FCC 47 CFR PART 15 SUBPART E

for

Dual-band Wifi Extender
Model: MX1200YZ (where Y can be A, B, C, D or blank, and Z can be A, B, C, D, or blank, for identical hardware models for marketing purposes only)
Brand: Motorola

Test Report Number:
C161220Z01-RP1-2

Issued Date: December 30, 2016

Issued for

MTRLC LLC

P.O.Box 12147 Boston, Massachusetts 02112-1147 United States

Issued by:

Compliance Certification Services (Shenzhen) Inc.
No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd.,
Guan Lan Town, Baoan District, Shenzhen, China
TEL: 86-755-28055000
FAX: 86-755-28055221
E-Mail: service@ccssz.com

中国认可
国际互认
检测
TESTING
CNAS L4818

ACCREDITED
TESTING CERT #2861.01

Note: *This report shall not be reproduced except in full, without the written approval of Compliance Certification Services (Shenzhen) Inc. This document may be altered or revised by Compliance Certification Services (Shenzhen) Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, A2LA, NVLAP, NIST or any government agencies. The TEST RESULTS in the report only apply to the tested sample.*

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 5, 2016	Initial Issue	ALL	Sabrina Wang
01	December 23, 2016	Updated	See Rev.01	Sabrina Wang
02	December 30, 2016	Updated	See Rev.02	Sabrina Wang

Rev.01: (C161219Z09-RP1-2)

1. The applicant, the Manufacturer information, the product name, the model name, the brand name and the appearance are changed based on the test report No.: C160322Z02-RP1-2.
2. The difference between the new model and the original model is the appearance and the PCBA different. After reassessment, this change didn't affect the test result.
3. The other information, please refer to the test report No.: C160322Z02-RP1-2 and this report.

Rev.02: (C161220Z01-RP1-2)

1. The applicant added the frequency range band II, band III basd on the test report No.: C161219Z09-RP1-2, after reassessement, all items were re-tested. And add the DFS report.
2. The other information, please refer to the test report No.: C161219Z09-RP1-2 and this report and C161220Z01-RP1-3 DFS report.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

TABLE OF CONTENTS

1. TEST CERTIFICATION 4

2. EUT DESCRIPTION 5

3. TEST METHODOLOGY 8

3.1 EUT CONFIGURATION 8
3.2 EUT EXERCISE 8
3.3 GENERAL TEST PROCEDURES 8
3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS 9
3.5 DESCRIPTION OF TEST MODES 10

4. SETUP OF EQUIPMENT UNDER TEST 12

4.1 DESCRIPTION OF SUPPORT UNITS 12
4.2 CONFIGURATION OF SYSTEM UNDER TEST 12

5. FACILITIES AND ACCREDITATIONS 13

5.1 FACILITIES 13
5.2 EQUIPMENT 13
5.3 ACCREDITATIONS 13
5.4 MEASUREMENT UNCERTAINTY 14

6. FCC PART 15 REQUIREMENTS 15

6.1 26DB EMISSION BANDWIDTH 15
6.2 6DB BANDWIDTH MEASUREMENT 52
6.3 ANTENNA GAIN 63
6.4 OUTPUT POWER 65
6.5 BAND EDGES MEASUREMENT 74
6.6 PEAK POWER SPECTAL DENSITY 100
6.7 RADIATED UNDESIABLE EMISSION 145
6.8 CONDUCTED UNDESIRABLE EMISSION 202
6.9 POWERLINE CONDUCTED EMISSIONS 225
6.10 FREQUENCY STABILITY 229

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

1. TEST CERTIFICATION

Product	Dual-band Wifi Extender
Model	MX1200YZ (where Y can be A, B, C, D or blank, and Z can be A, B, C, D, or blank, for identical hardware models for marketing purposes only)
Brand	Motorola
Tested	February 18~July 4, 2016 and December 20~29, 2016
Applicant	**MTRLC LLC** P.O.Box 12147 Boston, Massachusetts 02112-1147 United States
Manufacturer	**MTRLC LLC** P.O.Box 12147 Boston, Massachusetts 02112-1147 United States

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

We hereby certify that:

Compliance Certification Services (Shenzhen) Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407、FCC 14-30.

The TEST RESULTS of this report relate only to the tested sample identified in this report.

Approved by:

Sunday Hu
Supervisor of EMC Dept.
Compliance Certification Services (Shenzhen) Inc.

Reviewed by:

Ruby Zhang
Supervisor of Report Dept.
Compliance Certification Services (Shenzhen) Inc.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

2. EUT DESCRIPTION

Product	Dual-band Wifi Extender
Model Number	MX1200YZ (where Y can be A, B, C, D or blank, and Z can be A, B, C, D, or blank, for identical hardware models for marketing purposes only)
Brand	Motorola
Model Discrepancy	N/A
Serial Number	C161220Z01-RP1-2
Received Date	March 22, 2016
Power Supply	Input: ~100-240V, 50/60Hz, 0.5A
Frequency Range	UNII Band I: IEEE 802.11a, 802.11n HT20 : 5180MHz ~ 5240MHz; IEEE 802.11n HT40: 5190MHz ~ 5230MHz IEEE 802.11ac 80: 5210MHz UNII Band II IEEE 802.11a, 802.11n HT20 : 5260MHz ~ 5320MHz IEEE 802.11n HT40: 5270MHz ~ 5310MHz IEEE 802.11ac 80: 5290MHz UNII Band III IEEE 802.11a, 802.11n HT20 : 5500MHz ~ 5700MHz IEEE 802.11n HT40: 5510MHz ~ 5670MHz IEEE 802.11ac 80: 5530MHz UNII Band IV IEEE 802.11a, 802.11n HT20 : 5745MHz ~ 5825MHz IEEE 802.11n HT40: 5755MHz ~ 5795MHz IEEE 802.11ac 80: 5775MHz
Transmit Power	UNII Band I: IEEE 802.11a: 11.76dBm (Antenna 0) 14.94dBm (Antenna 1) IEEE 802.11n HT 20 MHz mode: 19.20dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11n HT 40 MHz mode: 21.13dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11ac 80: 19.38dBm (Combine with Antenna 0 and Antenna 1) UNII Band II IEEE 802.11a: 15.08dBm (Antenna 0) 14.71dBm (Antenna 1) IEEE 802.11n HT 20 MHz mode: 18.50dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11n HT 40 MHz mode: 18.05dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11ac 80: 15.25dBm (Combine with Antenna 0 and Antenna 1) UNII Band III IEEE 802.11a: 15.08dBm (Antenna 0) 15.60dBm (Antenna 1) IEEE 802.11n HT 20 MHz mode: 17.35dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11n HT 40 MHz mode: 17.63dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11ac 80: 15.88dBm (Combine with Antenna 0 and Antenna 1) UNII Band IV IEEE 802.11a: 14.94dBm (Antenna 0) 15.17dBm (Antenna 1) IEEE 802.11n HT 20 MHz mode: 19.42dBm (Combine with Antenna 0 and Antenna 1) IEEE 802.11n HT 40 MHz mode: 18.02dBm (Combine with Antenna 0 and Antenna 1)

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

	IEEE 802.11ac 80: 16.24dBm (Combine with Antenna 0 and Antenna 1)
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Transmit Data Rate	IEEE 802.11a mode: 48, 36, 24, 18, 12, 9, 6Mbps IEEE802.11n HT20MHz mode(800ns GI): 13,26,39,52,78,104,117,130Mbps IEEE802.11n HT40MHz mode(800ns GI): 27,54,81,108,162,216,243,270Mbps IEEE802.11ac VHT80MHz mode(800ns GI): 58.6,117,175.6,234,351,468,526.6, 585,702,780Mbps
Number of Channels	UNII Band I: IEEE 802.11a, 802.11n HT20 : 4 Channels IEEE 802.11n HT40 : 2 Channels IEEE 802.11ac 80: 1 Channel UNII Band II IEEE 802.11a, 802.11n HT20 : 4 Channels IEEE 802.11n HT40: 2 Channels IEEE 802.11ac 80: 1 Channel UNII Band III IEEE 802.11a, 802.11n HT20 : 9 Channels IEEE 802.11n HT 40 MHz mode: 4 Channels IEEE 802.11ac 80: 1 Channels UNII Band IV IEEE 802.11a, 802.11n HT20 : 5 Channels IEEE 802.11n HT 40 MHz mode: 2 Channels IEEE 802.11ac 80: 1 Channel
Antenna Specification	Embedded Antenna with 3.3dBi gain (Max)
Channels Spacing	IEEE 802.11a, 802.11n HT20 : 20MHz IEEE 802.11n HT40: 40MHz IEEE 802.11ac 80: 80MHz
Temperature Range	0°C ~ +40°C
Hardware Version	V1.01
Software Version	V1.0.0

Note: *1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	**MHz**
36	5180
38	5190
40	5200
42	5210
44	5220
46	5230
48	5240
52	5260
54	5270
56	5280
58	5290
60	5300
62	5310
64	5320
100	5500
102	5510
104	5520
106	5530
108	5540
110	5550
112	5560
116	5580
132	5660
134	5670
136	5680
140	5700
149	5745
151	5755
153	5765
155	5775
157	5785
159	5795
161	5805
165	5825

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **2AF5PMX1200** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules and FCC 14-30.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 Radiated testing was performed at an antenna to EUT distance 3 meters.
The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.407 and FCC 14-30.
Radio testing was performed according to KDB DA 02-2138、KDB 789033 D02、KDB 905462 D06；

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the TX frequency for the purposes of measurement.
According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m (below 1GHz) /1.5m (Above 1GHz) above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 - 13.41	322 - 335.4		

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

3.5 DESCRIPTION OF TEST MODES

The EUT is a 2x2 configuration spatial MIMO (2TX & 2RX) without beam forming function. Software used to control the EUT for staying in continuous transmitting mode was programmed.

Test Item	Test mode	Worse mode
Conducted Emission	**Mode 1:** Full System+1000Mbps 10%	**Mode 1**
Radiated Emission	**Mode 1:** TX	**Mode 1**

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

UNII Band I:

IEEE 802.11a for 5180 ~ 5240MHz:
Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5180 ~ 5240MHz:
Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 13Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Channel for 5190 ~ 5230MHz:
Channel Low (5190MHz) and Channel High (5230MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11ac 80 Channel for 5210MHz:
Channel Low (5210MHz) with 27Mbps data rate were chosen for full testing.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

UNII Band II:

IEEE 802.11a for 5260 ~ 5320MHz:
Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5260 ~ 5320MHz:
Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with 13Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Channel for 5270~ 5310MHz:
Channel Low (5270MHz) and Channel High (5310MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11ac 80 Channel for 5290MHz:
Channel Low (5290MHz) with 27Mbps data rate were chosen for full testing.

UNII Band III:

IEEE 802.11a for 5500 ~ 5700MHz:
Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5500 ~ 5700MHz:
Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with 13Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Channel for 5510~ 5670MHz:
Channel Low (5510MHz) and Channel High (5670MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11ac 80 Channel for 5530MHz:
Channel Low (5530MHz) with 27Mbps data rate were chosen for full testing.

UNII Band IV:

IEEE 802.11a for 5745 ~ 5825MHz:
Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 MHz for 5745 ~ 5825MHz:
Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 13Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 MHz Channel for 5755~ 5795MHz:
Channel Low (5755MHz) and Channel High (5795MHz) with 27Mbps data rate were chosen for full testing.

IEEE 802.11ac 80 Channel for 5775MHz:
Channel Low (5775MHz) with 27Mbps data rate were chosen for full testing.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

4. SETUP OF EQUIPMENT UNDER TEST

4.1 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook	E335	R9-WN1EF	DoC	Thinkpad	Unshielded 1.50m (RJ45 Cable)	Shielded 1.60m (AC Cable) Unshielded 1.80m (DC Cable)

Note:

Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.2 CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at
No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan Town, Baoan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.10, ANSI C63.7 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3 ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	**A2LA**
China	**CNAS**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	**FCC**
Japan	**VCCI(C-3478, R-3135, T-652, G-10624)**
Canada	**INDUSTRY CANADA**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccssz.com

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

5.4 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
RF frequency	+/-1 * 10-5
RF power conducted	+/- 1,5 dB
RF power radiated	+/- 6 dB
Spurious emissions, conducted	+/- 3 dB
Spurious emissions, radiated	+/- 6 dB
Humidity	+/- 5 %
Temperature	+/- 1°C
Time	+/-10 %

Remark: *This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.*

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

6. FCC PART 15 REQUIREMENTS

6.1 26dB EMISSION BANDWIDTH

6.1.1 LIMIT

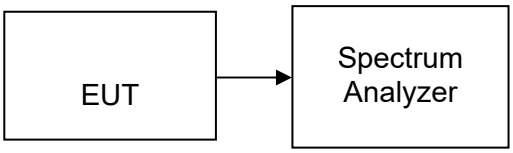
According to §15.403(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

6.1.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

Remark: *Each piece of equipment is scheduled for calibration once a year.*

6.1.3 TEST CONFIGURATION



6.1.4TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth, Detector = Peak, and Sweep = auto.
4. Mark the peak frequency and –26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

6.1.5 TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5180	19.56	19.47
Mid	5200	19.36	19.43
High	5240	19.67	19.66

Test mode: IEEE 802.11a mode / 5260 ~ 5320MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5260	19.60	19.35
Mid	5300	19.27	19.40
High	5320	19.35	19.38

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5500	19.61	19.36
Mid	5580	19.40	19.50
High	5700	19.57	19.75

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5180	19.91	19.68
Mid	5200	19.69	19.63
High	5240	19.75	19.87

Test mode: IEEE 802.11n HT 20 MHz mode / 5260 ~ 5320MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5260	19.66	19.91
Mid	5300	19.74	19.71
High	5320	20.02	19.91

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5500	19.79	19.75
Mid	5580	20.08	19.83
High	5700	19.76	19.76

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5190	39.20	39.14
High	5230	39.04	38.93

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5270	39.15	39.13
High	5310	38.74	39.28

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
Low	5510	39.08	38.76
Mid	5550	39.18	39.31
High	5670	39.09	39.27

This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test mode: IEEE 802.11ac 80 mode / 5210MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
	5210	78.89	78.88

Test mode: IEEE 802.11ac 80 mode / 5290MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
	5290	78.71	78.76

Test mode: IEEE 802.11ac 80 mode / 5530MHz

Channel	Frequency (MHz)	26dB Bandwidth(B) (MHz)	
		Antenna 0	Antenna 1
	5530	78.77	78.76

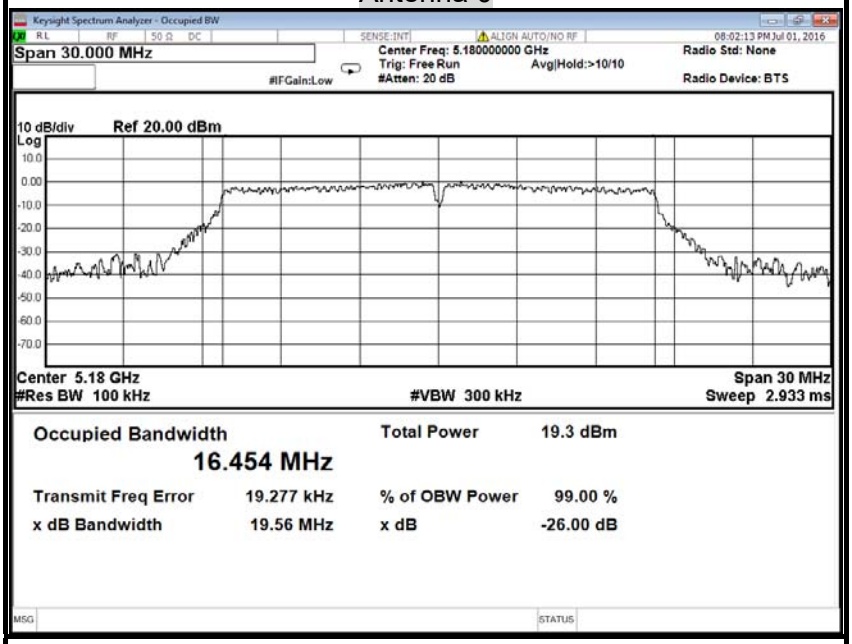
This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

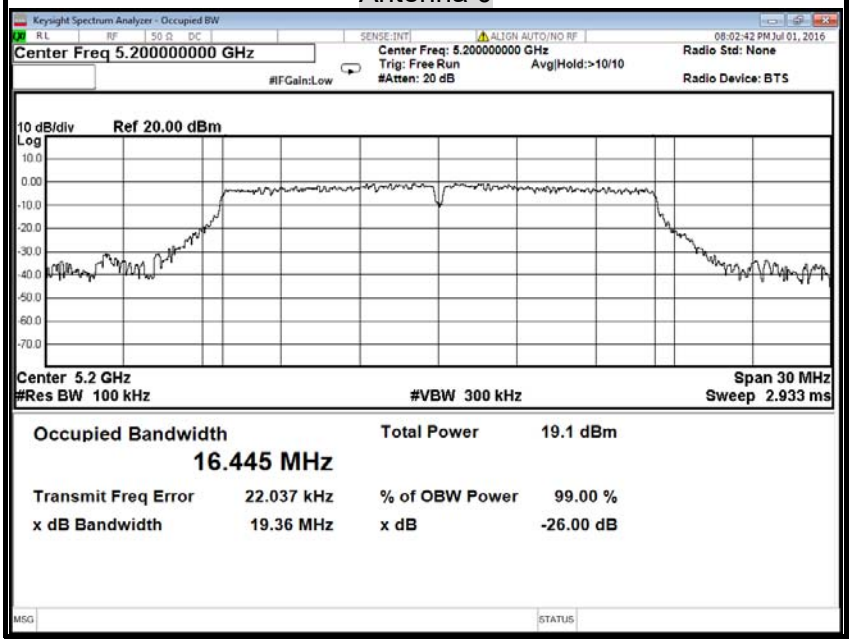
26dB Bandwidth (CH Low)

Antenna 0



26dB Bandwidth (CH Mid)

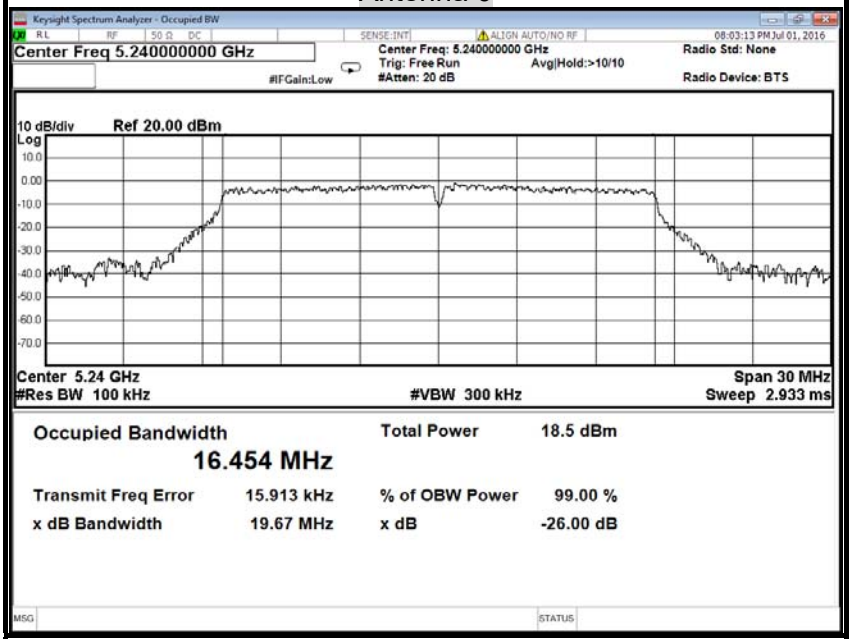
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

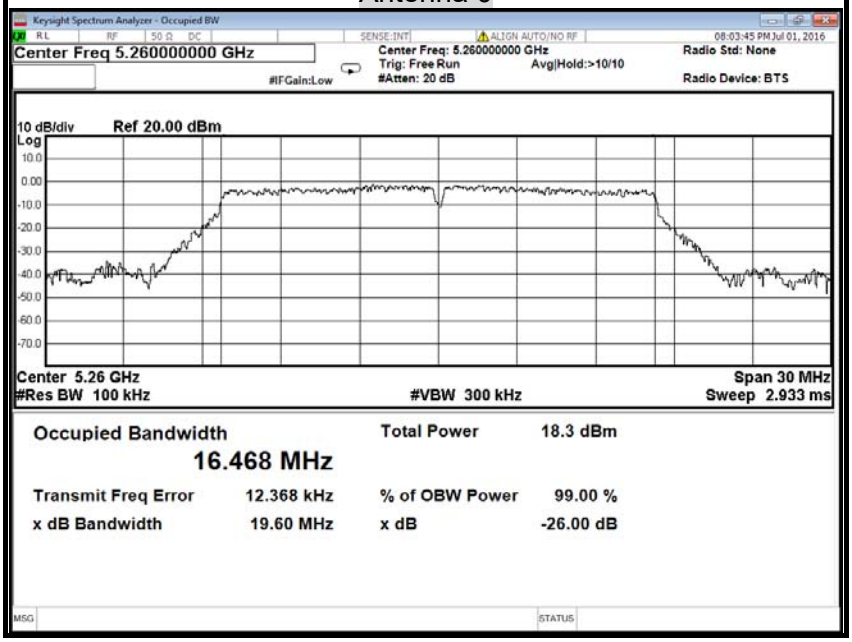
Antenna 0



IEEE 802.11a mode / 5260~ 5320MHz

26dB Bandwidth (CH Low)

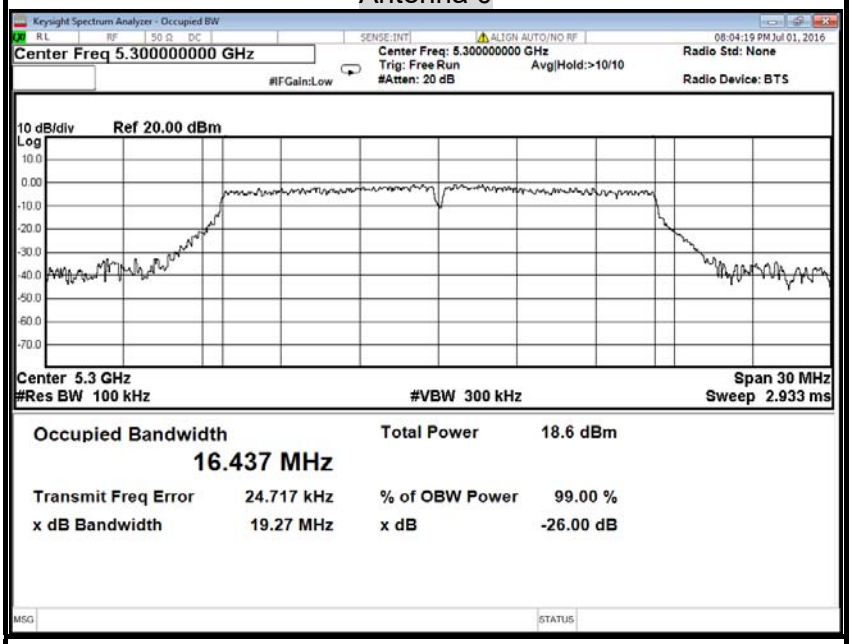
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

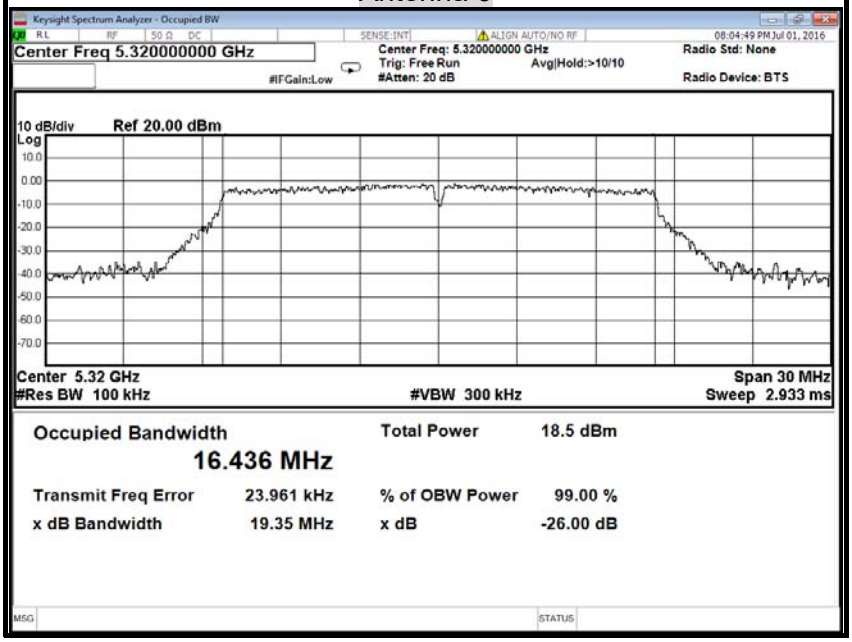
26dB Bandwidth (CH Mid)

Antenna 0



26dB Bandwidth (CH High)

Antenna 0

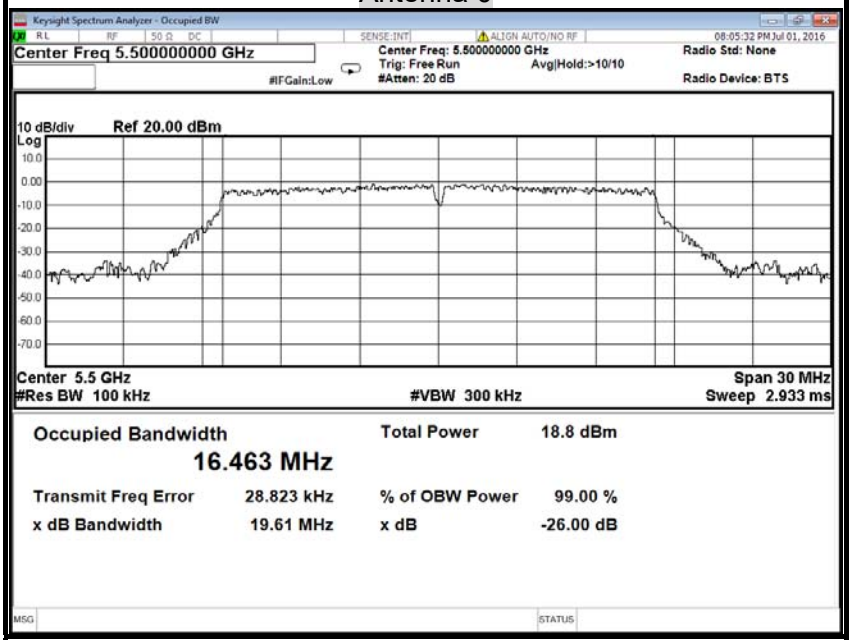


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11a mode / 5500 ~ 5700MHz

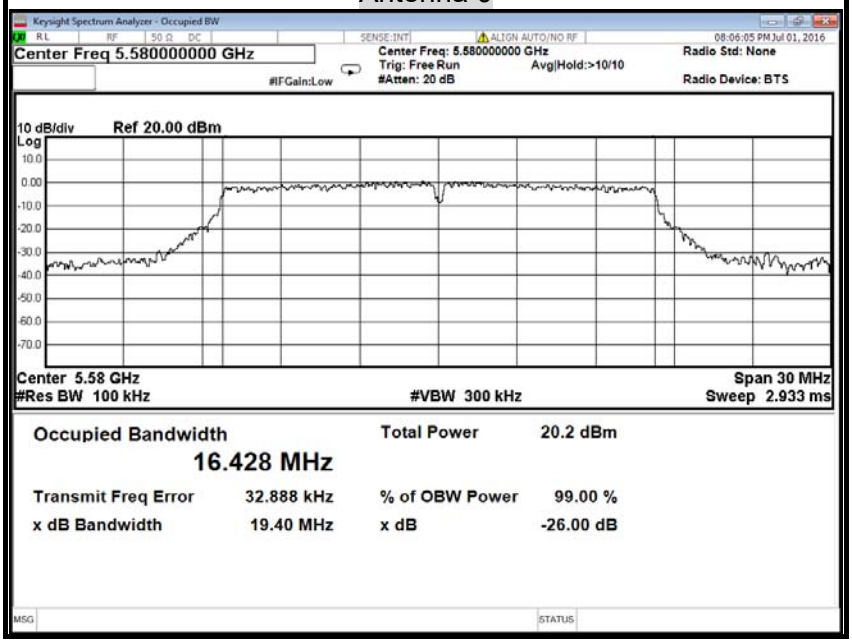
26dB Bandwidth (CH Low)

Antenna 0



26dB Bandwidth (CH Mid)

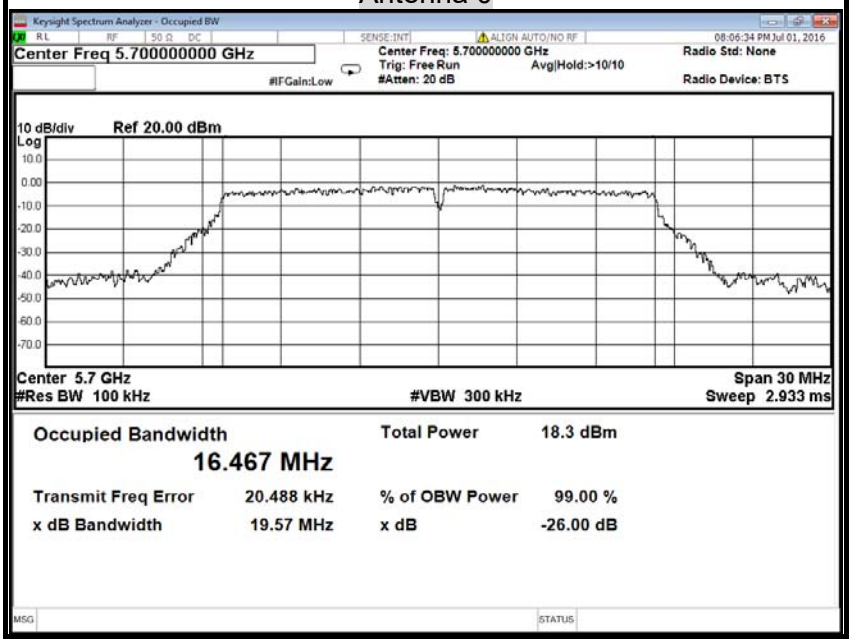
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

Antenna 0

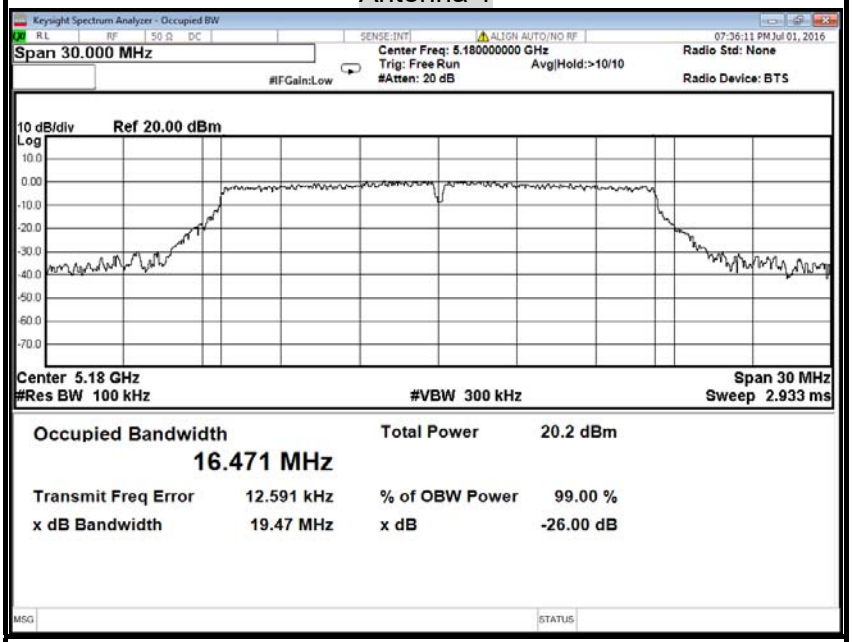


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11a mode / 5180 ~ 5240MHz

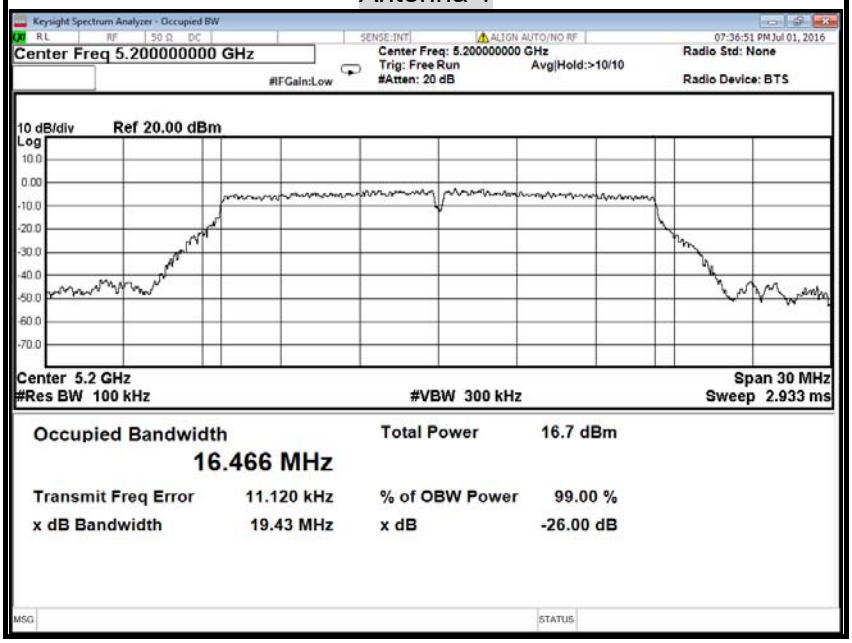
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH Mid)

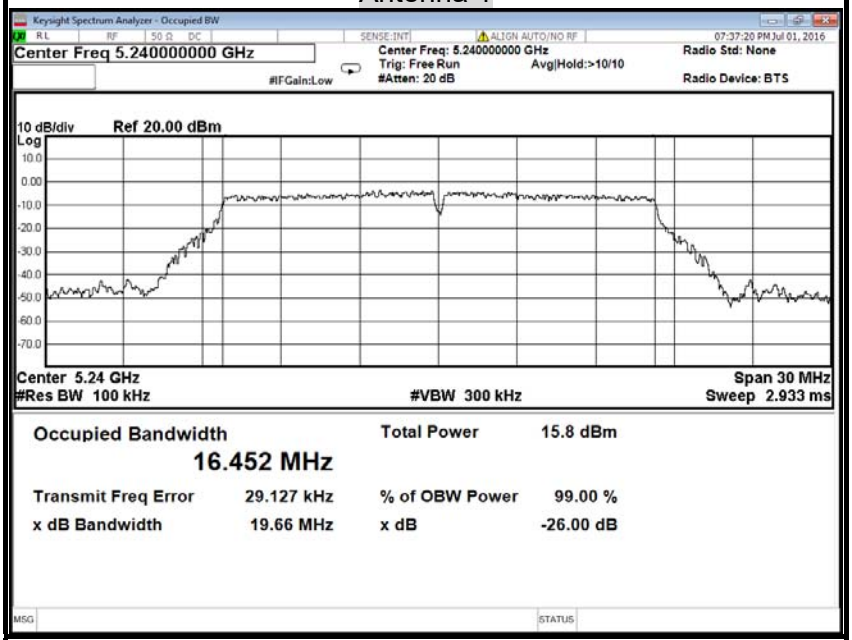
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

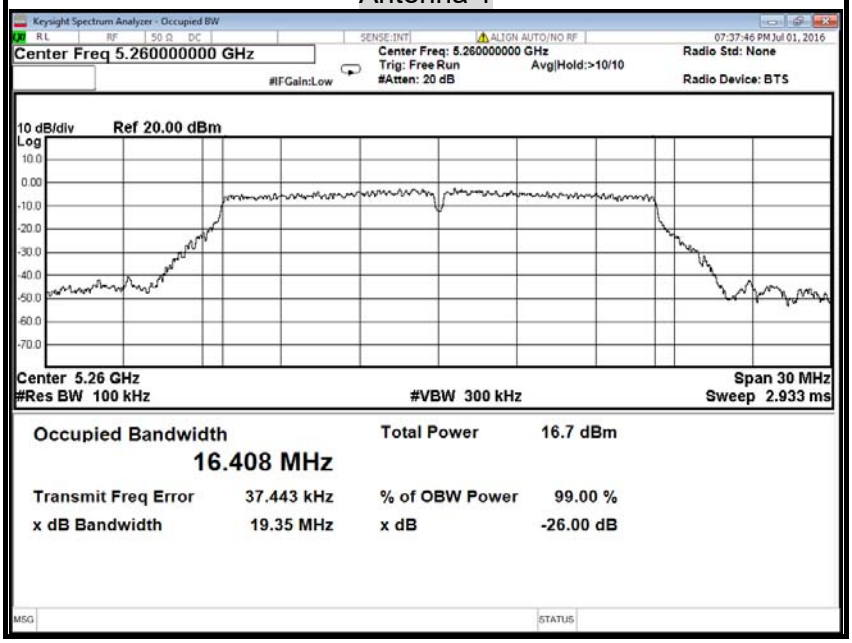
Antenna 1



IEEE 802.11a mode / 5260~ 5320MHz

26dB Bandwidth (CH Low)

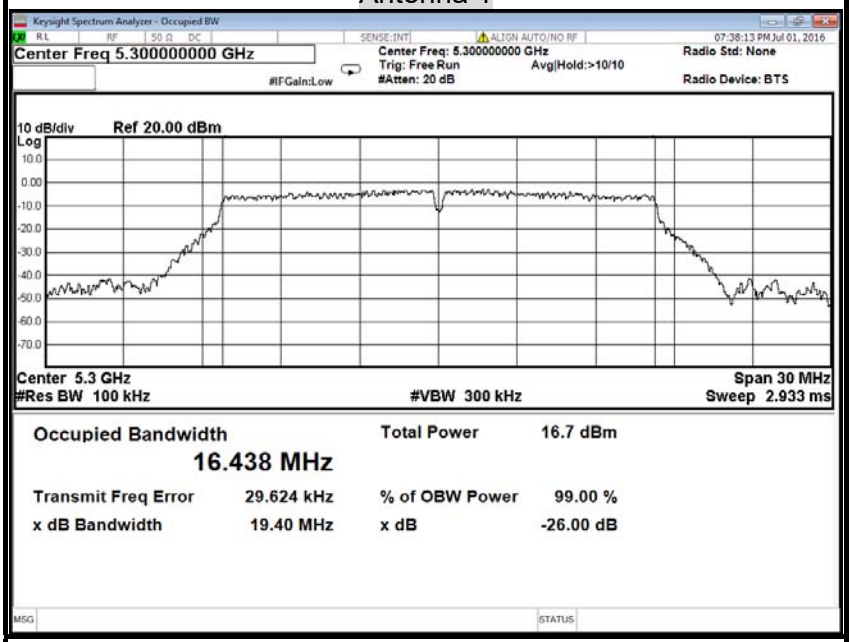
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

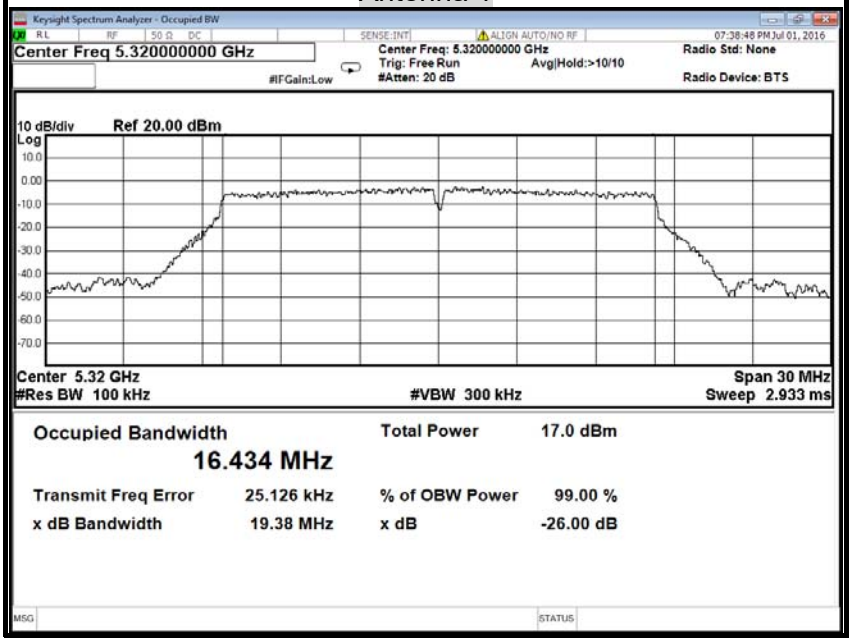
26dB Bandwidth (CH Mid)

Antenna 1



26dB Bandwidth (CH High)

Antenna 1

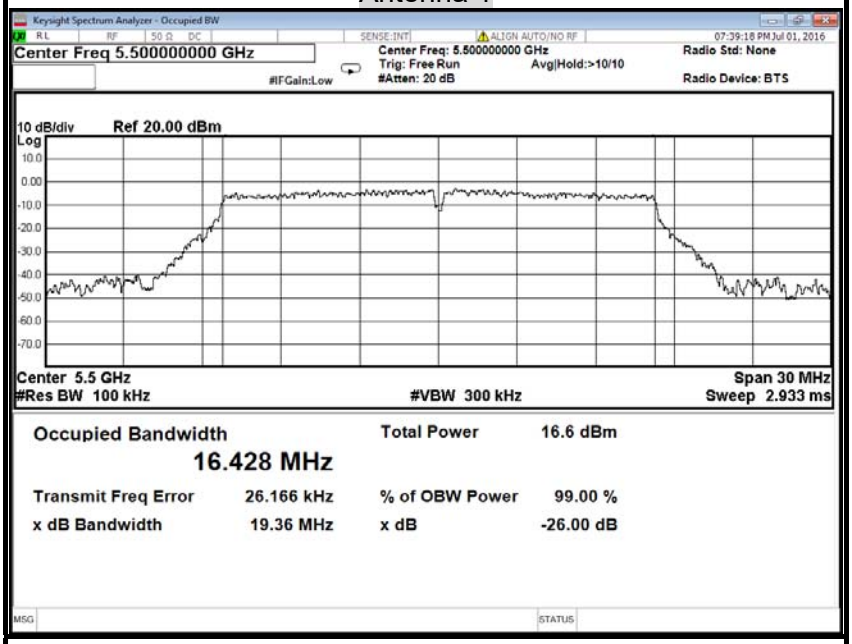


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11a mode / 5500~ 5700MHz

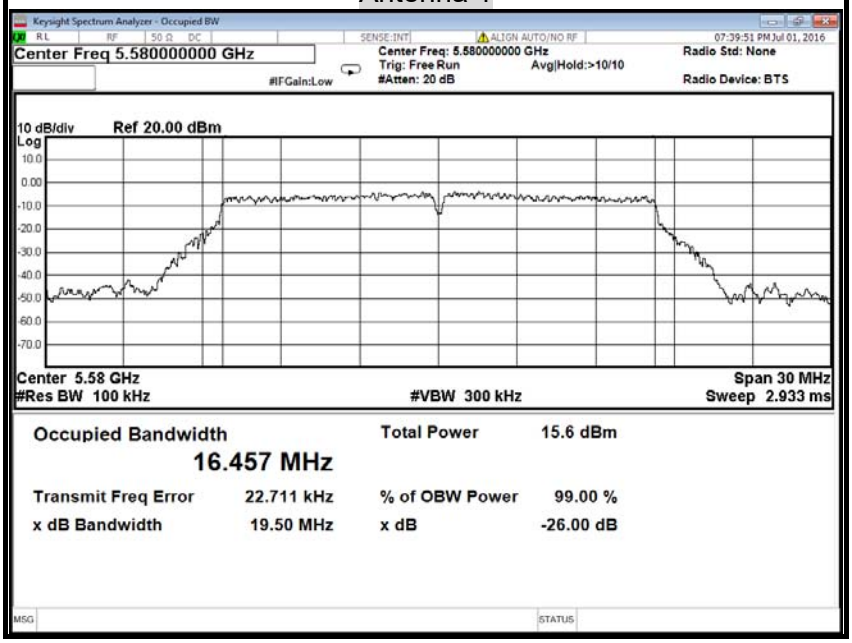
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH Mid)

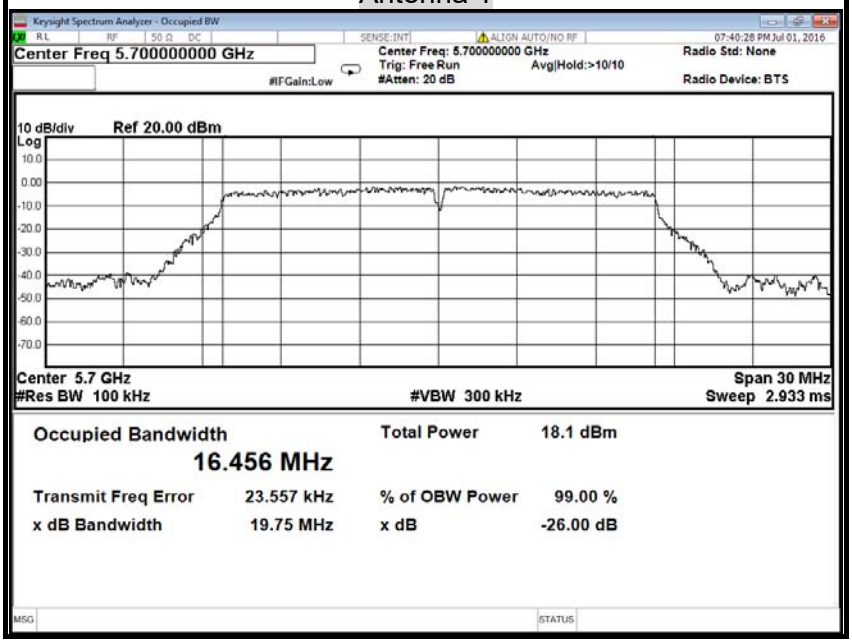
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

Antenna 1

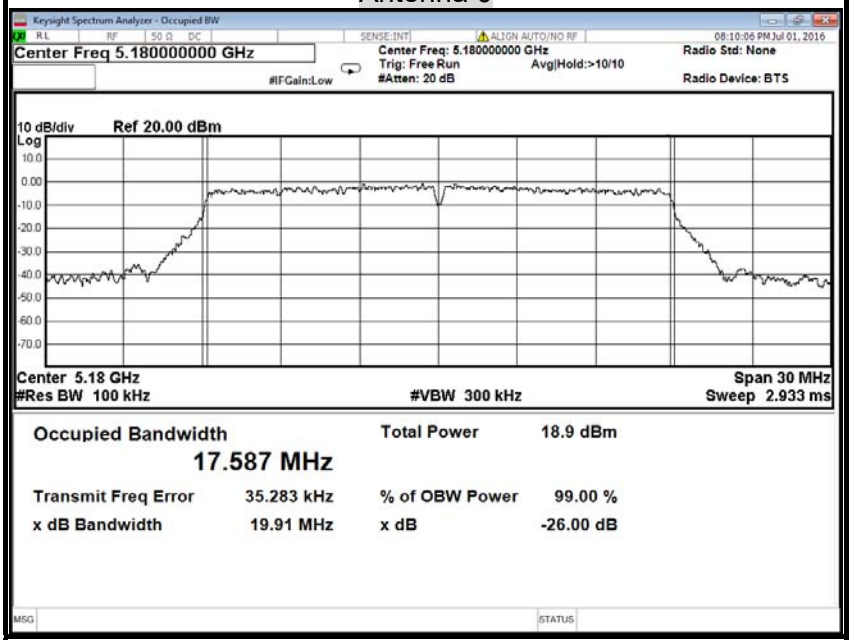


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

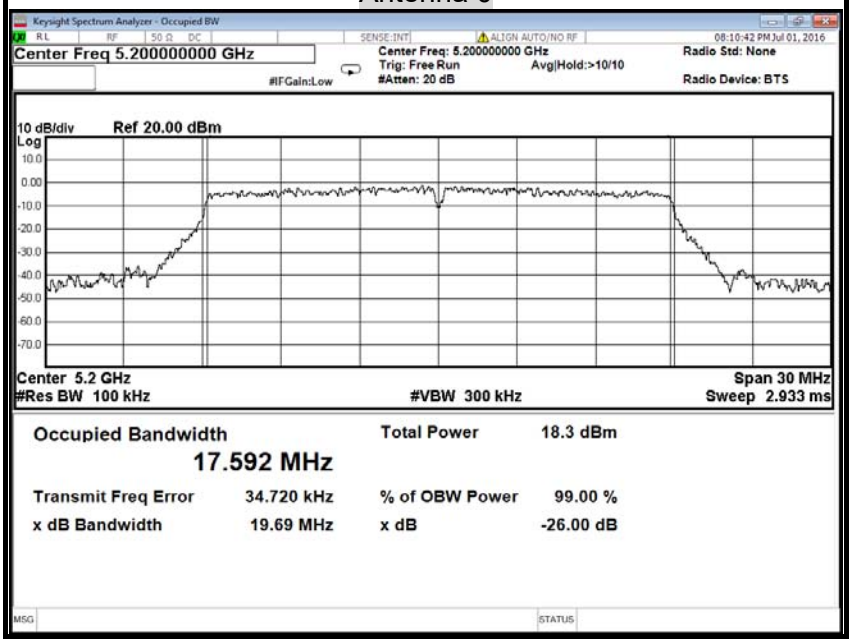
26dB Bandwidth (CH Low)

Antenna 0



26dB Bandwidth (CH Mid)

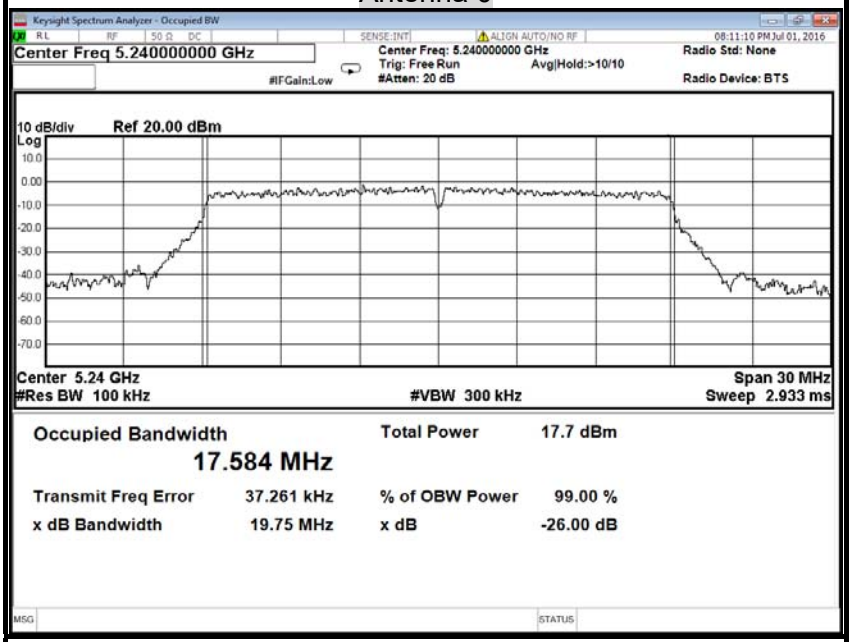
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

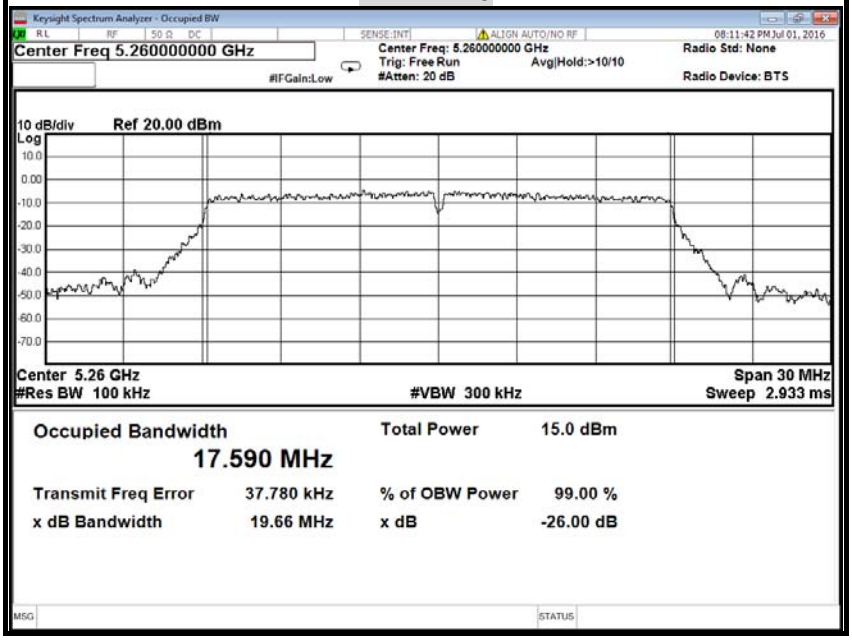
Antenna 0



IEEE 802.11n HT 20 MHz mode / 5260~ 5320MHz

26dB Bandwidth (CH Low)

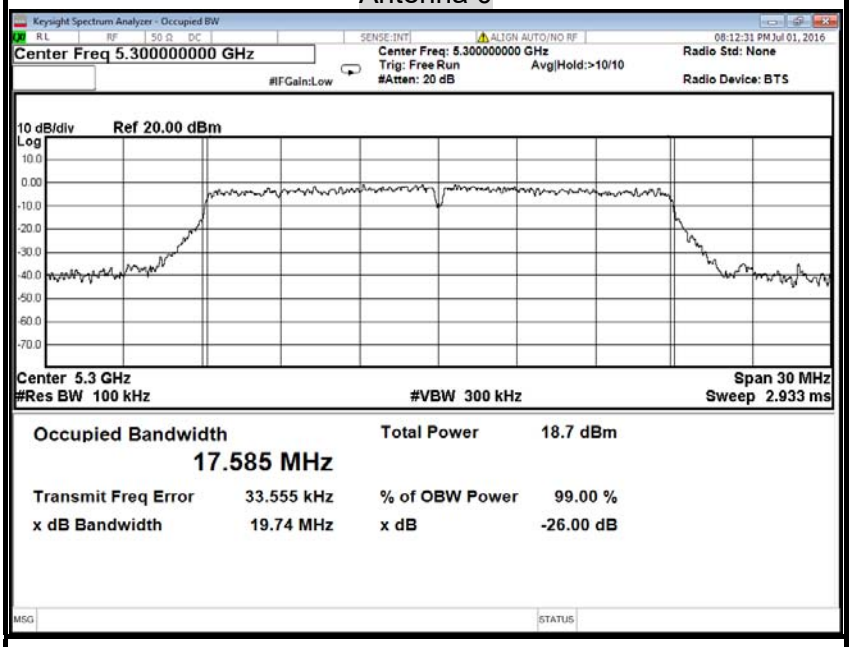
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

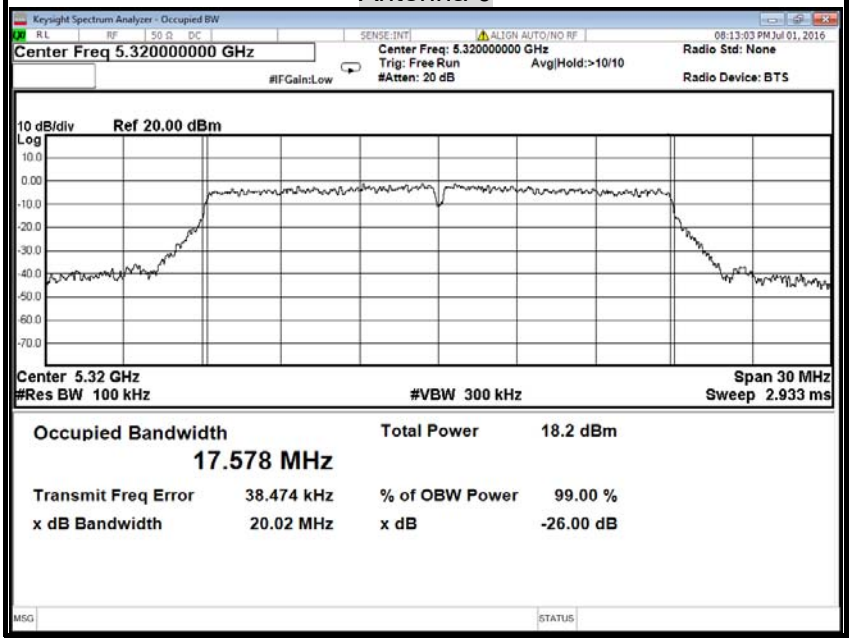
26dB Bandwidth (CH Mid)

Antenna 0



26dB Bandwidth (CH High)

Antenna 0

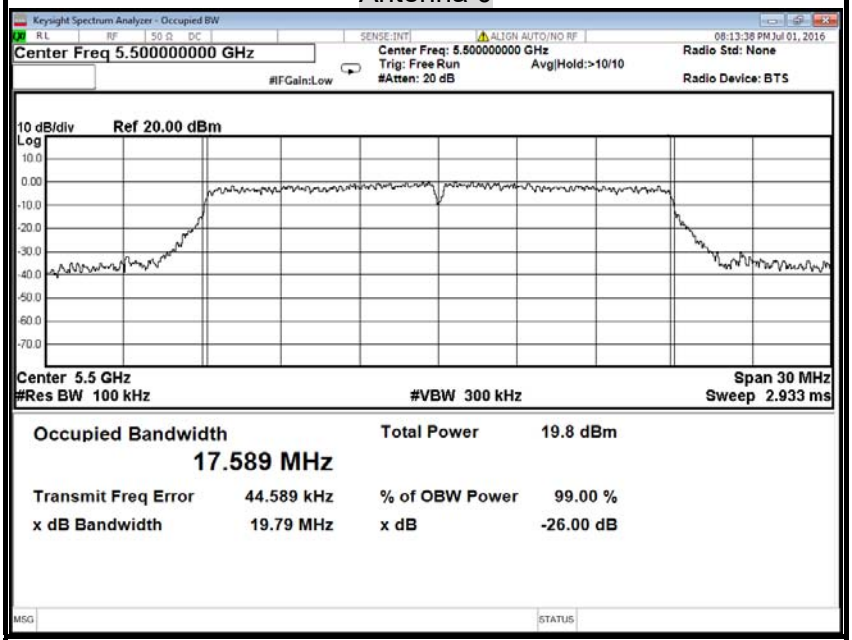


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

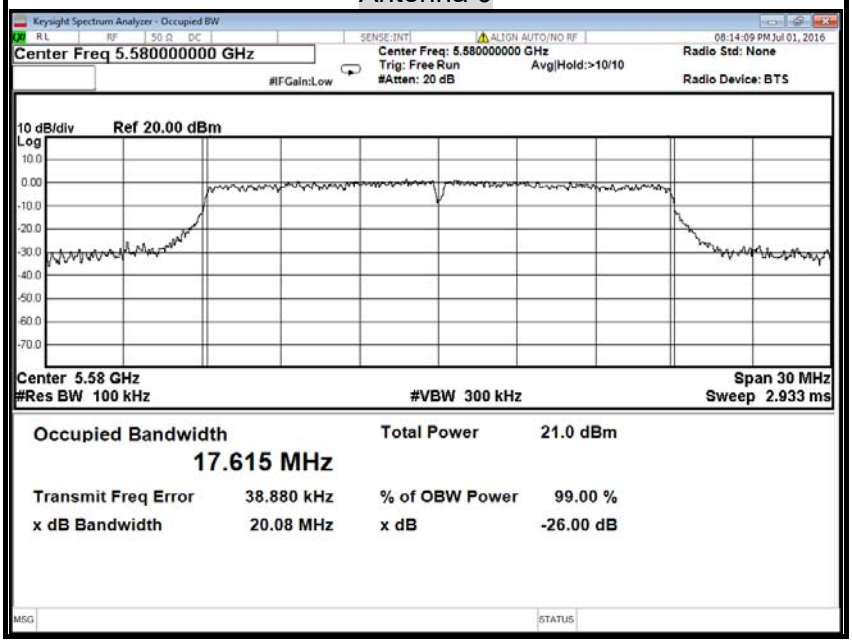
26dB Bandwidth (CH Low)

Antenna 0



26dB Bandwidth (CH Mid)

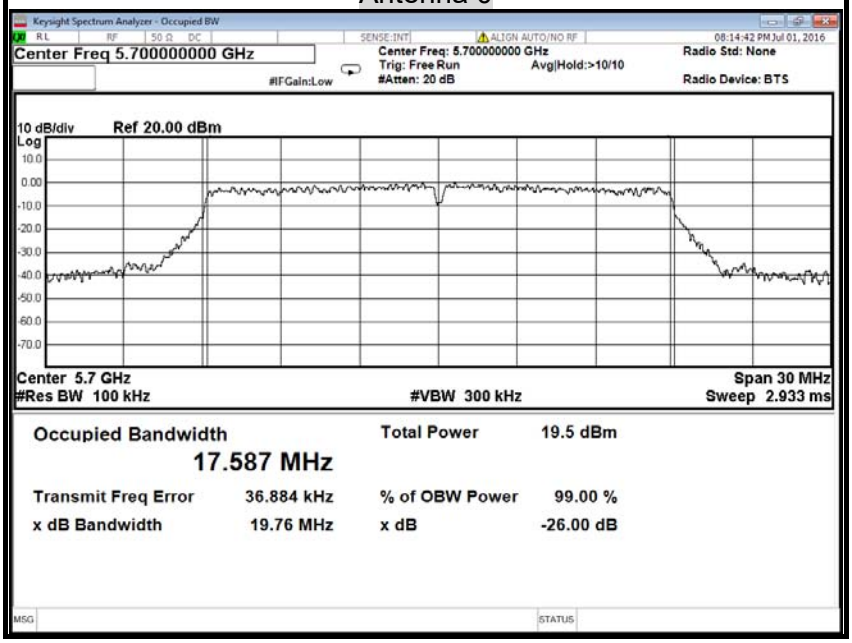
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

Antenna 0

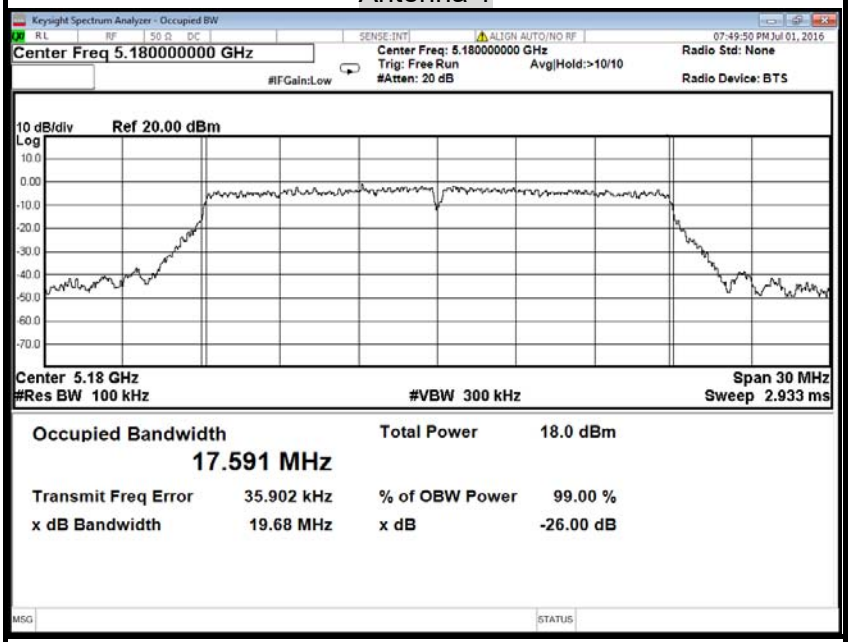


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

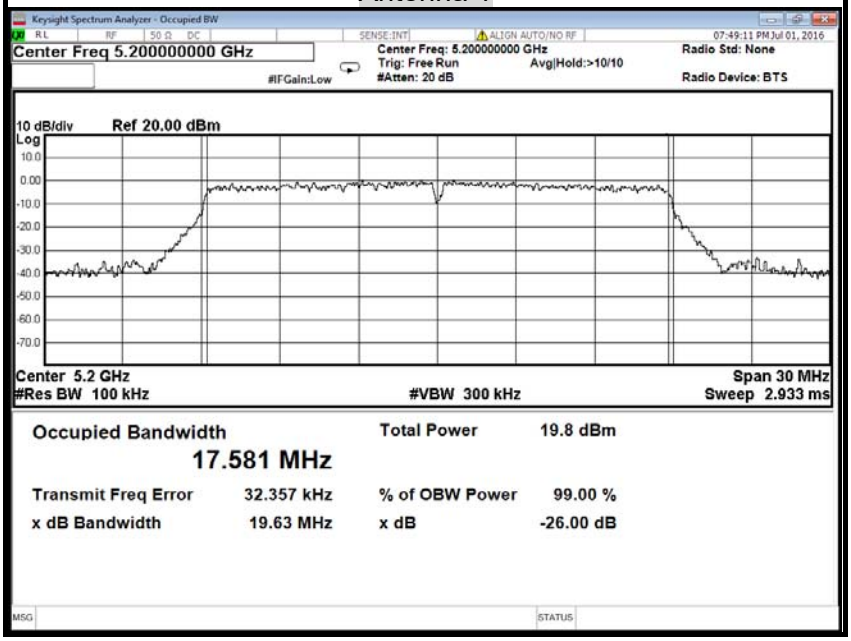
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH Mid)

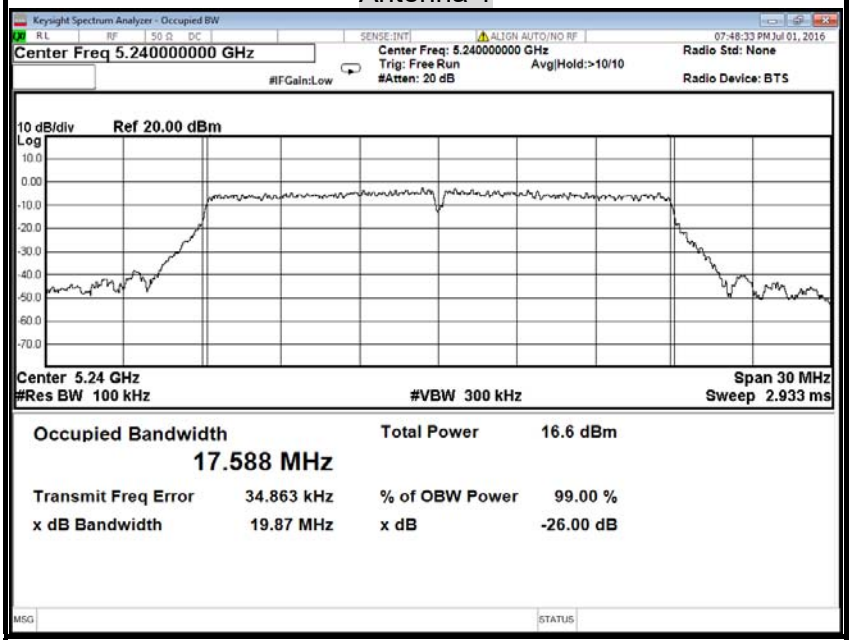
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

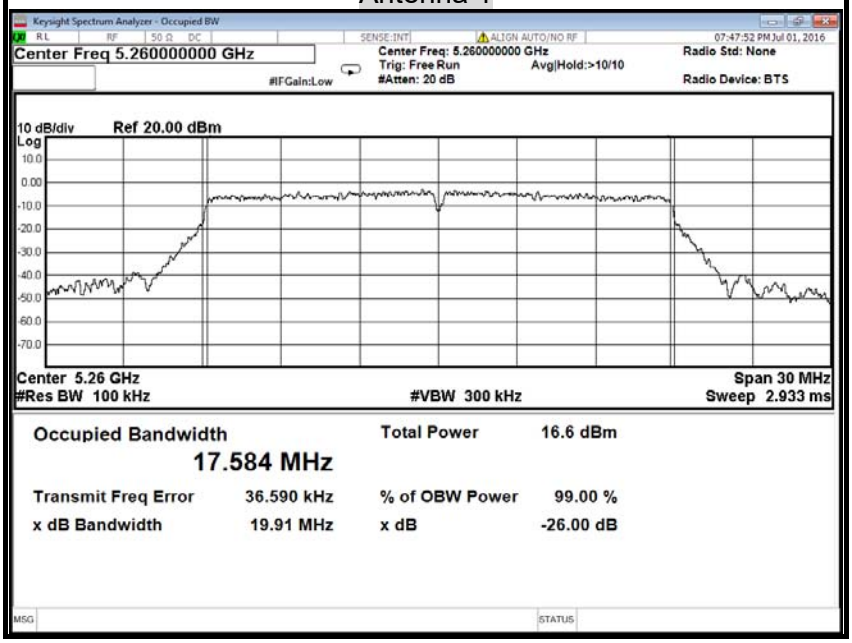
Antenna 1



IEEE 802.11n HT 20 MHz mode / 5260~ 5320MHz

26dB Bandwidth (CH Low)

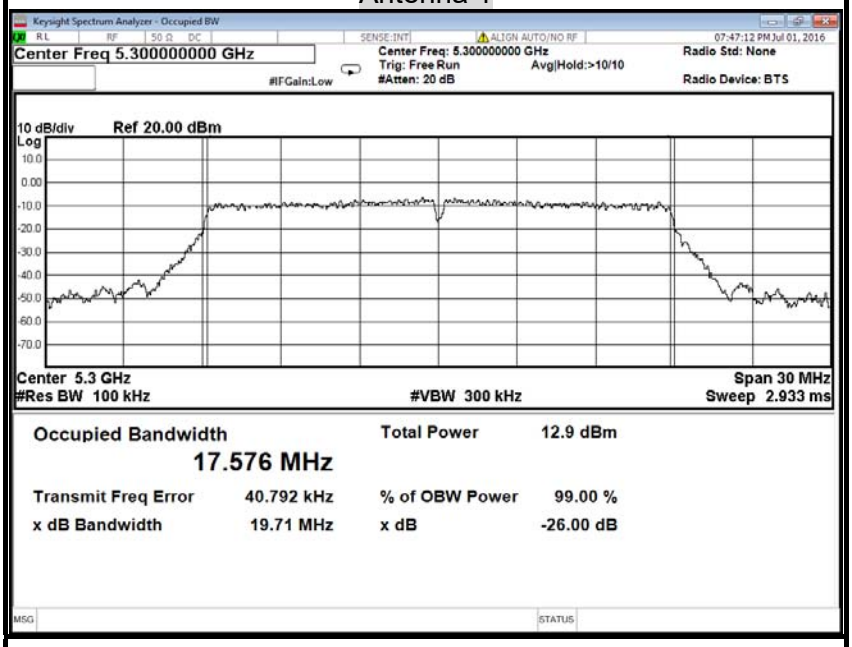
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

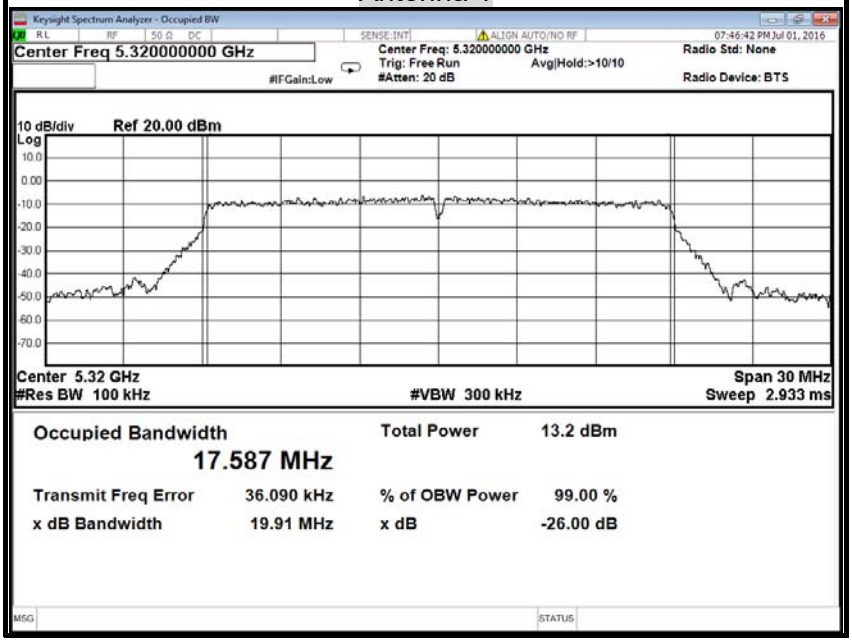
26dB Bandwidth (CH Mid)

Antenna 1



26dB Bandwidth (CH High)

Antenna 1

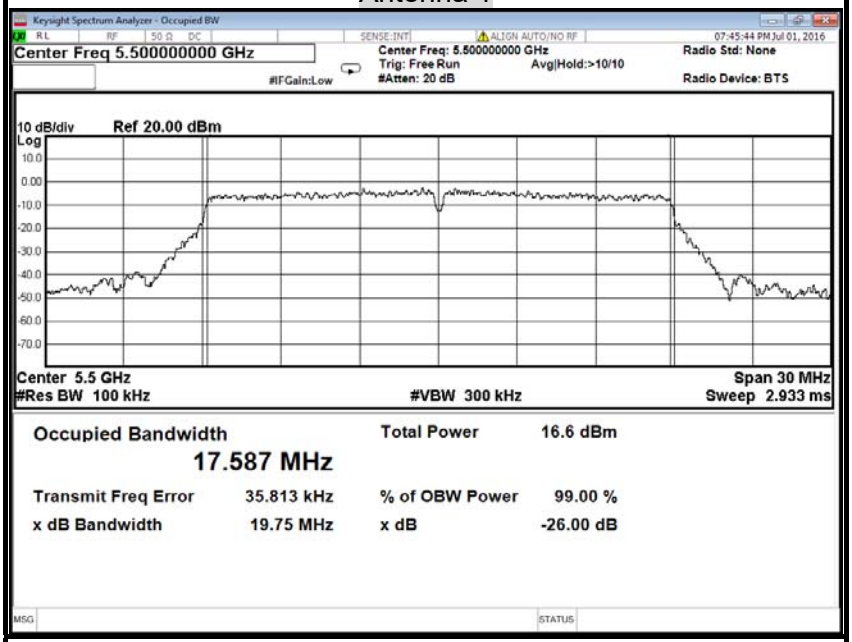


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

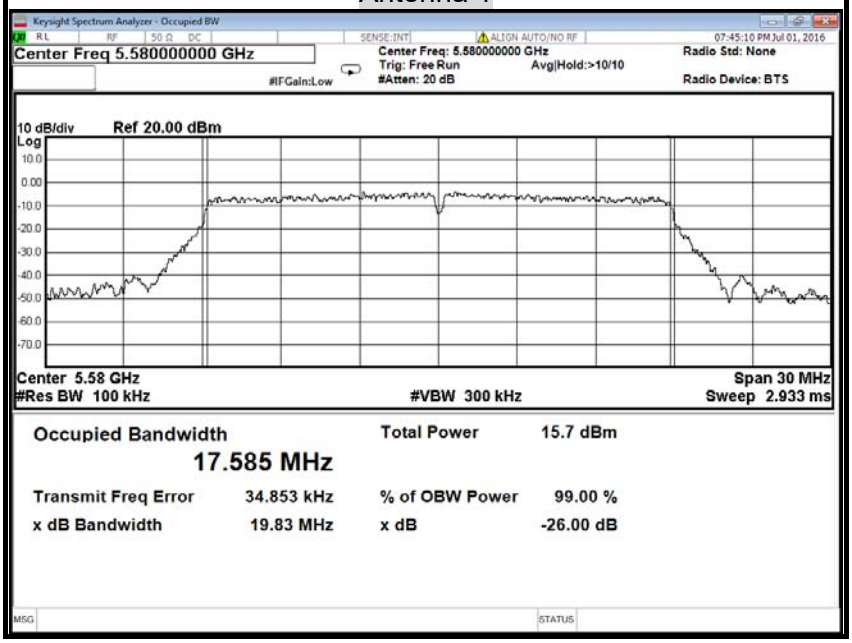
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH Mid)

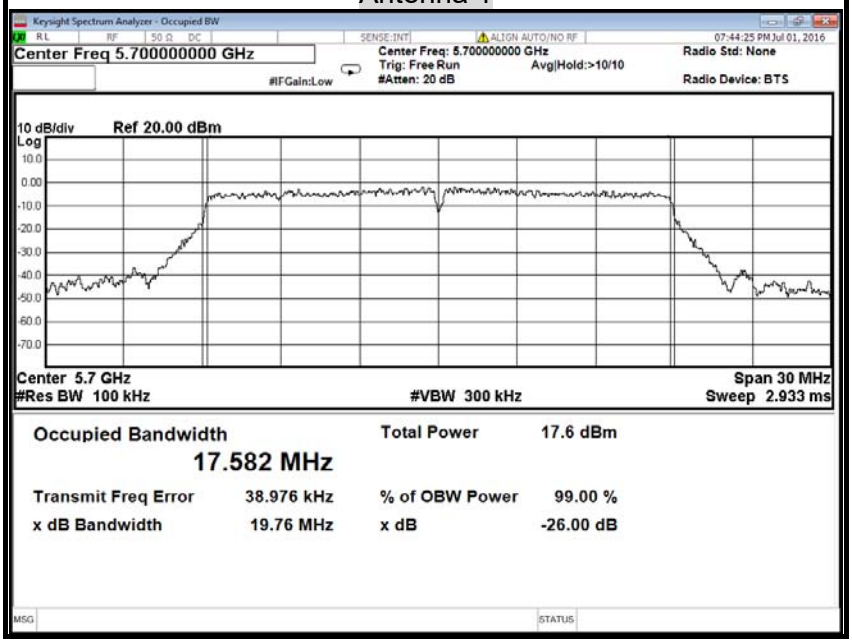
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

Antenna 1

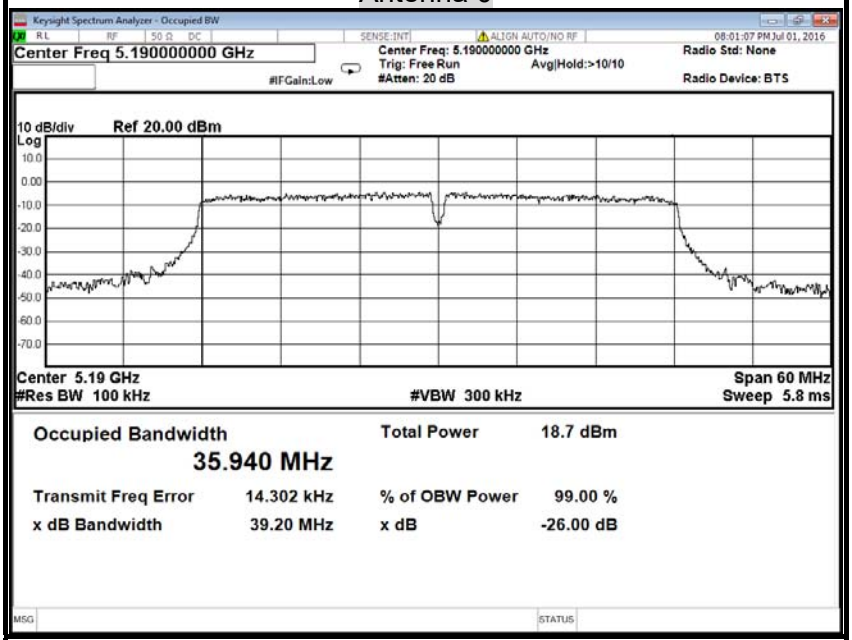


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

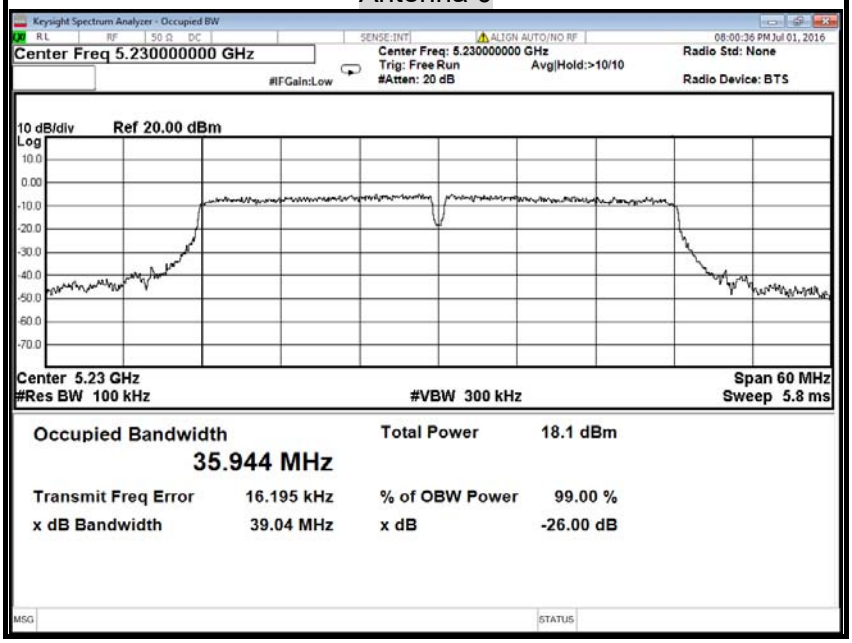
26dB Bandwidth (CH Low)

Antenna 0



26dB Bandwidth (CH High)

Antenna 0

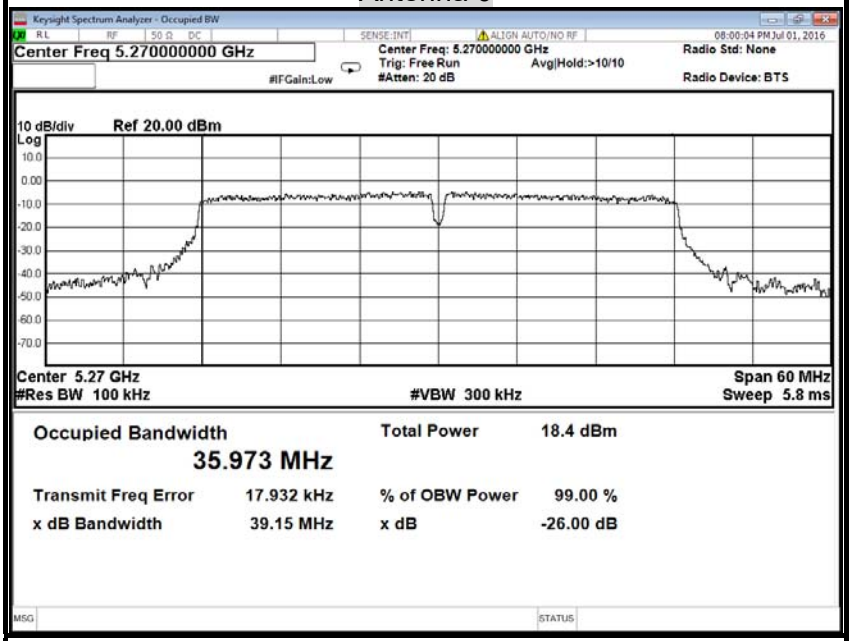


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

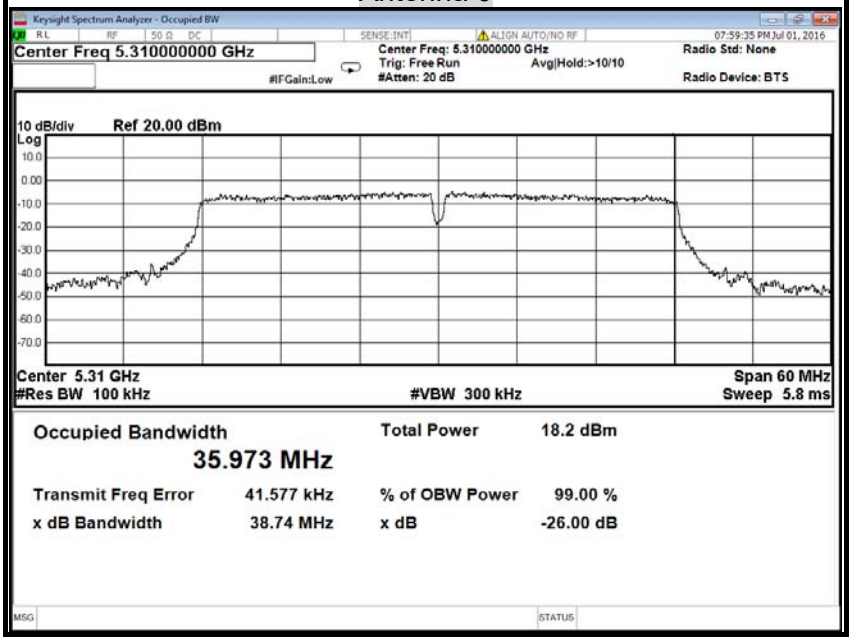
26dB Bandwidth (CH Low)

Antenna 0



26dB Bandwidth (CH High)

Antenna 0

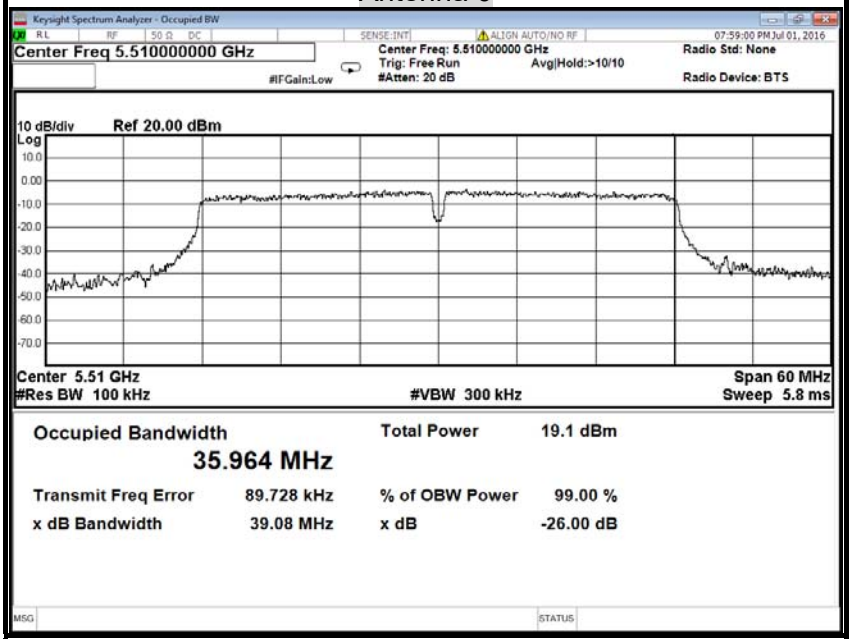


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 40 MHz mode / 5510~ 5670MHz

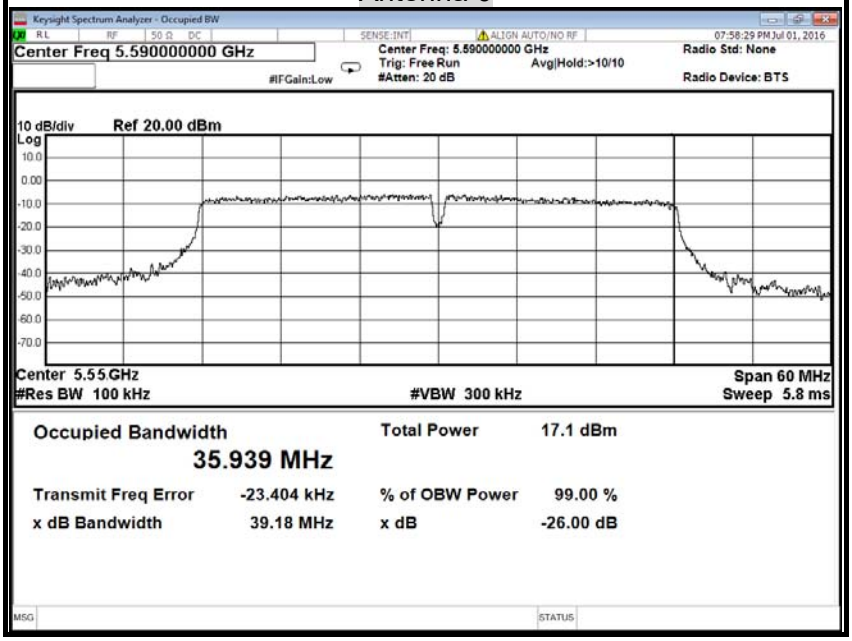
26dB Bandwidth (CH Low)

Antenna 0



26dB Bandwidth (CH Mid)

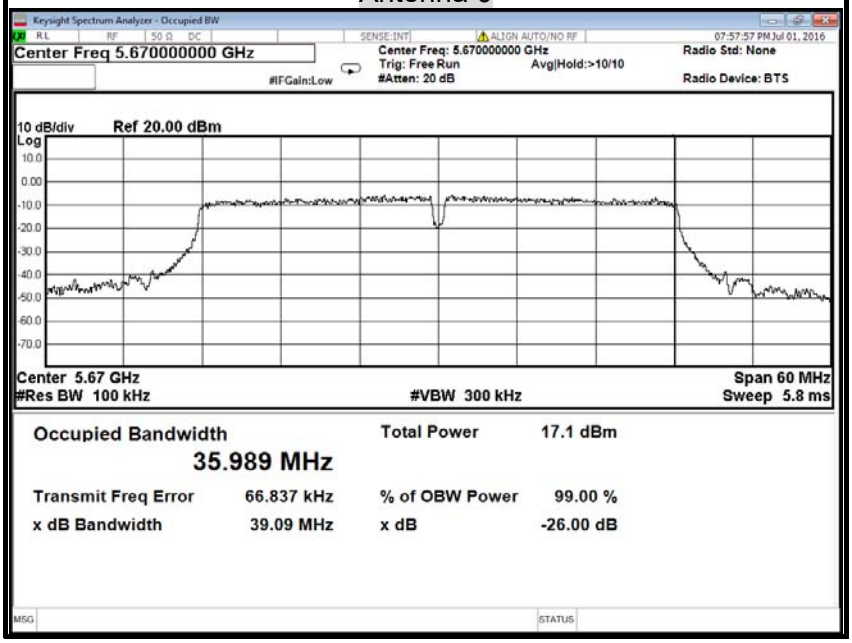
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

Antenna 0

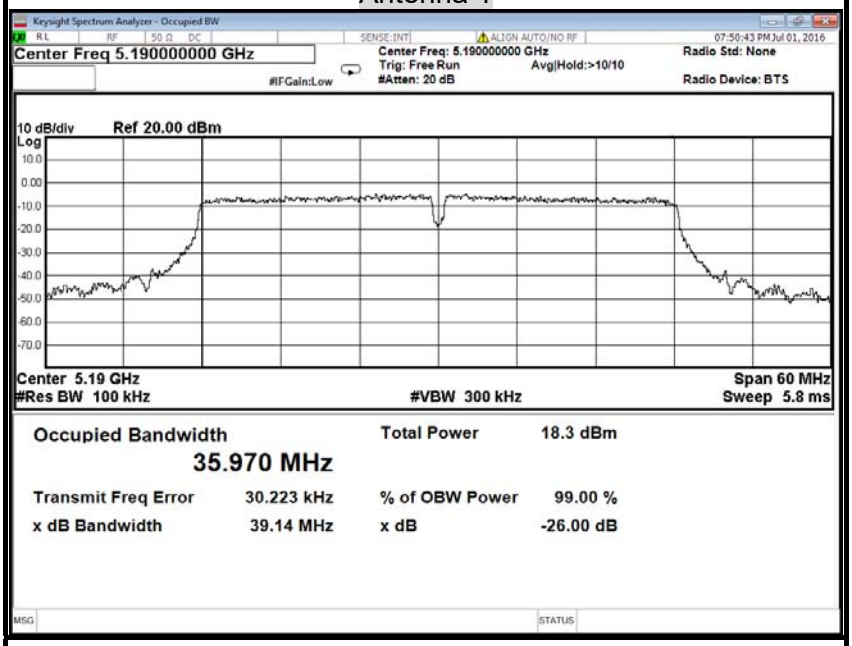


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

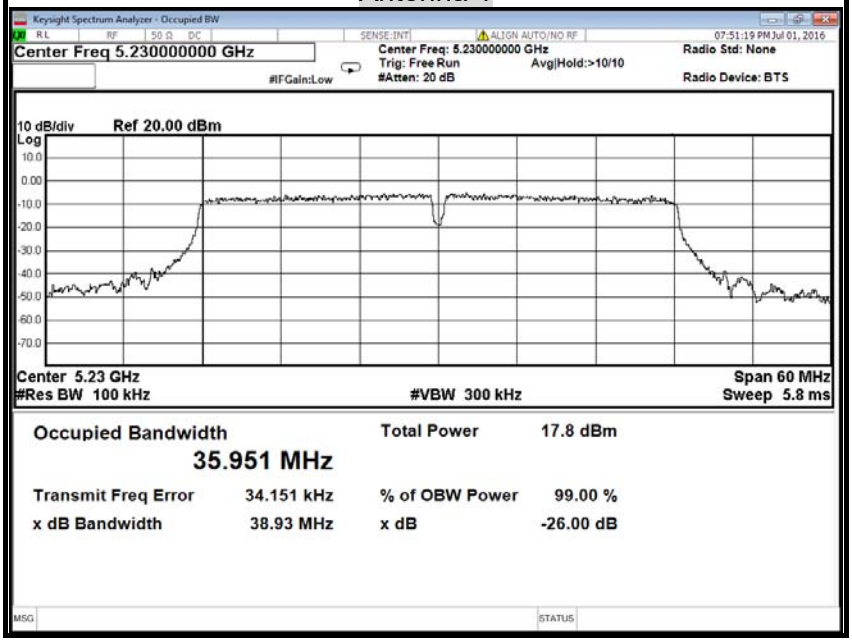
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH High)

Antenna 1

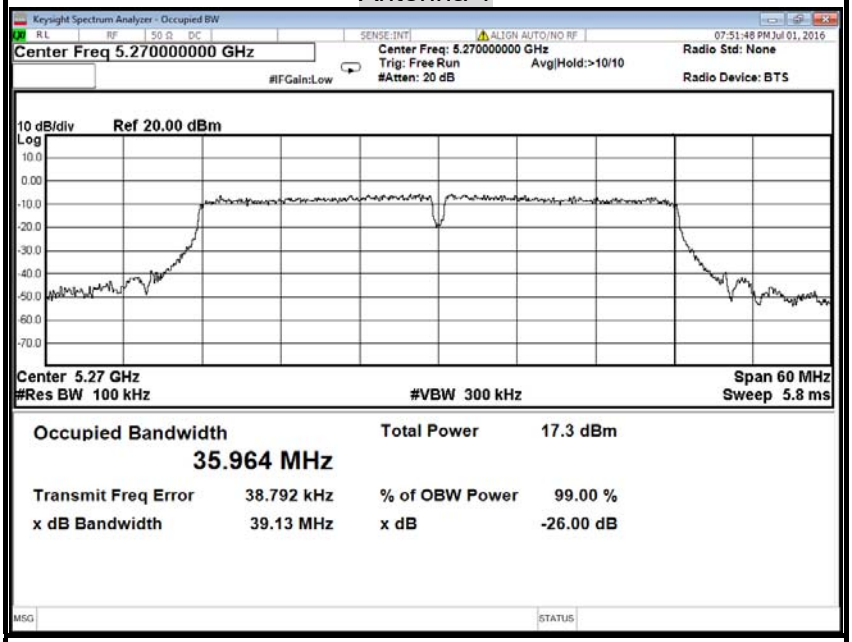


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

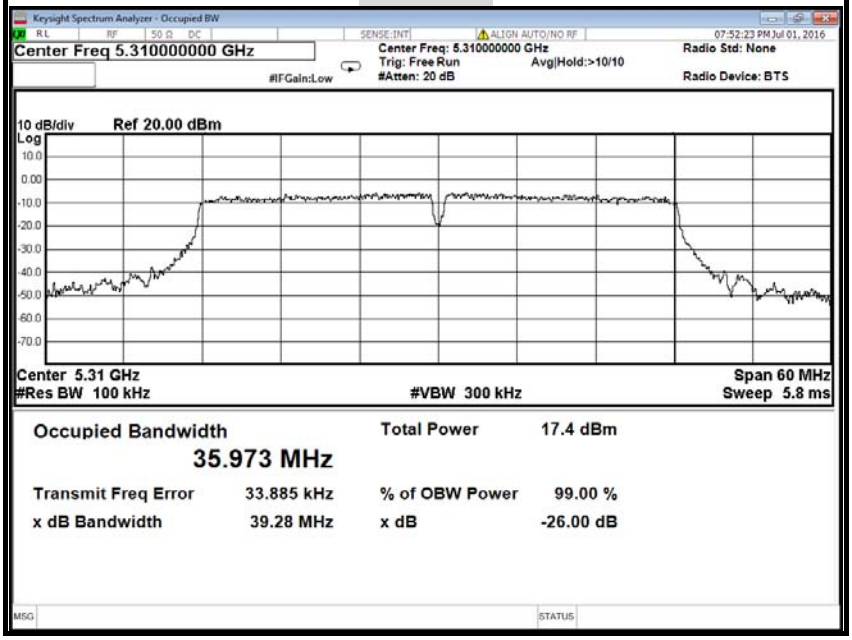
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH High)

Antenna 1

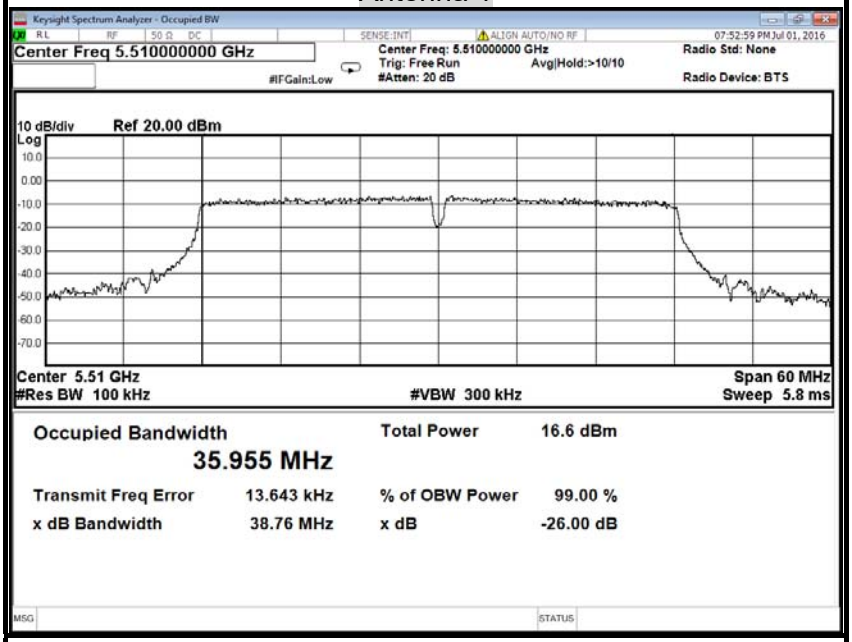


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 40 MHz mode / 5510~5670MHz

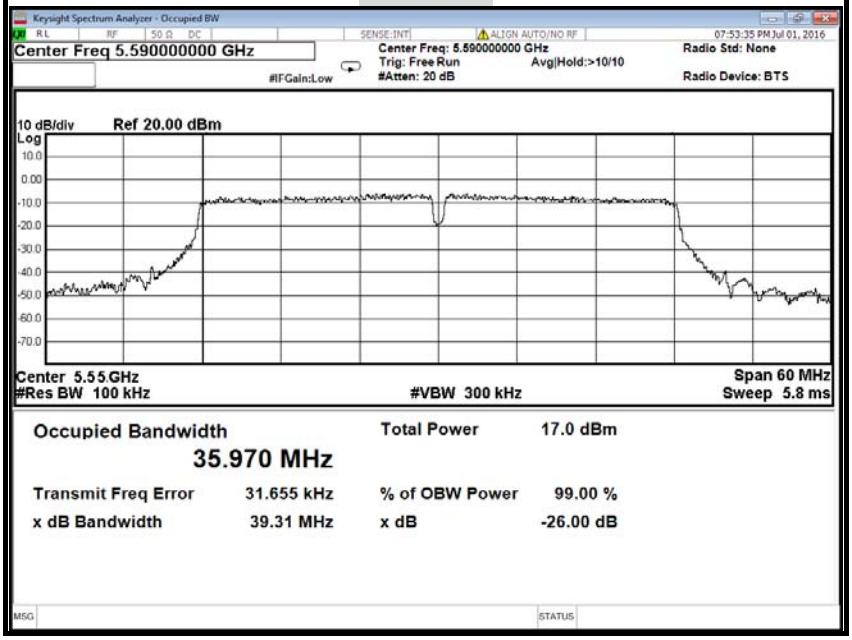
26dB Bandwidth (CH Low)

Antenna 1



26dB Bandwidth (CH Mid)

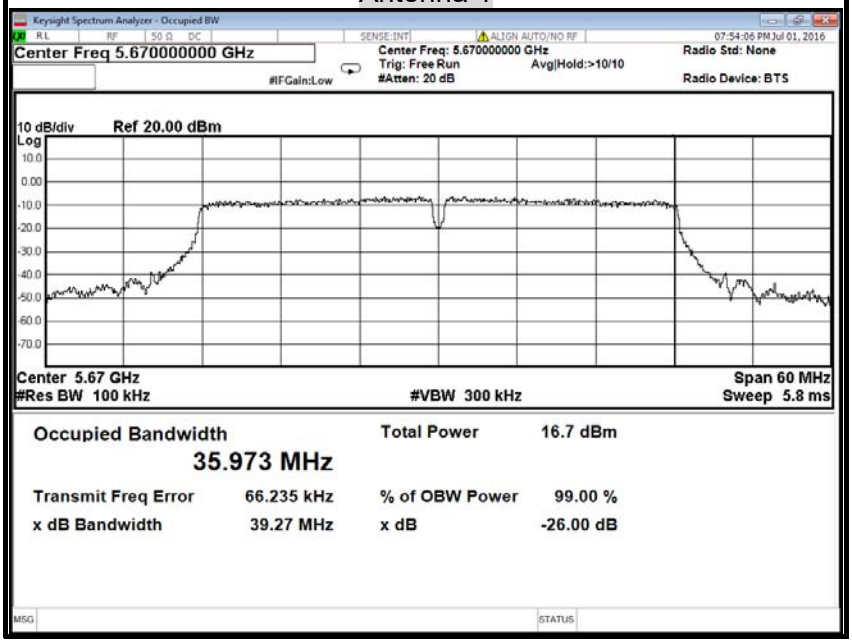
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

26dB Bandwidth (CH High)

Antenna 1

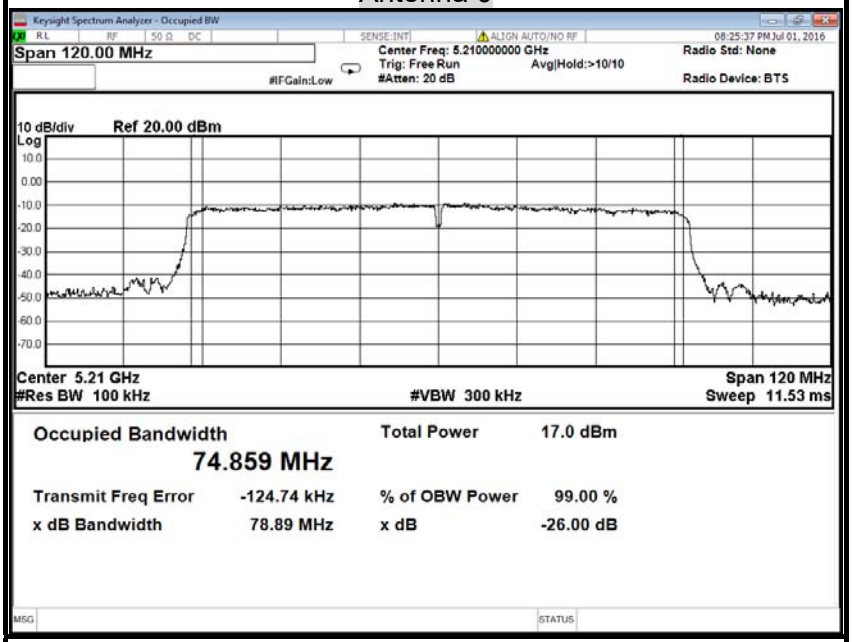


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11ac 80 mode / 5210MHz

26dB Bandwidth

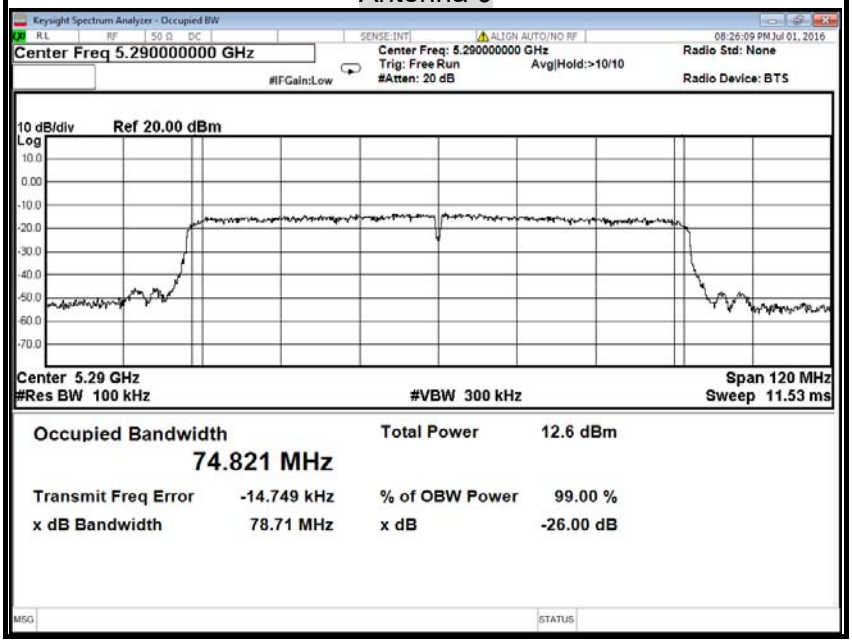
Antenna 0



IEEE 802.11ac 80 mode / 5290MHz

99% Bandwidth

Antenna 0

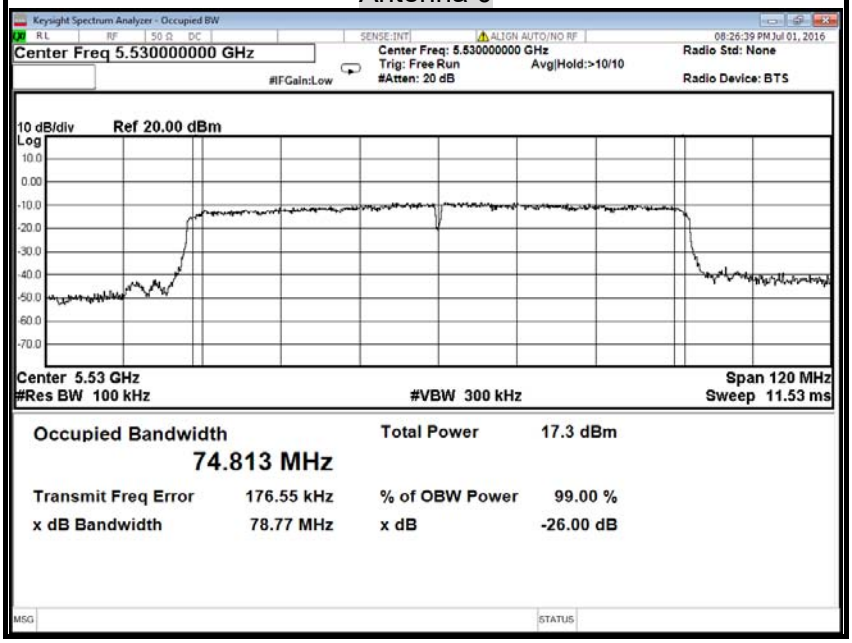


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11ac 80 mode / 5530MHz

99% Bandwidth

Antenna 0

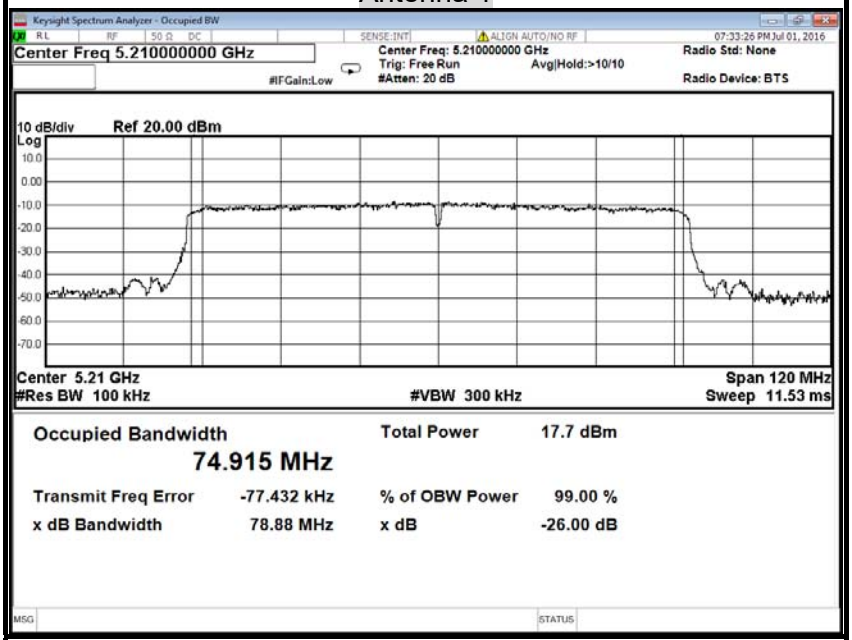


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11ac 80 mode / 5210MHz

26dB Bandwidth

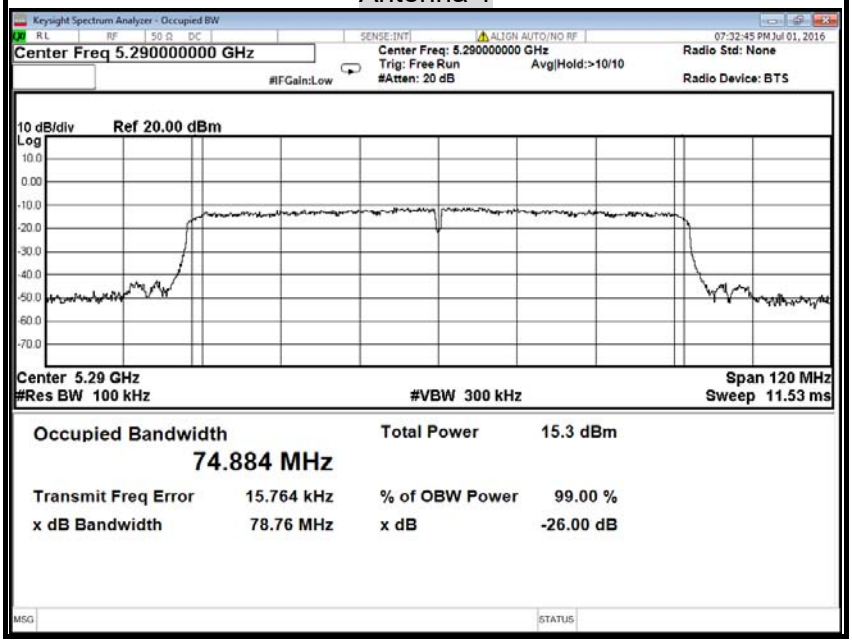
Antenna 1



IEEE 802.11ac 80 mode / 5290MHz

99% Bandwidth

Antenna 1

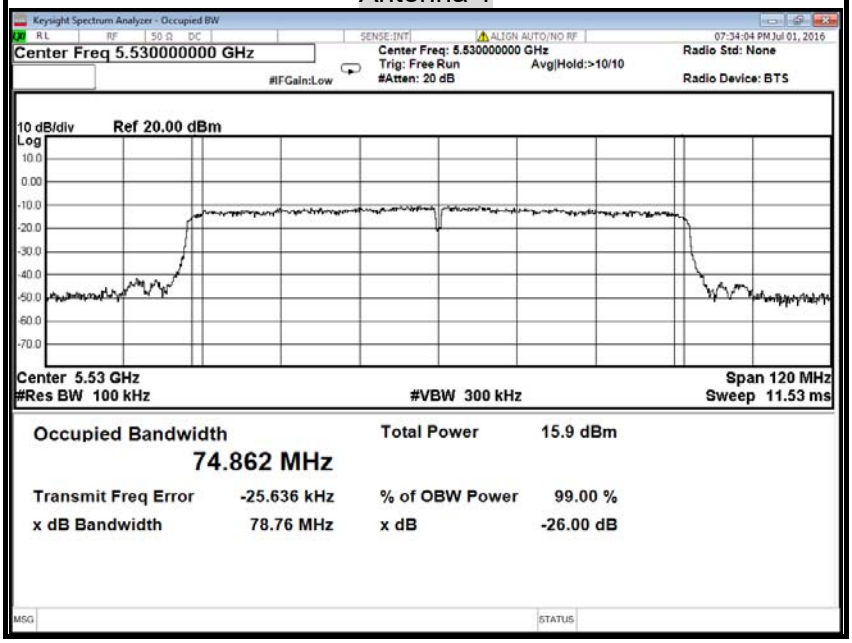


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11ac 80 mode / 5530MHz

26dB Bandwidth

Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

6.2 6dB BANDWIDTH MEASUREMENT

6.2.1 LIMITS

According to §15.407(e), Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

6.2.2 TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

6.2.3 TEST PROCEDURES (please refer to measurement standard)

8.1 Option 1:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 x RBW.

c) Detector = Peak.

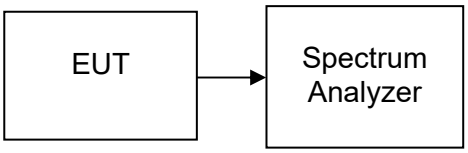
d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.2.4 TEST SETUP



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

6.2.5 TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	6dB Bandwidth(B) (MHz)		Limit (kHz)	Test Result
		Antenna 0	Antenna 1		
Low	5745	16.54	16.55	>500	PASS
Mid	5785	16.51	16.49		PASS
High	5825	16.54	16.55		PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	6dB Bandwidth(B) (MHz)		Limit (kHz)	Test Result
		Antenna 0	Antenna 1		
Low	5745	17.63	17.65	>500	PASS
Mid	5785	17.67	17.67		PASS
High	5825	17.67	17.67		PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	6dB Bandwidth(B) (MHz)		Limit (kHz)	Test Result
		Antenna 0	Antenna 1		
Low	5755	36.35	36.40	>500	PASS
High	5795	36.40	36.39		PASS

Test mode: IEEE 802.11ac 80 mode / 5775MHz

Channel	Frequency (MHz)	6dB Bandwidth(B) (MHz)		Limit (kHz)	Test Result
		Antenna 0	Antenna 1		
	5775	75.51	75.29	>500	PASS

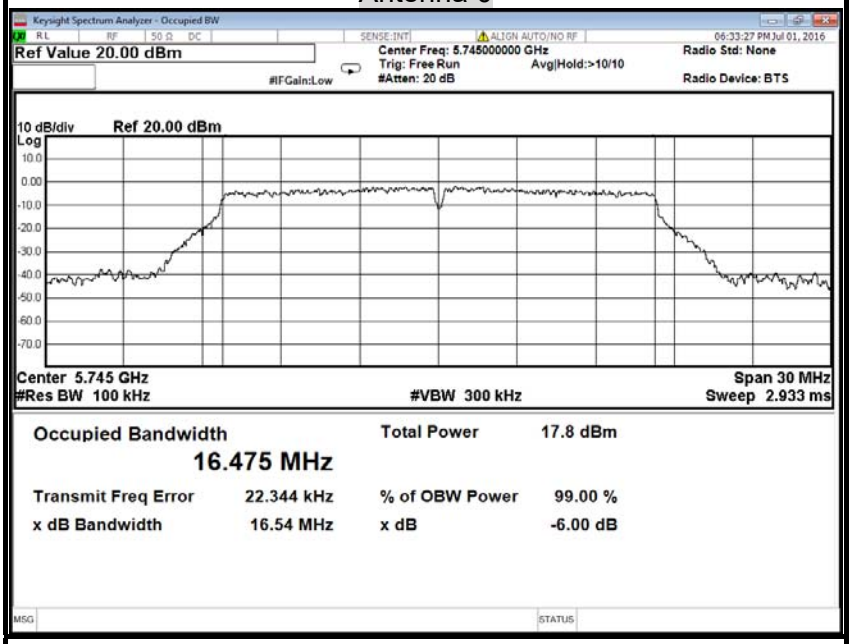
This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

Test Plot

IEEE 802.11a mode / 5745 ~ 5825MHz

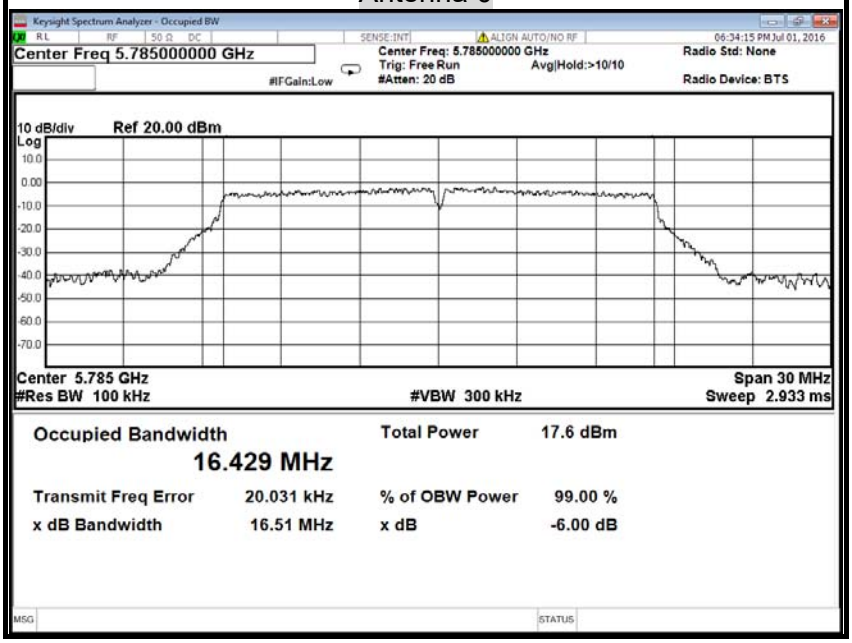
6dB Bandwidth (CH Low)

Antenna 0



6dB Bandwidth (CH Mid)

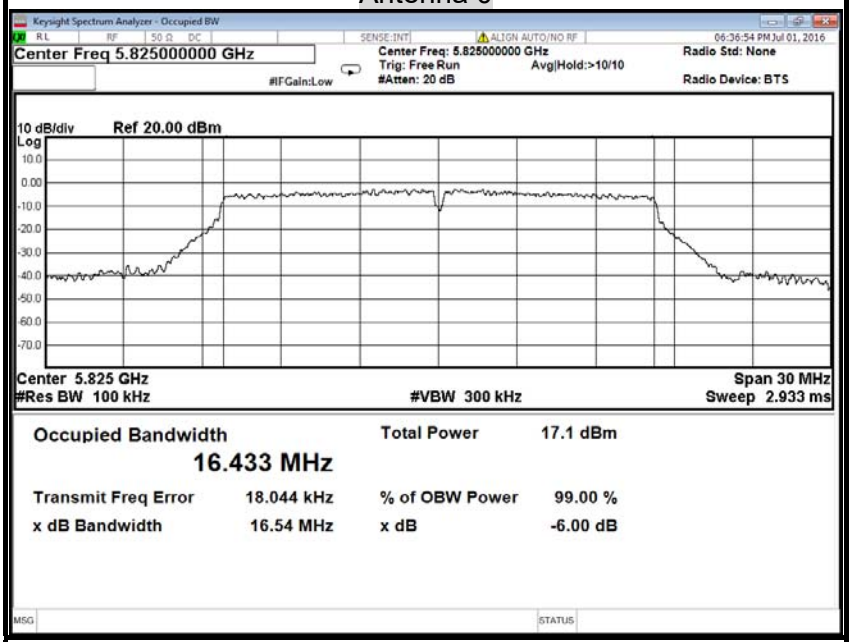
Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

6dB Bandwidth (CH High)

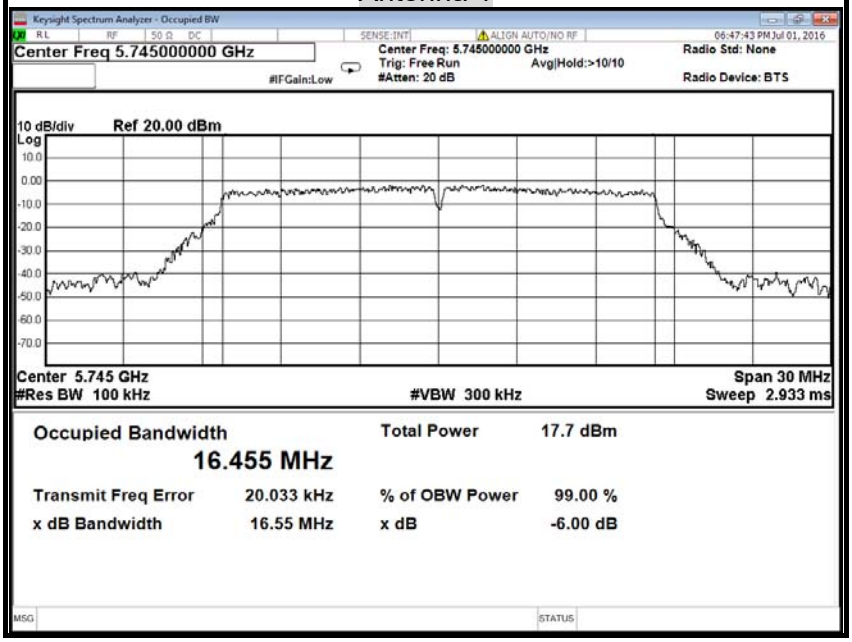
Antenna 0



IEEE 802.11a mode / 5745 ~ 5825MHz

6dB Bandwidth (CH Low)

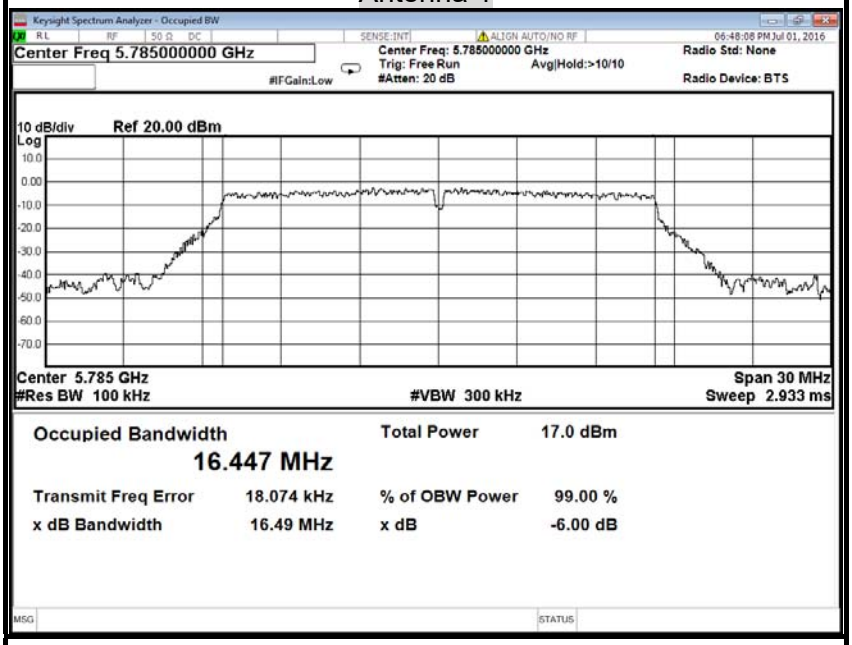
Antenna 1



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

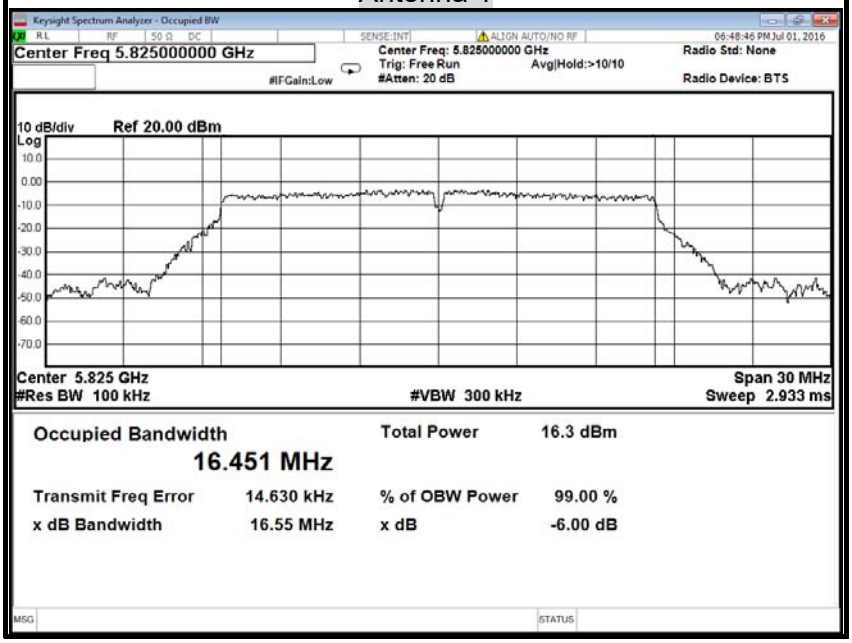
6dB Bandwidth (CH Mid)

Antenna 1



6dB Bandwidth (CH High)

Antenna 1

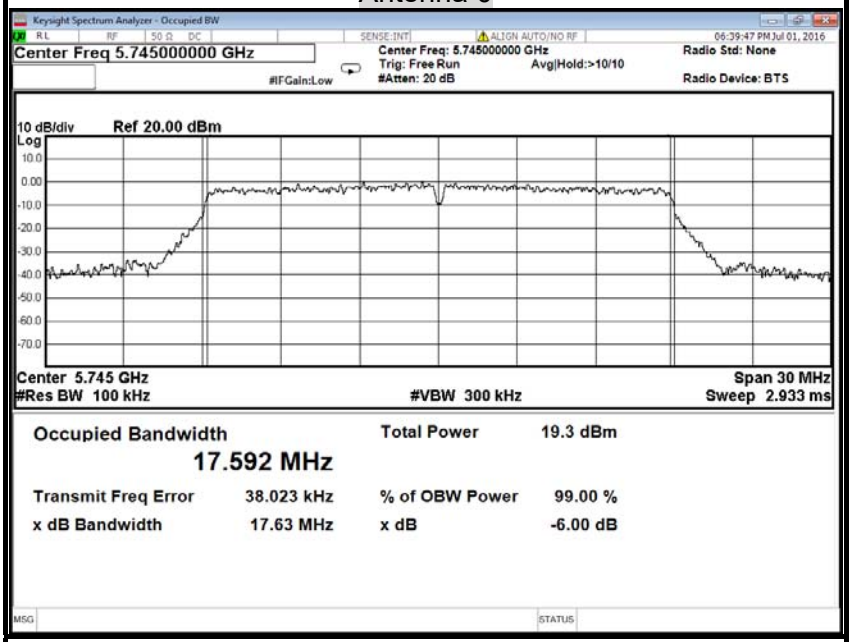


This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.

IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

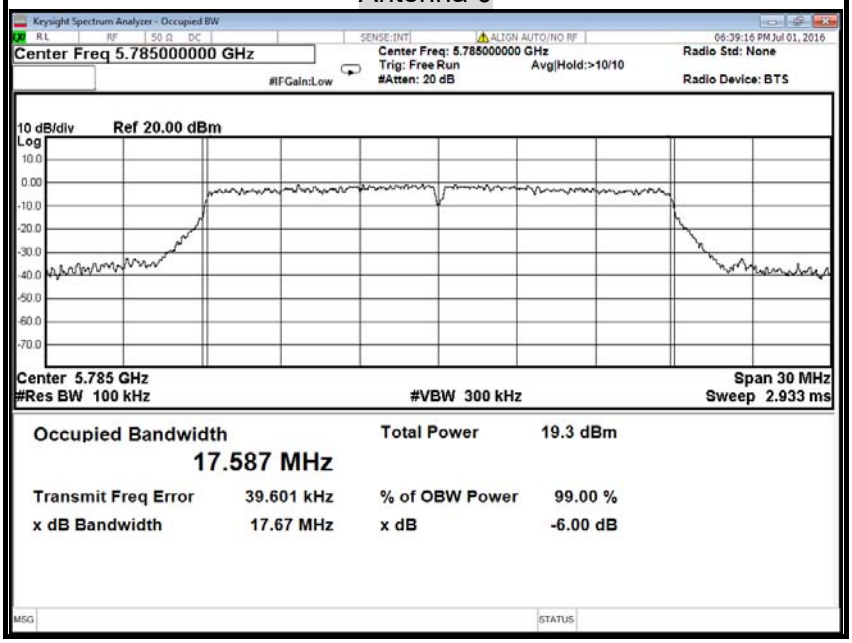
6dB Bandwidth (CH Low)

Antenna 0



6dB Bandwidth (CH Mid)

Antenna 0



This report shall not be reproduced except in full, without the written approval of Compliance Certification Services.