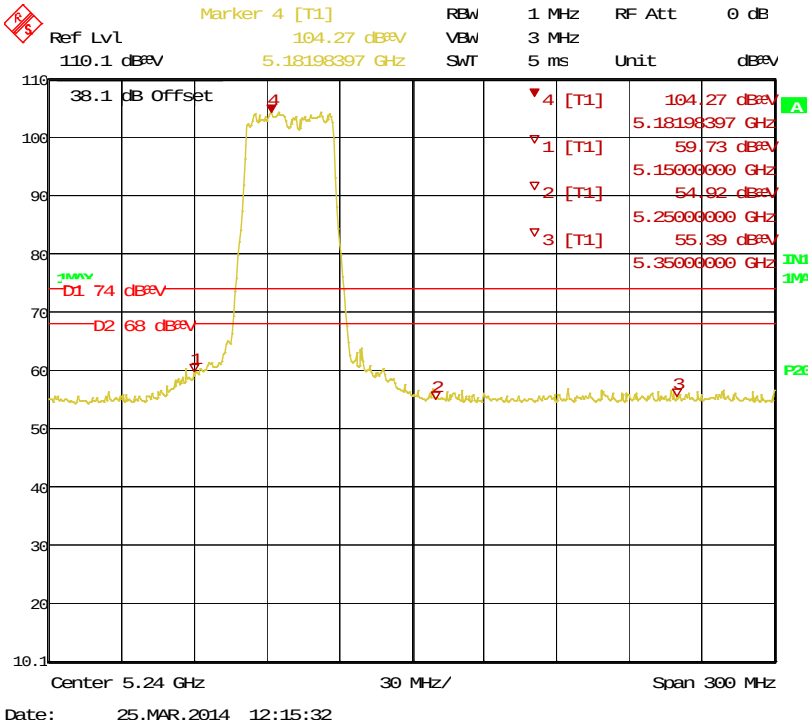


Figure 273: Bandedge-5190 MHz-VHT40-MCS0-11 dBm-V-Pk

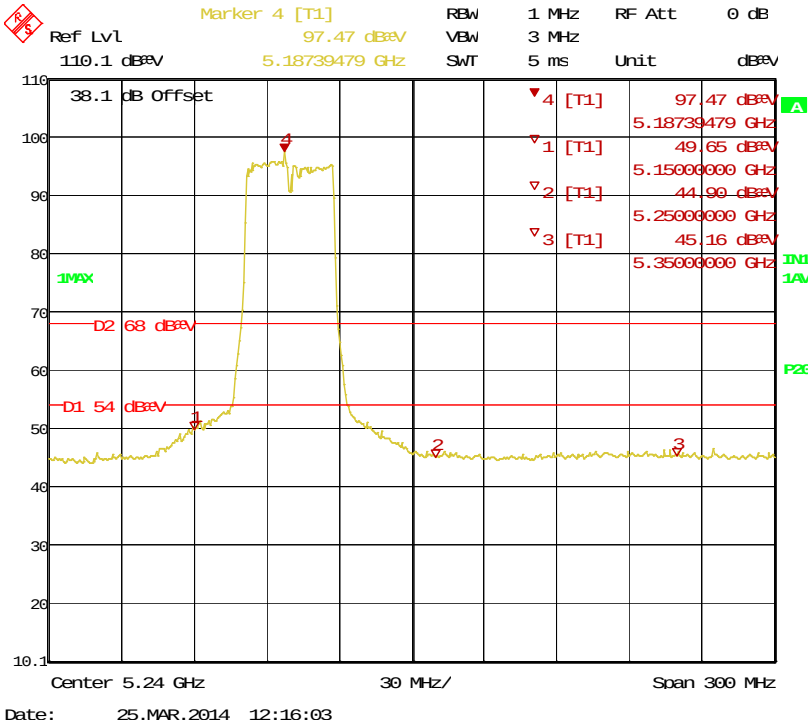


Figure 274: Bandedge-5190 MHz-VHT40-MCS0-11 dBm-V-Ave

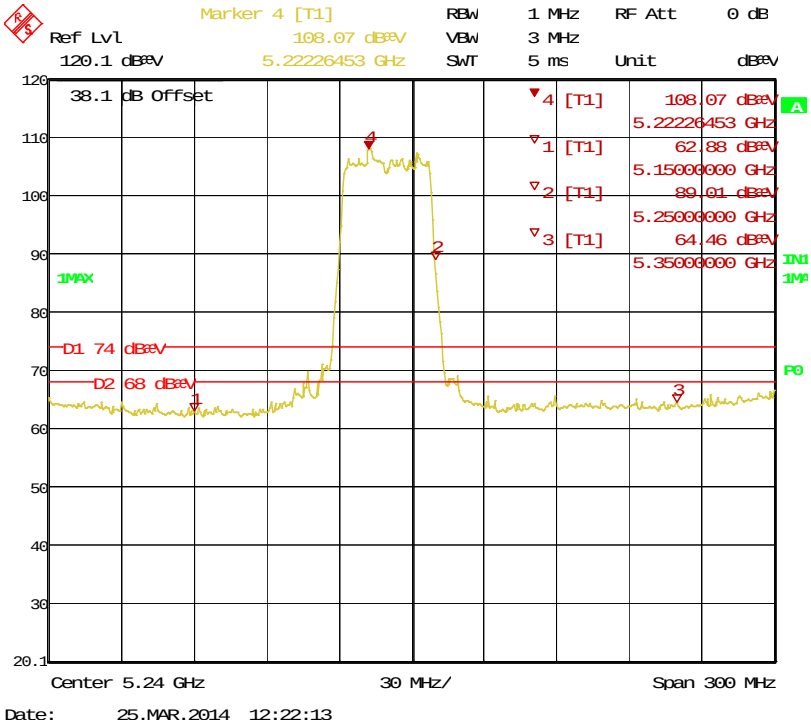


Figure 275: Bandedge-5230 MHz-VHT40-MCS0-11 dBm-H-Pk

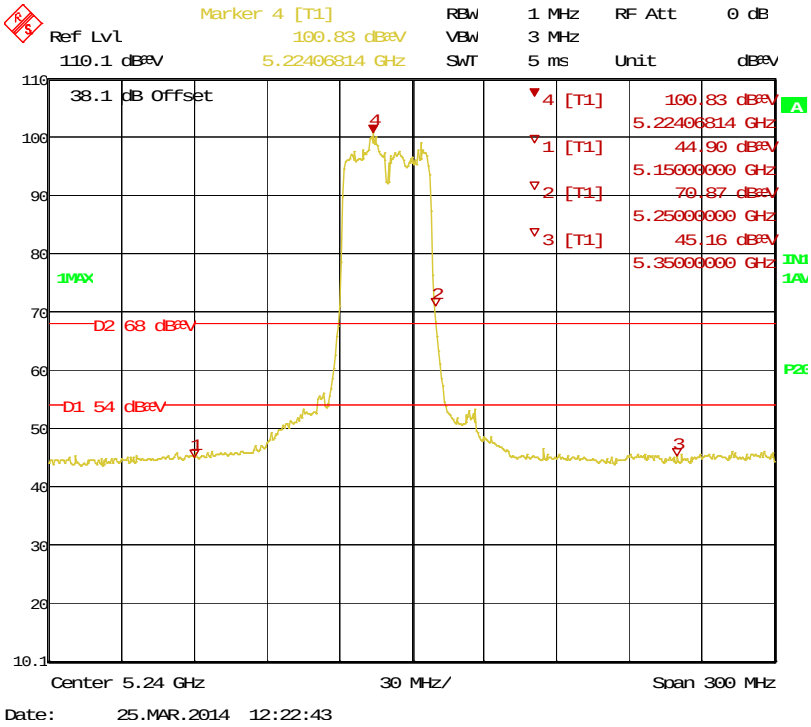


Figure 276: Bandedge-5230 MHz-VHT40-MCS0-11 dBm-H-Ave

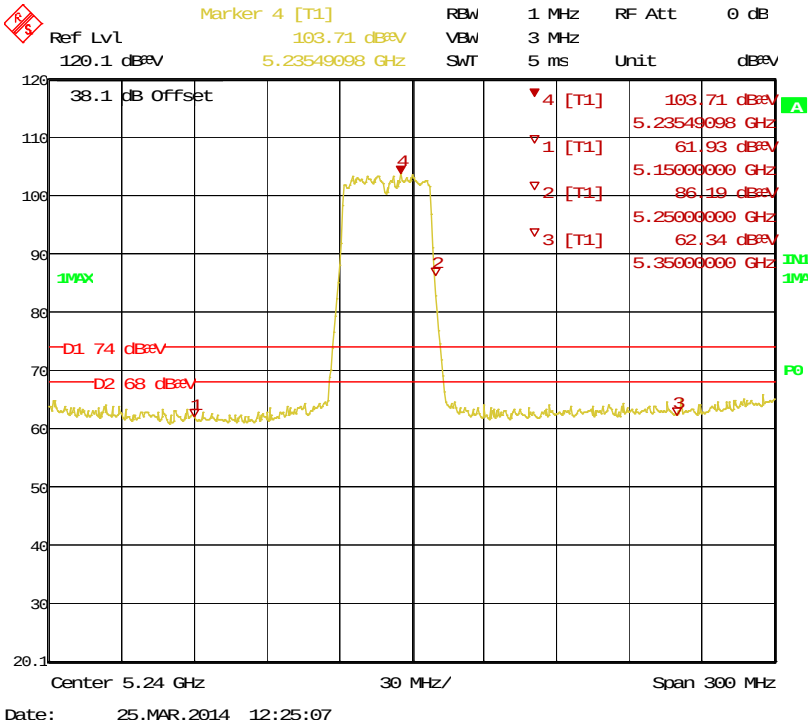


Figure 277: Bandedge-5230 MHz-VHT40-MCS0-11 dBm-V-Pk

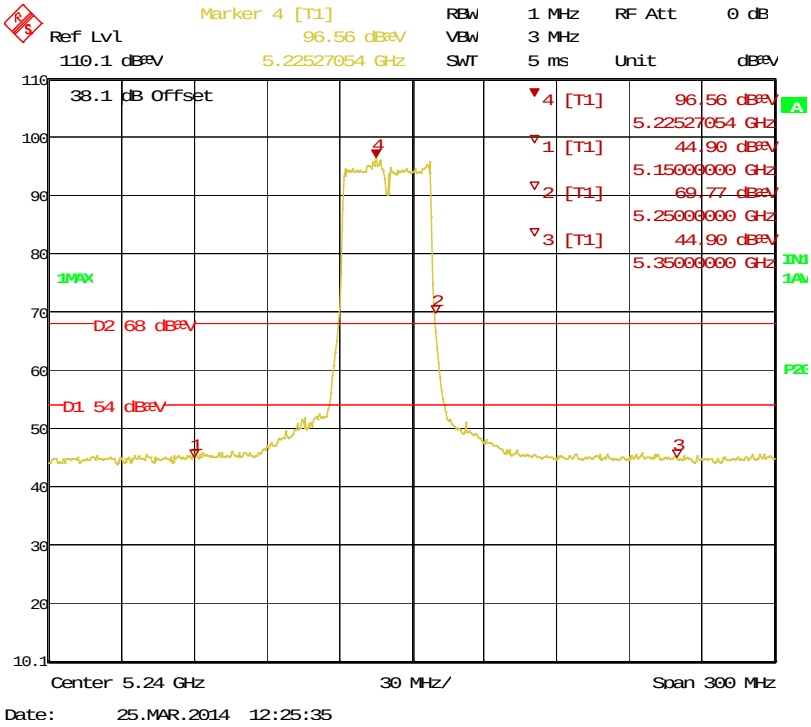


Figure 278: Bandedge-5230 MHz-VHT40-MCS0-11 dBm-V-Ave

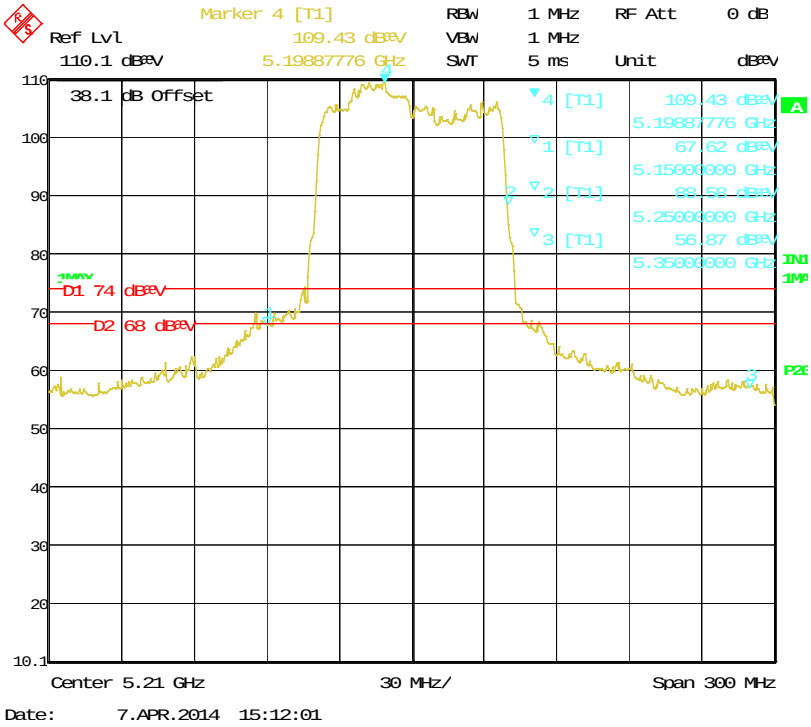


Figure 279: Bandedge-5210 MHz-VHT80-MCS0-11 dBm-H-Pk

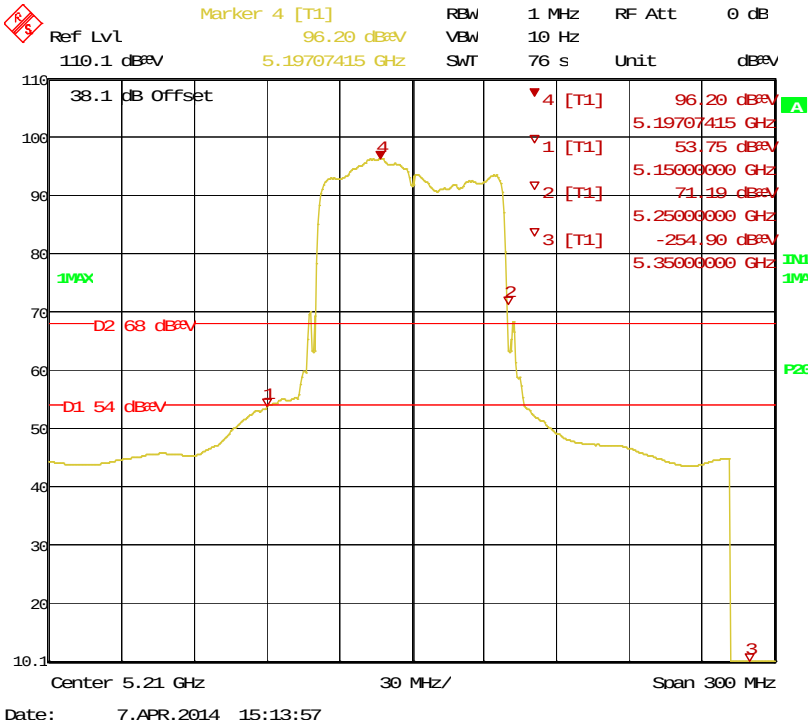


Figure 280: Bandedge-5210 MHz-VHT80-MCS0-11 dBm-H-Ave

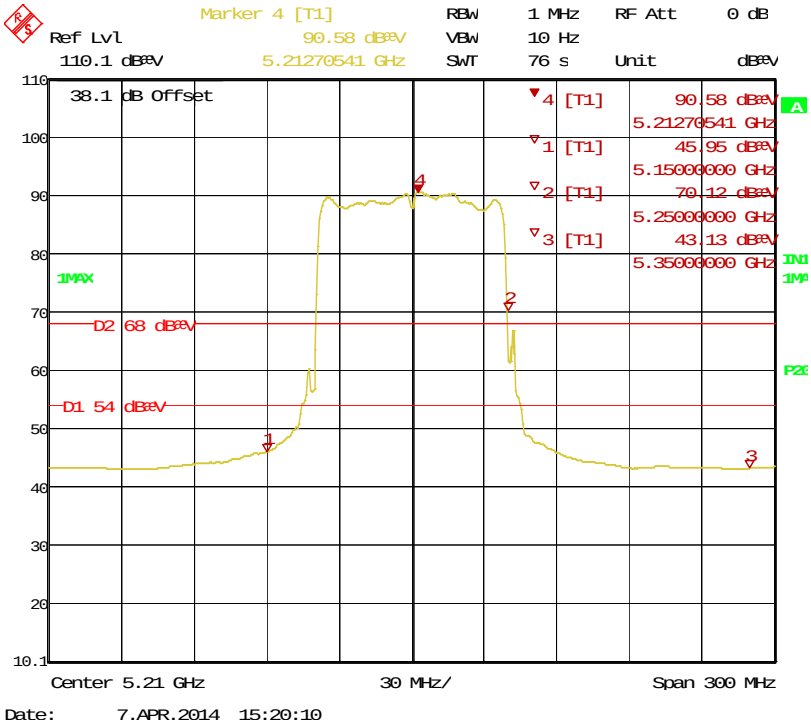


Figure 281: Bandedge-5210 MHz-VHT80-MCS0-11 dBm-V-Ave

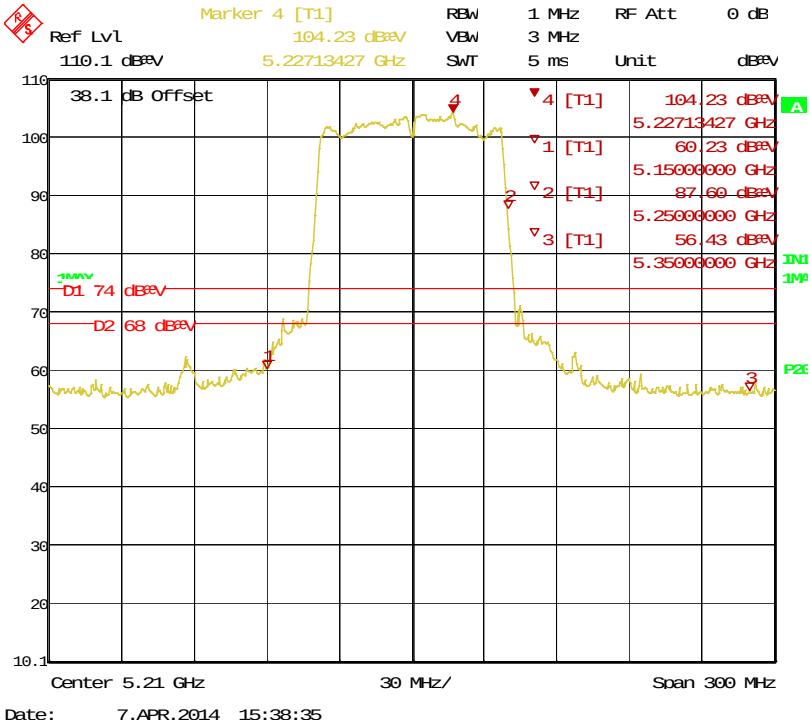


Figure 282: Bandedge-5210 MHz-VHT80-MCS0-11 dBm-V-Pk

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EUT Name	Wireless Residential Gateway	**Date**	March 31, 2014
EUT Model	5268AC	**Temp / Hum in**	23° C / 40%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	802.11AC VHT80 at Y-Axis (30 MHz-1GHz)	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz/ 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 802.11ac VHT80, 5210 MHz											
624.97	47.95	3.00	-18.67	32.28	QP	H	117	100	37.00	-4.72	Pass
749.98	42.75	3.32	-16.99	29.08	QP	H	99	86	37.00	-7.92	Pass
30.70	32.13	0.60	-16.51	16.21	QP	V	162	220	30.00	-13.79	Pass
45.24	46.49	0.73	-27.37	19.85	QP	V	154	60	30.00	-10.15	Pass
56.76	50.48	0.83	-30.44	20.86	QP	V	105	26	30.00	-9.14	Pass
85.35	47.19	1.02	-30.16	18.06	QP	V	110	334	30.00	-11.94	Pass
99.98	50.37	1.11	-27.28	24.20	QP	V	120	320	30.00	-5.81	Pass
400.01	48.08	2.36	-21.55	28.89	QP	V	113	294	37.00	-8.11	Pass

Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty
CF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 4.52 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Note: The worst case was observed at 802.11ac, VHT80, 5210 MHz.
All other emissions passed Class B limit.

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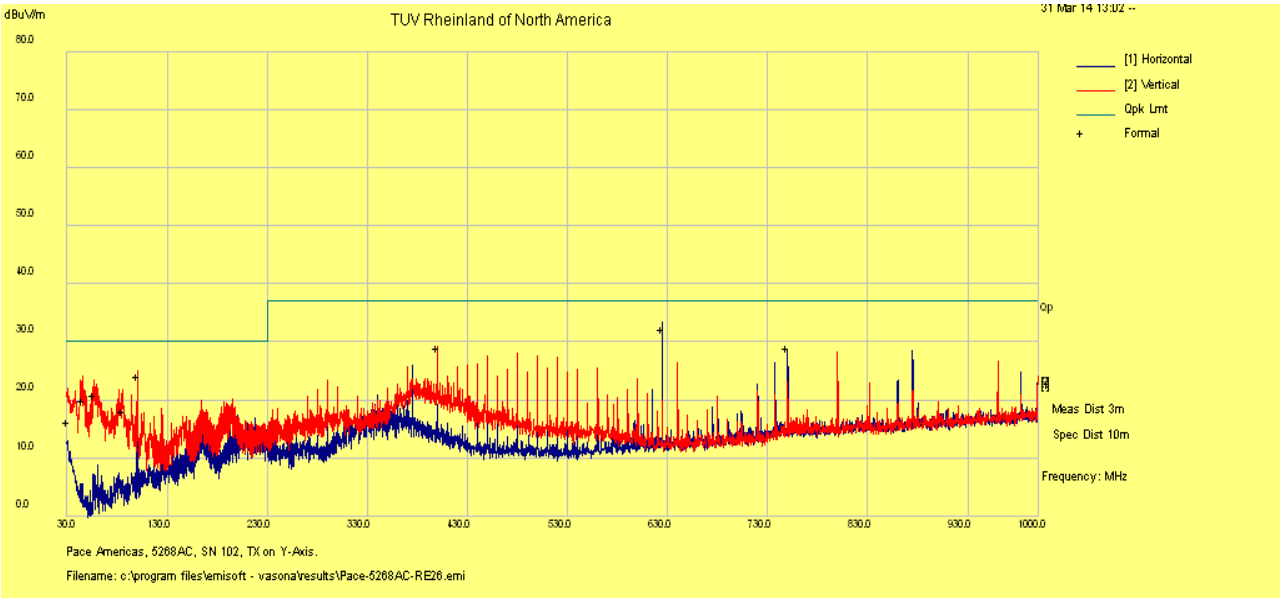
EUT Name	Wireless Residential Gateway	**Date**	March 31, 2014
EUT Model	5268AC	**Temp / Hum in**	23° C / 40%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	802.11AC VHT80 at Y-Axis (30 MHz-1GHz)	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz/ 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

30 MHz to 1GHz Plots for Transmit Mode at 5210 MHz



Notes: FCC Class B Limit.

SOP 1 Radiated Emissions — Tracking # 31153119.002 Page 3 of 36

EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11a at 6Mbps	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Freq	Raw	Cbl	AF	Level	Det	Pol	Hght	Azt	Limit	Margin	Comment
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 5180 MHz at 802.11a, 6Mbit/s											
10364.65	38.30	6.20	-9.00	35.50	Ave	V	199	50	54.00	-18.50	Harmonics
20719.90	47.34	5.29	3.68	56.31	Ave	V	131	155	63.98	-7.67	Harmonics
25899.90	30.86	6.02	3.48	40.36	Ave	V	130	149	63.98	-23.62	Harmonics
Transmitted Data at 5200 MHz at 802.11a, 6Mbit/s											
9619.04	36.20	6.00	-8.50	33.70	Ave	V	211	54	54.00	-20.30	Spurious
10399.80	40.53	6.20	-9.07	37.66	Ave	V	215	72	54.00	-16.34	Harmonics
13872.05	38.00	7.20	-10.50	34.70	Ave	V	153	96	54.00	-19.30	Spurious
20799.90	47.54	5.30	3.64	56.48	Ave	V	133	153	63.98	-7.50	Harmonics
25999.90	30.27	6.04	3.57	39.88	Ave	V	133	149	63.98	-24.10	Harmonics
Transmitted Data at 5240 MHz at 802.11a, 6Mbit/s											
7246.77	39.20	5.20	-11.50	32.90	Ave	V	216	152	54.00	-21.10	Spurious
10480.16	38.90	6.20	-9.20	36.00	Ave	V	163	286	54.00	-18.00	Harmonics
13975.06	36.20	7.20	-10.00	33.50	Ave	V	293	82	54.00	-20.50	Spurious
20959.90	45.91	5.33	3.57	54.81	Ave	V	166	416	63.98	-9.17	Harmonics
26199.80	29.96	6.06	4.17	40.19	Ave	V	145	389	63.98	-23.79	Harmonics

Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty
CF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 4.93dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: All emissions passed the spurious emission limit.

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EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT20 at MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Freq	Raw	Cbl	AF	Level	Det	Pol	Hght	Azt	Limit	Margin	Comment
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 5180 MHz at 802.11n HT20 MCS0											
12863.47	38.80	6.90	-12.10	33.70	Ave	H	112	106	54.00	-20.30	Spurious
10361.56	37.00	6.20	-8.90	34.20	Ave	V	227	38	54.00	-19.80	Harmonics
20719.90	47.09	5.30	3.65	56.04	Ave	V	167	48	63.98	-7.94	Harmonics
Transmitted Data at 5200 MHz at 802.11n HT20 MCS0											
15598.09	35.40	7.70	-8.80	34.30	Ave	H	137	160	54.00	-19.70	Harmonics
10399.97	41.35	6.20	-9.07	38.47	Ave	V	179	274	54.00	-15.53	Harmonics
20799.90	46.82	5.30	3.64	55.76	Ave	H	147	139	63.98	-8.22	Harmonics
Transmitted Data at 5240 MHz at 802.11n HT20 MCS0											
10483.95	38.20	6.20	-9.20	35.30	Ave	V	254	356	54.00	-18.70	Harmonics
13973.21	46.98	7.25	-9.98	44.26	Ave	V	264	88	54.00	-9.74	Spurious
20959.90	43.26	5.33	3.57	52.16	Ave	H	101	105	63.98	-11.82	Harmonics
26199.91	30.96	6.06	4.17	41.19	Ave	V	102	112	63.98	-22.79	Harmonics

Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty
CF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 4.93dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: All emissions passed the spurious emission limit.

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EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT40 at MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Freq	Raw	Cbl	AF	Level	Det	Pol	Hght	Azt	Limit	Margin	Comment
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 5190 MHz at 802.11n HT40 MCS0											
14644.29	35.30	7.50	-7.30	35.50	Ave	H	211	212	54.00	-18.50	Spurious
7235.41	38.10	5.20	-11.60	31.80	Ave	V	128	198	54.00	-22.20	Spurious
10381.15	37.10	6.20	-9.00	34.30	Ave	V	257	64	54.00	-19.70	Harmonics
20759.90	46.55	5.30	3.65	55.50	Ave	H	163	136	63.98	-8.48	Harmonics
Transmitted Data at 5230 MHz at 802.11n HT40 MCS0											
15681.83	36.90	7.80	-8.70	35.90	Ave	H	233	148	54.00	-18.10	Harmonics
7257.20	38.10	5.30	-11.50	31.90	Ave	V	112	56	54.00	-22.10	Spurious
13946.70	48.96	7.24	-10.16	46.04	Ave	V	267	88	54.00	-7.96	Harmonics
20919.90	43.11	5.32	3.59	52.02	Ave	H	167	101	63.98	-11.96	Harmonics

Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty
CF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 4.93dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: All emissions passed the spurious emission limit.

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EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT20 at MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Freq	Raw	Cbl	AF	Level	Det	Pol	Hght	Azt	Limit	Margin	Comment
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 5180 MHz at 802.11ac VHT20 MCS0											
10363.42	37.10	6.20	-8.90	34.30	Ave	V	99	288	54.00	-19.70	Harmonics
13819.52	36.20	7.20	-10.80	32.60	Ave	V	167	202	54.00	-21.40	Spurious
15514.29	34.10	7.70	-8.50	33.30	Ave	V	117	310	54.00	-20.70	Harmonics
20719.90	48.49	5.29	3.68	57.46	Ave	H	165	43	63.98	-6.52	Harmonics
Transmitted Data at 5200 MHz at 802.11ac VHT20 MCS0											
10397.02	36.00	6.20	-9.10	33.10	Ave	V	229	360	54.00	-20.90	Harmonics
15599.81	36.73	7.72	-8.79	35.66	Ave	V	264	122	54.00	-18.34	Harmonics
20799.90	47.18	5.30	3.64	56.12	Ave	V	175	47	63.98	-7.86	Harmonics
Transmitted Data at 5240 MHz at 802.11ac VHT20 MCS0											
12866.53	38.20	6.90	-12.00	33.10	Ave	H	232	72	54.00	-20.90	Spurious
15720.01	35.70	7.80	-8.80	34.70	Ave	H	223	248	54.00	-19.30	Harmonics
10472.42	36.60	6.20	-9.10	33.70	Ave	V	171	142	54.00	-20.30	Harmonics
13975.29	37.20	7.20	-10.00	34.50	Ave	V	201	300	54.00	-19.50	Spurious
14793.87	35.50	7.50	-7.30	35.80	Ave	V	184	78	54.00	-18.20	Spurious
20959.90	42.10	5.33	3.57	51.00	Ave	H	160	82	63.98	-12.98	Harmonics

Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty
CF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 4.93dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: All emissions passed the spurious emission limit.

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EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT40 at MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Freq	Raw	Cbl	AF	Level	Det	Pol	Hght	Azt	Limit	Margin	Comment
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 5190 MHz at 802.11ac VHT40 MCS0											
10379.91	38.20	6.20	-9.00	35.40	Ave	V	172	126	54.00	-18.60	Harmonics
13845.93	36.80	7.20	-10.60	33.40	Ave	V	162	340	54.00	-20.60	Spurious
15575.22	36.30	7.70	-8.70	35.30	Ave	V	208	68	54.00	-18.70	Harmonics
20759.90	45.87	5.30	3.65	54.82	Ave	V	162	159	63.98	-9.16	Harmonics
Transmitted Data at 5230 MHz at 802.11ac VHT40 MCS0											
15689.89	36.16	7.77	-8.70	35.23	Ave	H	100	104	54.00	-18.77	Harmonics
10465.81	37.60	6.20	-9.10	34.70	Ave	V	297	176	54.00	-19.30	Harmonics
13946.35	38.54	7.24	-10.16	35.62	Ave	V	134	272	54.00	-18.39	Spurious
14496.02	35.50	7.40	-8.20	34.70	Ave	V	131	172	54.00	-19.30	Spurious
20919.90	45.91	5.32	3.59	54.82	Ave	H	160	93	63.98	-9.16	Harmonics

Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty
CF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 4.93dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: All emissions passed the spurious emission limit.

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EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	121404000111	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT80 at MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m / EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Freq	Raw	Cbl	AF	Level	Det	Pol	Hght	Azt	Limit	Margin	Comment
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 5210 MHz at 802.11ac VHT80 MCS0											
14473.06	34.97	7.40	-8.32	34.05	Ave	H	112	142	60.00	-25.95	Spurious
15628.54	32.36	7.79	-8.77	31.37	Ave	H	134	82	60.00	-28.63	Harmonics
10420.07	45.11	6.19	-9.17	42.13	Ave	V	147	62	60.00	-17.87	Harmonics
20839.90	45.51	5.31	3.62	54.44	Ave	H	158	140	63.98	-9.54	Harmonics

Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty
CF= Amp Gain + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 4.93dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: All emissions passed the spurious emission limit.

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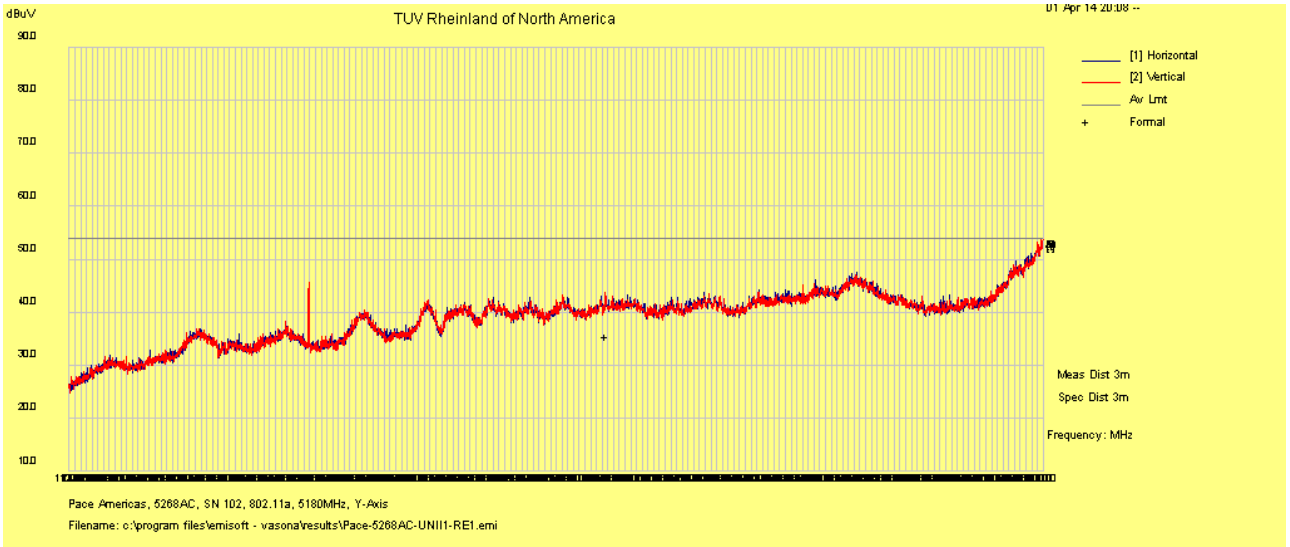
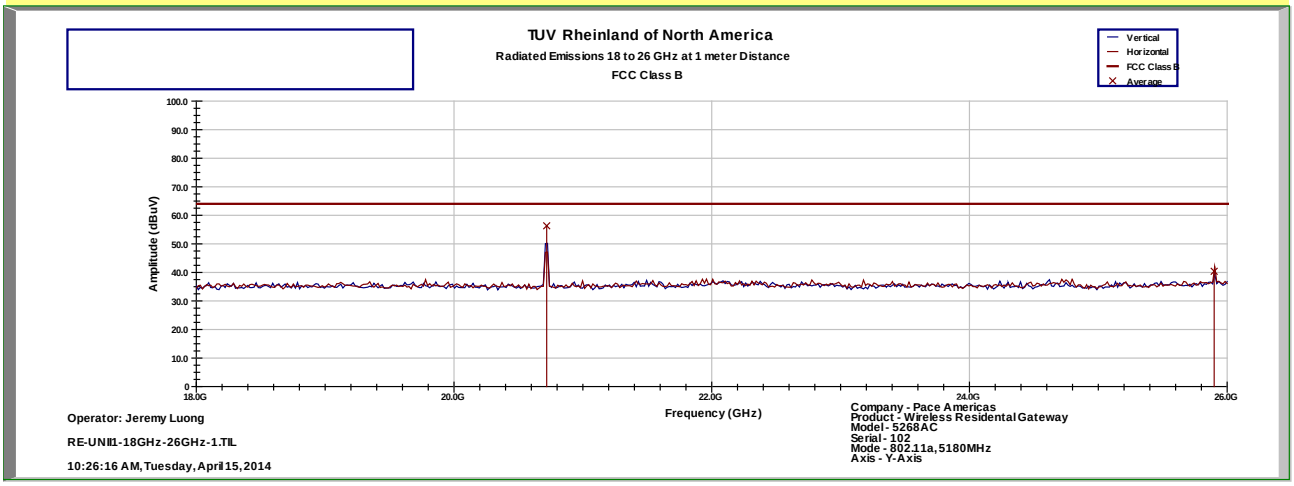
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11a at 6Mbps	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5180 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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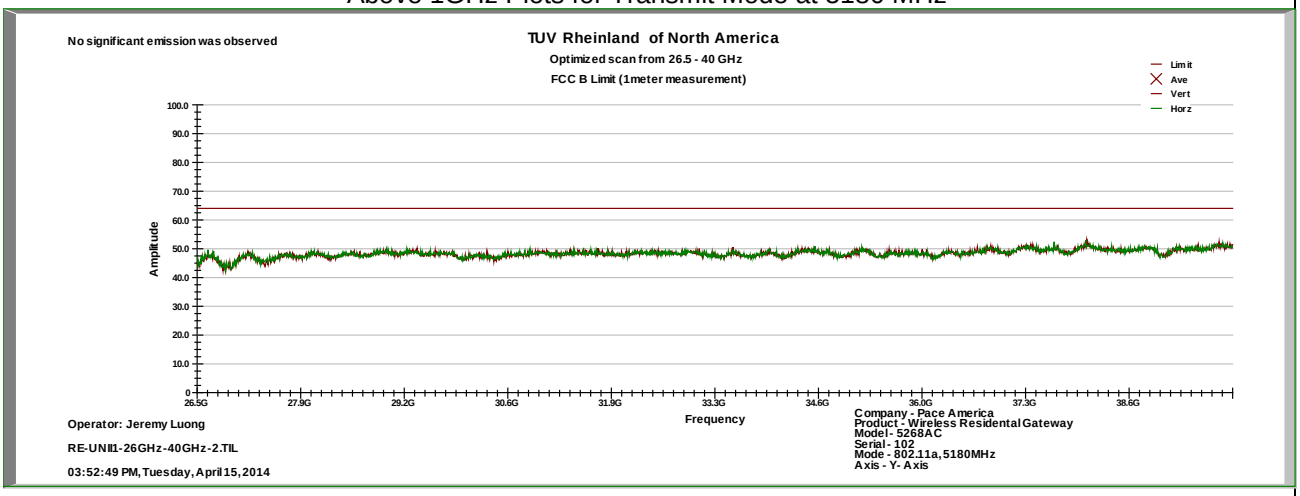
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11a at 6Mbps	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5180 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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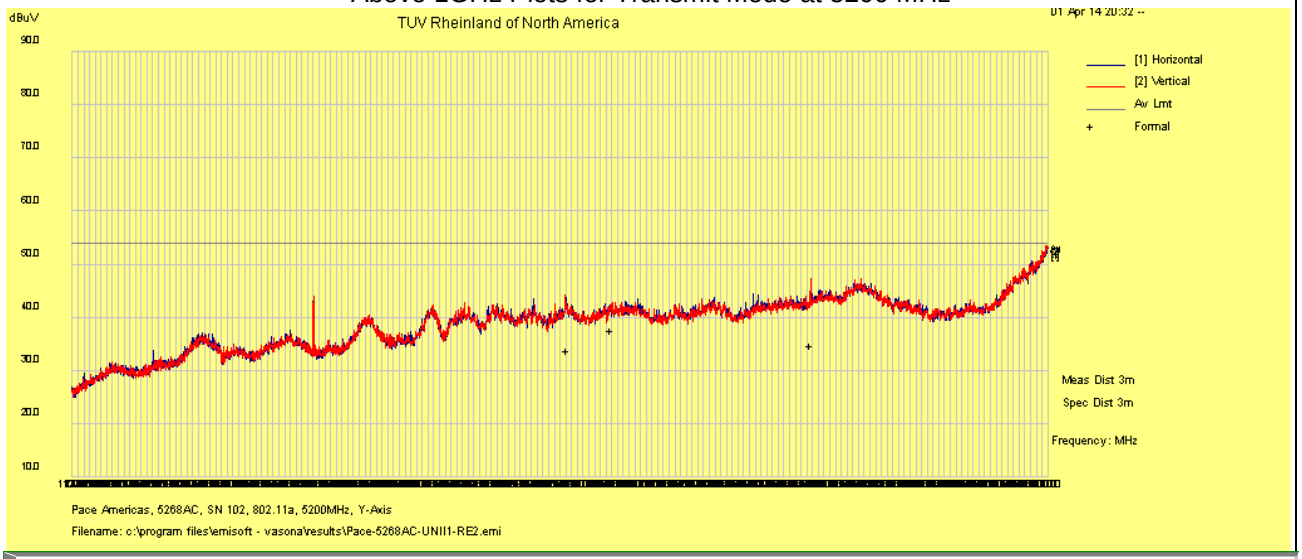
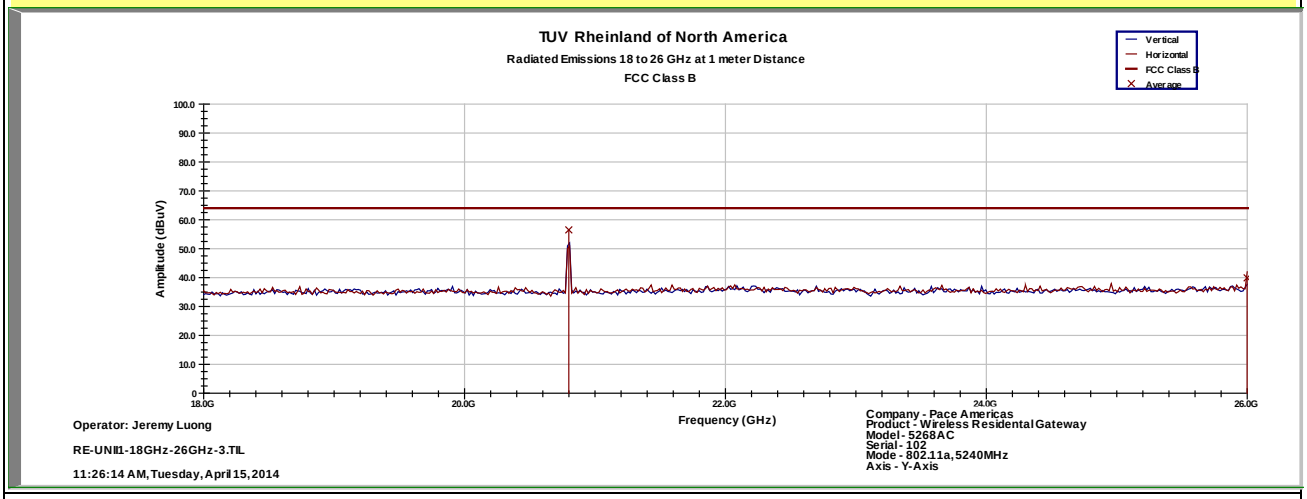
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11a at 6Mbps	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5200 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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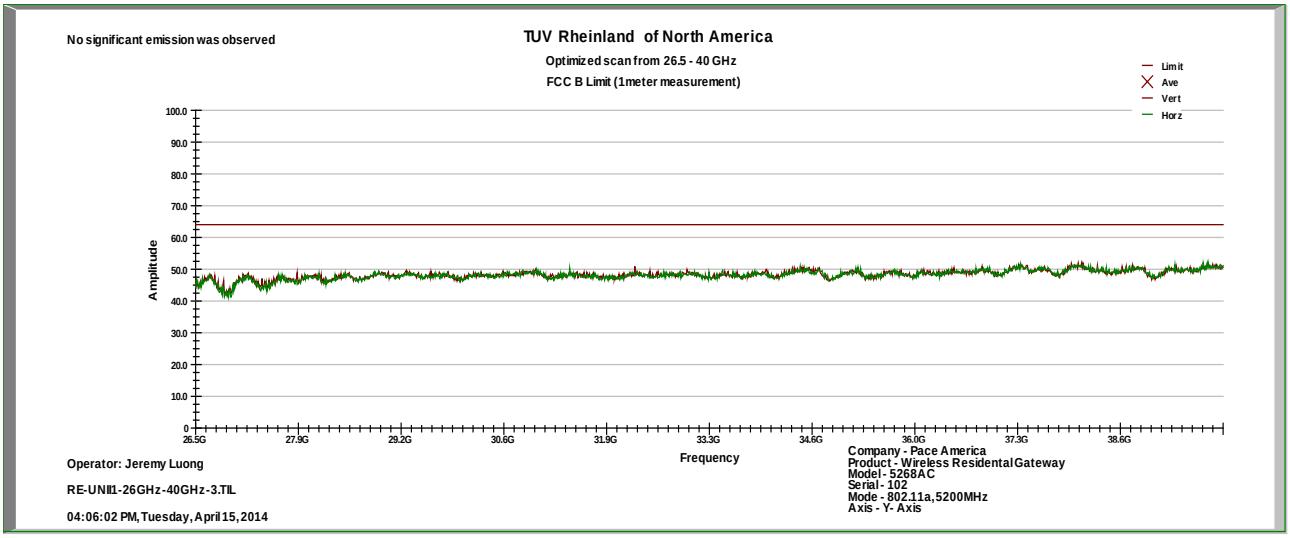
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11a at 6Mbps	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5200 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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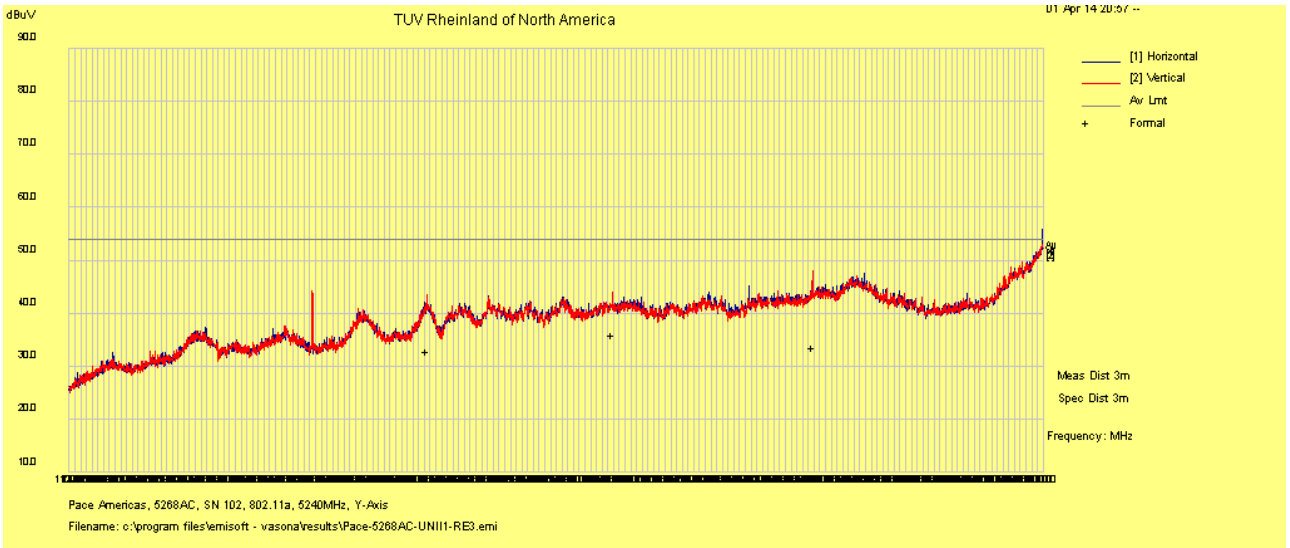
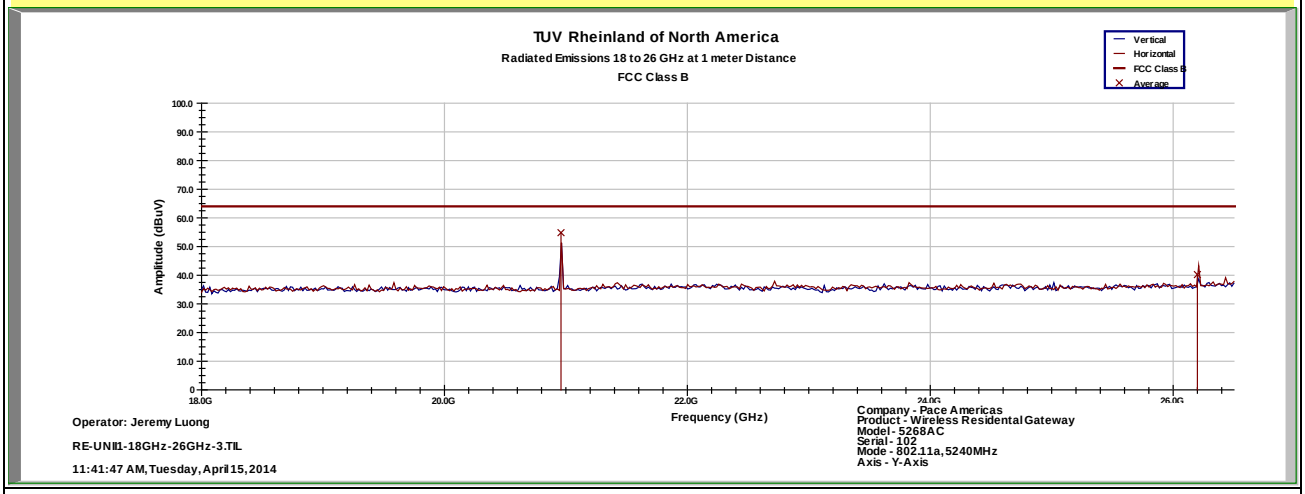
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11a at 6Mbps	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5240 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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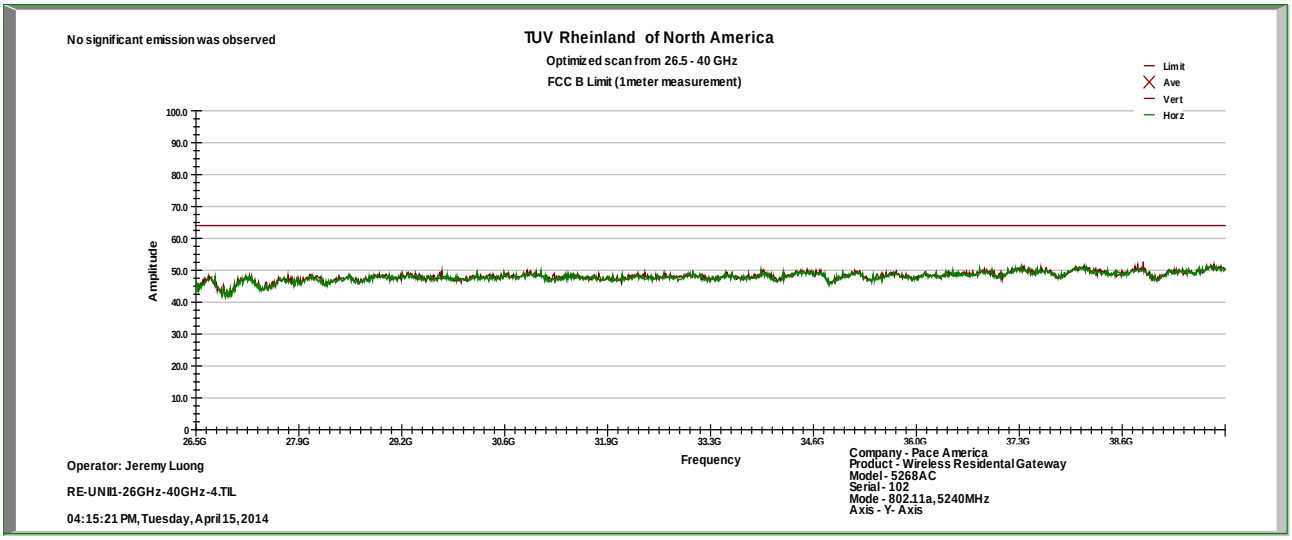
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11a at 6Mbps	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5240 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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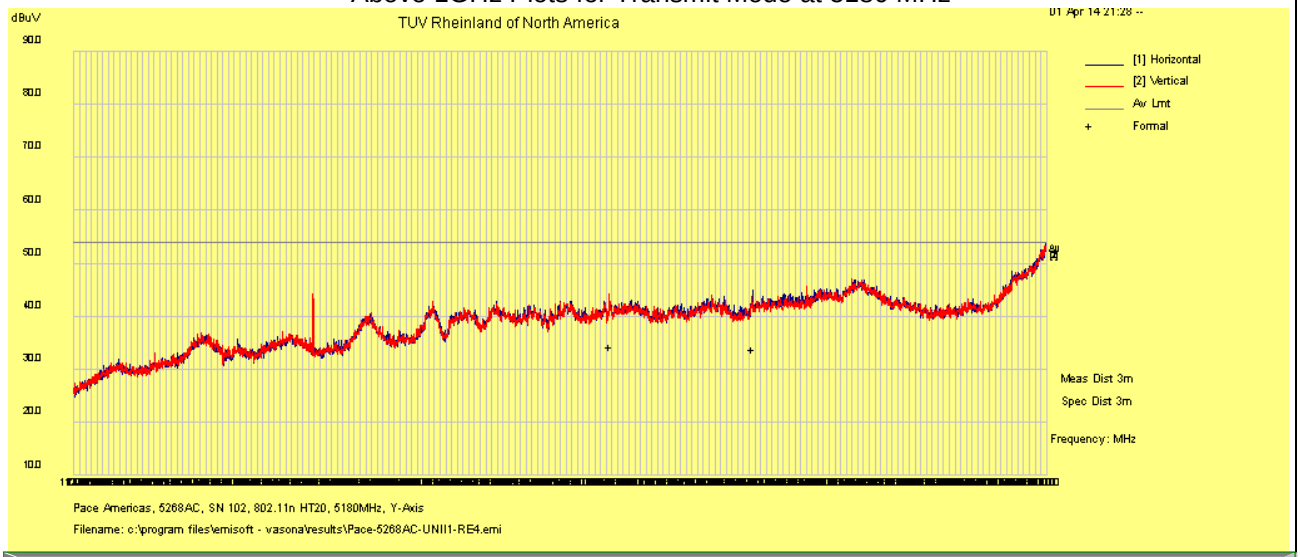
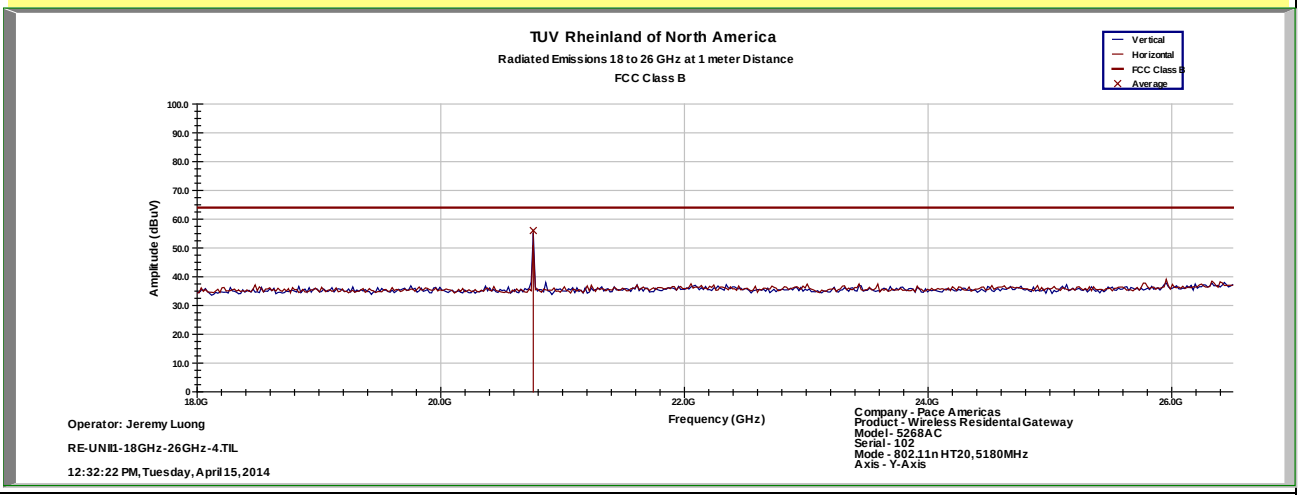
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT20 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5180 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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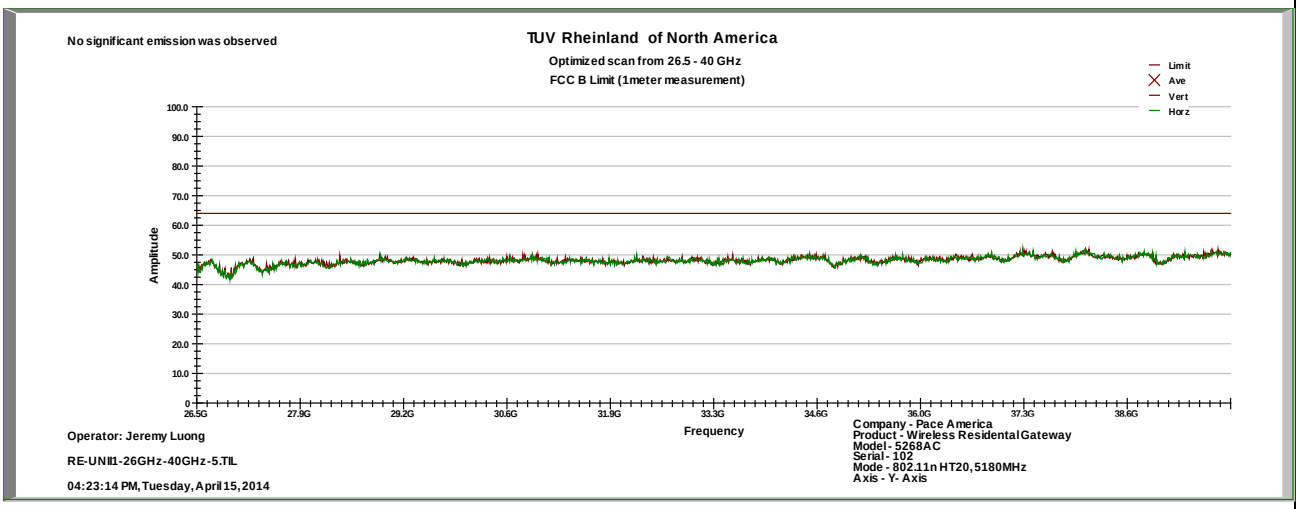
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT20 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5180 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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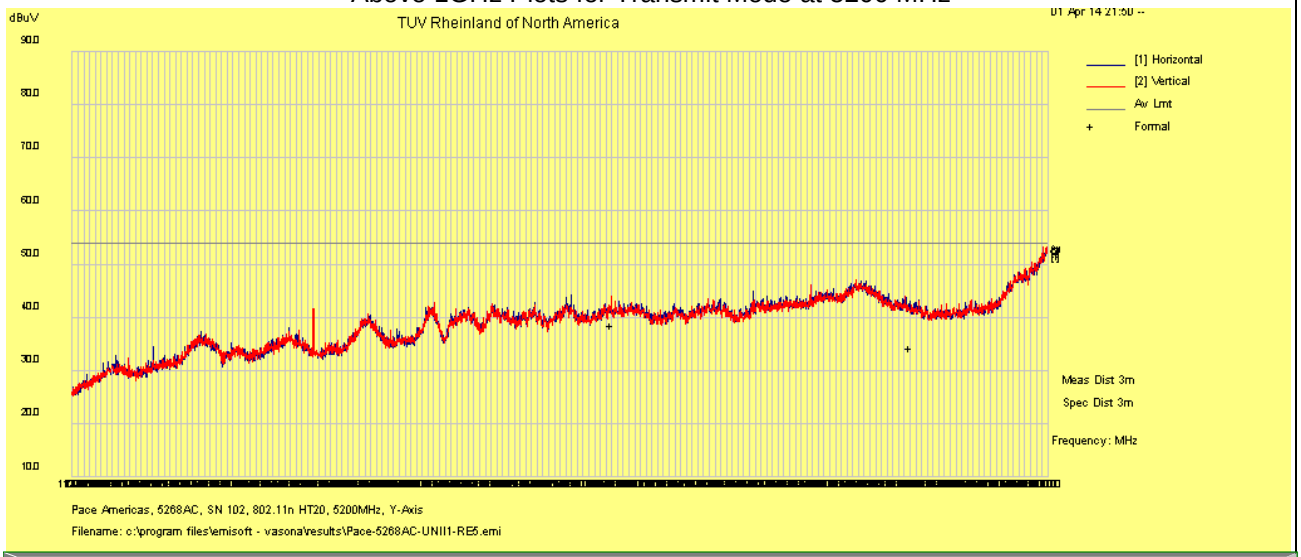
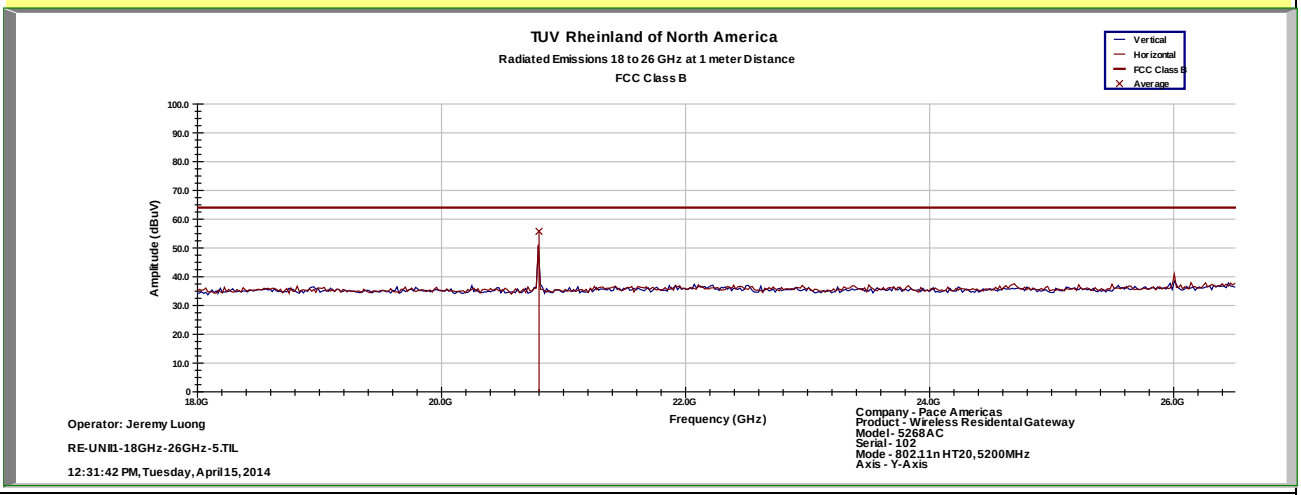
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT20 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5200 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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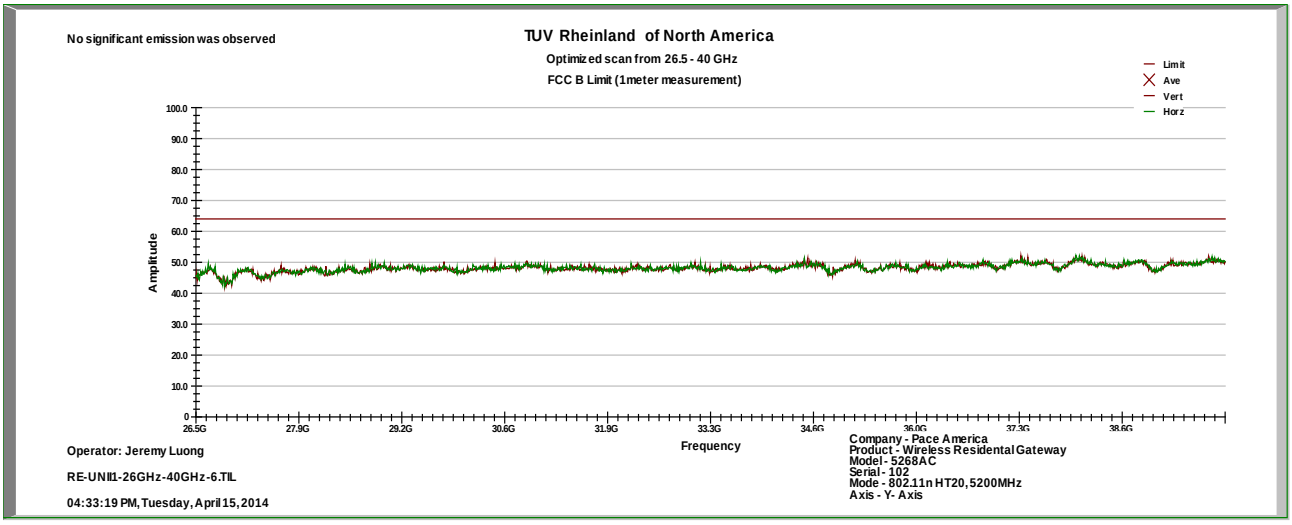
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT20 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5200 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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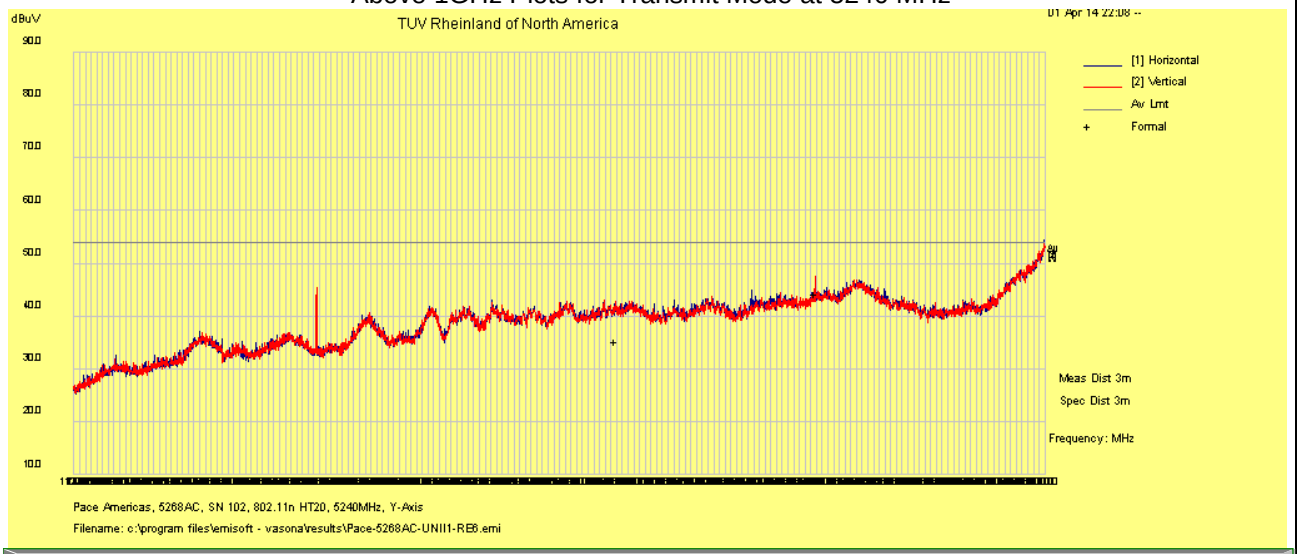
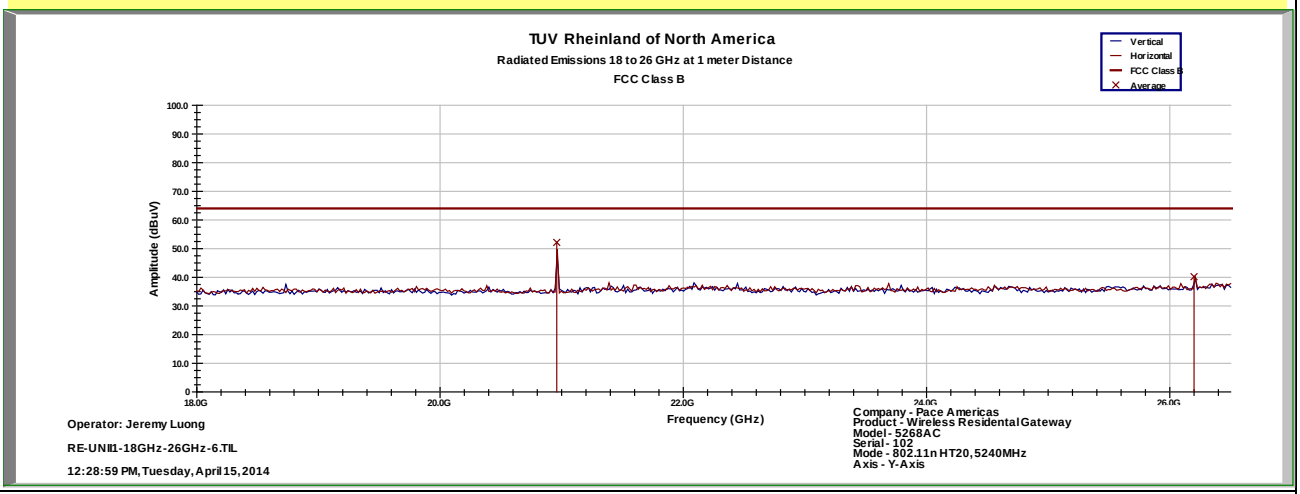
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT20 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5240 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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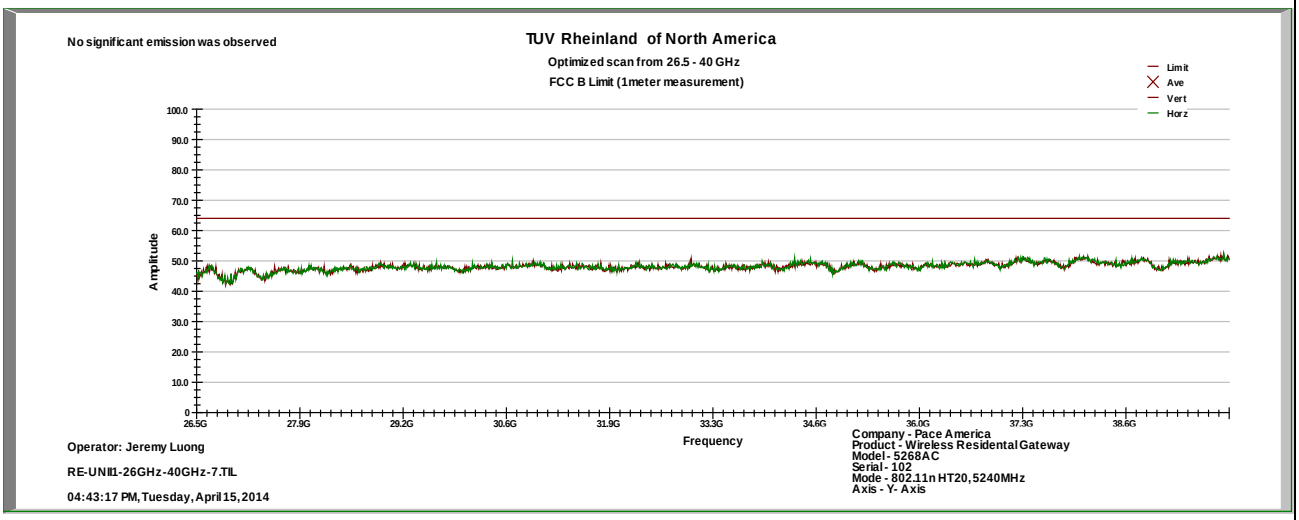
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT20 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5240 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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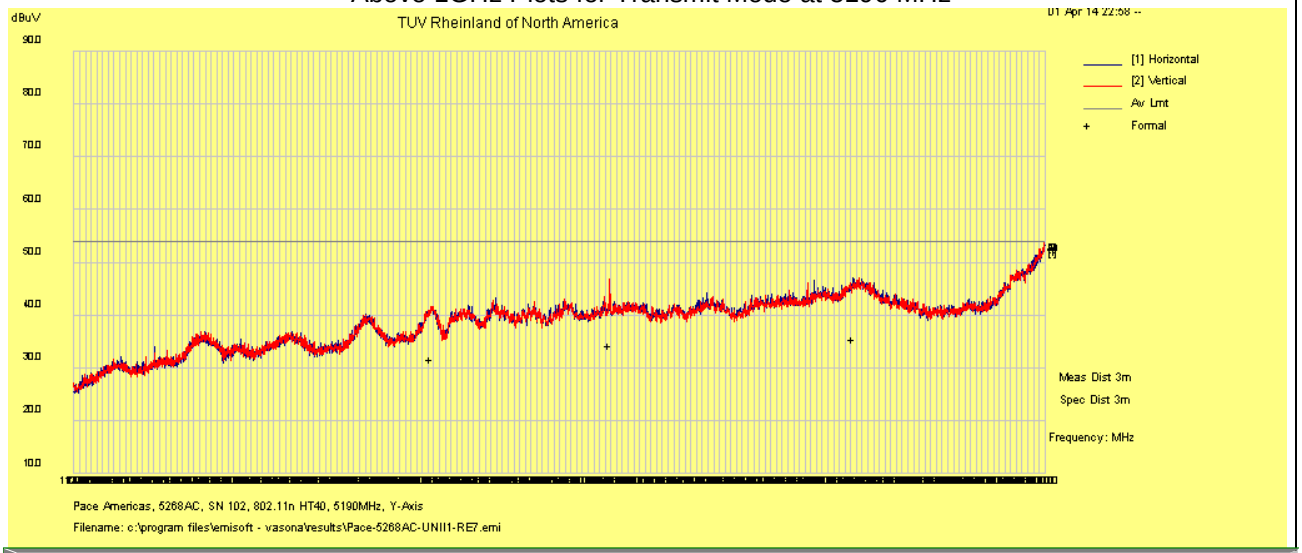
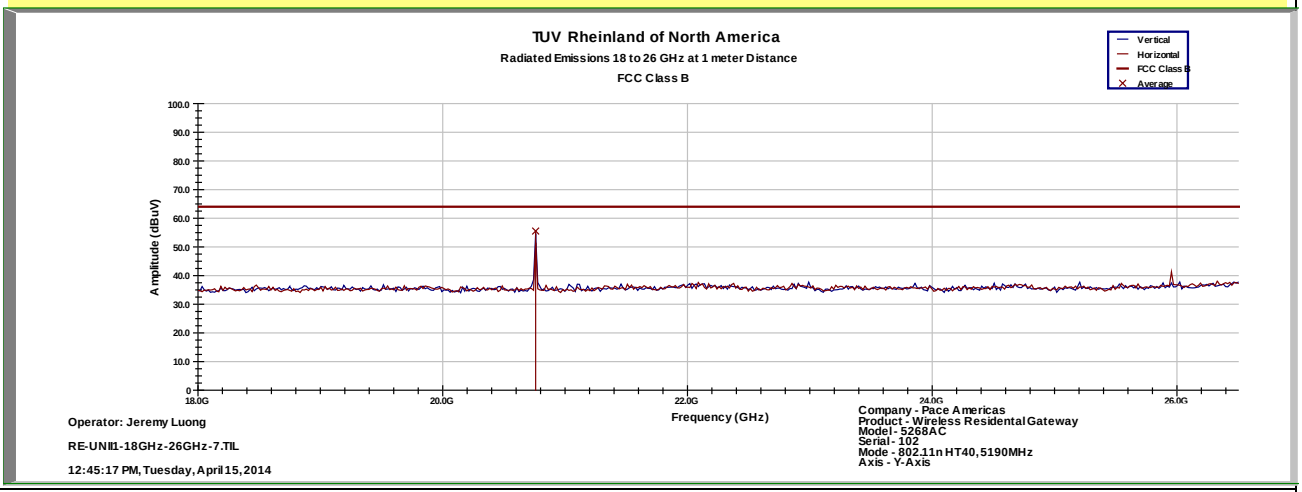
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT40 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5190 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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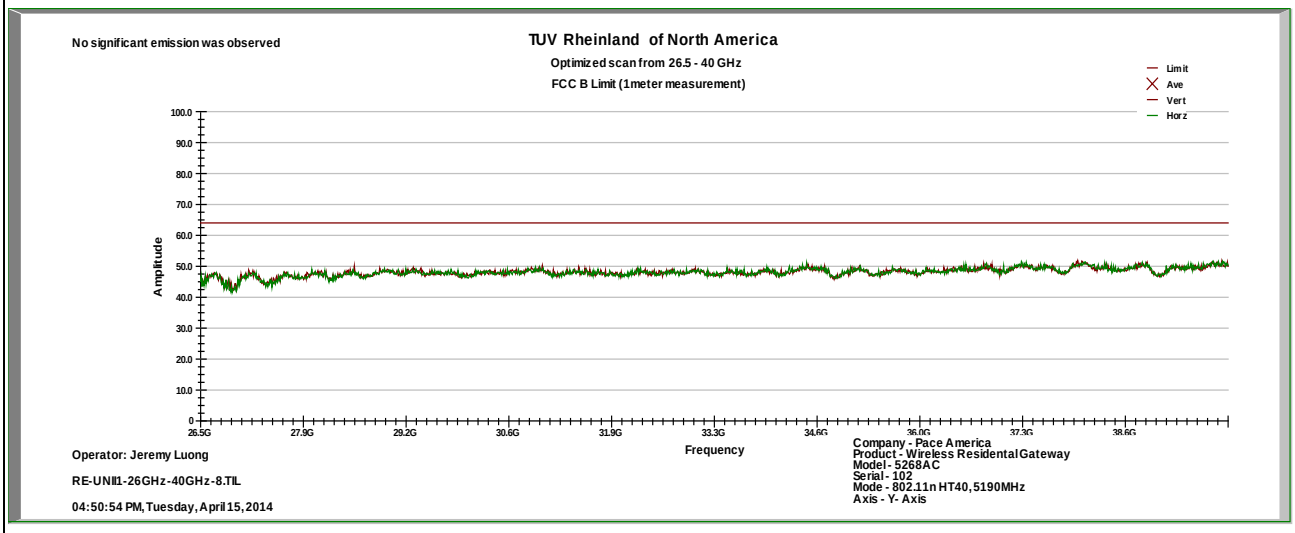
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT40 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5190 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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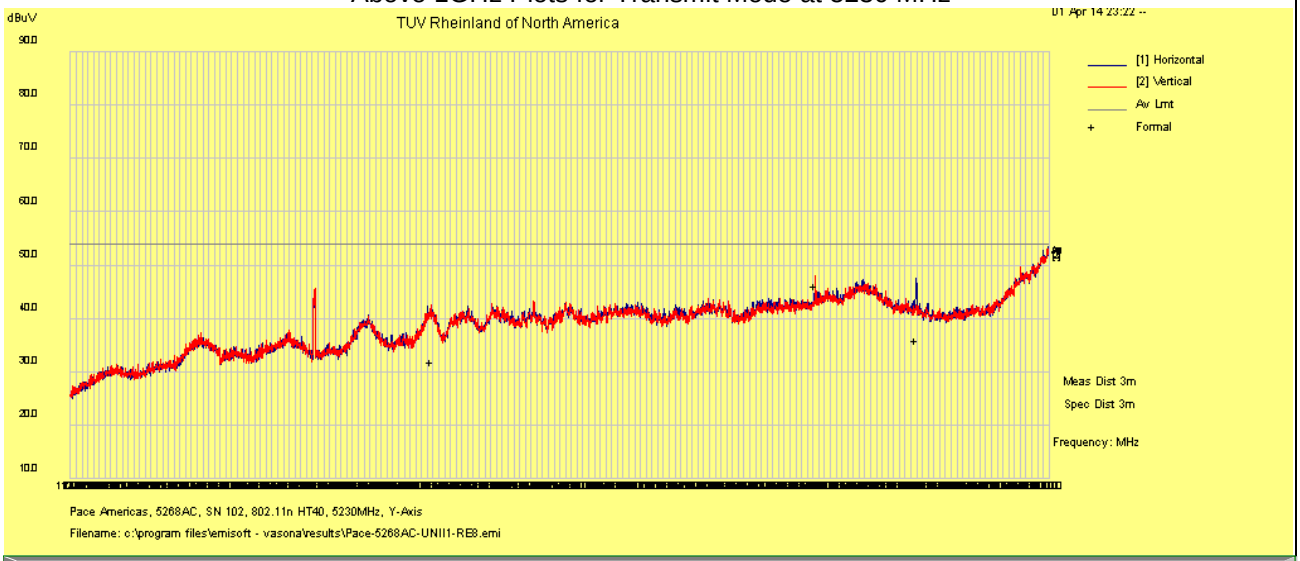
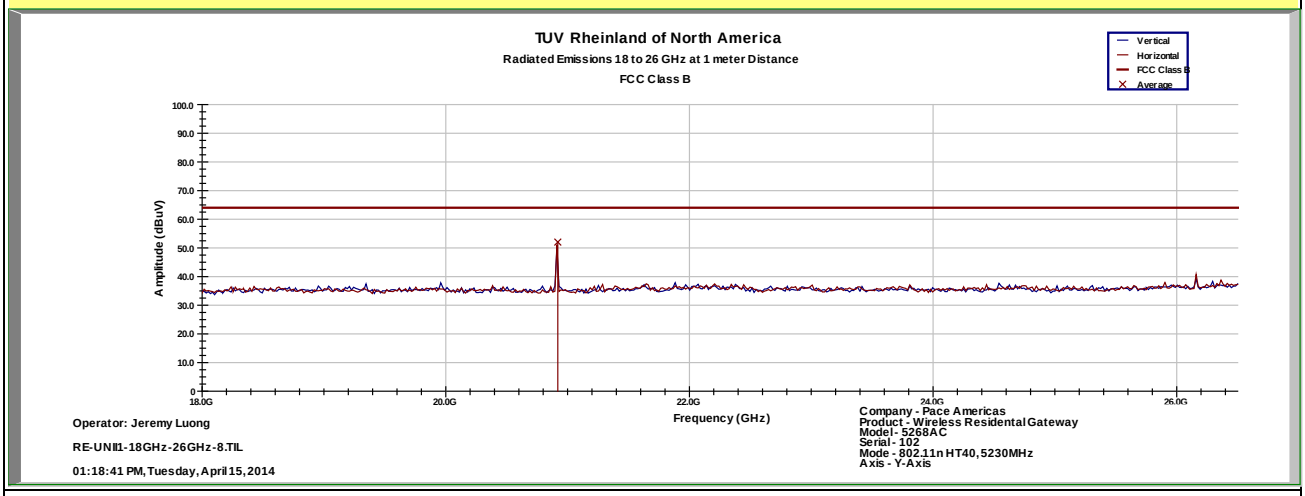
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT40 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5230 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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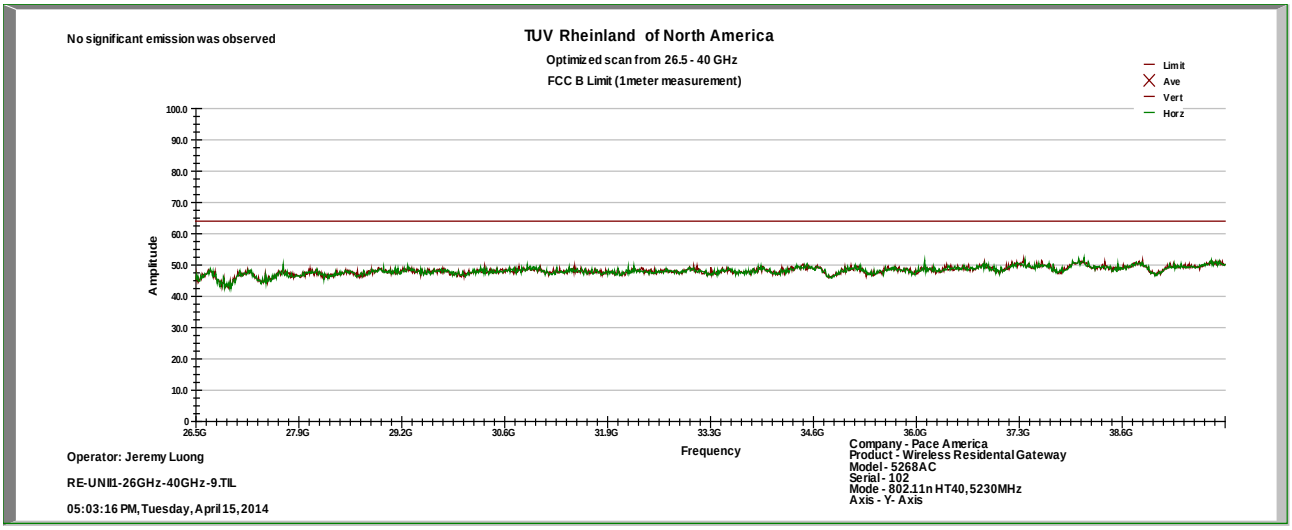
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11n HT40 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5230 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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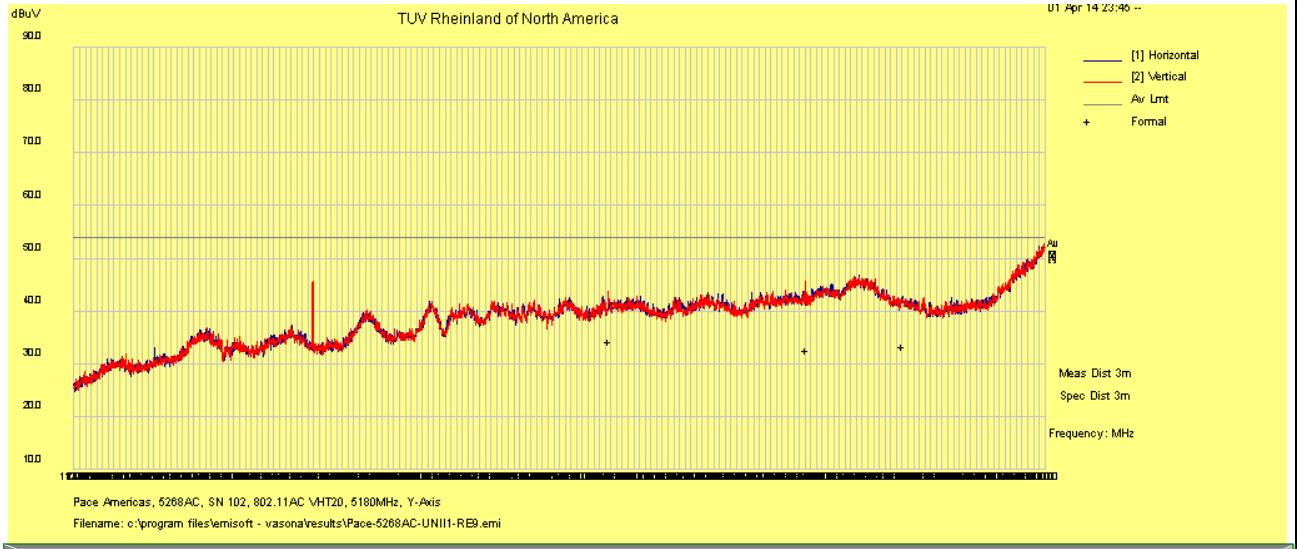
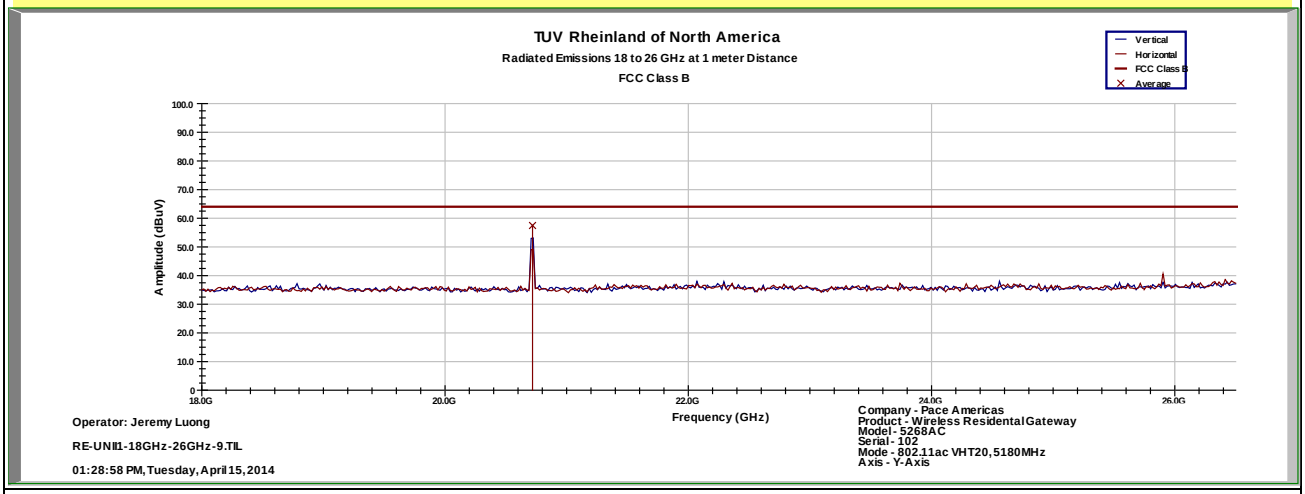
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT20 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5180 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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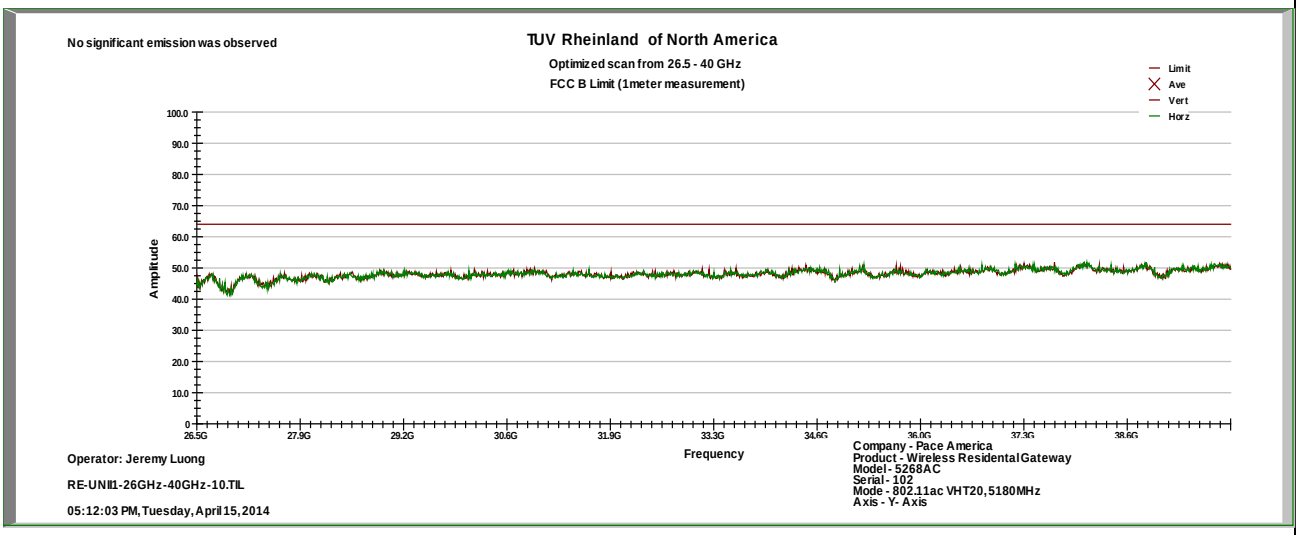
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT20 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5180 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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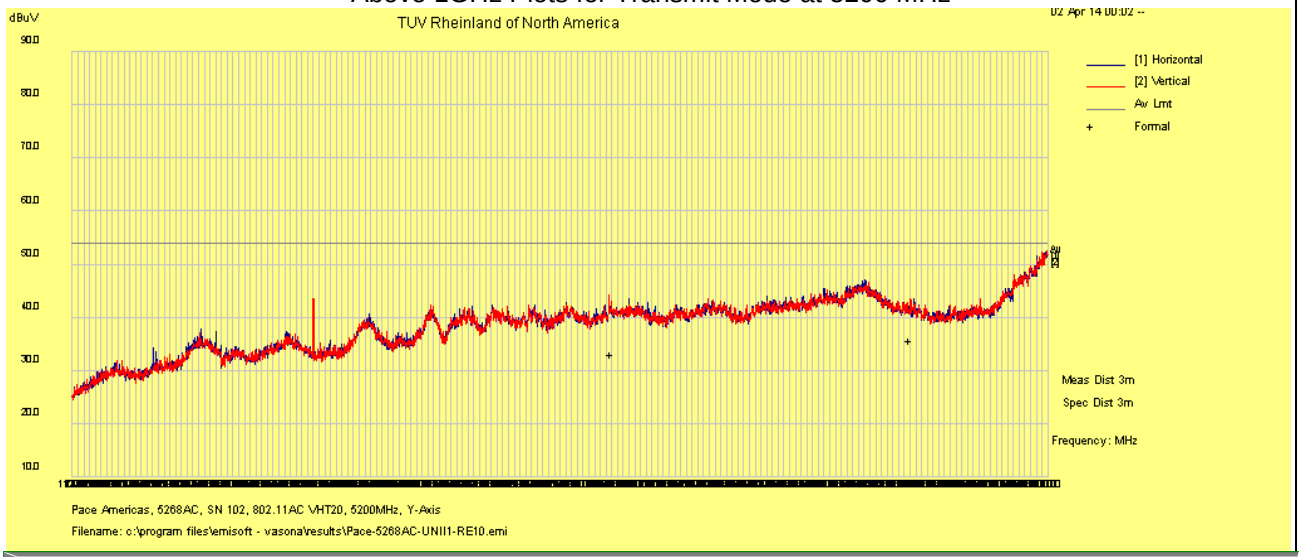
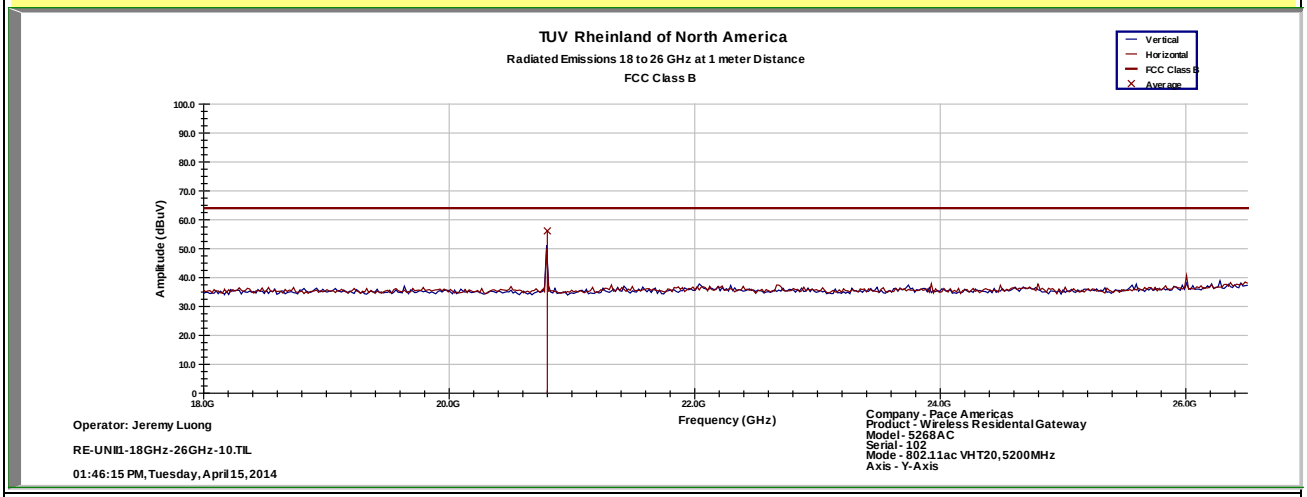
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT20 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5200 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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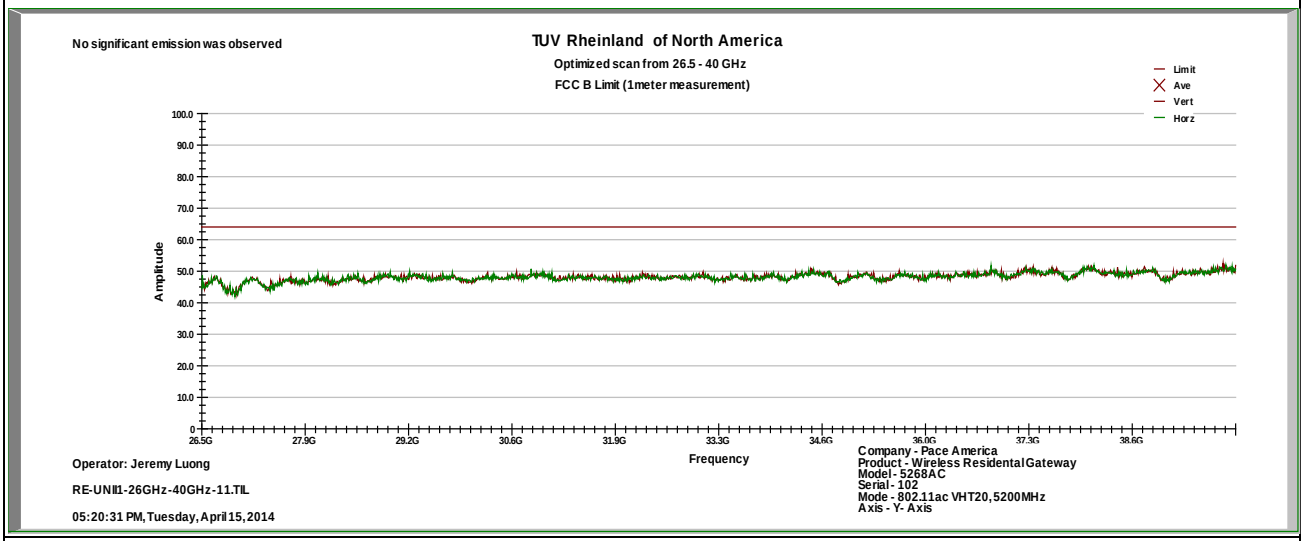
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT20 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5200 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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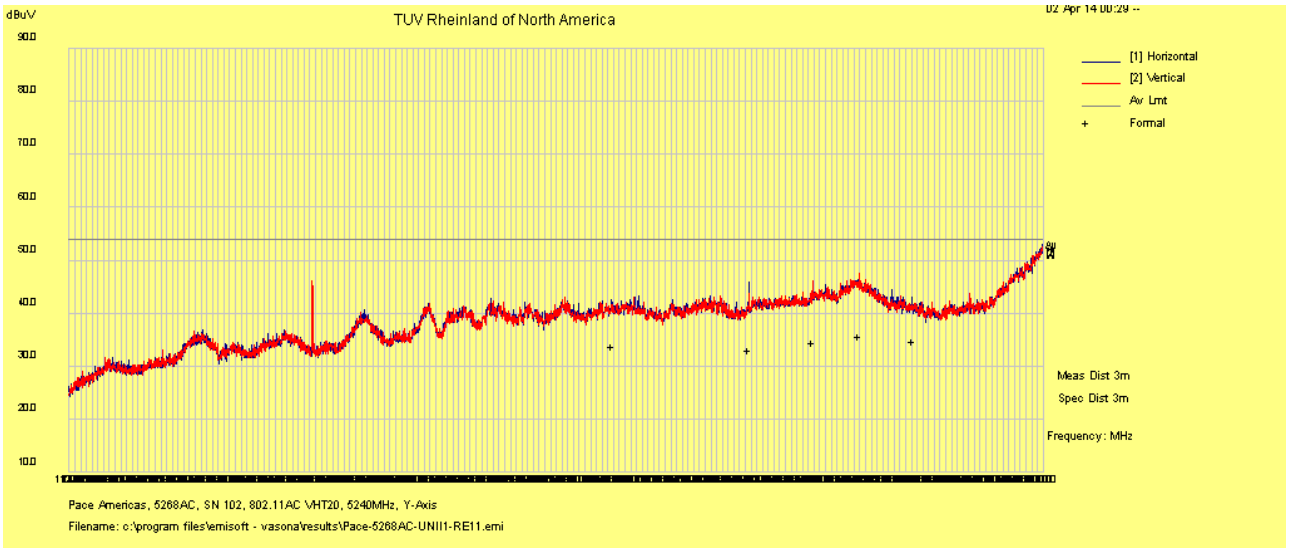
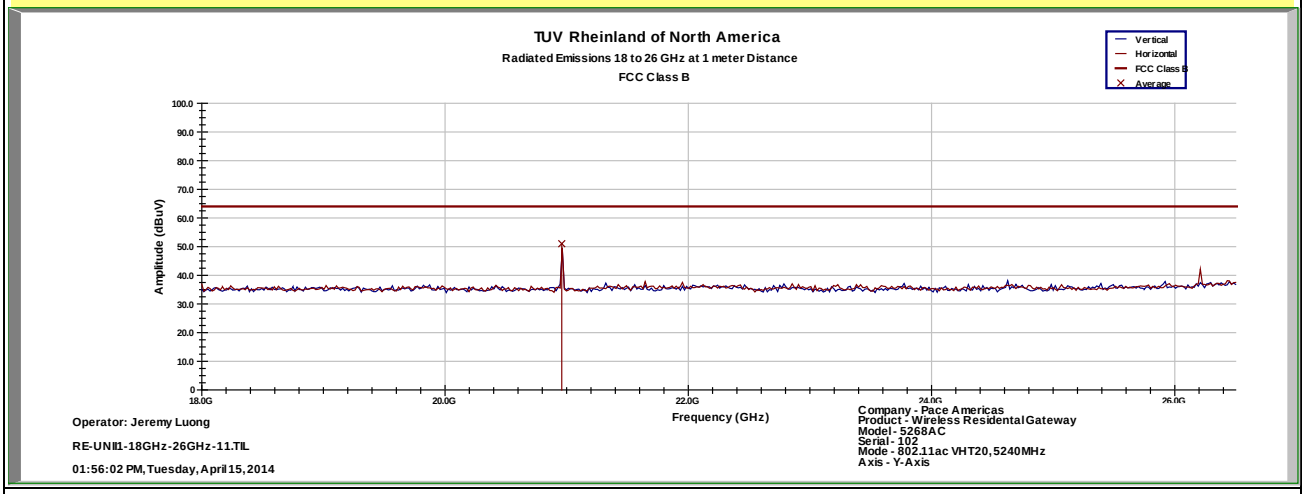
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT20 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5240 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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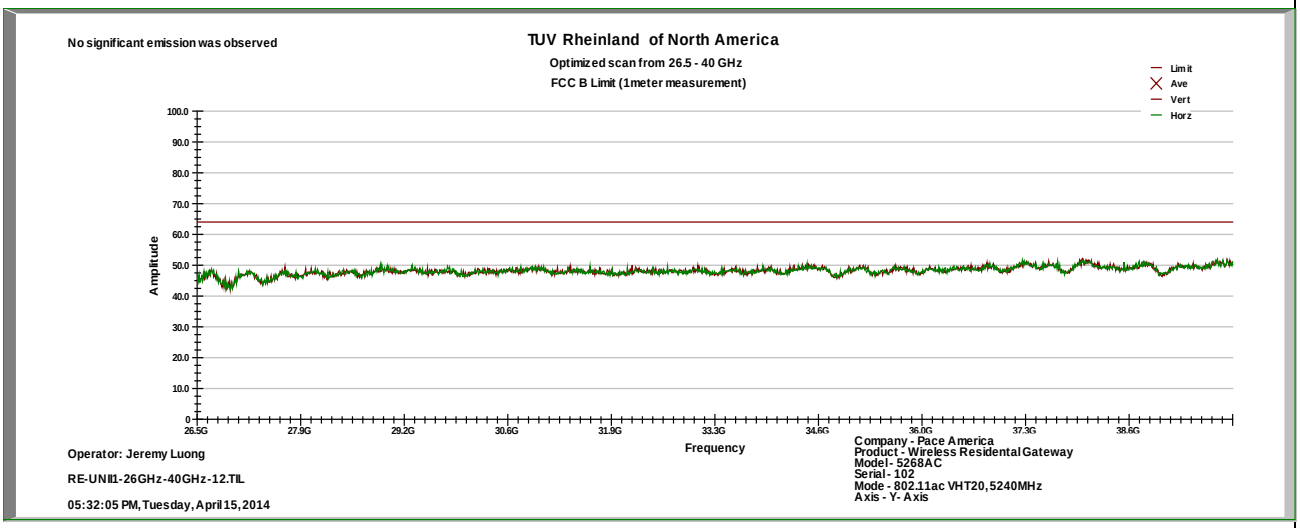
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT20 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5240 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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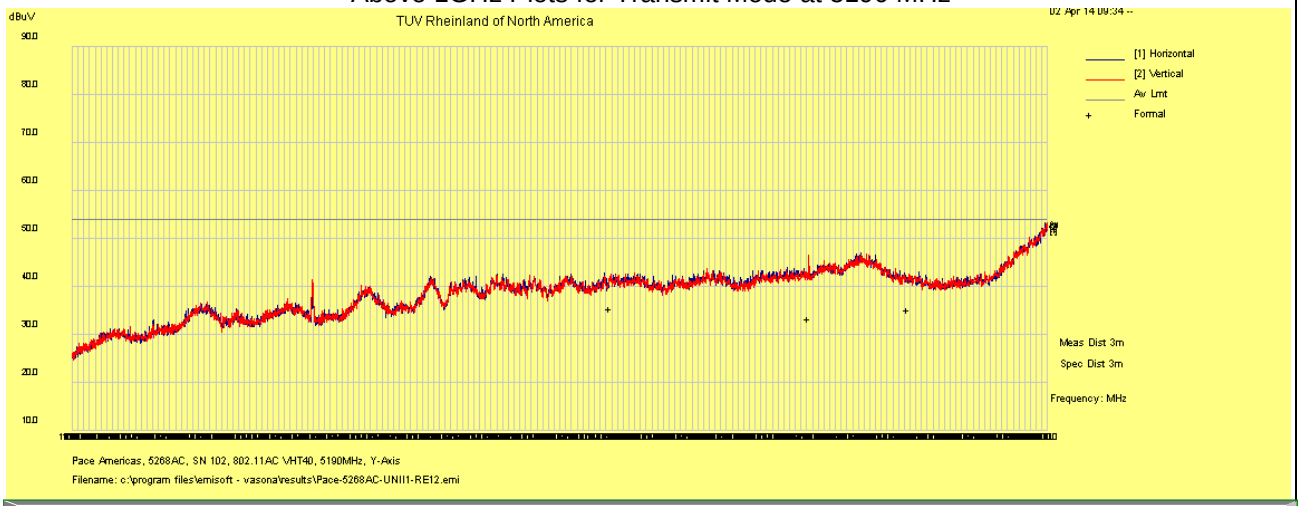
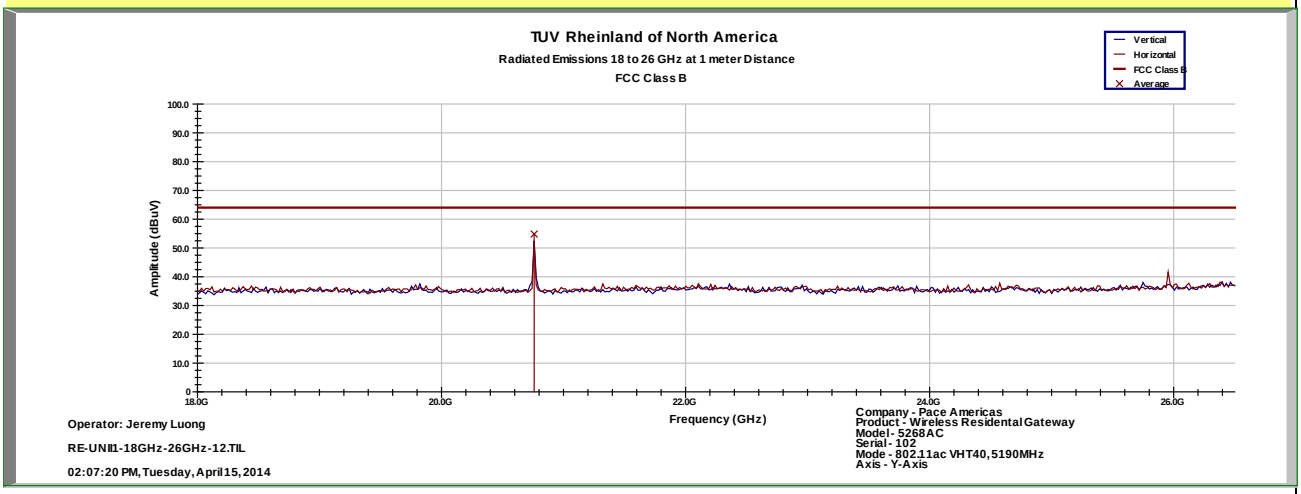
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT40 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5190 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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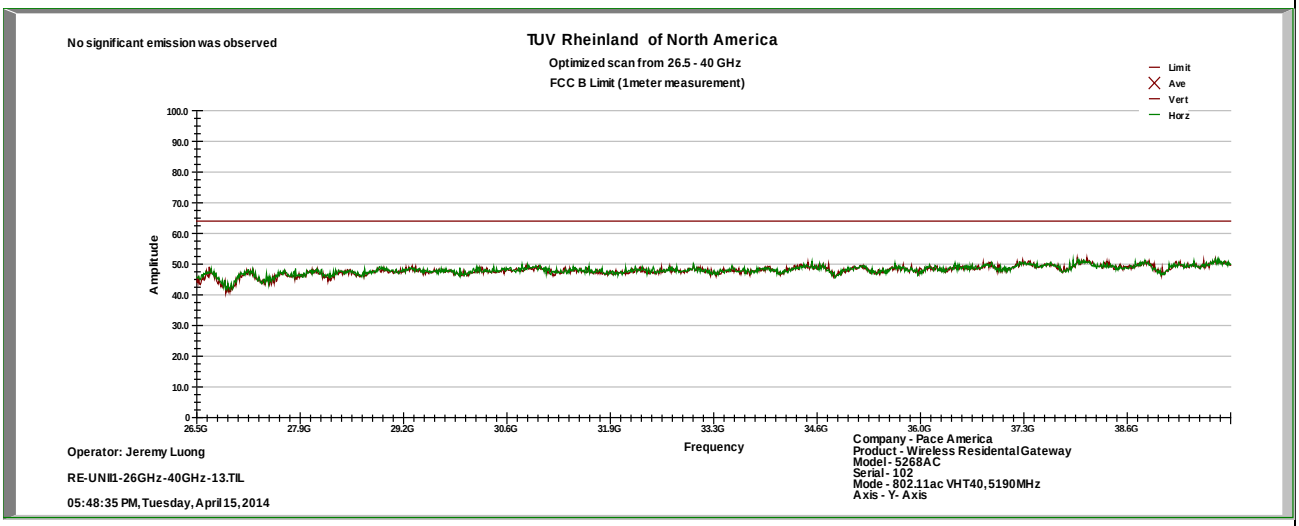
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT40 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5190 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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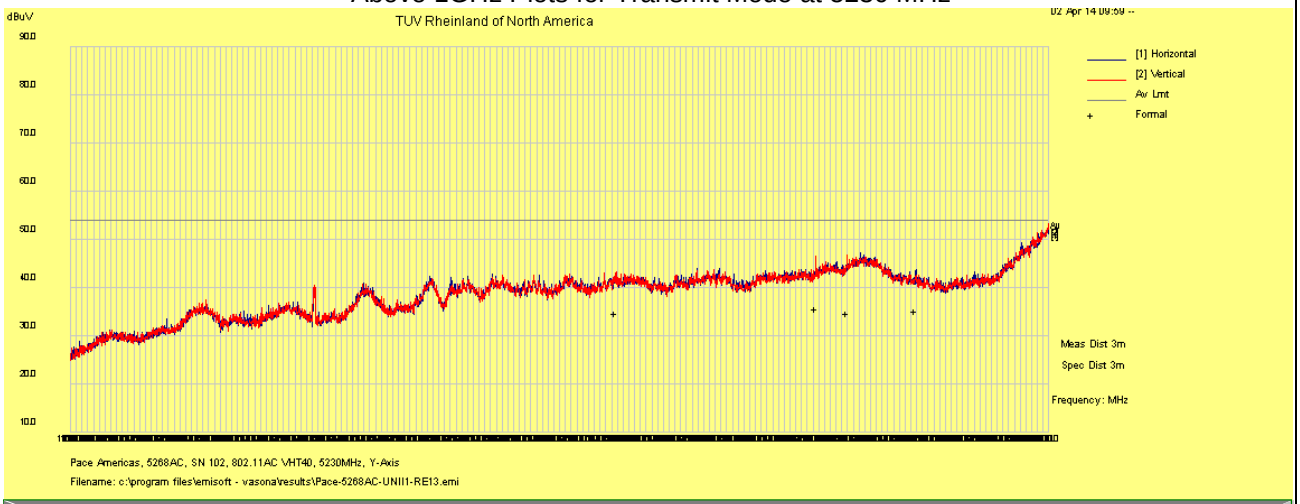
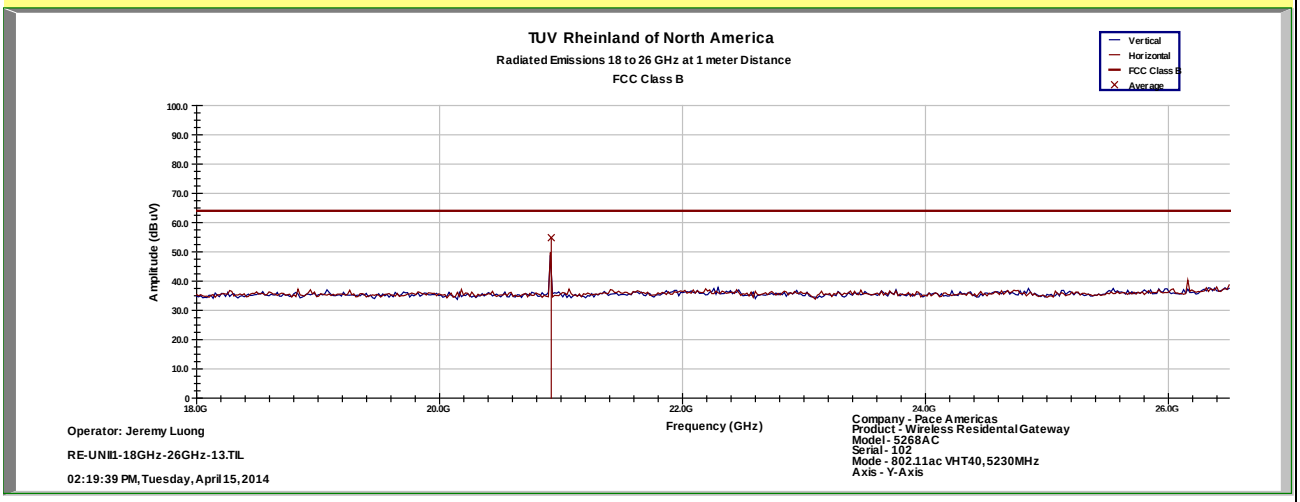
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT40 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5230 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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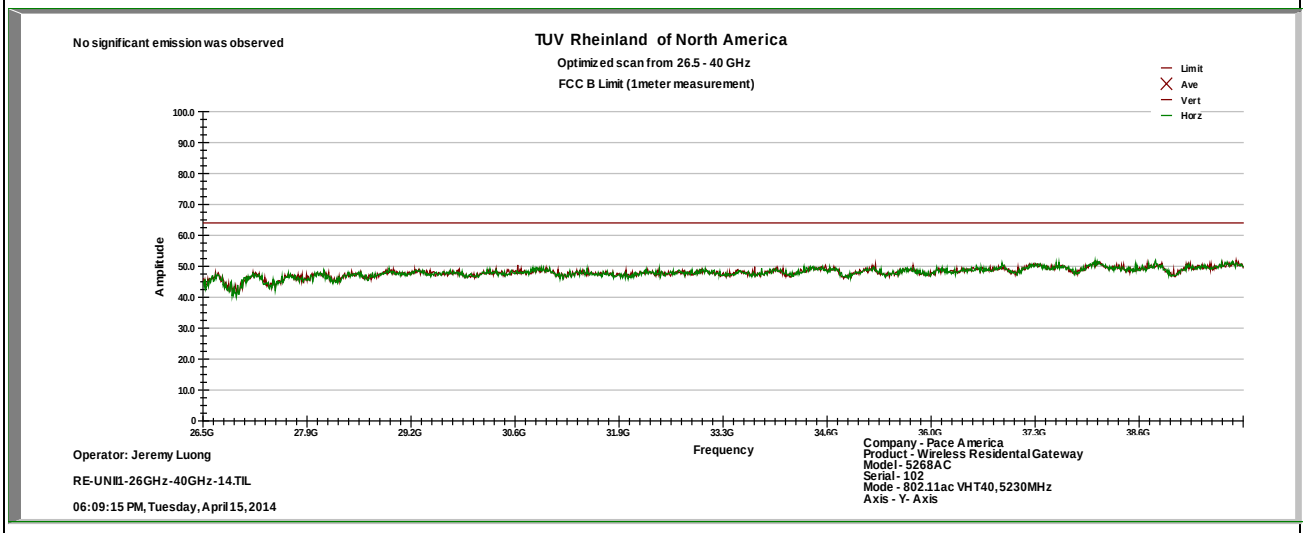
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT40 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5230 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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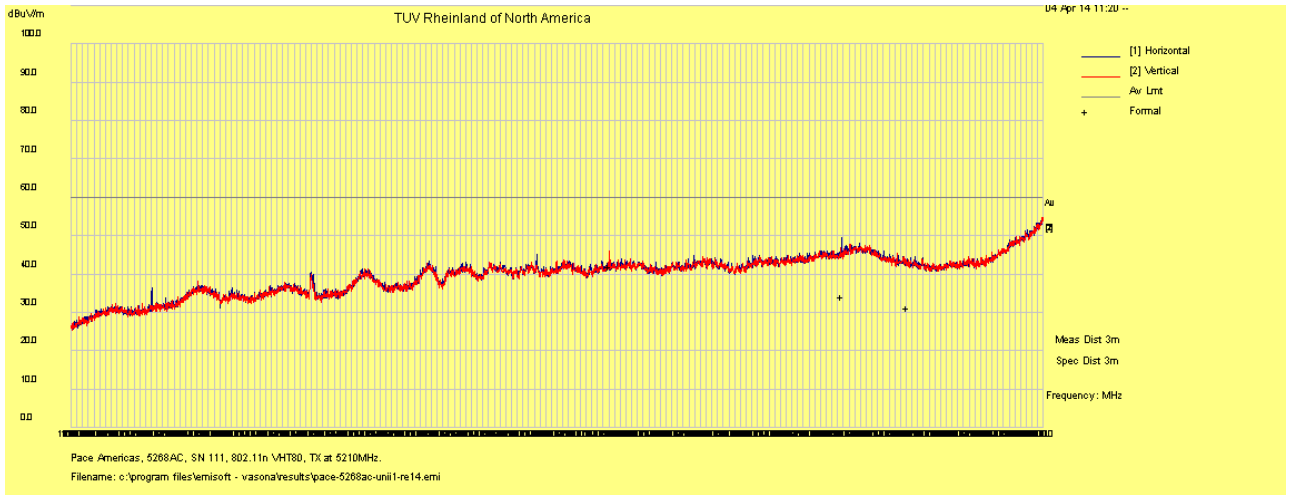
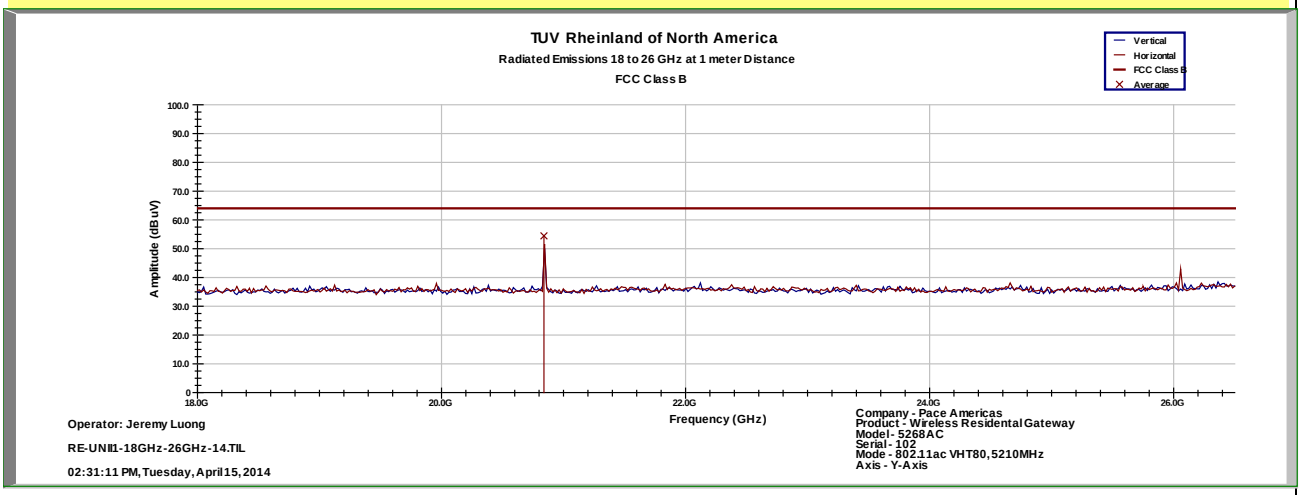
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	121404000111	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT80 MCS0	**Line AC**	120Vac 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5210 MHz





Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

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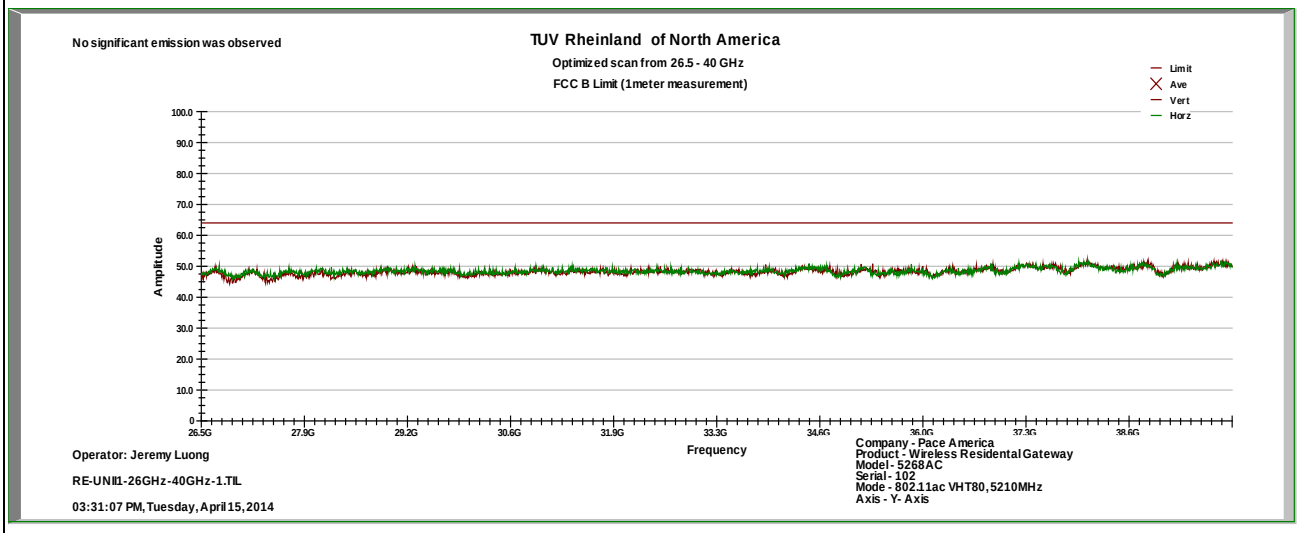
EUT Name	Wireless Residential Gateway	**Date**	April 1, 2013
EUT Model	5268AC	**Temp / Hum in**	23° C / 33%rh
EUT Serial	102	**Temp / Hum out**	N/A
EUT Config.	Y-Axis, 802.11ac VHT80 MCS0	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

Above 1GHz Plots for Transmit Mode at 5210 MHz



Notes: Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.

4.5.4 Sample Calculation

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Level (dB}\mu\text{V/m)} = \text{Raw} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: Raw = Field Intensity Meter (dBμV)
AMP = Amplifier Gain (dB)
CBL = Cable Loss (dB)
ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{dB\mu V/m}{20}}$$

4.6 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4: 2010. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures the levels emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207: 2013 and RSS-210: 2010.

4.6.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of 50µH / 50Ω LISNs.

Testing is either performed in Lab 2. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

4.6.1.1 Deviations

There were no deviations from this test methodology.

4.6.2 Test Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 8: AC Conducted Emissions – Test Results

Test Conditions: AC Conducted Measurement	**Test Date:** April 10, 2014
Antenna Type: Attached	**Power Level:** See Test Plan
AC Power: 110 Vac/60 Hz	**Configuration:** Tabletop
Ambient Temperature: 23° C	**Relative Humidity:** 35% RH

Configuration	Frequency Range	Test Result
Line 1 (Hot)	0.15 to 30 MHz	Pass
Line 2 (Neutral)	0.15 to 30 MHz	Pass

SOP 2 Conducted Emissions — Tracking # 31153119.002 Page 1 of 4

EUT Name	Wireless Residential Gateway	**Date**	April 10, 2014
EUT Model	5268AC	**Temp / Hum in**	23° C / 35% rh
EUT Serial	121404000111	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #2 /Com-Power, Line 1	**Performed by**	Jeremy Luong

Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.150	41.71	10.15	-0.72	51.14	QP	Live	66.00	-14.86	Pass
0.150	29.33	10.15	-0.72	38.76	Ave	Live	56.00	-17.24	Pass
0.161	30.71	10.15	-0.69	40.17	QP	Live	65.42	-25.25	Pass
0.161	22.24	10.15	-0.69	31.70	Ave	Live	55.42	-23.72	Pass
0.496	27.50	10.18	-0.31	37.37	QP	Live	56.07	-18.70	Pass
0.496	14.57	10.18	-0.31	24.44	Ave	Live	46.07	-21.63	Pass
0.762	21.71	10.21	-0.24	31.68	QP	Live	56.00	-24.32	Pass
0.762	9.34	10.21	-0.24	19.31	Ave	Live	46.00	-26.69	Pass
1.448	18.07	10.27	-0.19	28.15	QP	Live	56.00	-27.85	Pass
1.448	7.81	10.27	-0.19	17.89	Ave	Live	46.00	-28.11	Pass
4.481	21.79	10.43	-0.14	32.08	QP	Live	56.00	-23.92	Pass
4.481	12.91	10.43	-0.14	23.20	Ave	Live	46.00	-22.80	Pass
4.632	23.76	10.43	-0.14	34.05	QP	Live	56.00	-21.95	Pass
4.632	14.73	10.43	-0.14	25.02	Ave	Live	46.00	-20.98	Pass

Spec Margin = QP./Ave. - Limit, ± Uncertainty

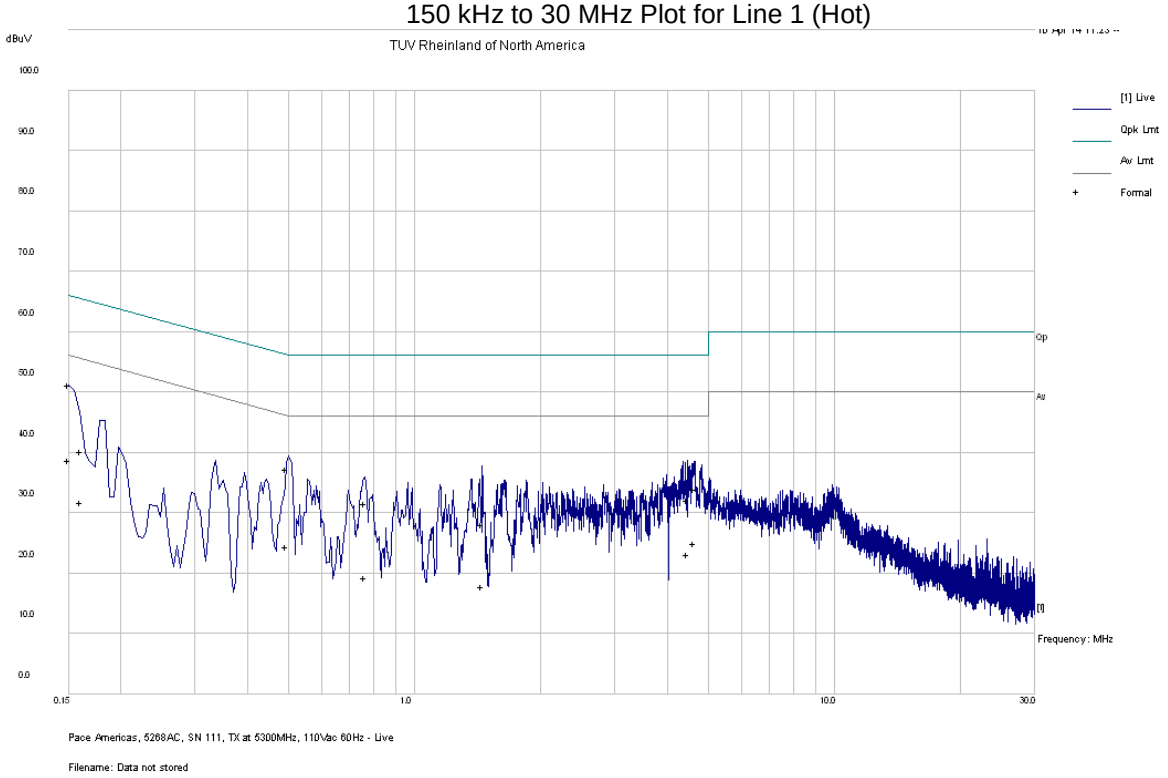
Combined Standard Uncertainty $u_c(y)$ = ± 2.18 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: EUT was setup as table top equipment and transmitted at 5200 MHz in 802.11a at 6Mbps

SOP 2 Conducted Emissions — Tracking # 31153119.002 Page 2 of 4

EUT Name	Wireless Residential Gateway	**Date**	April 10, 2014
EUT Model	5268AC	**Temp / Hum in**	23° C / 35% rh
EUT Serial	121404000111	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #2 /Com-Power, Line 1	**Performed by**	Jeremy Luong

150 kHz to 30 MHz Plot for Line 1 (Hot)



Notes: Meet FCC Class B limit.

SOP 2 Conducted Emissions

Tracking # 31153119.002 Page 3 of 4

EUT Name	Wireless Residential Gateway	**Date**	April 10, 2014
EUT Model	5268AC	**Temp / Hum in**	23° C / 35% rh
EUT Serial	121404000111	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #2 /Com-Power, Line 2	**Performed by**	Jeremy Luong

Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.150	42.30	10.15	-0.72	51.73	QP	Neutral	66.00	-14.27	Pass
0.150	31.62	10.15	-0.72	41.05	Ave	Neutral	56.00	-14.95	Pass
0.334	21.62	10.16	-0.40	31.38	QP	Neutral	59.36	-27.98	Pass
0.334	1.22	10.16	-0.40	10.98	Ave	Neutral	49.36	-38.38	Pass
0.501	27.23	10.18	-0.31	37.10	QP	Neutral	56.00	-18.90	Pass
0.501	18.61	10.18	-0.31	28.48	Ave	Neutral	46.00	-17.52	Pass
0.969	20.51	10.23	-0.22	30.52	QP	Neutral	56.00	-25.48	Pass
0.969	10.39	10.23	-0.22	20.40	Ave	Neutral	46.00	-25.60	Pass
1.810	21.81	10.29	-0.17	31.93	QP	Neutral	56.00	-24.07	Pass
1.810	11.87	10.29	-0.17	21.99	Ave	Neutral	46.00	-24.01	Pass
4.364	26.01	10.42	-0.14	36.29	QP	Neutral	56.00	-19.71	Pass
4.364	15.86	10.42	-0.14	26.14	Ave	Neutral	46.00	-19.86	Pass
4.575	27.69	10.43	-0.14	37.98	QP	Neutral	56.00	-18.02	Pass
4.575	17.74	10.43	-0.14	28.03	Ave	Neutral	46.00	-17.97	Pass

Spec Margin = QP./Ave. - Limit, ± Uncertainty

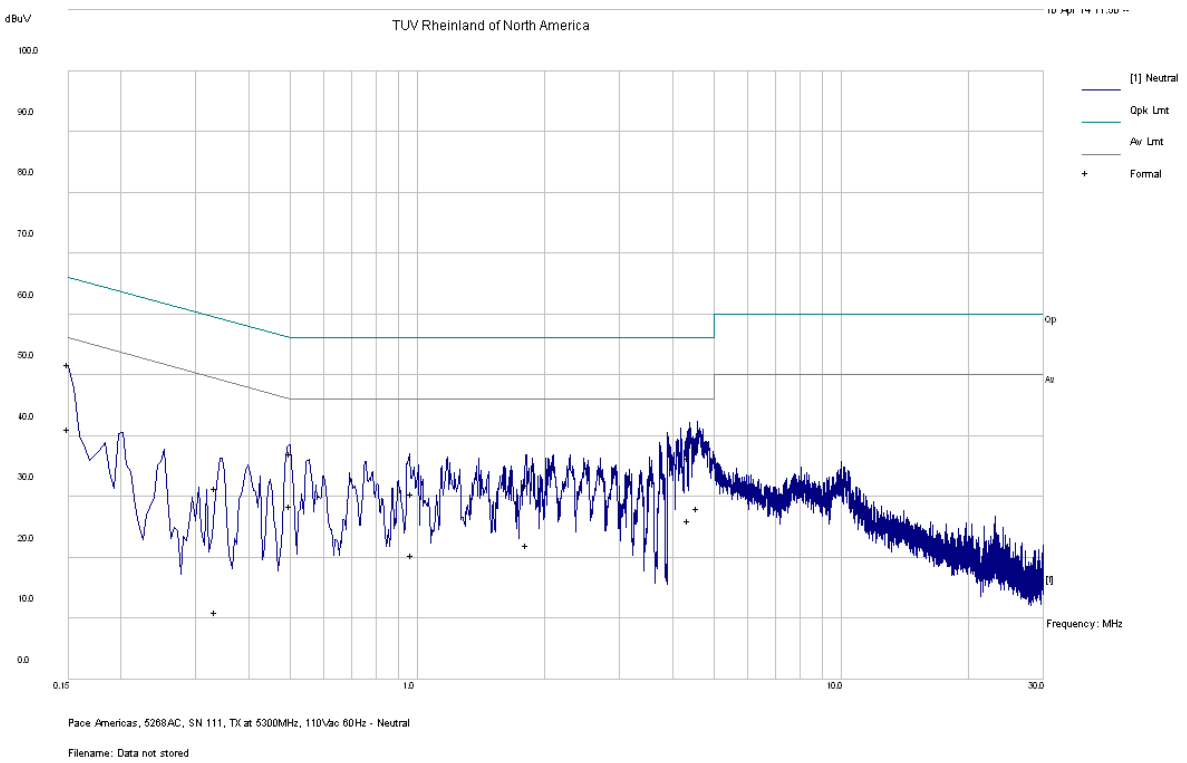
Combined Standard Uncertainty $u_c(y)$ = ± 2.18 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: EUT was setup as table top equipment and transmitted at 5200 MHz in 802.11a at 6Mbps

SOP 2 Conducted Emissions — Tracking # 31153119.002 Page 4 of 4

EUT Name	Wireless Residential Gateway	**Date**	April 10, 2014
EUT Model	5268AC	**Temp / Hum in**	23° C / 35% rh
EUT Serial	121404000111	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #2 /Com-Power, Line 2	**Performed by**	Jeremy Luong

150 kHz to 30 MHz Plot for Line 2 (Neutral)



Note: Meet FCC Class B Limit.

4.7 Frequency Stability

In accordance with 47 CFR Part 15.407(g) the frequency stability of U-NII devices must be such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual. The Manufacturer calls out operating temperature ranges of +0º to +40º C

4.7.1 Test Methodology

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions. This test performs according to ANSI C63.10-2009 Section 6.8

4.7.2 Manufacturer Declaration

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signal should have ±20ppm stability.

This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

Worst case:
5.500 GHz - ±20ppm/104 kHz

±20ppm at 5 GHz translates to a maximum frequency shift of ±103 kHz. As the edge of the channels are at least one MHz from either of the band edges, ±103 kHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the radio.

4.7.3 Limit

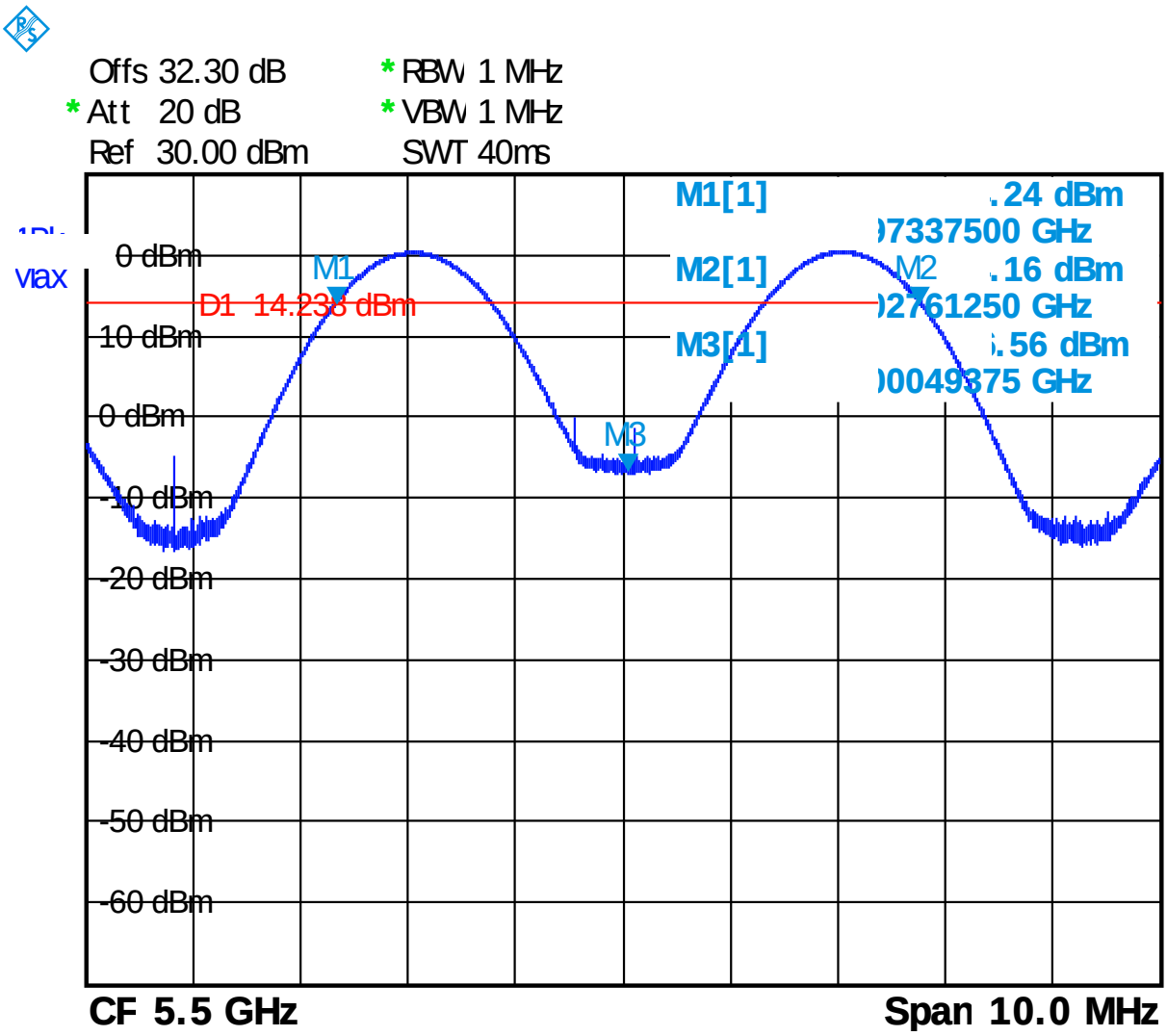
CFR47 Part 407(g) - Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

4.7.4 Test results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s) since the maximum frequency drift was 8.977 ppm.

Table 9: Frequency Stability – Test Results

Temperature	Time	PPM
0° C	Start	8.977
	2 Min.	7.500
	5 Min	7.045
	10 min	8.409
10° C	Start	7.500
	2 Min.	4.318
	5 Min	3.750
	10 min	3.636
20° C	Start	5.341
	2 Min.	2.273
	5 Min	1.477
	10 min	1.591
30° C	Start	2.159
	2 Min.	0.341
	5 Min	0.114
	10 min	0.114
40° C	Start	0.455
	2 Min.	0.000
	5 Min	0.000
	10 min	0.114



Date: 27.MAR.2014 12:10:51

Figure 283: Frequency Stability – Worst Case

4.8 Voltage Variation

In accordance with 47 CFR Part 15.31 (e) intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.8.1 Test Methodology

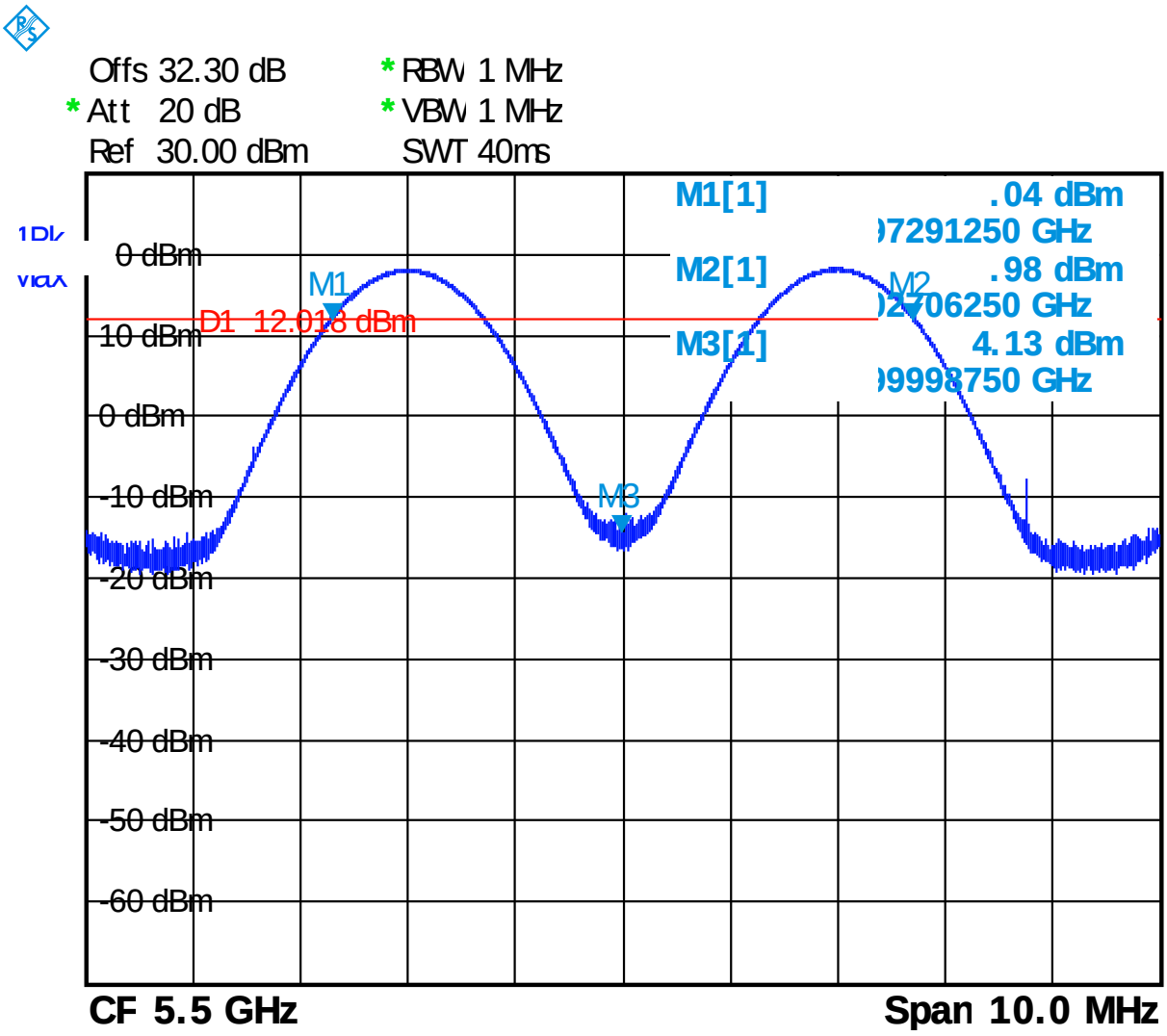
The ac supply voltage was varied between 85% and 115% of the nominal rated supply voltage. The fundamental frequency was observed during the variation. The access point was powered 110V/60Hz by programmable power supply. The voltage was varied from 102Vac to 138Vac mean while the fundamental frequencies were observed and record for the maximum drift in ppm; part per millions.

4.8.2 Test results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). The fundamental frequencies drifted less than ±20ppm.

Table 10: Voltage Variation – Test Results

Frequency MHz	**Nominal** (120Vac) ppm	**Lo Voltage** (102Vac) ppm	**Hi Voltage** (138Vac) ppm	**Max Drift** ppm
5500	0.568	0.227	0.341	0.568



Date: 27.MAR.2014 17:34:25

Figure 284: Voltage Variation – Worst Case

4.9 Maximum Permissible Exposure

4.9.1 Test Methodology

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this calculation is declared by the manufacturer, and the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

4.9.2 RF Exposure Limit

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	…	…	1.0	6
300 - 1500	…	…	f/300	6
1500 - 100,000	…	…	5	6
(B)Limits For General Population / Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/ f^2)	30
30–300	27.5	0.037	0.2	30
300 - 1500	…	…	f/1500	30
1500 - 100,000	…	…	1.0	30

F = Frequency in MHz
* = Plane-wave equivalent power density

4.9.3 EUT Operating Condition

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

4.9.4 Classification

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in user's manual. So, this device is classified as a **Mobile Device**.

4.9.5 Test Results

4.9.5.1 Antenna Gain

The transmitting antennas were integrated. The directional antenna gain was +8.08 dBi or 6.43 (numeric).

4.9.5.2 Output Power into Antenna & RF Exposure value at distance 20cm:

Calculations for this report are based on highest power measurement.

Limit for MPE (from FCC part 1.1310 table1) is 1.0 mW/cm^2

The highest measured total power is +14.89 dBm or 30.83188mW

Using the Friss transmission formula, the EIRP is Pout*G, and R is 20cm.

Pd = (30.83188*1.58) / (1600π) = 0.039441 mW/cm2, which is 0.96056 mW/cm2 below to the limit.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

4.9.6 Sample Calculation

The Friss transmission formula: $Pd = (Pout*G) / (4*\pi*R^2)$

Where;

Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
$\pi \approx 3.1416$
R = distance between observation point and center of the radiator in cm

Ref.: David K. Cheng, *Field and Wave Electromagnetics*, Second Edition, Page 640, Eq. (11-133).

6 Test Equipment Use List

6.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yy	Next Cal mm/dd/yy
Bilog Antenna	Sunol Sciences	JB3	A102606	05/15/2012	05/15/2014
Horn Antenna	Sunol Sciences	DRH-118	A040806	11/05/2012	11/05/2014
Antenna (18-26GHz)	CMT	RA42-K-F-4B-C	020131-004	06/19/2013	06/19/2014
Antenna (26-40 GHz)	CMT	RA28-K-F-4B-C	011469R-003	12/01/2013	12/01/2014
EMI Receiver	Hewlett Packard	8546A	3325A00168	11/14/2013	11/14/2014
Preselector	Hewlett Packard	85460A	3330A00174	11/14/2013	11/14/2014
Amplifier	Hewlett Packard	8447D	2944A07996	01/07/2014	02/07/2015
Spectrum Analyzer	Rohde & Schwarz	ESIB40	832427/002	01/08/2014	02/08/2015
Amplifier	Miteq	TTA1800-30-4G	1842452	01/08/2014	02/08/2015
Amplifier	Rohde & Schwarz	TS-PR26	100011	06/19/2013	06/19/2014
Amplifier	Rohde & Schwarz	TS-PR40	100012	12/01/2013	12/01/2014
Signal Generator	Anritsu	MG3694A	42803	01/07/2013	02/07/2015
Notch Filter	Micro-Tronics	BRM50702	9	01/16/2014	02/16/2016
Notch Filter	Micro-Tronics	BRC50703	1	01/16/2014	02/16/2016
Notch Filter	Micro-Tronics	BRC50704	8	01/16/2013	01/16/2015
Notch Filter	Micro-Tronics	BRC50705	9	01/16/2013	01/16/2015
High Pass Filter (3.5 GHz)	Hewlett Packard	84300-80038	820004	01/16/2013	01/16/2015
High Pass Filter (8.5 GHz)	Micro-Tronics	HPM50107	4	01/16/2013	01/16/2015
Power Supplier	California Instruments	1001P-232	L06329	VBU	VBU
Digital Multimeter	Fluke	83 III	84590116	01/07/2014	02/07/2015
Power Meter	Agilent	E4418B	MY45103902	01/09/2014	02/09/2015
Power Sensor	Hewlett Packard	8482A	55-5131	01/09/2014	02/09/2015
LISN	Com-Power	LI-215	12111	01/07/2014	02/07/2015
Transient Limiter	Com-Power	LIT-930	531582	01/08/2014	02/08/2015
Thermometer	Fluke	52II	96480032	08/07/2013	08/07/2014
Thermo Chamber	Espec	BTZ-133	0613436	03/17/2014	03/17/2015
Spectrum Analyzer	Rohde & Schwarz	FSL6	100169	01/08/2014	02/08/2015
Spectrum Analyzer	Agilent	N9038A	MY52260210	01/08/2014	02/08/2015
Spectrum Analyzer	Agilent	E4446A	MY46180348	03/24/2014	03/24/2016
Vector Signal Generator	Rohde & Schwarz	SMU 200A	1141.2005.02	06/13/2013	06/13/2015
Amplifier	Hewlett Packard	8449B	30008A01014	01/06/2014	02/06/2015

* Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.

7 EMC Test Plan

7.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

7.2 Customer

Table 11: Customer Information

Company Name	Pace Americas
Address	310 Providence Mine Road, Ste. 200
City, State, Zip	Nevada City, CA 95959
Country	U.S.A.
Phone	(530) 274-5440
Fax	(530) 273-6340

Table 12: Technical Contact Information

Name	Mark Rieger
E-mail	Mark.Rieger@pace.com
Phone	(530) 274-5440
Fax	(530) 273-6340

7.3 Equipment Under Test (EUT)

Table 13: EUT Specifications

EUT Specifications	
Dimensions	239mm (9.41”) x 177mm (6.97”) x 67mm (2.64”)
AC Adapter (M/N:EADP-36FB A)	Input Voltage: 120 Vac 50-60 Hz Input Current: 680 mA Output Voltage: 12 dc Output Current: 1.5 A
Environment	Indoor and Outdoor
Operating Temperature Range:	0 to 40 degrees C
Multiple Feeds:	☐ Yes and how many ☒ No
Hardware Version	4.0.8
Part Number	186-2173101
RF Software Version	Busy Box V1.10.3
802.11-radio modules	
Operating Mode	802.11a, b, g, n, and ac
Transmitter Frequency Band	2.412 GHz – 2.462 GHz 5.15 GHz to 5.25 GHz (Indoor Use) 5.25 GHz to 5.35 GHz 5.47 GHz to 5.725 GHz 5.725 GHz to 5.85 GHz
Max. Rated Power Output	See Channel Planning Table.
Power Setting @ Operating Channel	See Channel Planning Table.
Antenna Type	4 integrated metal stamped Antenna and 1 integrated PCB antenna (one metal stamped antenna used for both 2.4GHz and 5Ghz ranges)
Antenna Gain	Ant1 = 1.95 dBi, Ant2 = 2.27 dBi, Ant3 = 1.83 dBi, Ant4 = 2.03 dBi, Ant5 = 3.7 dBi, Ant6 = 1.9 dBi.
Modulation Type	☐ AM ☐ FM ☒ DSSS ☒ OFDM ☐ Other describe:

EUT Specifications	
Data Rate	*2.4 GHz Range:* 802.11b: 1, 2, 5.5, 11 Mbps at 1 Spatial Stream 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps at 1 Spatial Stream 802.11n HT20: 1 Spatial Stream: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps 2 Spatial Streams: 13, 26, 39, 58, 78, 104, 117, 130 Mbps 802.11n HT40: 1 Spatial Stream: 13.5, 27, 40.5, 54, 81, 108, 121.5, 135 Mbps 2 Spatial Streams: 27, 54, 81, 108, 162, 216, 243, 270 Mbps *5 GHz Range:* 802.11a: 4 Spatial Streams: 6, 9,12, 18, 24, 36, 48, 54 Mbps 802.11n HT20: 4 Spatial Streams: 26, 52, 78, 104, 156, 208, 234, 260 Mbps

802.11n HT40:

4 Spatial Streams: 54, 108, 162, 216, 324, 432, 486, 540 Mbps 802.11ac VHT20: 4 Spatial Streams: 26, 52, 78, 104, 156, 208, 234, 260, 312 Mbps 802.11ac VHT40: 4 Spatial Streams: 54, 108, 162, 216, 324, 432, 486, 540, 648, 720 Mbps 802.11ac VHT80: 4 Spatial Streams: 117, 234, 351, 468, 702, 936, 1053, 1170, 1404, 1560 Mbps	
TX/RX Chain (s)	2x2 at 2.4GHz Range 4x4 at 5 GHz Ranges
Directional Gain Type	☒ Correlated ☒ Beam-Forming ☐ Other describe:
Type of Equipment	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☐ Other
Note: 1. All four chains will be on / transmitted at all time. 2.This report only documents the radio characteristics for 5150 – 5250 MHz band	

Table 14: EUT Channel Power Specifications

No.	Frequency (MHz)	Target Power Value for					
		802.11a	HT20	HT40	VHT20	VHT40	VHT80
36	5180	9	9	11	9	11	
40	5200	9	9		9		11
44	5220	9	9	11	9	11	
48	5240	9	9		9		
52	5260						
56	5280						
60	5300						
64	5320						
100	5500						
104	5520						
108	5540						
112	5560						
116	5580						
120	5600						
124	5620						
128	5640						
132	5660						
136	5680						
140	5700						
149	5745	22	22	22	22	22	
153	5765	22	22		22		21
157	5785	22	22	22	22	22	
161	5805	22	22		22		
165	5825	22	22		22		

Note: 1. The center operating frequency is shifted upward by 10 MHz for HT40, VHT40, and VHT80
2. The adjusted power target values are updated at the evaluated frequencies.

Table 15: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
RJ45	CAT-5 Ethernet	☐ No	☒ Metric: 10 m	☒ M

Table 16: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell	PP23LB	9271001233	Setup EUT operating channel
Note: None.				

Table 17: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.247
5268AC	121404000102	Integrated Antenna	TX Emission, AC Conducted Emission
	121404000111	Direct via Murada Connection	Peak Transmit Power, Peak Power Spectral Density, Peak Excursion Ratio Occupied Bandwidth Frequency Stability Voltage Variation

Table 18: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Photo (X-Axis)	Setup Photo (Y-Axis)	Setup Photo (Z-Axis)
5268AC	Integrated	Transmit	EUT laid flat.	EUT stood upright	Na.
Note: Pre-scans were performed in 2 supporting axis, and Y-axis was worst.					

Table 19: Final Test Mode for 5150 - 5250 Bands

Test	802.11a	HT20	HT40	VHT20	VHT40	VHT40
Occupied Bandwidth FCC Part 15.407(a)	5180, 5220, 5240 MHz 4 Streams, 6Mbps	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5210 MHz 4 Streams, MCS0
Output Power FCC Part 15.407(a)(1-2)	5180, 5220, 5240 MHz 4 Streams, 6Mbps	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5210 MHz 4 Streams, MCS0
Peak Excursion Ratio FCC Part 15.407(a)(6)	5180, 5220, 5240 MHz 4 Streams, 6Mbps	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5210 MHz 4 Streams, MCS0

Peak Power Spectral Density FCC Part 15.407(a)	5180, 5220, 5240 MHz 4 Streams, 6Mbps	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5210 MHz 4 Streams, MCS0
Band-Edge (Radiated) FCC Part 15.205, 15.209, 15.407(b)	5180, 5240 MHz 4 Streams, 6Mbps	5180, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5180, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5210 MHz 4 Streams, MCS0
Transmitted Spurious Emission (30 MHz – 1GHz) FCC Part 15.205, 15.209, 15.407(b)		Worst Case: 5210 MHz 4 Streams – MCS0 (Y-Axis)				
Transmitted Spurious Emission (Above 1GHz) FCC Part 15.205, 15.209, 15.407(b)	5180, 5220, 5240 MHz 4 Streams, 6Mbps	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5180, 5220, 5240 MHz 4 Streams, MCS0	5190, 5230 MHz 4 Streams, MCS0	5210 MHz 4 Streams, MCS0
Conducted Spurious Emission (antenna port). FCC Part 15.407 (b)	According to CFR47 15.407 (b) EIPR shall not exceed -27 dBm/MHz. This is equivalent to the field strength of 68.2dBuV/m at 3 meter distance. The EUT is satisfied the requirement by meeting the limit under CFR47 Part 15.209.					
AC Conducted Emission FCC Part 15.207			5200 MHz at 4 Data Stream: 6Mbps			
Frequency Stability FCC Part 15.407 (g)	CW Tone at 5500 MHz, (Send_cw_signal 40 0 0 3 1 0).					
Voltage Variation FCC Part 15.31 (e)	CW Tone at 5500 MHz, (Send_cw_signal 40 0 0 3 1 0).					
Dynamic Frequency Selection FCC Part 15.407 (h)	5150 – 5250 MHz band does not support DFS.					
Note: 1. Band 1: 5150 MHz – 5250 MHz does not support 802.11a. 2. All radiated emission performed on Y-Axis. 3. All four chains will be on at all time. 4. All tests were pre-scanned for worst case before final testing.						

7.4 Test Specifications

Testing requirements

Table 20: Test Specifications

Emissions and Immunity	
Standard	Requirement
CFR 47 Part 15.407: 2013	All
RSS-210 Issue 8, 2010	All

END OF REPORT