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Emissions
Test Report

EUT Name: Wireless Residential Gateway

Model No.: 5268AC

CFR 47 Part 15.407:2016

Prepared for:

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Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	04/24/2014	Original Document	N/A
1	04/30/2014	Revised FCC ID number (throughout report).	J. Luong
2	04/12/2016	Updated Report to FCC UNII-3 Requirements	J. Luong

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 15.407:2016
Test Dates:	29 March 2014 to 18 April 2014

Guidance Documents:

Emissions: ANSI C63.10-2013, KDB 789033 D02 General U-NII Test Procedures New Rules v01r01. KDB 662911 D01 Multiple Transmitter Output v02r01.

Test Methods:

Emissions: ANSI C63.10-2013, KDB 789033 D02 General U-NII Test Procedures New Rules v01r01.

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.

Jeremy Luong	April 20, 2016	David Spencer	April 20, 2016 (Reissue Date)
Test Engineer	Date	Laboratory Manager	Date

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

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.407:2016 based on the results of testing performed on 29 March 2014 to 18 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 5725 MHz to 5850 MHz frequency band was covered this document.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.4:2009/ ANSI C63.10:2013	Test Parameters	Measured Value	Result
Spurious Emission in Transmitted Mode	CFR47 15.209	Class B	-1.27 dB (margin)	**Complied**
Restricted Bands of Operation	CFR47 15.205	Class B		**Complied**
AC Power Conducted Emission	CFR47 15.207	Class B	-17.47 dB (margin)	**Complied**
Occupied Bandwidth	CFR47 15.407 (e)	≥ 500 kHz	16.373 MHz	**Complied**
Maximum Transmitted Power	CFR47 15.407 (a) (3)	27.92 dBm	26.57 dBm	**Complied**
Peak Power Spectral Density	CFR47 15.407 (a) (3)	8 dBm/ 3 kHz.	-6.06 dBm	**Complied**
Conducted Emission – Antenna Port	CFR47 15.407 (b)(4)	< -27 dBm/MHz	Note 2	**Complied**
Frequency Stability	CFR47 15.407 (g)	±20 ppm	8.98 ppm	**Complied**
Voltage Variation	CFR47 15.31 (e)	±20 ppm	0.568 ppm	**Complied**
RF Exposure - General Population	CFR47 15.407 (f), 2.1091	1.0 mW/cm^2	0.8188 mW/cm^2	**Complied**

Note: 1.This report is only covered for 5725 to 5850 MHz.
2. Per Memorandum Opinion and Order Released March 2, 2016 (FCC 16-24), CFR47 15.407 (b)(4)(ii) accepts compliance with the 15.247 (d) limit.

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 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 Testing Cert #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-1). 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 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 Testing Cert #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. Equipment calibration records are kept on file at the test facility.

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.

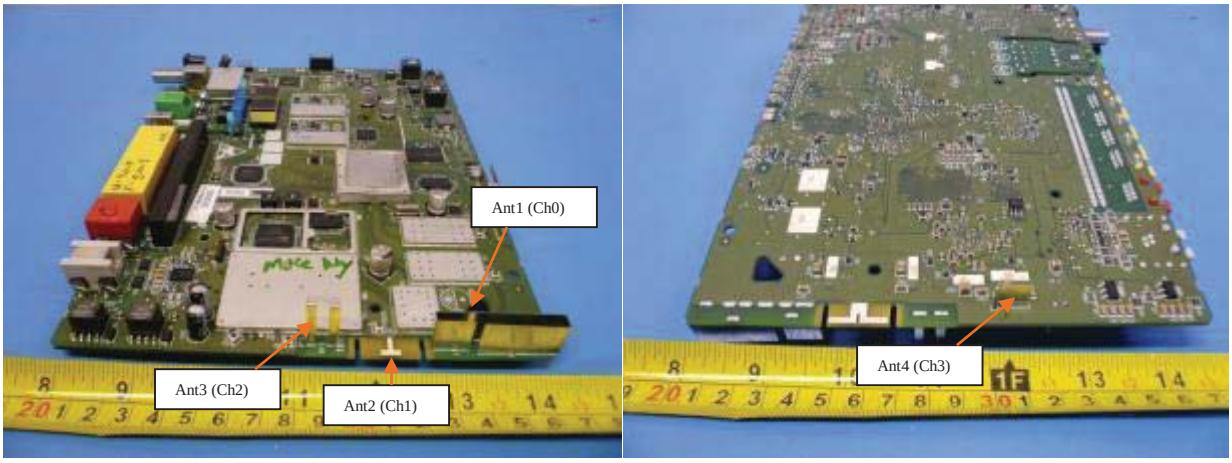
3.4 Unique Antenna Connector

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: 2016. 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.

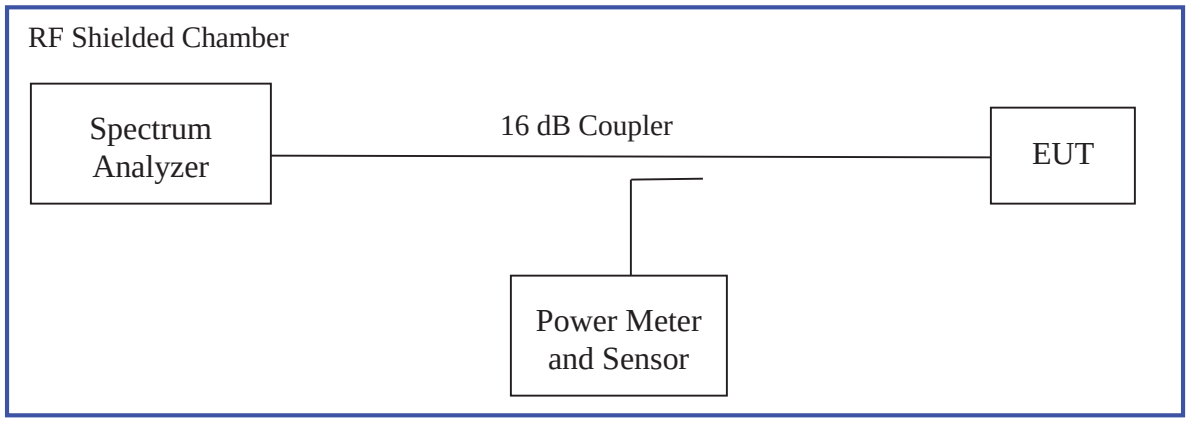
The maximum output power and harmonics shall not exceed CFR47 Part 15.407(a)(3):2016

The maximum transmitted power is +30 dBm or 1Watt.

4.1.1 Test Method

The ANSI C63.10-2013 Section 12.3.2.4 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)(3):2016; 5725 MHz to 5850 MHz. The worst mode results indicated below.

Test Setup:



The maximum conducted output power, Method SA-2 of ANSI C63.10 (2013) was used.

Each chain was measured individually and applied the measure-and-sum approach per KDB662911. All chains will be on at all time and beam performing. Per CFR47 Part 15.407 (a)(3), the limit is reduced for every dBi gain exceeding 6 dBi. The adjusted limit is 27.92 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 16, 2014
Antenna Type: Integrated	**Power Setting:** See test plan
Max. Directional Gain: + 8.08 dBi	**Signal State:** Modulated
Ambient Temp.: 22 °C	**Relative Humidity:**30%

802.11a Mode, 4x4

Operating Channel	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total Power [dBm]	Margin [dB]
5745	27.92	20.41	19.96	19.91	21.14	0.04	26.45	-1.47
5785	27.92	20.43	19.63	19.48	21.30	0.04	26.34	-1.58
5825	27.92	20.47	19.48	19.91	20.90	0.04	26.29	-1.63

Note: 1.The highest output power was observed at 802.11a 6 Mbps, 4 data streams at 99% duty cycle.

802.11n (HT20) Mode, 4x4

Operating Channel	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total Power [dBm]	Margin [dB]
5745	27.92	20.73	19.66	19.51	20.89	0.09	26.35	-1.57
5785	27.92	20.40	19.89	19.53	21.00	0.09	26.35	-1.57
5825	27.92	20.11	20.12	20.04	21.05	0.09	26.46	-1.46

Note: 1.The highest output power was observed at HT20 MCS0, 4 data streams at 98% duty cycle.

802.11n (HT40) Mode, 4x4

Operating Channel	Limit [dBm]	Ch0 [dBm]	Ch1 [dBm]	Ch2 [dBm]	Ch3 [dBm]	CF [dB]	Total Power [dBm]	Margin [dB]
5755	27.92	19.64	19.87	20.20	21.16	0.18	26.46	-1.46
5795	27.92	20.27	19.94	19.90	21.10	0.18	26.53	-1.39

Note: 1.The highest output power was observed at HT40 MCS0, 4 Data Streams at 96% duty cycle.

802.11ac (VHT20) Mode, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5745	27.92	20.70	19.63	19.51	21.27	0.09	26.45	-1.47
5785	27.92	20.39	19.91	19.73	21.05	0.09	26.41	-1.51
5825	27.92	20.02	20.04	20.12	21.07	0.09	26.45	-1.47
Note: 1.The highest output power was observed at VHT20 MCS0, 4 data streams at 98% duty cycle.								
802.11ac (VHT40) Mode, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5755	27.92	20.85	19.97	19.75	20.99	0.12	26.57	-1.35
5795	27.92	20.08	20.17	19.83	21.13	0.12	26.47	-1.45
Note: 1.The highest output power was observed at VHT40 MCS0, 4 data streams at 97% duty cycle.								
802.11ac (VHT80) Mode, 4x4								
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**CF [dB]**	**Total Power [dBm]**	**Margin [dB]**
5775	27.92	18.94	18.22	17.99	19.58	0.32	25.06	-2.86
Note: 1.The highest output power was observed at VHT80 MCS0, 4 data streams at 93% duty cycle.								

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

Test Conditions: Conducted Measurement				**Test Date:** April 10, 2014			
Antenna Type: Integrated				**Power Setting:** See test plan			
Max. Directional Gain: + 8.08 dBi				**Signal State:** Modulated			
Ambient Temp.: 22 °C				**Relative Humidity:**30%			
802.11a Mode, 4x4							
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5745	N/A	21.83	21.44	21.42	22.53	27.85	N/A
5785	N/A	22.05	21.28	21.10	22.92	27.92	N/A
5825	N/A	22.12	21.14	21.60	22.51	27.90	N/A
Note: The highest output power was observed at 802.11a 6Mbps, 4 Data Streams.							
802.11n (HT20) Mode, 4x4							
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5745	N/A	22.12	21.00	20.91	22.42	27.68	N/A
5785	N/A	22.03	21.42	21.15	22.73	27.89	N/A
5825	N/A	21.64	21.76	21.81	22.83	28.06	N/A
Note: The highest output power was observed at HT20 MCS0, 4 Data Streams.							
802.11n (HT40) Mode, 4x4							
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5755	N/A	21.53	21.33	21.66	22.92	27.93	N/A
5795	N/A	21.90	21.57	21.56	22.85	28.02	N/A
Note: The highest output power was observed at HT40 MCS0, 4 Data Streams.							
802.11ac (VHT20) Mode, 4x4							
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5745	N/A	22.21	21.04	20.98	22.82	27.86	N/A
5785	N/A	22.04	21.52	21.23	22.79	27.96	N/A
5825	N/A	21.64	21.69	21.83	22.42	27.92	N/A
Note: The highest output power was observed at VHT20 MCS0, 4 Data Streams.							

802.11ac (VHT40) Mode, 4x4							
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5755	N/A	22.27	21.45	21.23	22.60	27.94	N/A
5795	N/A	21.64	21.80	21.46	22.86	28.00	N/A
Note: The highest output power was observed at VHT40 MCS0, 4 Data Streams.							
802.11ac (VHT80) Mode, 4x4							
Operating Channel	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Ch2 [dBm]**	**Ch3 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5775	N/A	21.63	21.26	21.29	22.71	27.78	N/A
Note: The highest output power was observed at VHT80 MCS0, 4 Data Streams.							

Figure 1: Maximum Conducted Output Power-5745MHz-11a-6Mpbs-Ch0

Figure 2: Maximum Conducted Output Power-5745MHz-11a-6Mpbs-Ch1

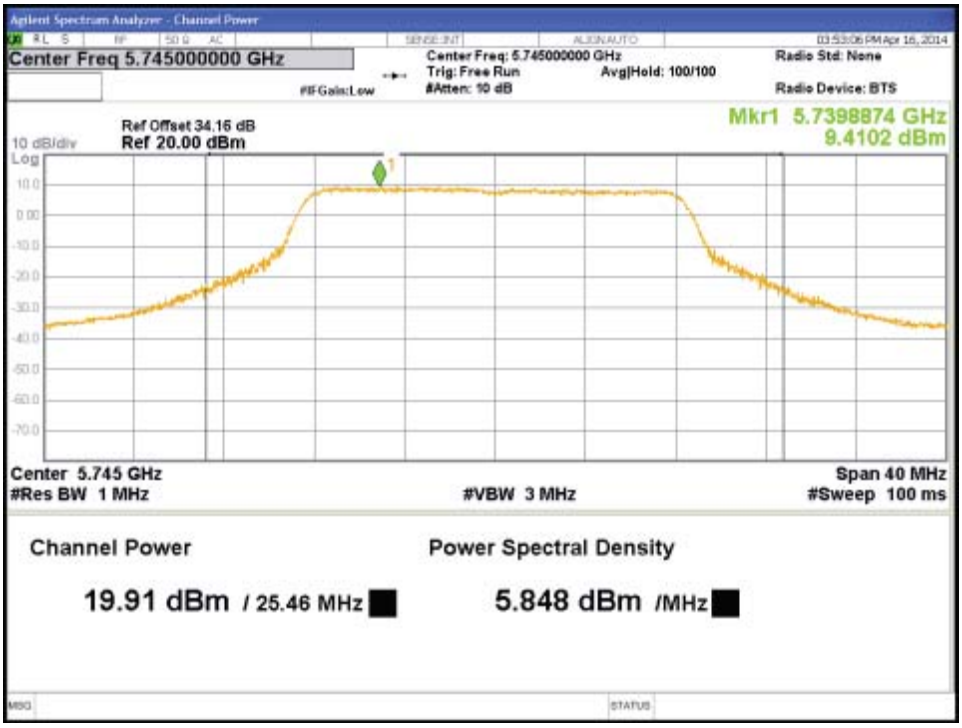


Figure 3: Maximum Conducted Output Power-5745MHz-11a-6Mpbs-Ch2

Figure 4: Maximum Conducted Output Power-5745MHz-11a-6Mpbs-Ch3

Figure 5: Maximum Conducted Output Power-5785MHz-11a-6Mpbs-Ch0

Figure 6: Maximum Conducted Output Power-5785MHz-11a-6Mpbs-Ch1

Figure 7: Maximum Conducted Output Power-5785MHz-11a-6Mpbs-Ch2

Figure 8: Maximum Conducted Output Power-5785MHz-11a-6Mpbs-Ch3

Figure 9: Maximum Conducted Output Power-5825MHz-11a-6Mpbs-Ch0

Figure 10: Maximum Conducted Output Power-5825MHz-11a-6Mpbs-Ch1

Figure 11: Maximum Conducted Output Power-5825MHz-11a-6Mpbs-Ch2

Figure 12: Maximum Conducted Output Power-5825MHz-11a-6Mpbs-Ch3

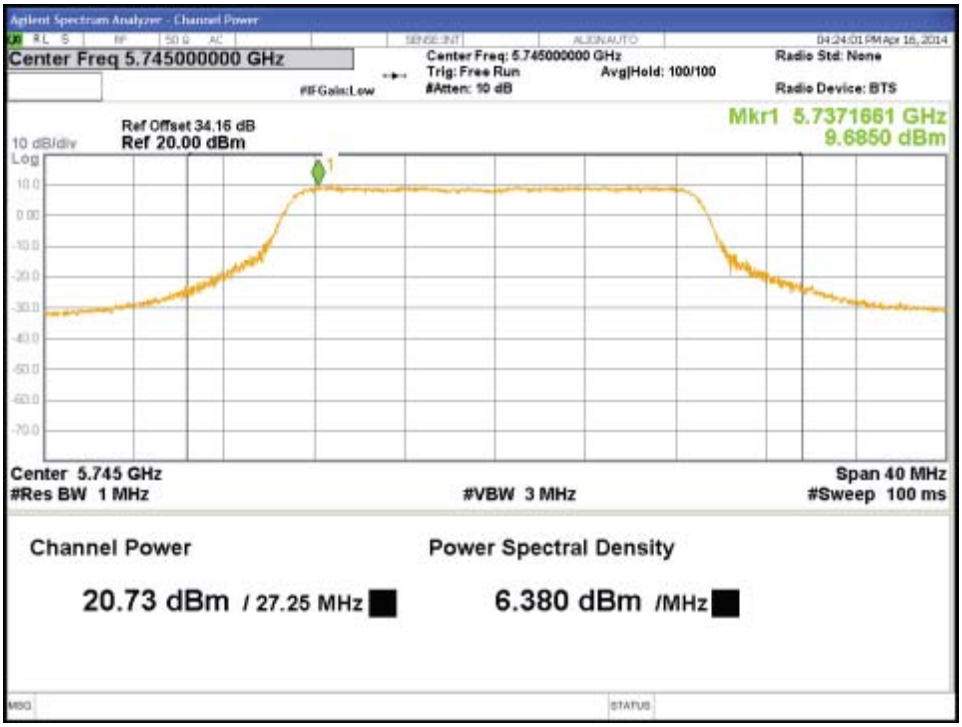


Figure 13: Maximum Conducted Output Power-5745MHz-HT20-MCS0-Ch0

Figure 14: Maximum Conducted Output Power-5745MHz-HT20-MCS0-Ch1

Figure 15: Maximum Conducted Output Power-5745MHz-HT20-MCS0-Ch2

Figure 16: Maximum Conducted Output Power-5745MHz-HT20-MCS0-Ch3

Figure 17: Maximum Conducted Output Power-5785MHz-HT20-MCS0-Ch0

Figure 18: Maximum Conducted Output Power-5785MHz-HT20-MCS0-Ch1

Figure 19: Maximum Conducted Output Power-5785MHz-HT20-MCS0-Ch2

Figure 20: Maximum Conducted Output Power-5785MHz-HT20-MCS0-Ch3

Figure 21: Maximum Conducted Output Power-5825MHz-HT20-MCS0-Ch0

Figure 22: Maximum Conducted Output Power-5825MHz-HT20-MCS0-Ch1

Figure 23: Maximum Conducted Output Power-5825MHz-HT20-MCS0-Ch2

Figure 24: Maximum Conducted Output Power-5825MHz-HT20-MCS0-Ch3

Figure 25: Maximum Conducted Output Power-5755MHz-HT40-MCS0-Ch0

Figure 26: Maximum Conducted Output Power-5755MHz-HT40-MCS0-Ch1

Figure 27: Maximum Conducted Output Power-5755MHz-HT40-MCS0-Ch2

Figure 28: Maximum Conducted Output Power-5755MHz-HT40-MCS0-Ch3

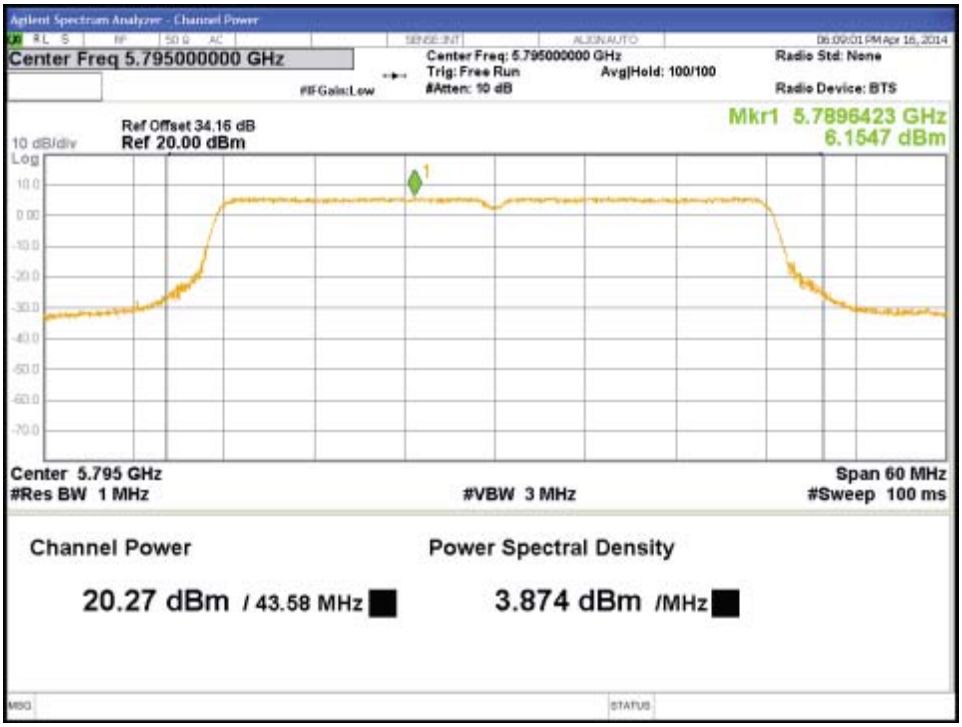


Figure 29: Maximum Conducted Output Power-5795MHz-HT40-MCS0-Ch0

Figure 30: Maximum Conducted Output Power-5795MHz-HT40-MCS0-Ch1

Figure 31: Maximum Conducted Output Power-5795MHz-HT40-MCS0-Ch2

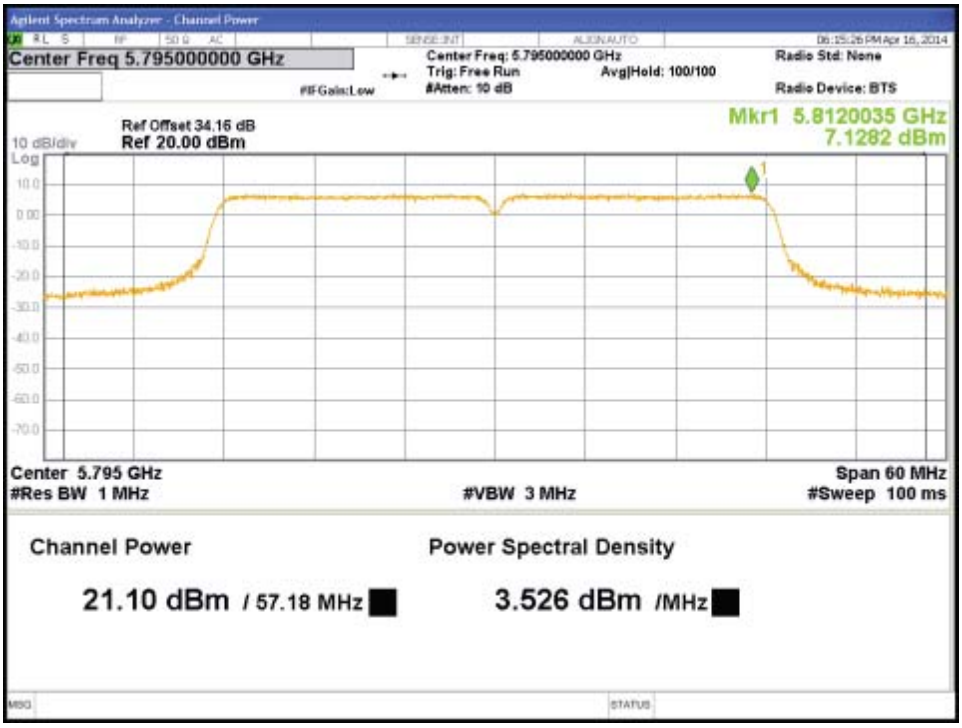


Figure 32: Maximum Conducted Output Power-5795MHz-HT40-MCS0-Ch3

Figure 33: Maximum Conducted Output Power-5745MHz-VHT20-MCS0-Ch0

Figure 34: Maximum Conducted Output Power-5745MHz-VHT20-MCS0-Ch1

Figure 35: Maximum Conducted Output Power-5745MHz-VHT20-MCS0-Ch2

Figure 36: Maximum Conducted Output Power-5745MHz-VHT20-MCS0-Ch3

Figure 37: Maximum Conducted Output Power-5785MHz-VHT20-MCS0-Ch0

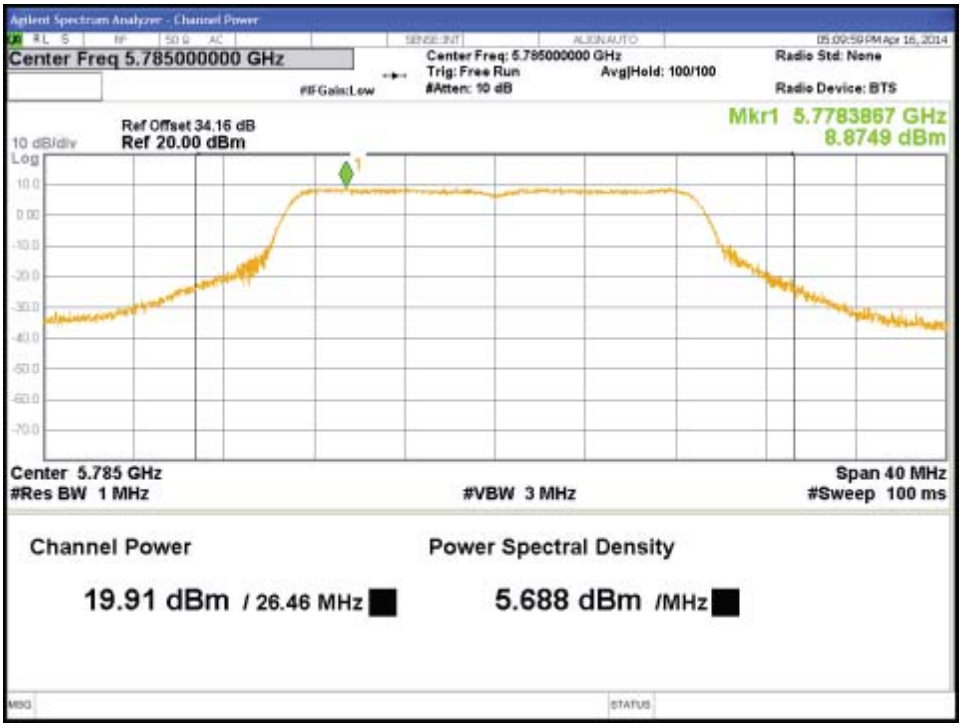


Figure 38: Maximum Conducted Output Power-5785MHz-VHT20-MCS0-Ch1

Figure 39: Maximum Conducted Output Power-5785MHz-VHT20-MCS0-Ch2

Figure 40: Maximum Conducted Output Power-5785MHz-VHT20-MCS0-Ch3

Figure 41: Maximum Conducted Output Power-5825MHz-VHT20-MCS0-Ch0

Figure 42: Maximum Conducted Output Power-5825MHz-VHT20-MCS0-Ch1

Figure 43: Maximum Conducted Output Power-5825MHz-VHT20-MCS0-Ch2

Figure 44: Maximum Conducted Output Power-5825MHz-VHT20-MCS0-Ch3

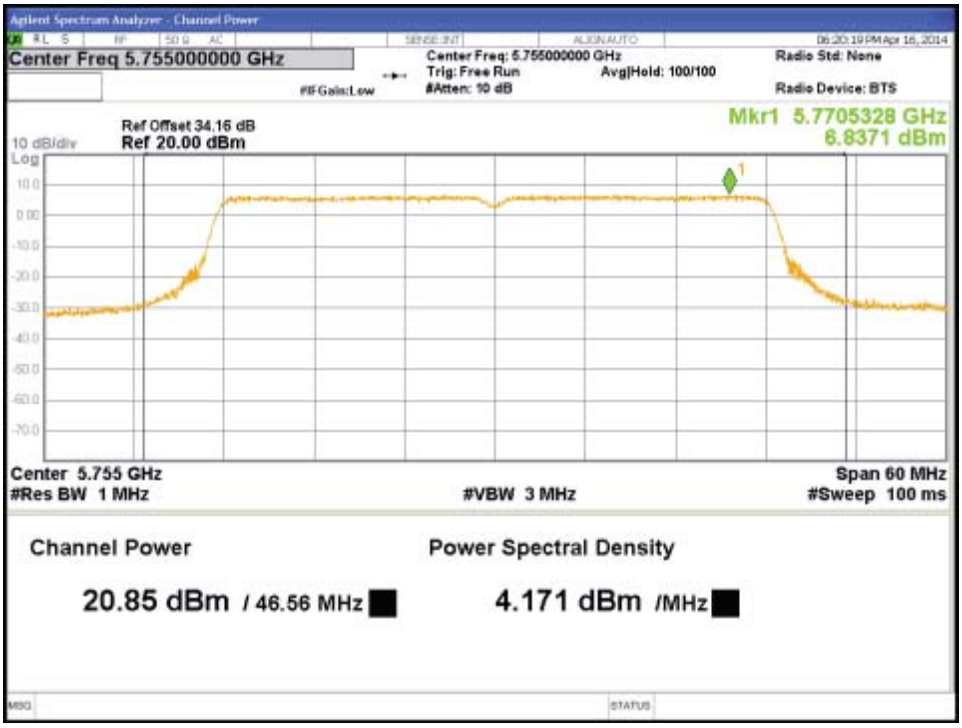


Figure 45: Maximum Conducted Output Power-5755MHz-VHT40-MCS0-Ch0

Figure 46: Maximum Conducted Output Power-5755MHz-VHT40-MCS0-Ch1

Figure 47: Maximum Conducted Output Power-5755MHz-VHT40-MCS0-Ch2

Figure 48: Maximum Conducted Output Power-5755MHz-VHT40-MCS0-Ch3

Figure 49: Maximum Conducted Output Power-5795MHz-VHT40-MCS0-Ch0

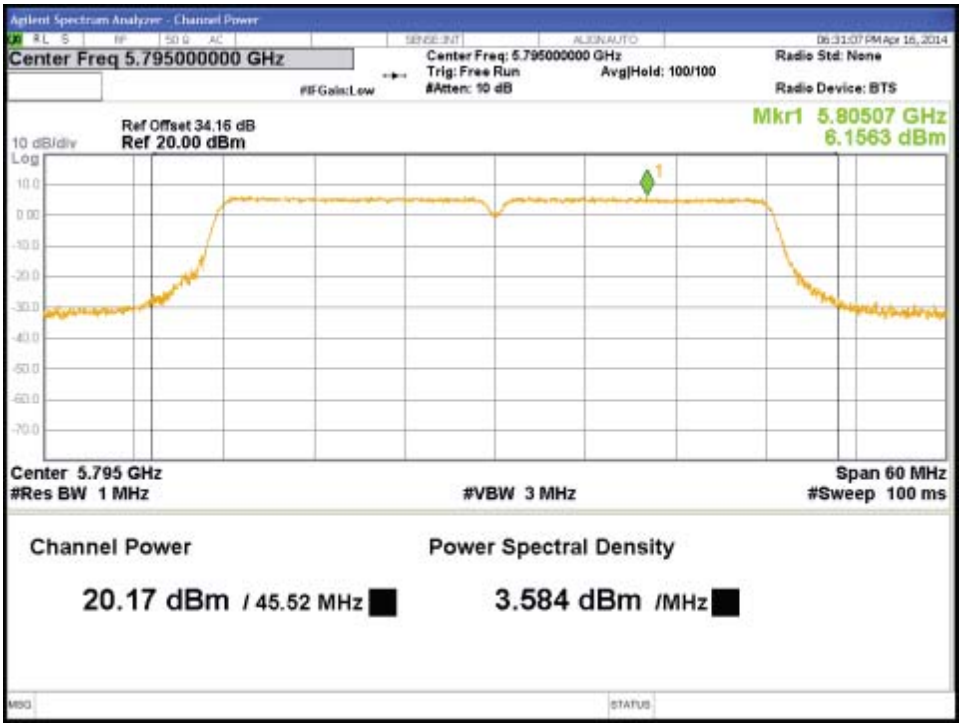


Figure 50: Maximum Conducted Output Power-5795MHz-VHT40-MCS0-Ch1

Figure 51: Maximum Conducted Output Power-5795MHz-VHT40-MCS0-Ch2

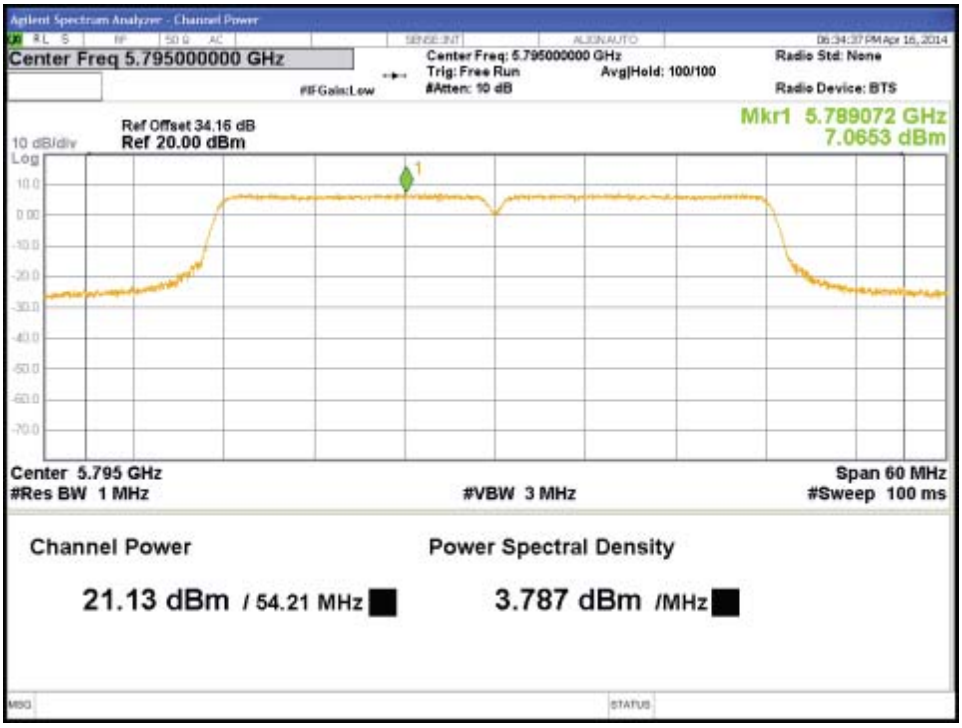


Figure 52: Maximum Conducted Output Power-5795MHz-VHT40-MCS0-Ch3

Figure 53: Maximum Conducted Output Power-5775MHz-VHT80-MCS0-Ch0

Figure 54: Maximum Conducted Output Power-5775MHz-VHT80-MCS0-Ch1

Figure 55: Maximum Conducted Output Power-5775MHz-VHT80-MCS0-Ch2

Figure 56: Maximum Conducted Output Power-5775MHz-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.

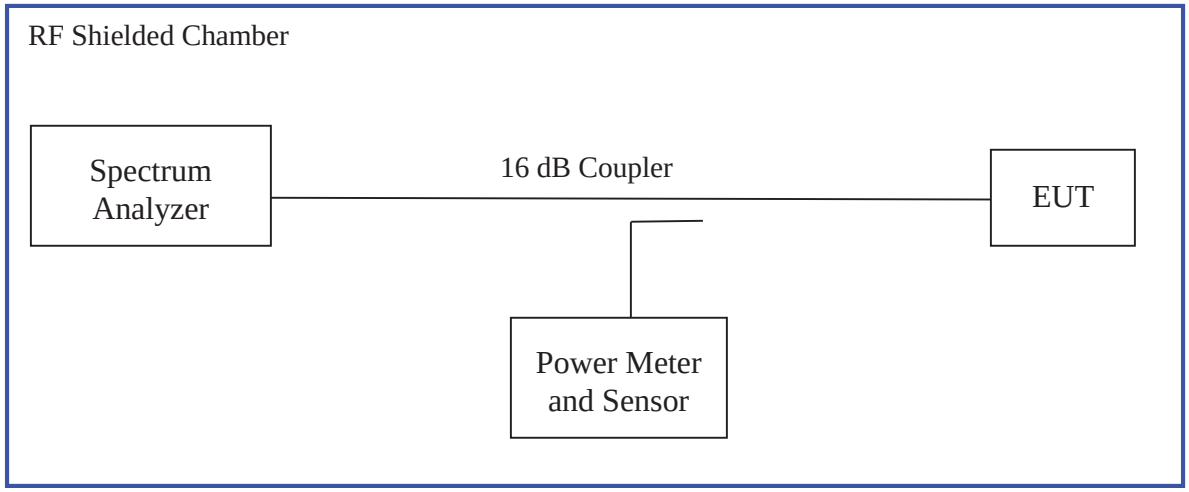
The 6dB bandwidth is defined the bandwidth of 6 dBr from highest transmitted level of the fundamental frequency.

The bandwidth shall be at least 500 kHz per Section CFR47 15.407(e) 2016.

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(e) 2016. The preliminary investigation was performed to find the narrowest 6 dB bandwidth for each operational mode at different data rates. This worst finding was performed on 3 channels in each operating frequency range; 5725 MHz to 5850 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:** April 16, 2014			
Antenna Type: Integrated			**Power Setting:** See test plan			
Max. Directional Gain: + 8.08 dBi			**Signal State:** Modulated			
Ambient Temp.: 22 °C			**Relative Humidity:**30%			
Bandwidth (MHz) for 802.11a						
Freq. (MHz)	**Limit (kHz)**	**6 dB Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5745	500	16.433	16.418	16.388	16.388	Pass
5785	500	16.373	16.418	16.403	16.418	Pass
5825	500	16.343	16.403	16.433	16.373	Pass
Freq. (MHz)	**Limit (kHz)**	**99 % Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5745		17.01	16.99	16.94	17.01	
5785		16.98	17.01	16.93	17.02	
5825		16.92	17.05	16.91	17.00	
Note: The narrowest bandwidth was observed at 802.11a, 6 Mbps						

Bandwidth (MHz) for 802.11n HT20						
Freq. (MHz)	**Limit (kHz)**	**6 dB Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5745	500	17.694	17.619	17.619	17.664	Pass
5785	500	17.619	17.604	17.697	17.634	Pass
5825	500	17.604	17.634	17.694	17.619	Pass

Freq. (MHz)	Limit (kHz)	99% Bandwidth (MHz)				
		Ch0	Ch1	Ch2	Ch3	Results
5745		18.29	18.23	18.26	18.31	
5785		18.29	18.25	18.26	18.32	
5825		18.29	18.26	18.27	18.33	
Note: The narrowest bandwidth was observed at 802.11n HT20, MCS0						
Bandwidth (MHz) for 802.11n HT40						
Freq. (MHz)	**Limit (kHz)**	**6 dB Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5755	500	36.330	36.356	36.305	36.330	Pass
5795	500	36.305	36.356	36.330	36.330	Pass
Freq. (MHz)	**Limit (kHz)**	**99% Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5755		36.50	36.52	36.49	36.63	
5795		36.52	36.53	36.52	36.60	
Note: The bandwidth was observed at 802.11n HT40, MCS0						
Bandwidth (MHz) for 802.11ac VHT20						
Freq. (MHz)	**Limit (kHz)**	**6 dB Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5745	500	17.619	17.619	17.604	17.619	Pass
5785	500	17.619	17.664	17.694	17.619	Pass
5825	500	17.589	17.619	17.724	17.604	Pass
Freq. (MHz)	**Limit (kHz)**	**99% Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5745		18.35	18.22	18.32	18.33	
5785		18.35	18.23	18.32	18.31	
5825		18.34	18.24	18.33	18.32	

Note: The narrowest bandwidth was observed at 802.11n HT20, MCS0						
Bandwidth (MHz) for 802.11ac VHT40						
Freq. (MHz)	**Limit (kHz)**	**6 dB Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5755	500	36.305	36.330	36.254	36.330	Pass
5795	500	35.845	36.356	36.279	36.305	Pass
Freq. (MHz)	**Limit (kHz)**	**99% Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5755		36.51	36.65	36.49	36.73	
5795		36.52	36.64	36.53	36.71	
Note: The bandwidth was observed at 802.11n HT40, MCS0						
Bandwidth (MHz) for 802.11ac VHT80						
Freq. (MHz)	**Limit (kHz)**	**6 dB Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5755	500	75.44	74.49	75.14	75.09	Pass
Freq. (MHz)	**Limit (kHz)**	**99% Bandwidth (MHz)**				
		Ch0	**Ch1**	**Ch2**	**Ch3**	**Results**
5755		75.48	75.56	75.46	75.72	
Note: The bandwidth was observed at 802.11n HT80, MCS0						

Figure 57: 6 dB Bandwidth-5745MHz-11a-6Mbps-Ch0

Figure 58: 6 dB Bandwidth-5745MHz-11a-6Mbps-Ch1

Figure 59: 6 dB Bandwidth-5745MHz-11a-6Mbps-Ch2

Figure 60: 6 dB Bandwidth-5745MHz-11a-6Mbps-Ch3

Figure 61: 6 dB Bandwidth-5785MHz-11a-6Mbps-Ch0

Figure 62: 6 dB Bandwidth-5785MHz-11a-6Mbps-Ch1

Figure 63: 6 dB Bandwidth-5785MHz-11a-6Mbps-Ch2

Figure 64: 6 dB Bandwidth-5785MHz-11a-6Mbps-Ch3

Figure 65: 6 dB Bandwidth-5825MHz-11a-6Mbps-Ch0

Figure 66: 6 dB Bandwidth-5825MHz-11a-6Mbps-Ch1

Figure 67: 6 dB Bandwidth-5825MHz-11a-6Mbps-Ch2

Figure 68: 6 dB Bandwidth-5825MHz-11a-6Mbps-Ch3

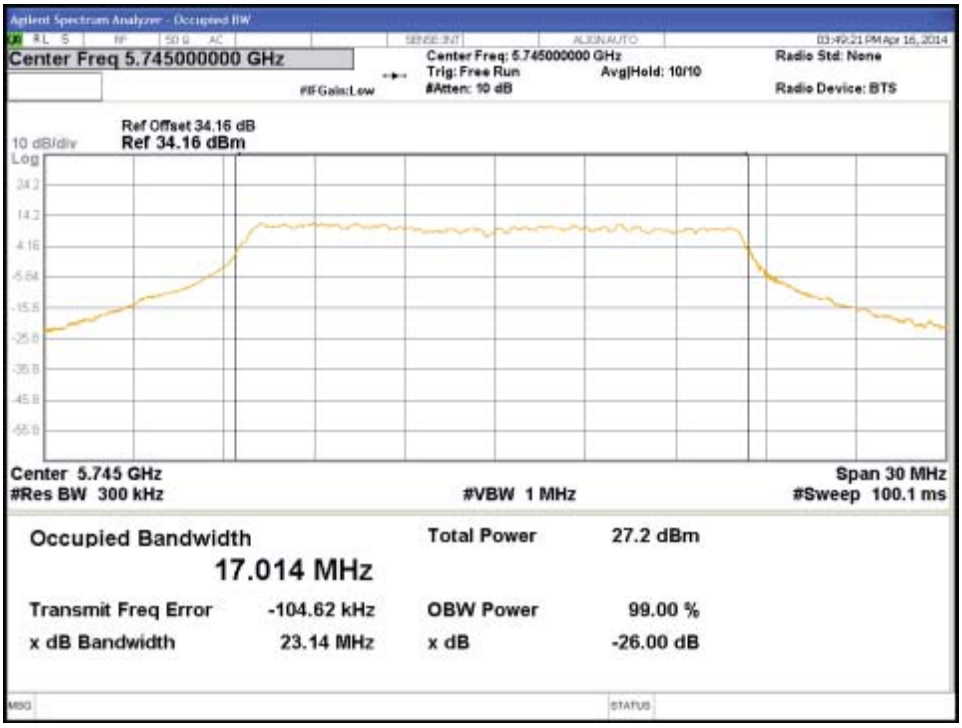


Figure 69: 99% Bandwidth-5745MHz-11a-6Mbps-Ch0

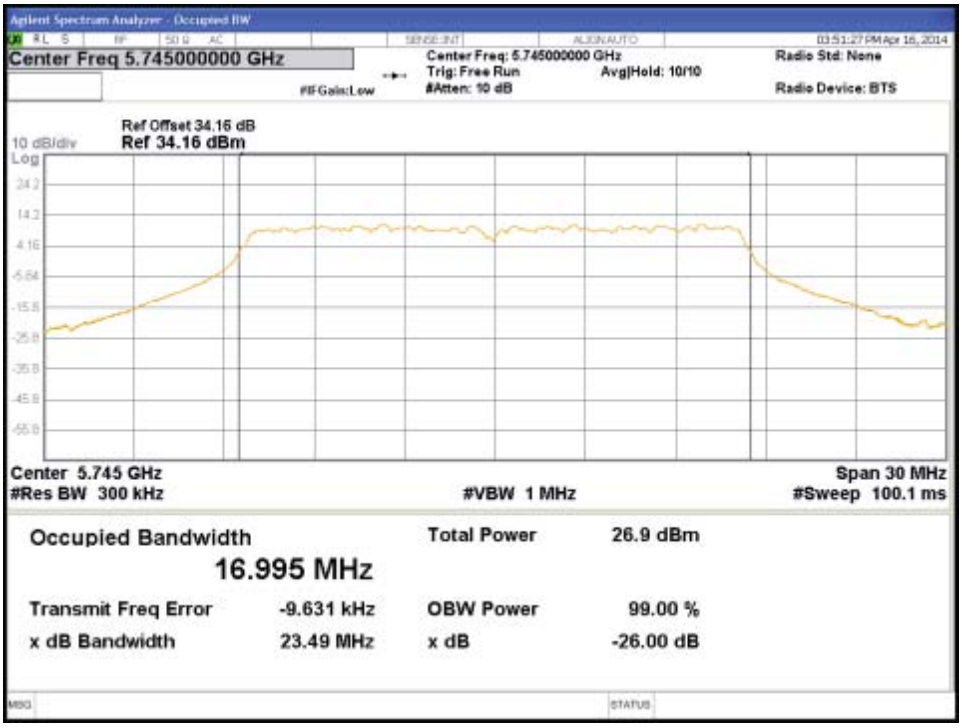


Figure 70: 99% Bandwidth-5745MHz-11a-6Mbps-Ch1

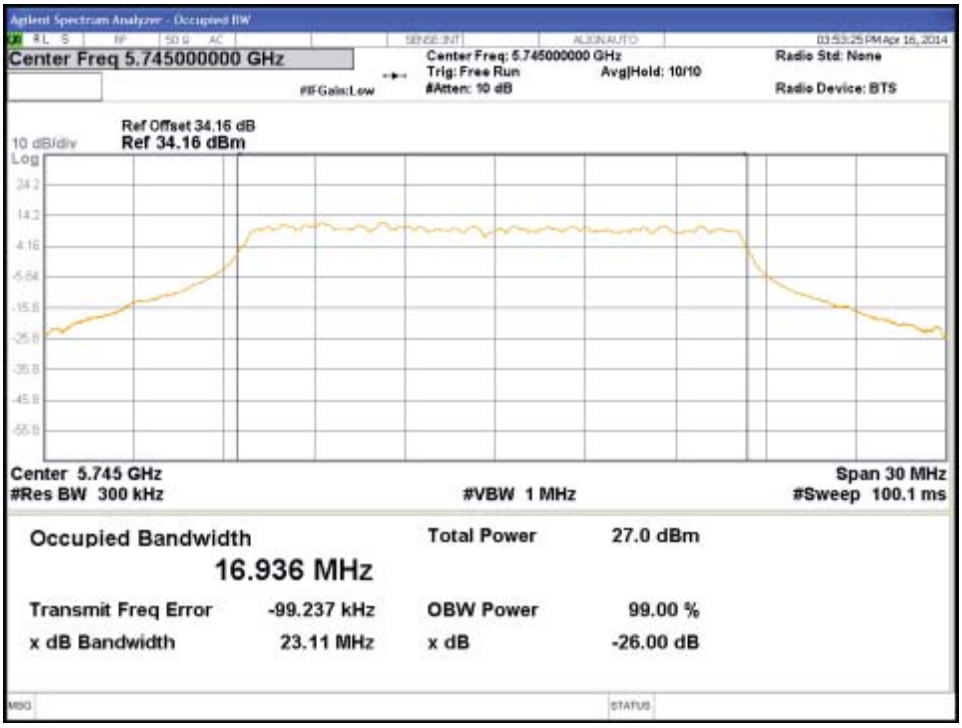


Figure 71: 99% Bandwidth-5745MHz-11a-6Mbps-Ch2

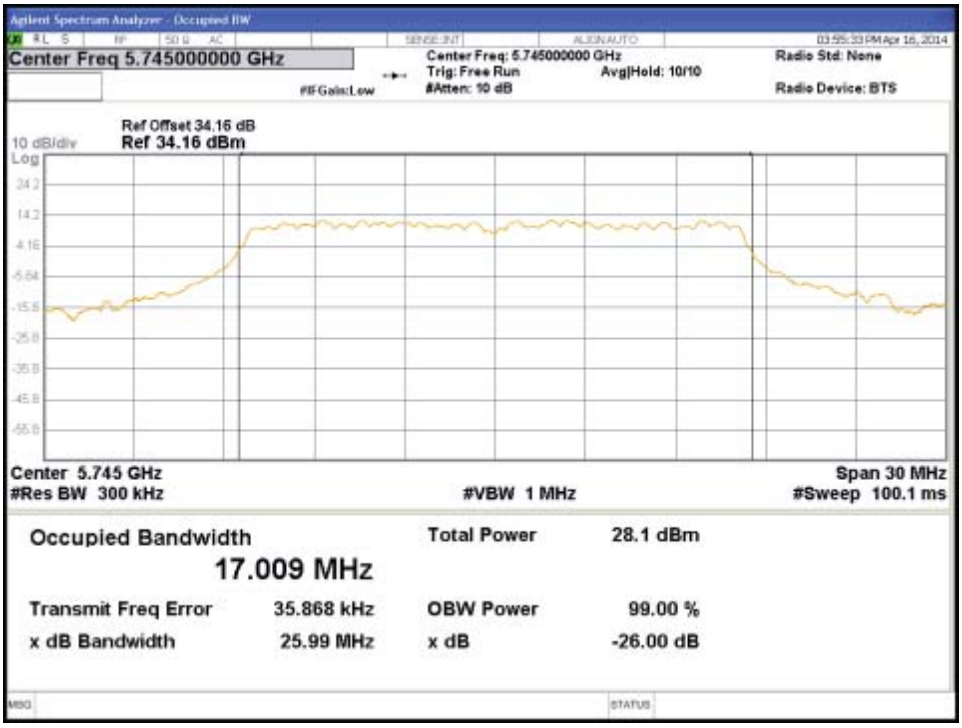


Figure 72: 99% Bandwidth-5745MHz-11a-6Mbps-Ch3

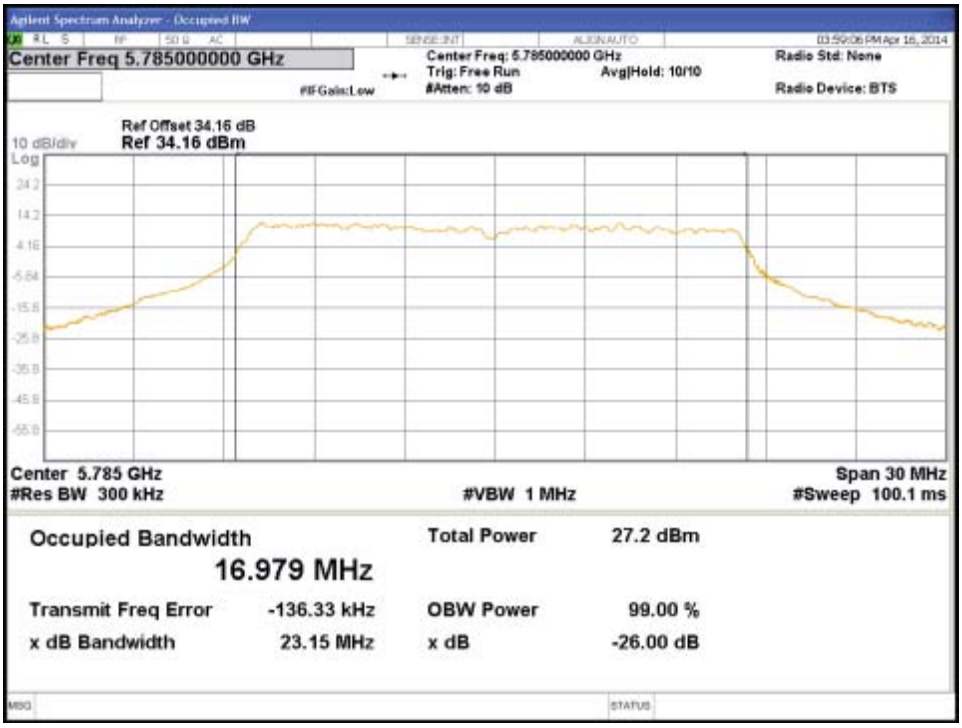


Figure 73: 99% Bandwidth-5785MHz-11a-6Mbps-Ch0

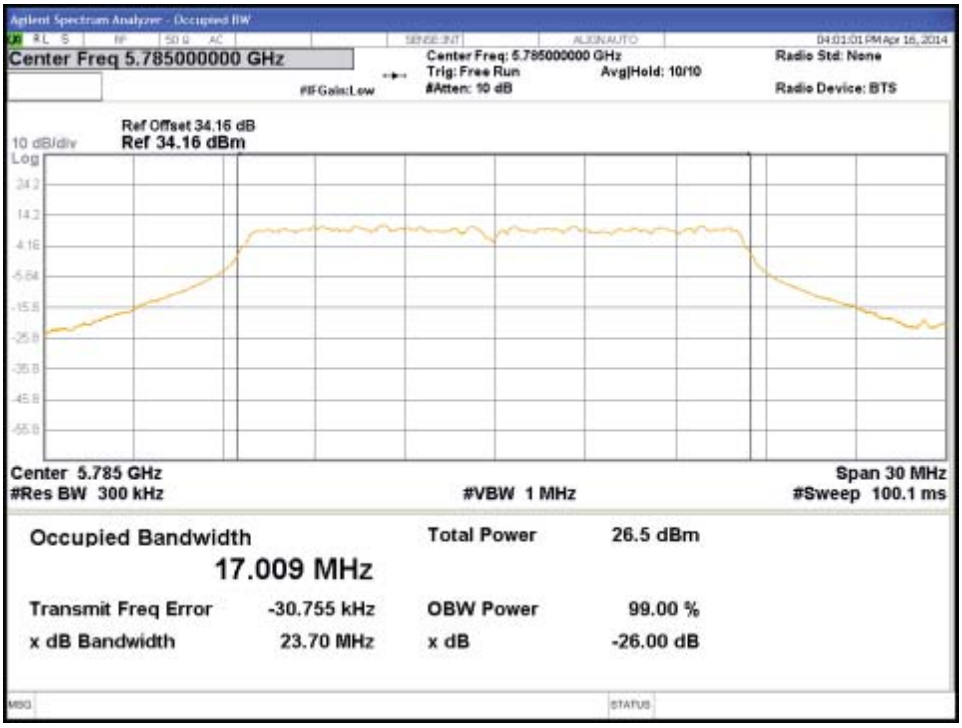


Figure 74: 99% Bandwidth-5785MHz-11a-6Mbps-Ch1

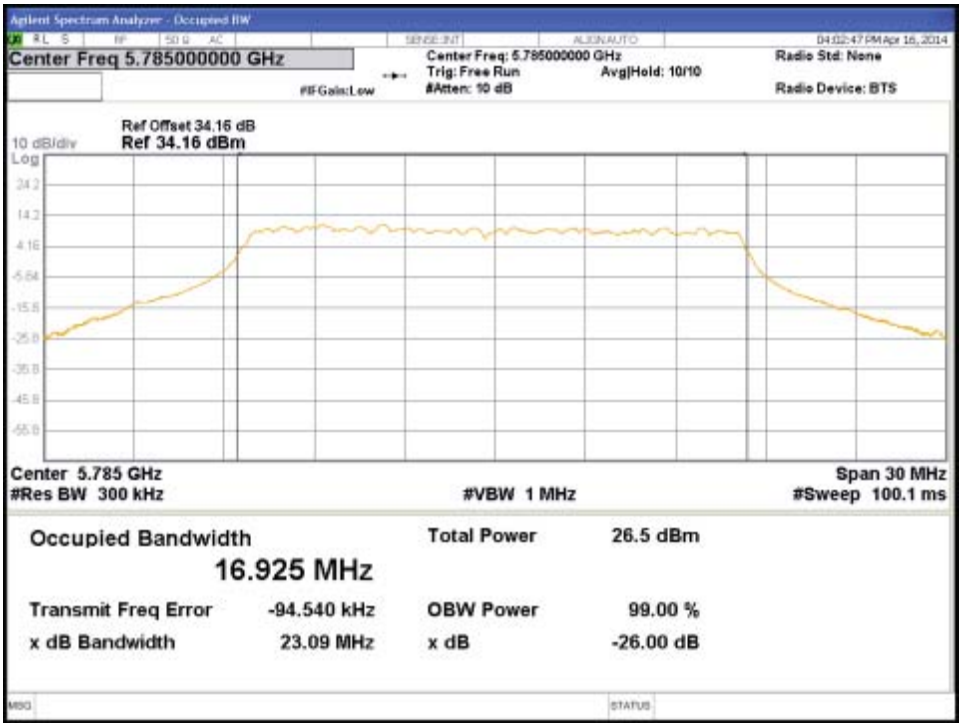


Figure 75: 99% Bandwidth-5785MHz-11a-6Mbps-Ch2

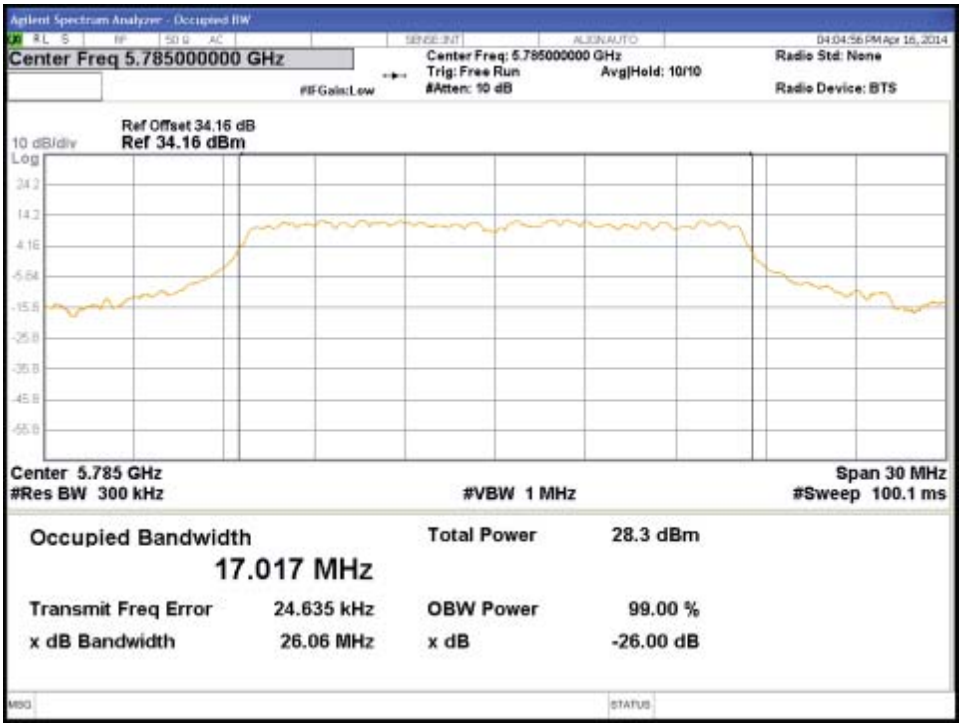


Figure 76: 99% Bandwidth-5785MHz-11a-6Mbps-Ch3

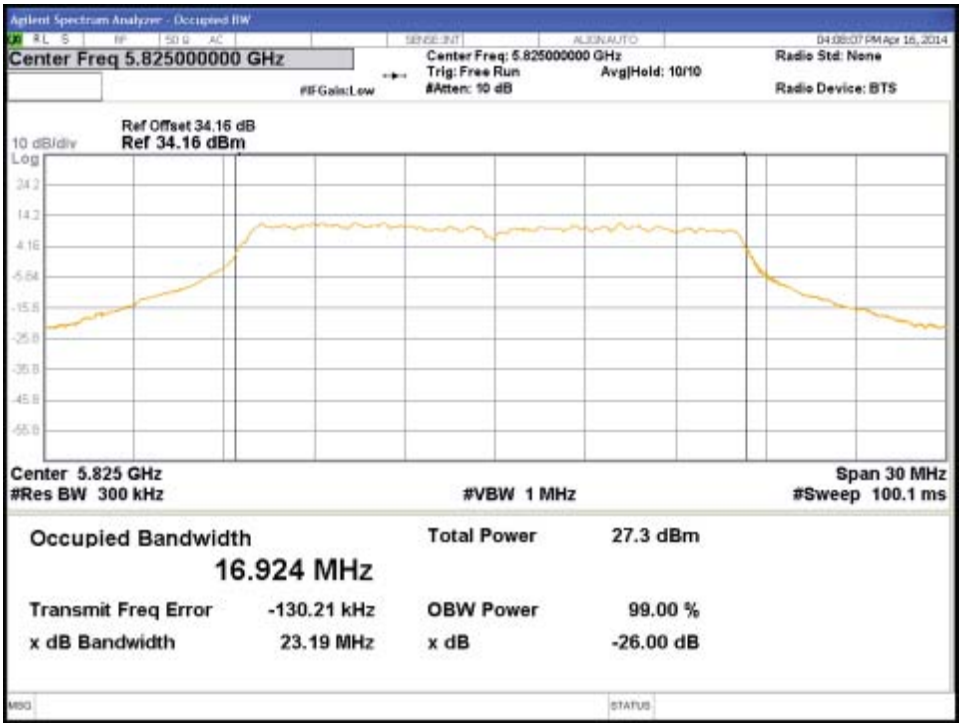


Figure 77: 99% Bandwidth-5825MHz-11a-6Mbps-Ch0

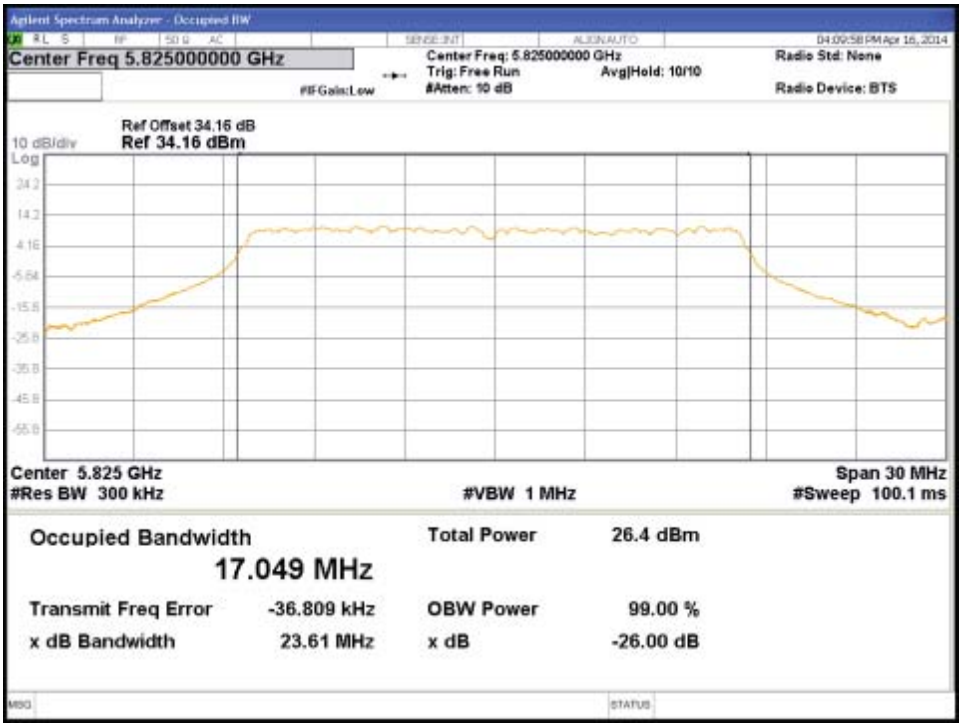


Figure 78: 99% Bandwidth-5825MHz-11a-6Mbps-Ch1

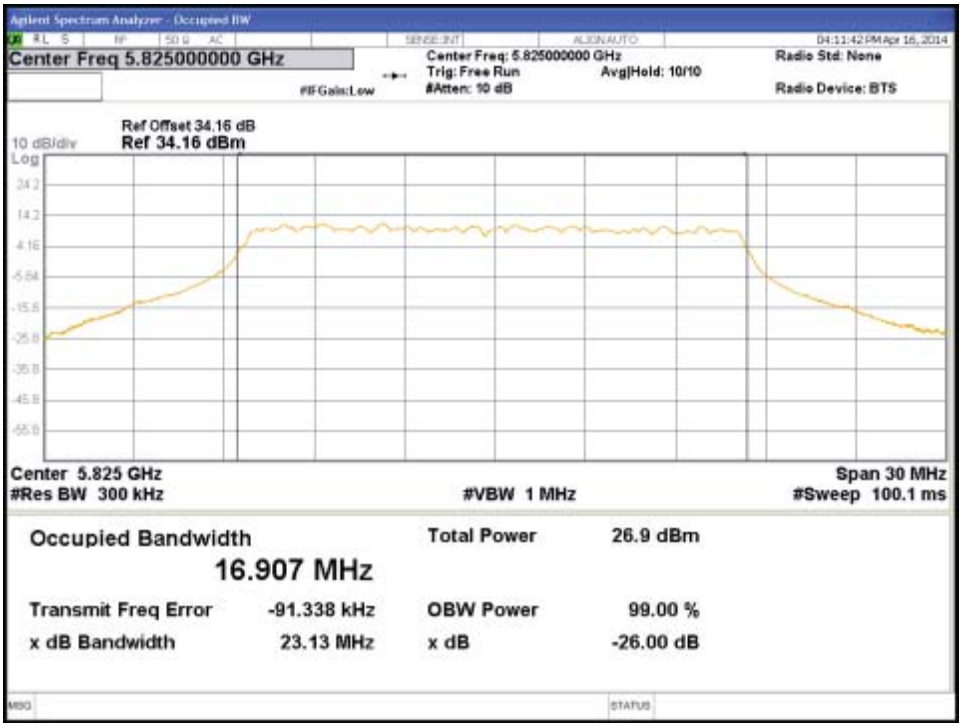


Figure 79: 99% Bandwidth-5825MHz-11a-6Mbps-Ch2

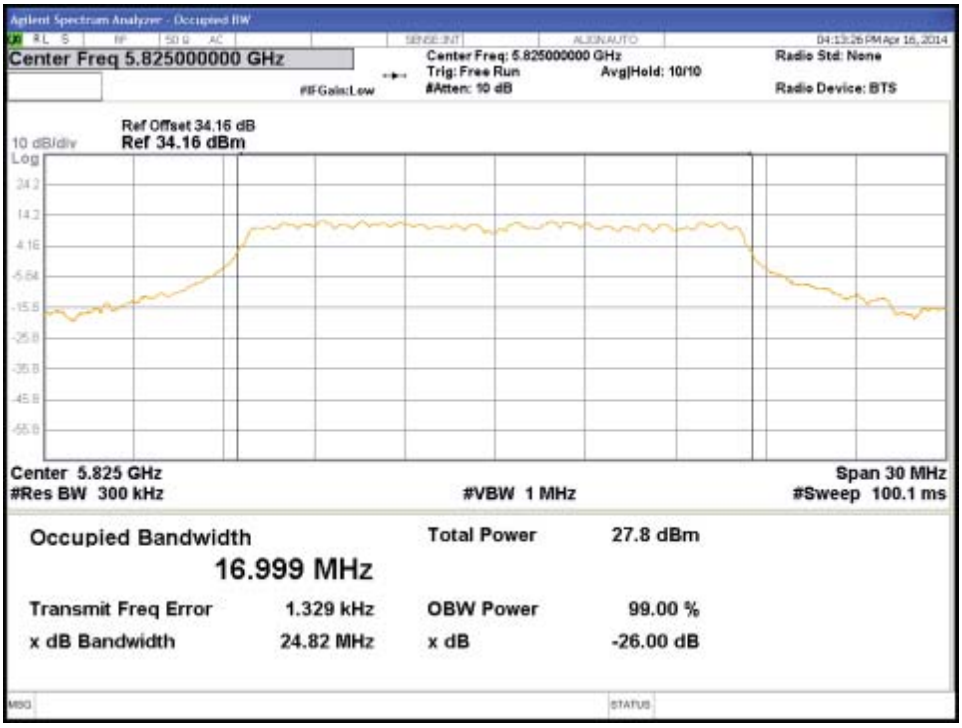


Figure 80: 99% Bandwidth-5825MHz-11a-6Mbps-Ch3

Figure 81: 6 dB Bandwidth-5745MHz-HT20-MCS0-Ch0

Figure 82: 6 dB Bandwidth-5745MHz-HT20-MCS0-Ch1

Figure 83: 6 dB Bandwidth-5745MHz-HT20-MCS0-Ch2

Figure 84: 6 dB Bandwidth-5745MHz-HT20-MCS0-Ch3

Figure 85: 6 dB Bandwidth-5785MHz-HT20-MCS0-Ch0

Figure 86: 6 dB Bandwidth-5785MHz-HT20-MCS0-Ch1

Figure 87: 6 dB Bandwidth-5785MHz-HT20-MCS0-Ch2

Figure 88: 6 dB Bandwidth-5785MHz-HT20-MCS0-Ch3

Figure 89: 6 dB Bandwidth-5825MHz-HT20-MCS0-Ch0

Figure 90: 6 dB Bandwidth-5825MHz-HT20-MCS0-Ch1

Figure 91: 6 dB Bandwidth-5825MHz-HT20-MCS0-Ch2

Figure 92: 6 dB Bandwidth-5825MHz-HT20-MCS0-Ch3

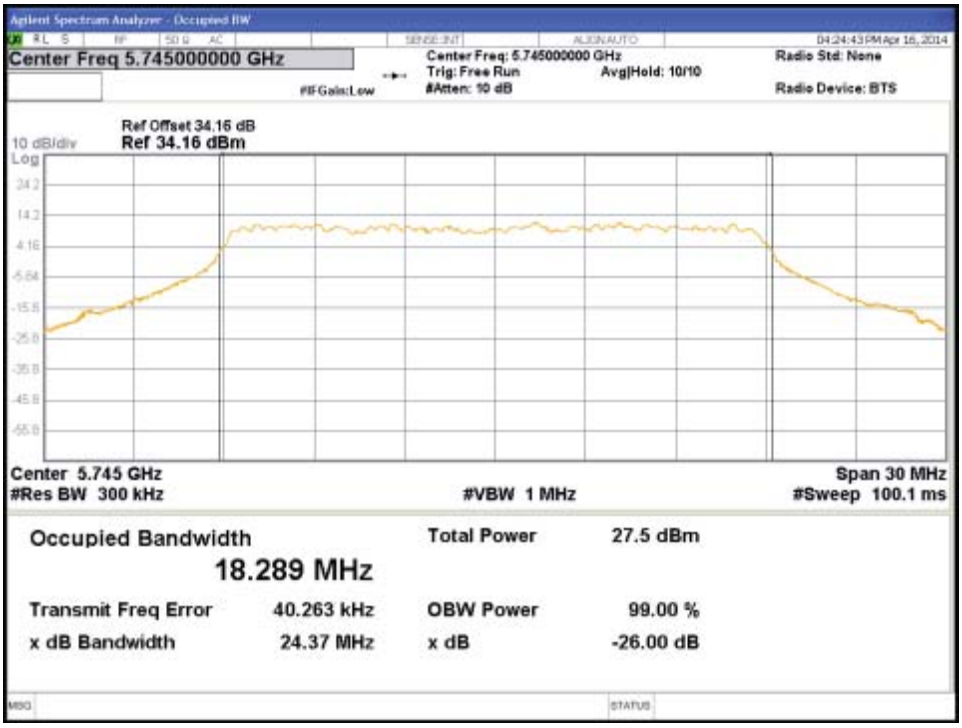


Figure 93: 99% Bandwidth-5745MHz-HT20-MCS0-Ch0

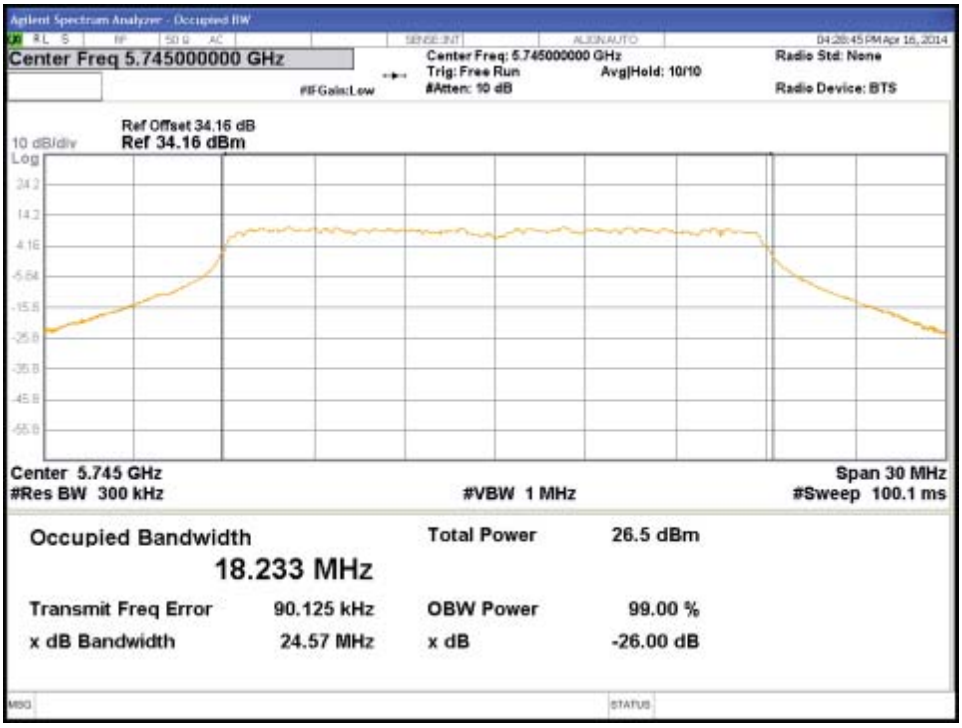


Figure 94: 99% Bandwidth-5745MHz-HT20-MCS0-Ch1

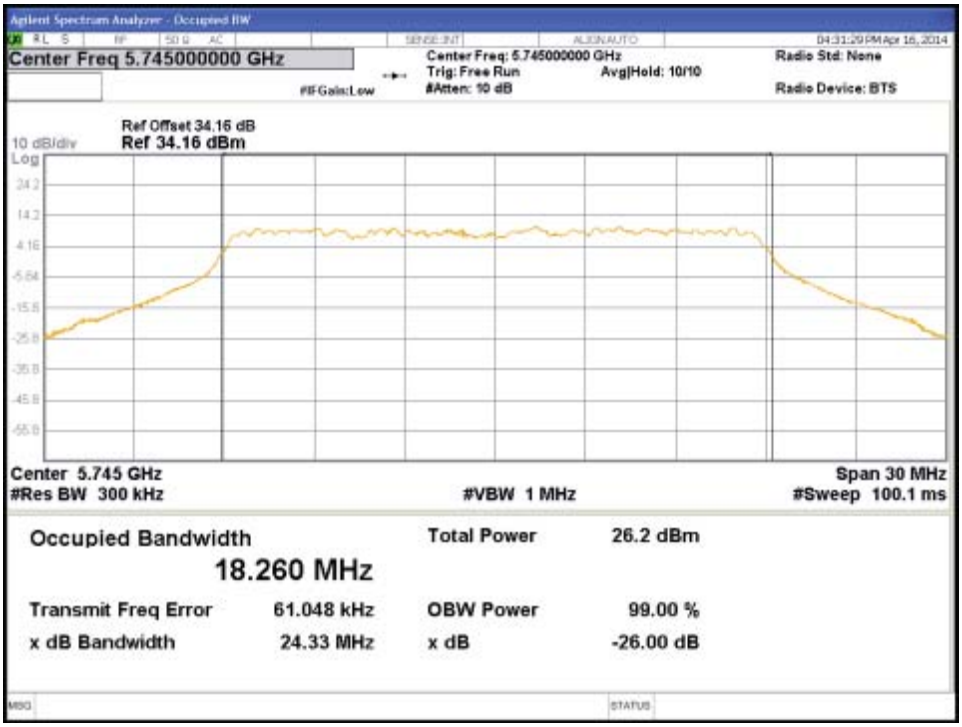


Figure 95: 99% Bandwidth-5745MHz-HT20-MCS0-Ch2

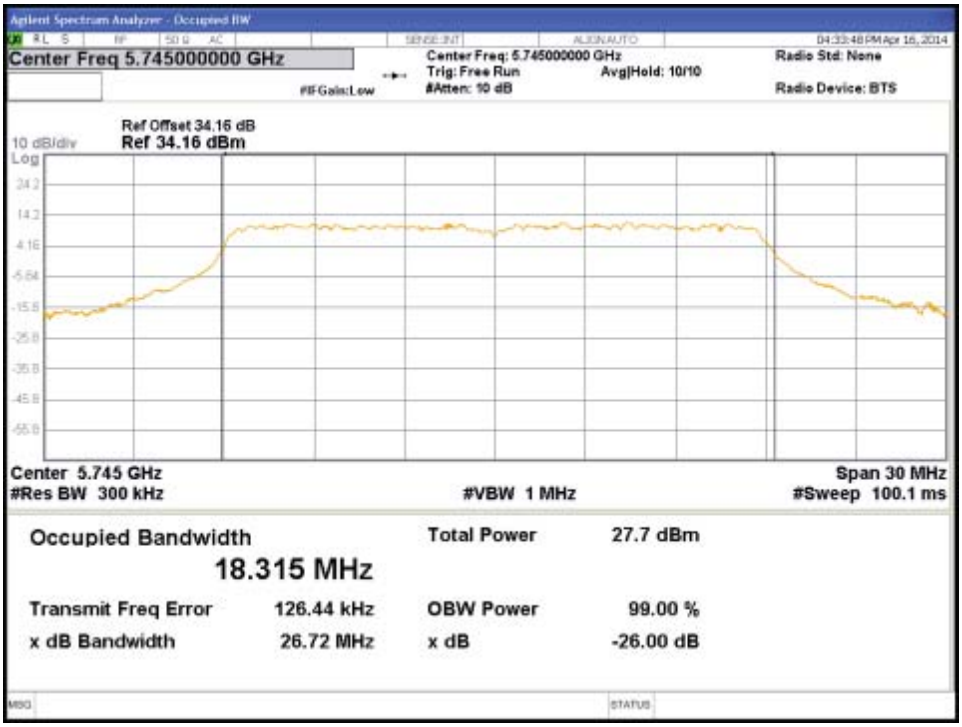


Figure 96: 99% Bandwidth-5745MHz-HT20-MCS0-Ch3

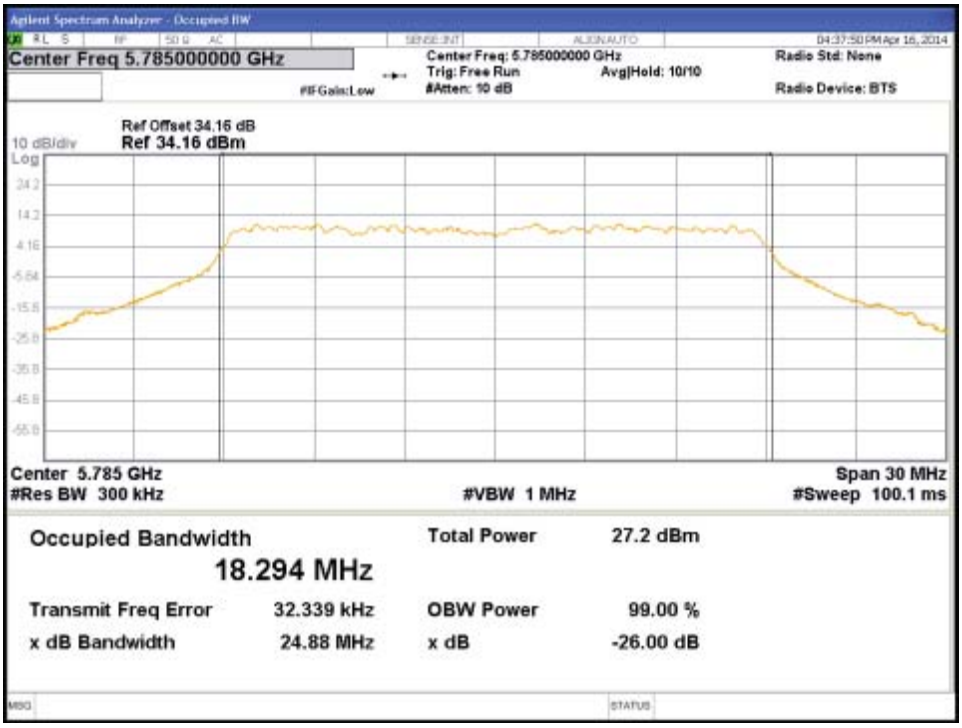


Figure 97: 99% Bandwidth-5785MHz-HT20-MCS0-Ch0

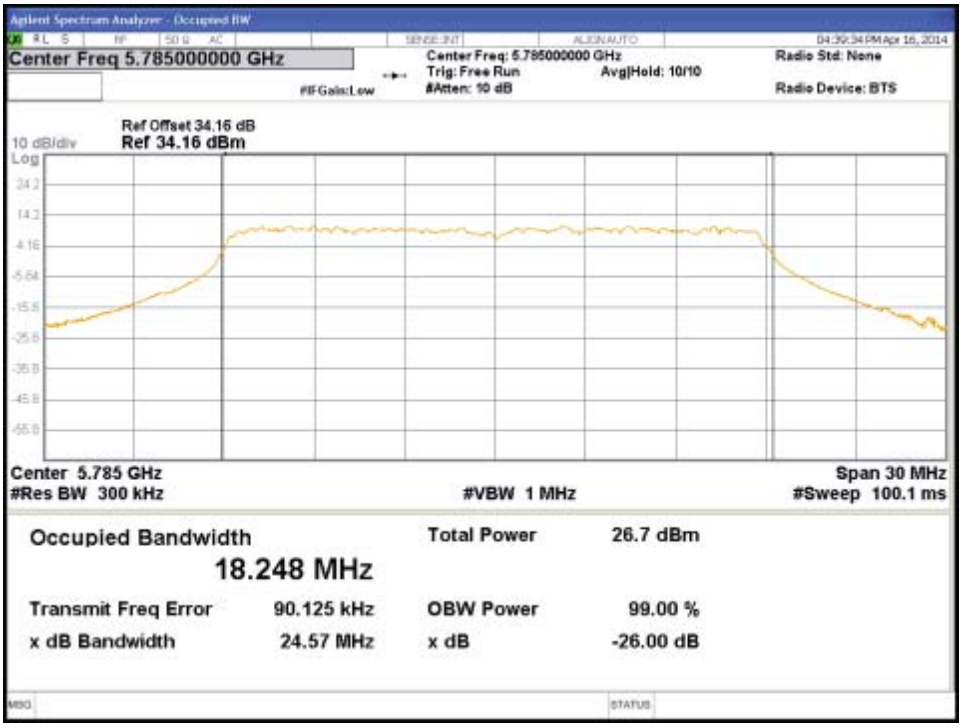


Figure 98: 99% Bandwidth-5785MHz-HT20-MCS0-Ch1

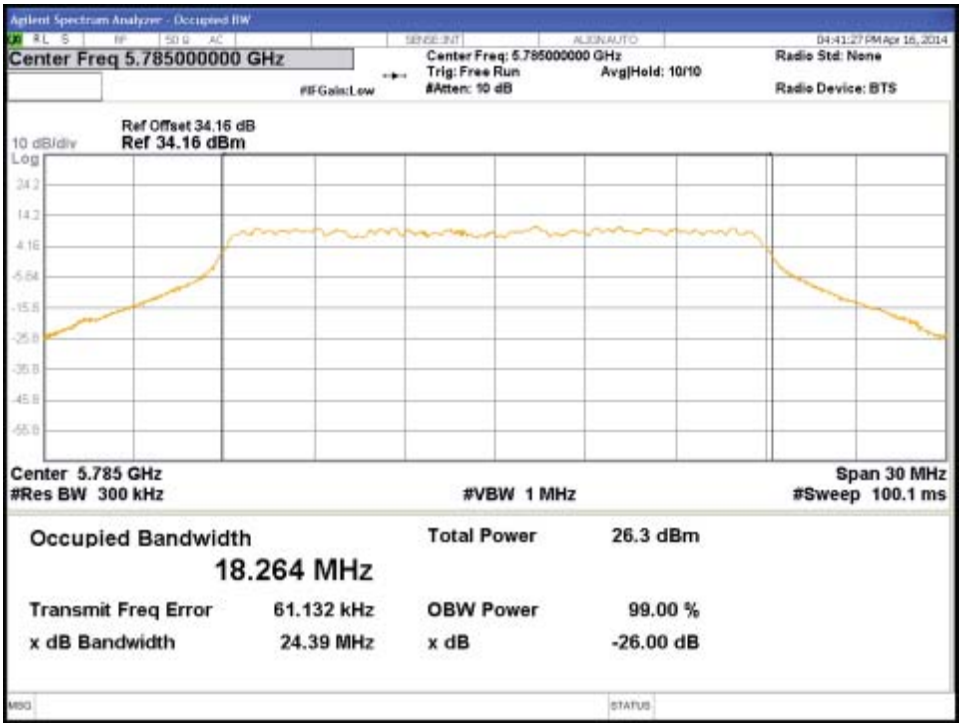


Figure 99: 99% Bandwidth-5785MHz-HT20-MCS0-Ch2

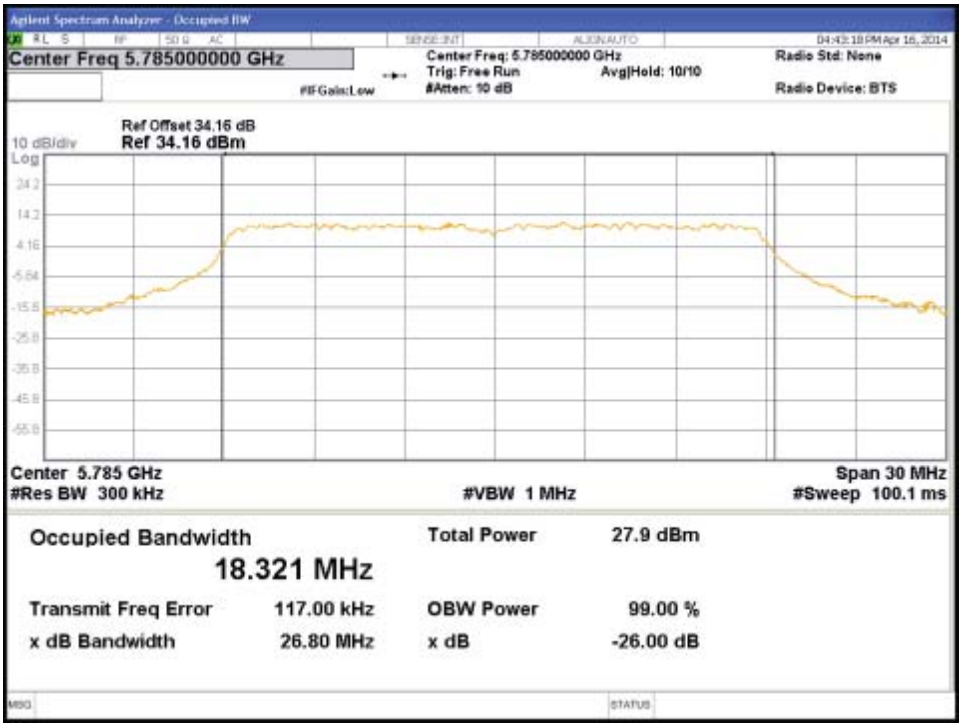


Figure 100: 99% Bandwidth-5785MHz-HT20-MCS0-Ch3

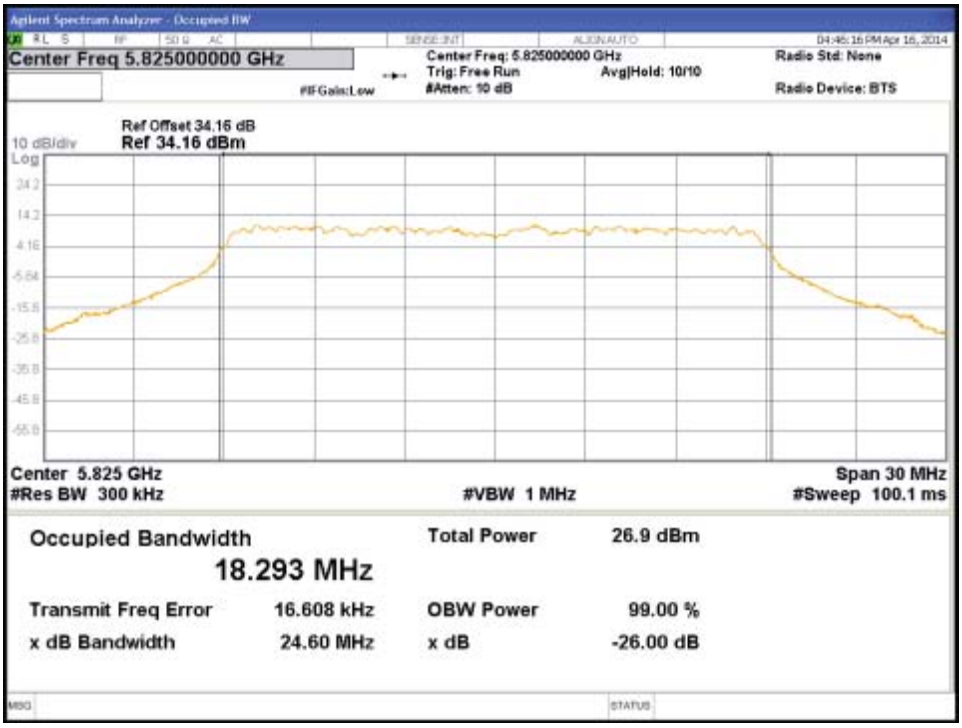


Figure 101: 99% Bandwidth-5825MHz-HT20-MCS0-Ch0

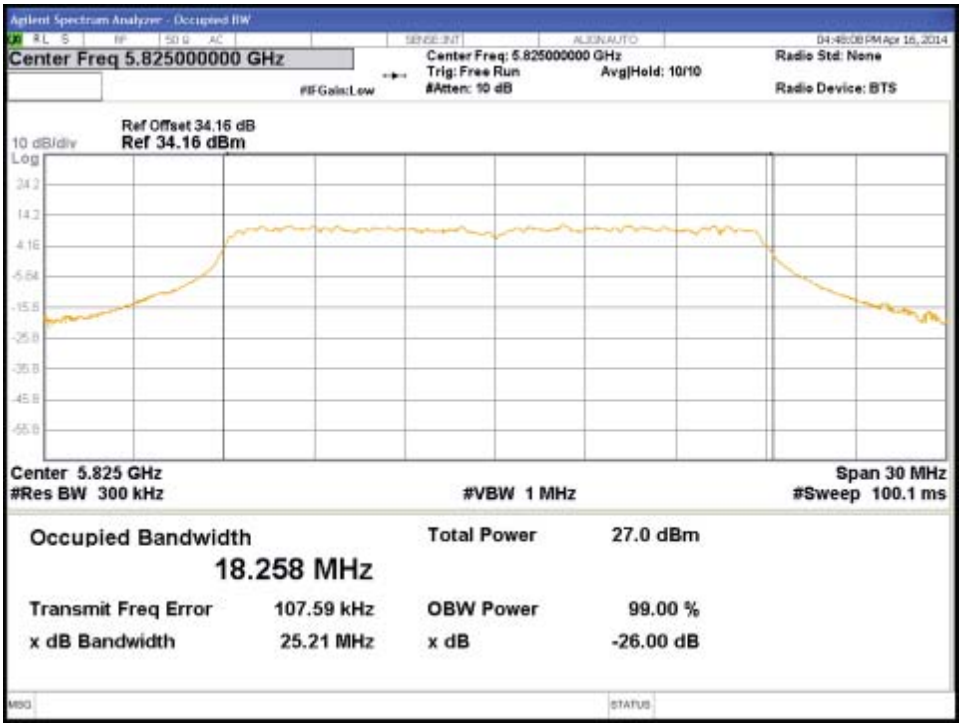


Figure 102: 99% Bandwidth-5825MHz-HT20-MCS0-Ch1

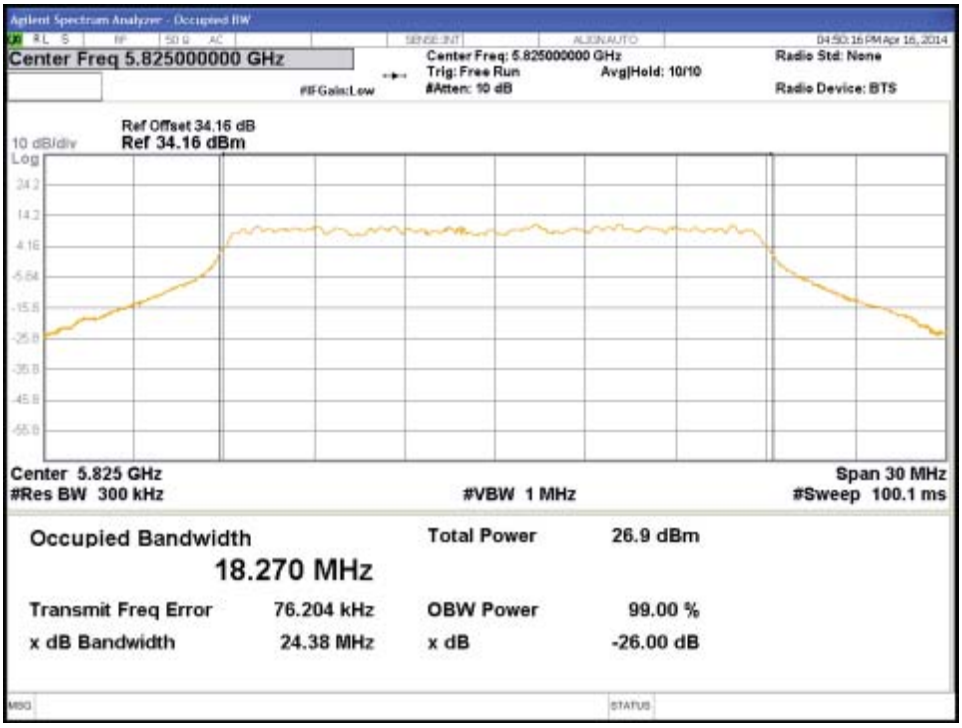


Figure 103: 99% Bandwidth-5825MHz-HT20-MCS0-Ch2

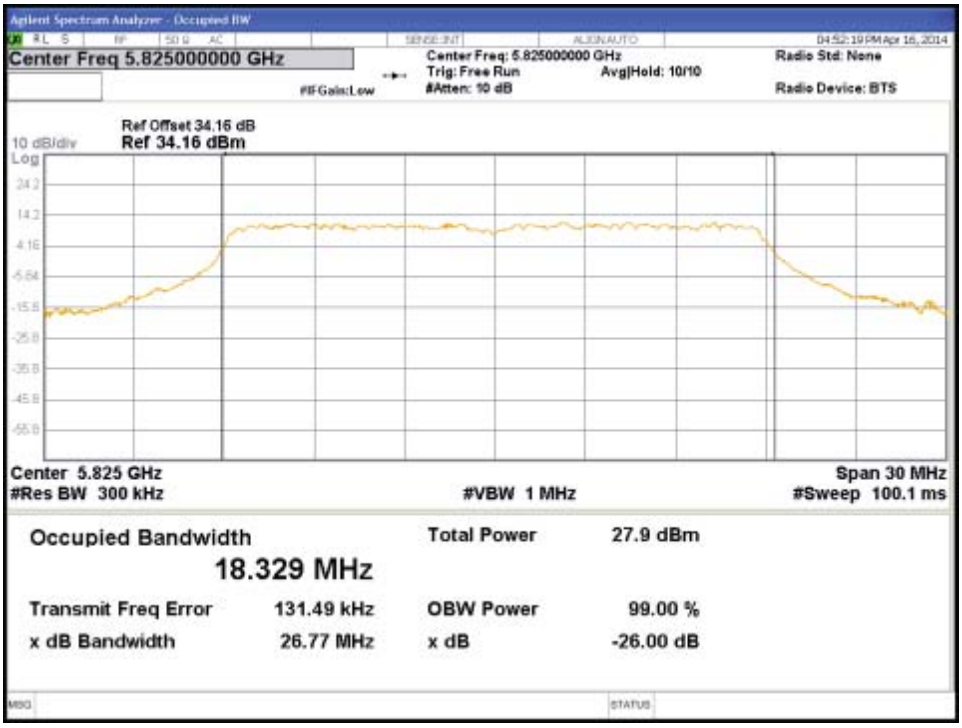


Figure 104: 99% Bandwidth-5825MHz-HT20-MCS0-Ch3