

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E AND INDUSTRY CANADA RSS 247 REQUIREMENT

OF

Product Name:	Smart Module
Brand Name:	N/A
Model No.:	SIMT 1502
Model Difference:	N/A
FCC ID:	UDV-20170406
IC:	8460A-20170406
Report No.:	ER/2017/50038-01
Issue Date:	Feb. 12, 2019
FCC Rule Part:	§15.407
IC Rule Part	RSS-247 issue 2 Feb. 2017
Prepared for:	SHANGHAI SIMCOM LIMITED Building A, SIM Technology Building, No.633, Jinzhong Road, Changning Dis- trict , Shanghai
Prepared by:	SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Indus- trial Park, Wuku District, New Taipei City, Taiwan 24803



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VERIFICATION OF COMPLIANCE

Applicant: SHANGHAI SIMCOM LIMITED
Building A, SIM Technology Building, No.633, Jinzhong Road,
Changning District , Shanghai

Product Name: Smart Module

Brand Name: N/A

Model No.: SIMT 1502

Model Difference: N/A

FCC ID: UDV-20170406

IC : 8460A-20170406

File Number: ER/2017/50038-01

Date of test: May 08, 2017 ~ Aug. 08, 2017
Nov. 30, 2018 ~ Dec. 07, 2018 (Spot Check)

Date of EUT Received: May 08, 2017

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. 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.

The test results of this report relate only to the tested sample identified in this report.

Test By:

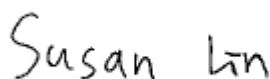


Date:

Feb. 12, 2019

Nick Lin / Sr. Engineer

Prepared By:

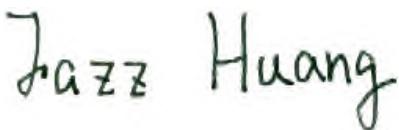


Date:

Feb. 12, 2019

Susan Lin / Clerk

Approved By:



Date:

Feb. 12, 2019

Jazz Huang / Asst. Supervisor

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Revision History

Report Number	Revision	Description	Issue Date
ER/2017/50038	Rev.00	Initial creation of document	Jul. 21, 2017
ER/2017/50038	Rev.01	Update measurement data	Aug. 09, 2017
ER/2017/50038-01	Rev.02	Remove WWAN function and add spot check data in page 221.	Feb. 12, 2019

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	Smart Module
Brand Name:	N/A
Model No.:	SIMT 1502
Model Difference:	N/A
Product SW/HW version:	CB03_8909_CH_V5.30_S_20171027 / V1.20
Radio SW/HW version:	N/A / N/A
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Power Supply:	3.8Vdc from DC power Supply

Antenna Designation	External Antenna, 5GHz Gain: 3.37 dBi (5150MHz-5250MHz) 5GHz Gain: 3.23 dBi (5250MHz-5350MHz) 5GHz Gain: 1.51 dBi (5470MHz-5725MHz) 5GHz Gain: 0.42 dBi (5725MHz-5850MHz)
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 - 150.0Mbps

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FCC WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.)	Modulation Technology
11a	5150~5250	4	15.98 dBm	OFDM
	5250~5350	4	16.36 dBm	
	5470~5725	12	15.54 dBm	
	5725~5850	5	14.26 dBm	
11n	HT20 5150~5250	4	16.00 dBm	OFDM
	HT20 5250~5350	4	16.31 dBm	
	HT20 5470~5725	12	15.58 dBm	
	HT20 5725~5850	5	14.33 dBm	
11n	HT40 5150~5250	2	16.54 dBm	OFDM
	HT40 5250~5350	2	16.50 dBm	
	HT40 5470~5725	6	14.07 dBm	
	HT40 5725~5850	2	14.29 dBm	

IC WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg.) / (EIRP)	Modulation Technology
11a	5150~5250	4	15.98 dBm (EIRP)	OFDM
	5250~5350	4	16.36 dBm	
	5500~5580	5	14.66 dBm	
	5700~5700	1	15.54 dBm	
	5745-5825	5	14.26 dBm	
11n	HT20 5150~5250	4	16.00 dBm (EIRP)	OFDM
	HT20 5250~5350	4	16.31 dBm	
	HT20 5500~5580	5	14.53 dBm	
	HT20 5660~5720	4	15.58 dBm	
	HT20 5745-5825	5	14.33 dBm	
11n	HT40 5150~5250	2	16.54 dBm (EIRP)	OFDM
	HT40 5250~5350	2	16.50 dBm	
	HT40 5510~5550	2	14.07 dBm	
	HT40 5670~5670	1	13.01 dBm	
	HT40 5755-5795	2	14.29 dBm	

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

RSS-247 issue 2 Feb. 2017

RSS-Gen issue 5 Apr. 2018

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

FCC Registration Numbers are: 509634

Canada Registration Number: 4620A-5

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 2dB, and 10dB attenuator.

$$= \text{RF cable loss (dB)} + \text{attenuation factor(dB)} = 12(\text{dB})$$

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2.5 Configuration of Tested System

Fig. 2-1 Configuration of Conducted and Radiated Tested System



Fig. 2-2 Conduction

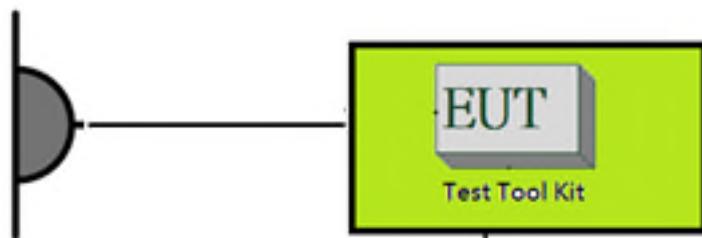


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L430	R9-YYG88	Shielded	Un-shielded
3.	Test Tool Kit	N/A	N/A	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	RSS-247 §6.2.1~ 4 (1) RSS-Gen §6.7	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.407(g)	RSS-Gen §6.11	Frequency Stability	Compliant
§15.203 §15.407(a)	RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

4 channels are provided for 802.11a, 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

Operated band in 5250 MHz ~5350 MHz:

4 channels are provided for 802.11a, 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
54	5270 MHz	62	5310 MHz

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Operated band in 5470 MHz ~5725 MHz:

11 channels are provided for FCC 802.11a, 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz		

5 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz		

Note: Channels from 5600MHz ~ 5650MHz are disabled when this product is marketed withing Canada.

Operated band in 5725 MHz ~5850 MHz:

5 channels are provided for 802.11a, 802.11n_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11a	5180~5240	36 to 48	44	OFDM	6
802.11a	5260~5320	52 to 64	60	OFDM	6
802.11a	5500~5720	100 to 140	116	OFDM	6
802.11a	5745~5825	149 to 165	157	OFDM	6

RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS0

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MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11a	5500~5720	100 to 144	100,116,140	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5510~5710	102 to 142	102,110,134	OFDM	MCS0
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0

Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n/ac WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS0
802.11a	5500~5720	100 to 140	100,116,140	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5510~5710	102 to 134	102,110,134	OFDM	MCS0
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB
Measurement uncertainty (Polarization : Horizontal)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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

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6 CONDUCTED EMISSION TEST

6.1. Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

1. The lower limit shall apply at the transition frequencies

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2. Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
LISN	SCHWARZ BECK	NSLK 8127	8127-649	05/22/2016	05/21/2017
LISN	MESS TEC	FCC-LISN-50/250-25- 2-01	4034	03/19/2017	03/18/2018
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2016	11/25/2017

6.3. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

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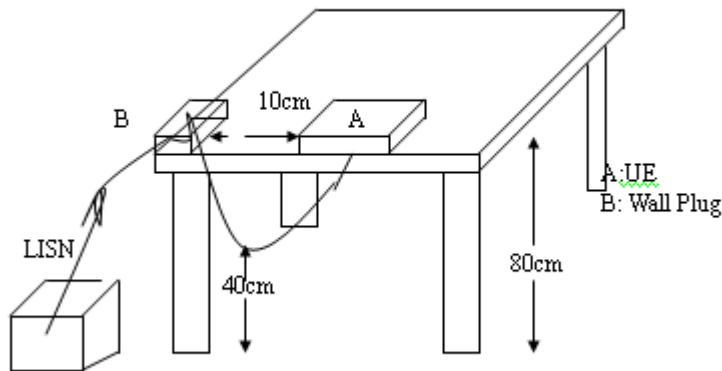
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6.4. Test SET-UP



6.5. Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

6.6. Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit

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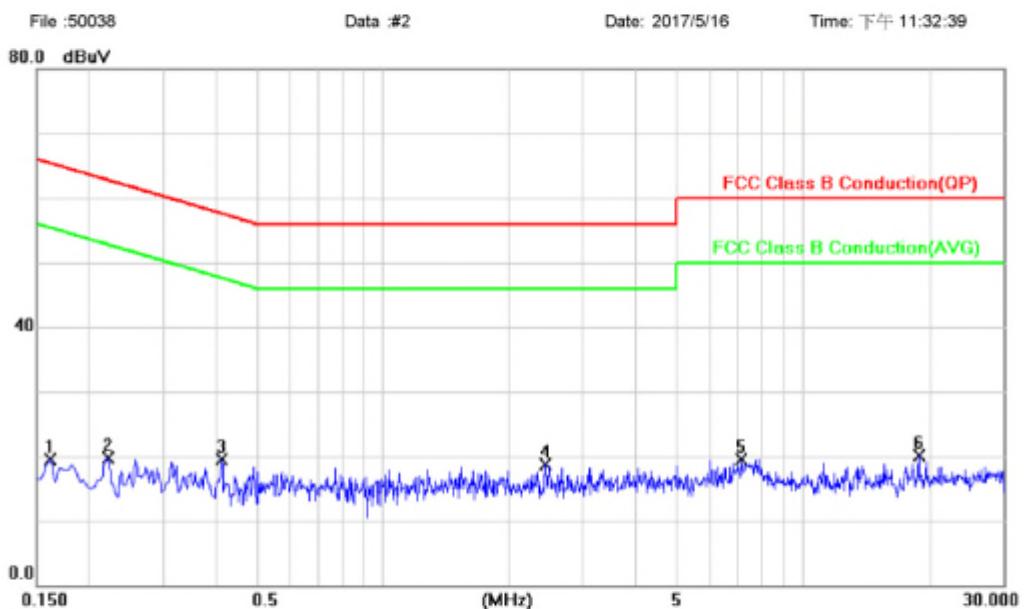
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Operation Mode:	Operation mode	Test By:	Tin
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Site Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation

Phase: **L1** Temperature: 20 °C
Power: AC 120V/60Hz Humidity: 58 %

Conducted Emission



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
MHz		dBuV	dB	dBuV	dBuV	dB			
1	0.1620	9.76	9.80	19.56	65.36	-45.80	peak		
2	0.2220	9.89	9.79	19.68	62.74	-43.06	peak		
3	0.4140	9.81	9.79	19.60	57.57	-37.97	peak		
4 *	2.4460	8.97	9.83	18.80	56.00	-37.20	peak		
5	7.1700	9.45	9.99	19.44	60.00	-40.56	peak		
6	18.8780	9.91	10.15	20.06	60.00	-39.94	peak		

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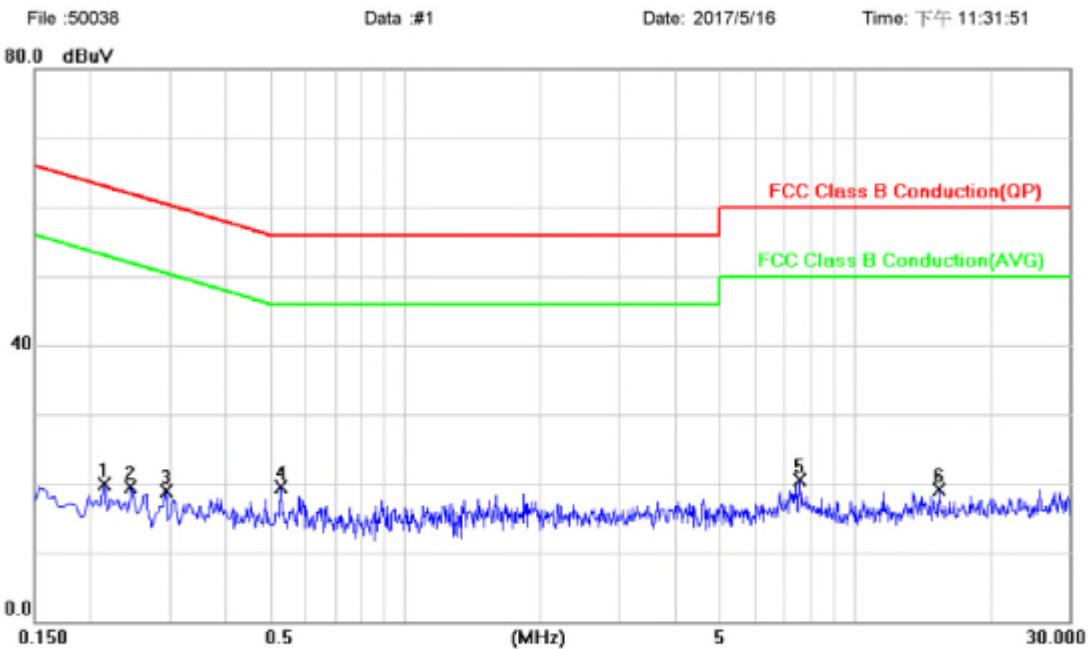
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Site Conduction Room
Limit: FCC Class B Conduction(QP)
Mode: Operation

Phase: **N**
Power: AC 120V/60Hz

Temperature: 20 °C
Humidity: 58 %

Conducted Emission



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dB			
1		0.2140	10.06	9.79	19.85	63.05	-43.20	peak	
2		0.2460	9.76	9.79	19.55	61.89	-42.34	peak	
3		0.2940	9.16	9.79	18.95	60.41	-41.46	peak	
4 *		0.5300	9.67	9.79	19.46	56.00	-36.54	peak	
5		7.5260	10.49	10.00	20.49	60.00	-39.51	peak	
6		15.4340	8.95	10.11	19.06	60.00	-40.94	peak	

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7 DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)
802.11a	87.33	0.59
802.11n_20	86.46	0.63
802.11n_40	76.02	1.19

$$\text{Duty Cycle Factor: } 10 * \log(1/0.8733) = 0.59$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.8646) = 0.63$$

$$\text{Duty Cycle Factor: } 10 * \log(1/0.7602) = 1.19$$

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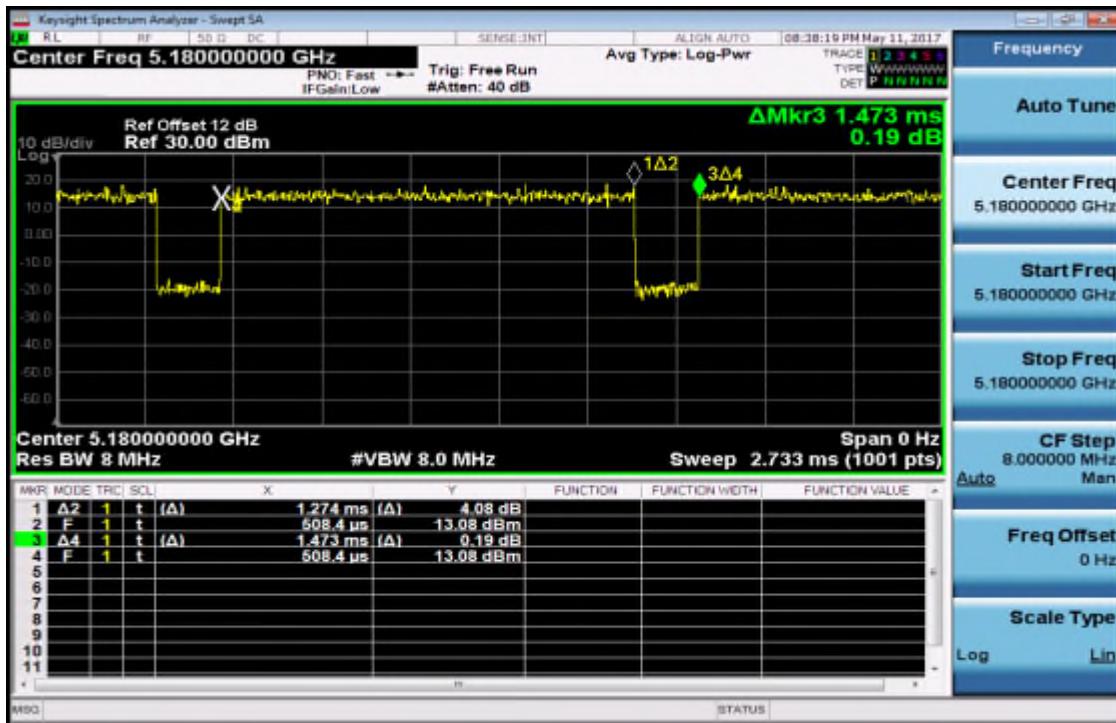
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DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20



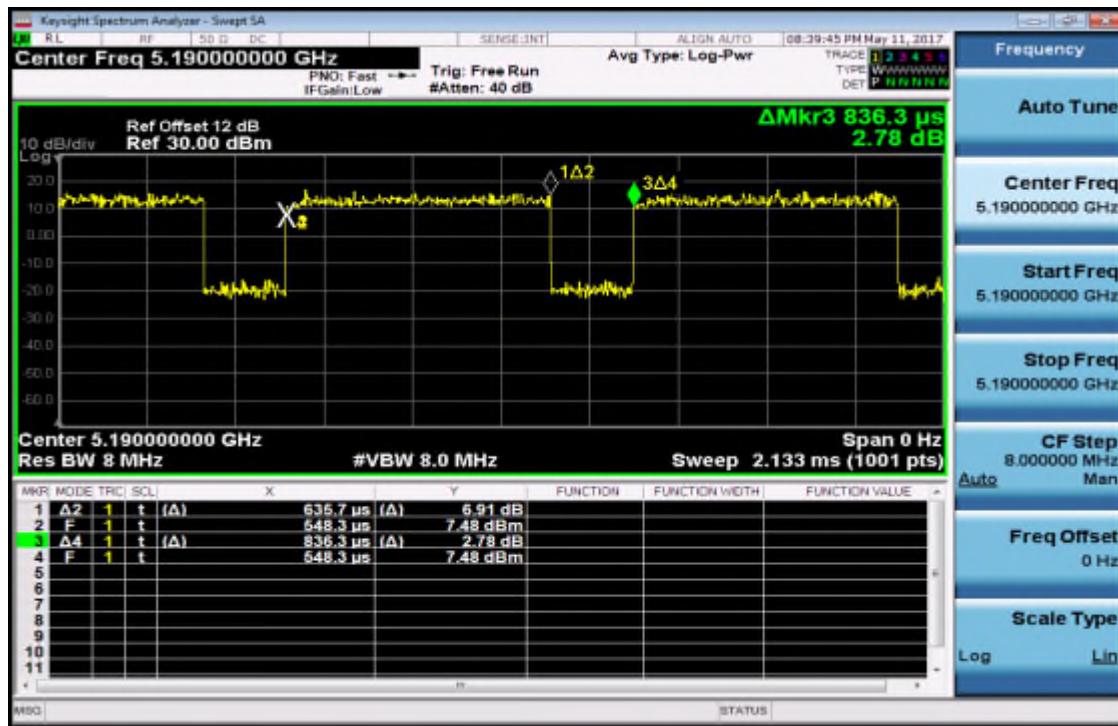
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802.11 n HT 40



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8 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
 - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
 - b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
 - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak,
Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all test default channel measured were complete.

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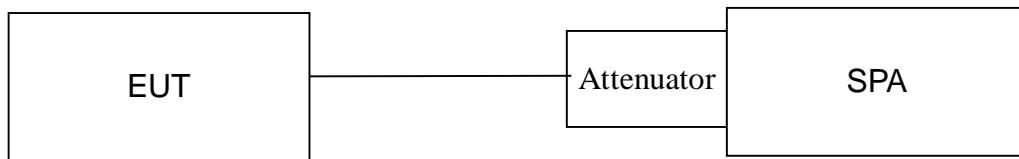
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8.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018

8.4 Test Set-up



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8.5 Measurement Result

26dB Bandwidth

802.11a_Main

802.11n_HT20_Main

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	802.11n _HT40_Main		
						Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	28.80	14.594	5180	29.90	14.757			
5220	30.00	14.771	5220	29.88	14.753			
5240	30.00	14.771	5240	30.00	14.771	5190	50.00	16.990
5260	30.00	14.771	5260	30.00	14.771	5230	50.00	16.990
5300	30.00	14.771	5300	29.87	14.752	5270	50.00	16.990
5320	30.00	14.771	5320	29.98	14.768	5310	50.00	16.990
5500	29.68	14.725	5500	30.00	14.771	5510	50.00	16.990
5580	29.62	14.715	5580	29.64	14.718	5550	47.30	16.749
5700	29.98	14.769	5700	29.95	14.765	5670	49.34	16.932

802.11a_Main

802.11n_HT20_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	802.11n _HT40_Main		
						Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.48	12.170	5745	17.66	12.469			
5785	16.41	12.152	5785	17.66	12.469	5755	35.21	15.467
5825	16.41	12.152	5825	17.62	12.459	5795	35.21	15.467

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99% Bandwidth

802.11a_Main

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.600	12.201
5220	16.500	12.175
5240	16.572	12.194
5260	16.609	12.203
5300	16.574	12.194
5320	16.433	12.157
5500	16.439	12.159
5580	16.434	12.157
5700	16.507	12.177

802.11n_HT20_Main

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.811	12.507
5220	17.950	12.541
5240	17.781	12.500
5260	17.829	12.511
5300	17.803	12.505
5320	17.763	12.495
5500	17.690	12.477
5580	17.904	12.530
5700	17.766	12.496

802.11n_HT40_Main

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	36.319	15.601
5230	36.332	15.603
5270	36.339	15.604
5310	36.335	15.603
5510	36.309	15.600
5550	36.380	15.609
5670	36.311	15.600

802.11a_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.61	12.203
5785	16.57	12.194
5825	16.54	12.186

802.11n_HT20_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.76	12.495
5785	17.82	12.510
5825	17.90	12.528

802.11n_HT40_Main

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	36.28	15.597
5795	36.34	15.604

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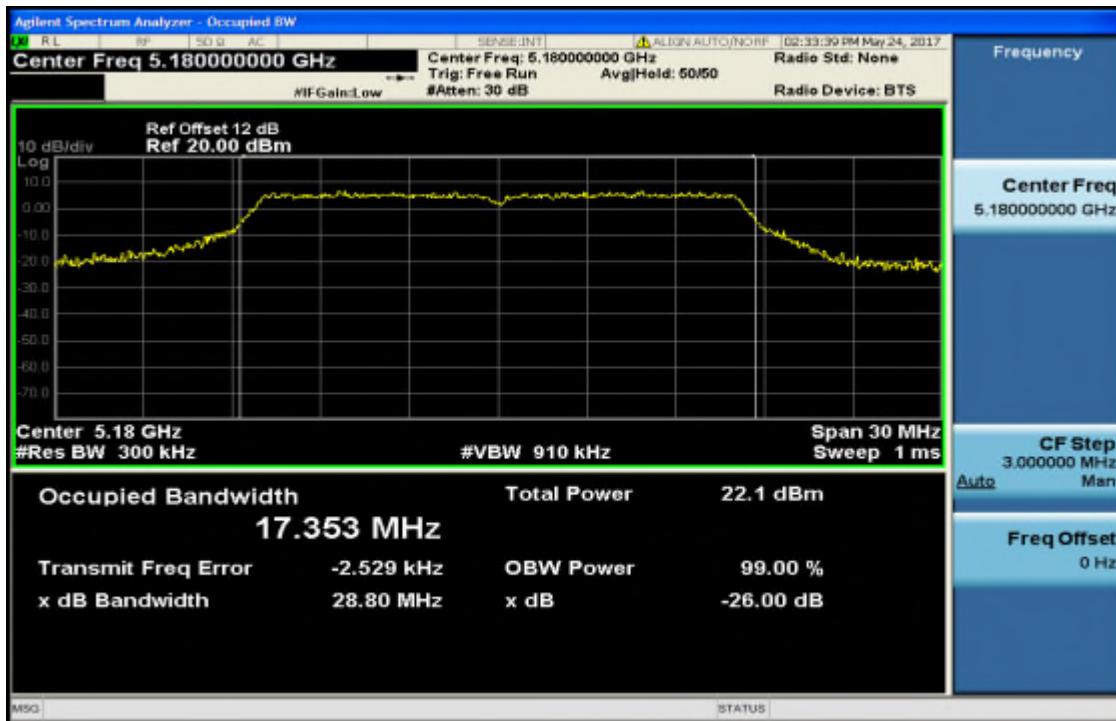
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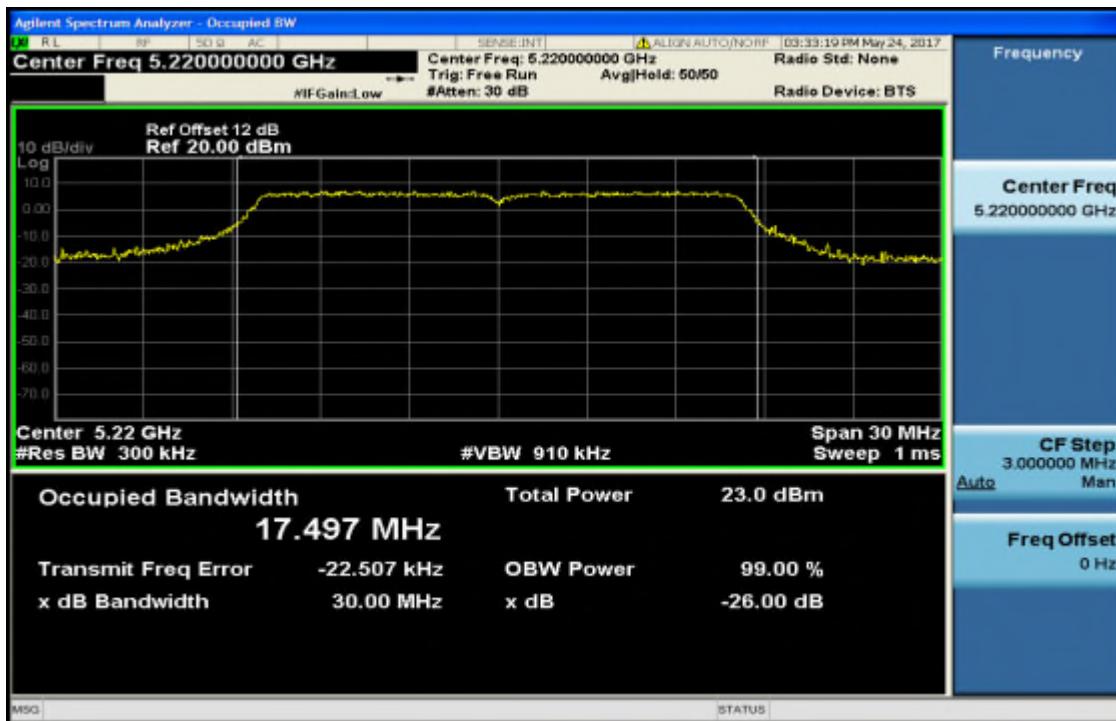
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802.11a, 5150~5250 MHz (Main)

26dB Band Width Test Data CH-Low (5180MHz)



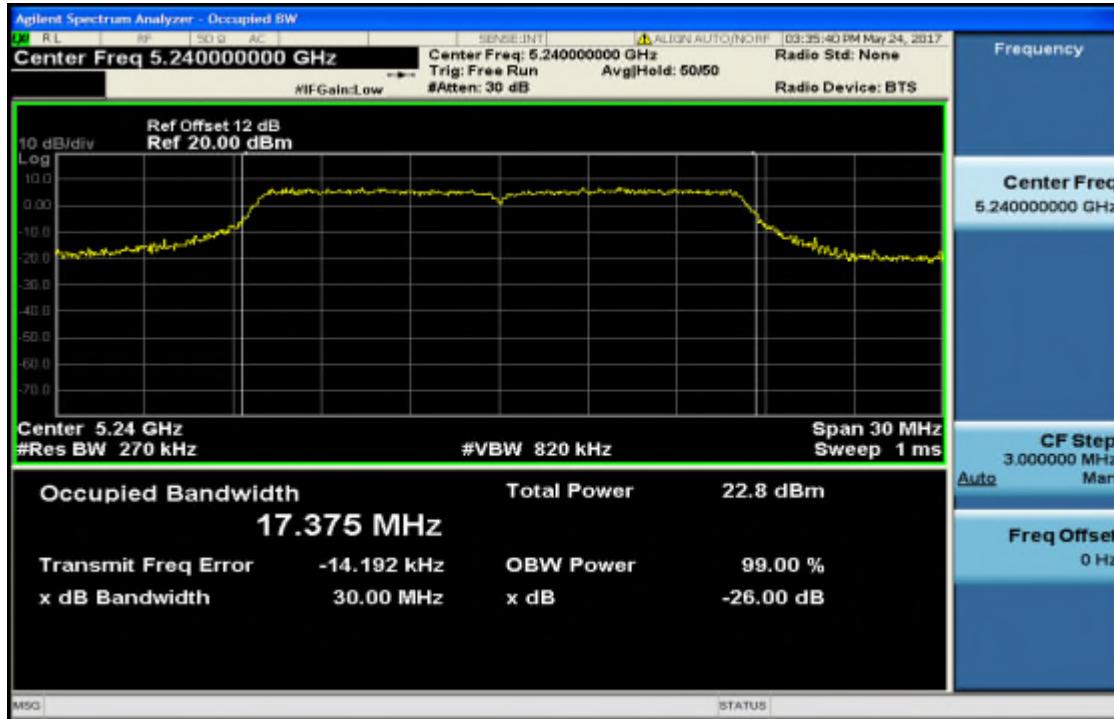
26dB Band Width Test Data CH-Mid (5220MHz)



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26dB Band Width Test Data CH-High (5240MHz)

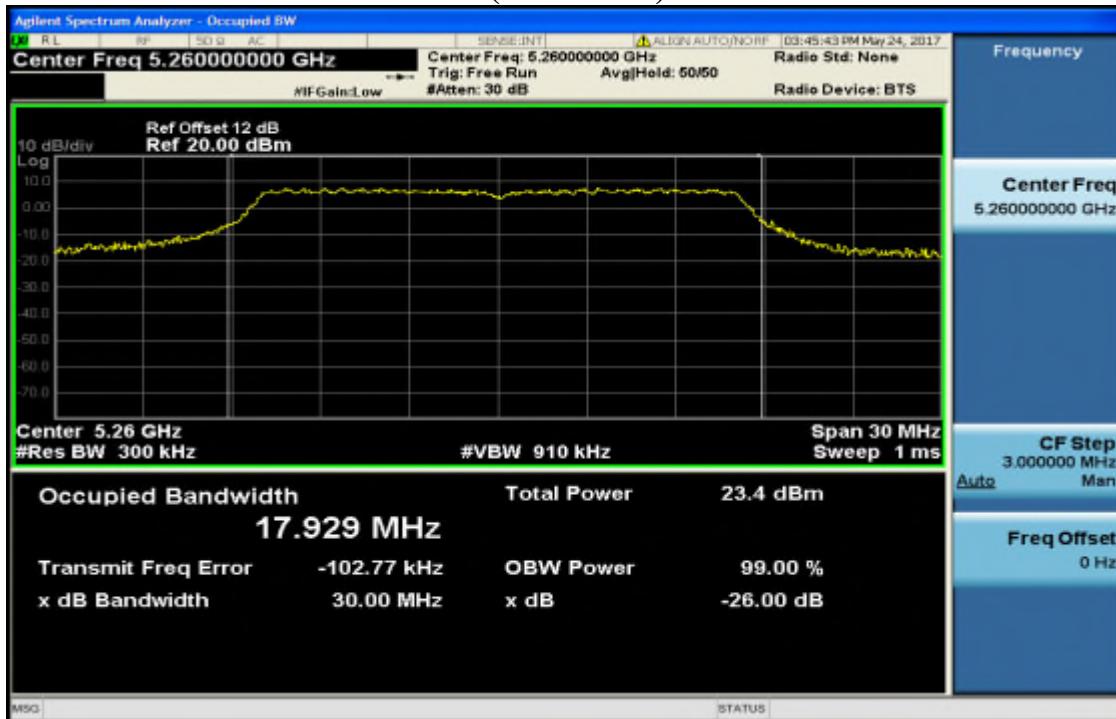


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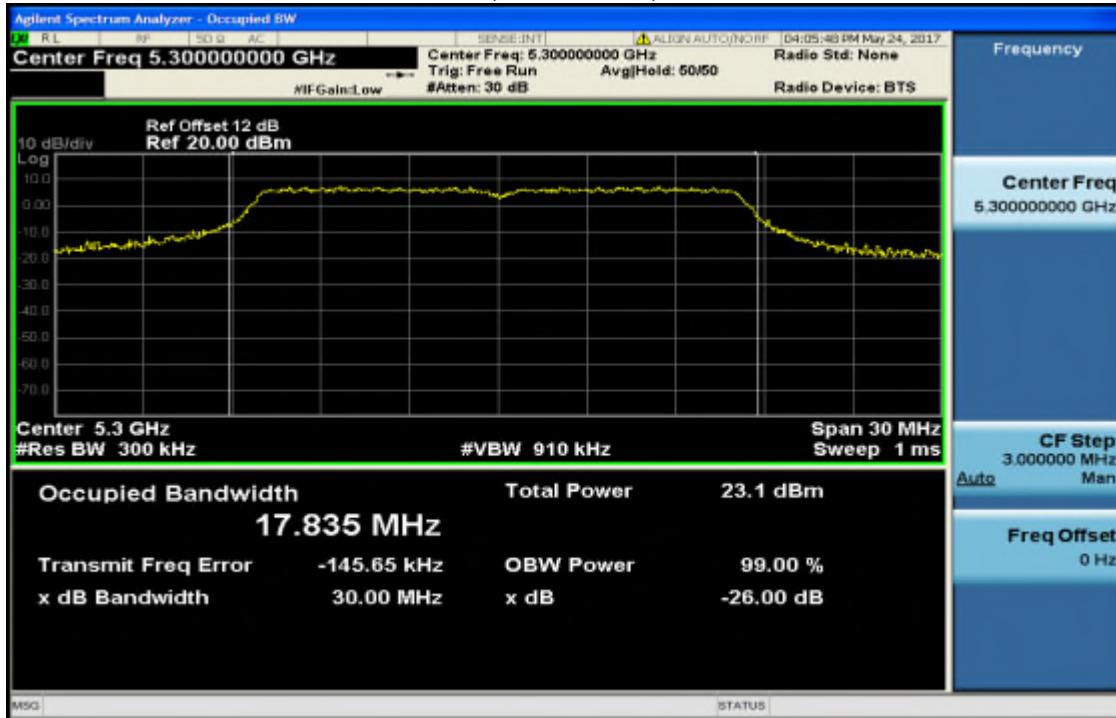
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802.11a, 5250~5350 MHz (Main) 26dB Band Width Test Data CH-Low (5260MHz)



26dB Band Width Test Data CH-Mid (5300MHz)

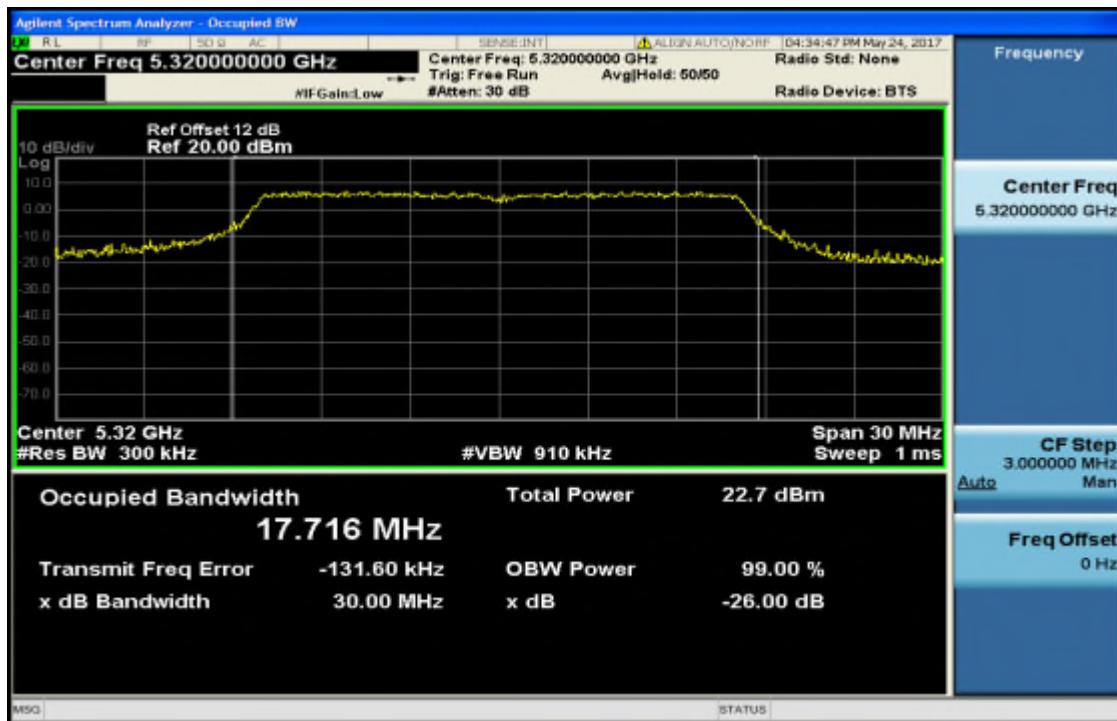


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26dB Band Width Test Data CH-High (5320MHz)

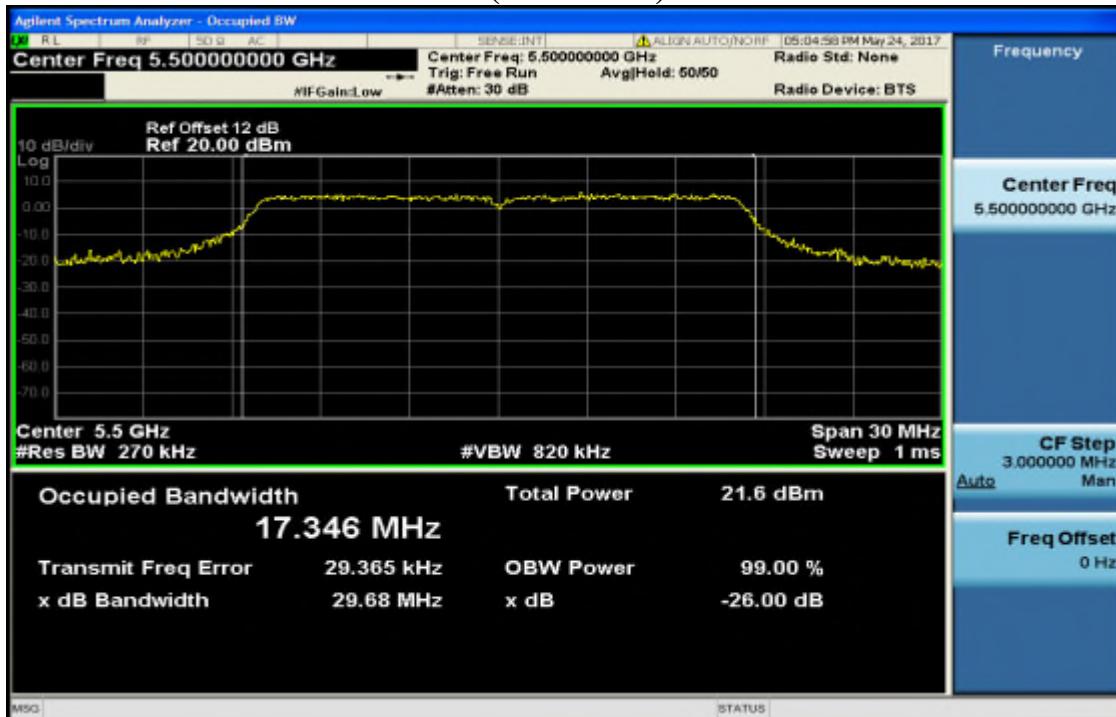


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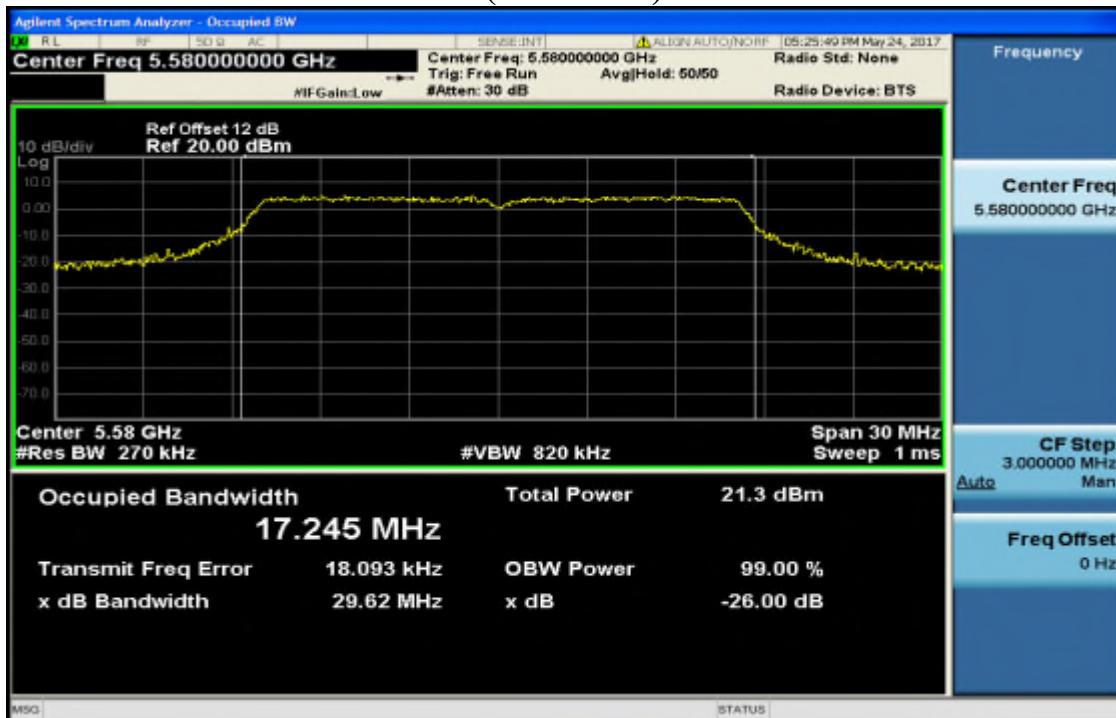
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802.11a, 5470~5725 MHz (Main) 26dB Band Width Test Data CH-Low (5500MHz)



26dB Band Width Test Data CH-Mid (5580MHz)

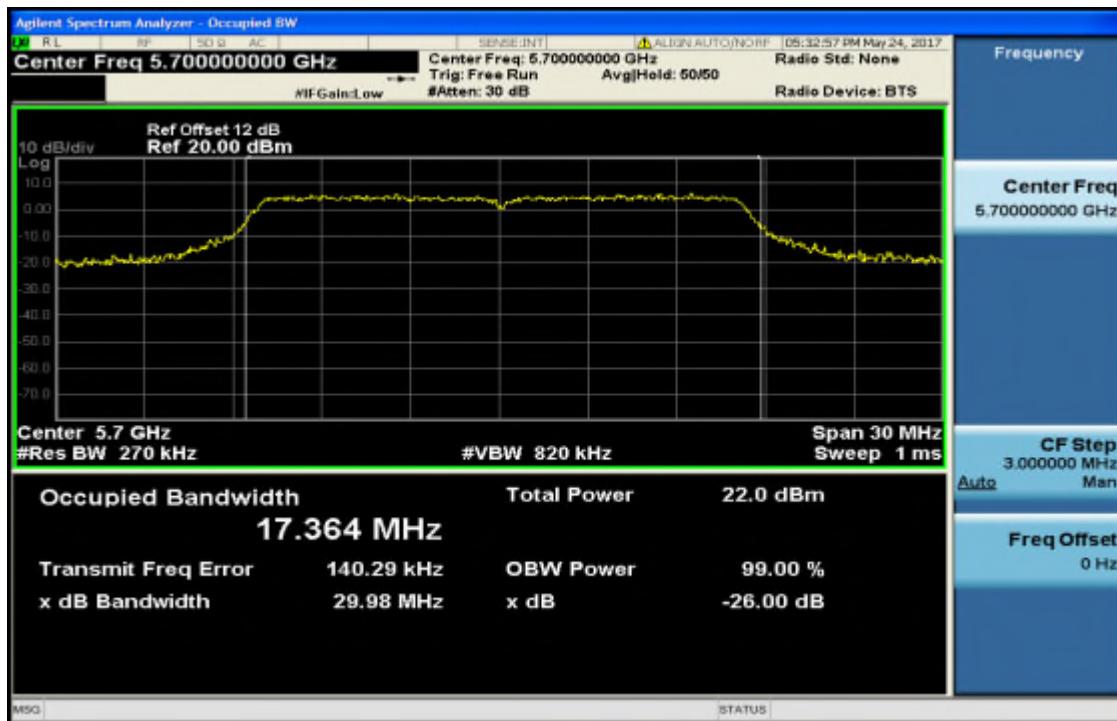


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26dB Band Width Test Data CH-High (5700MHz)

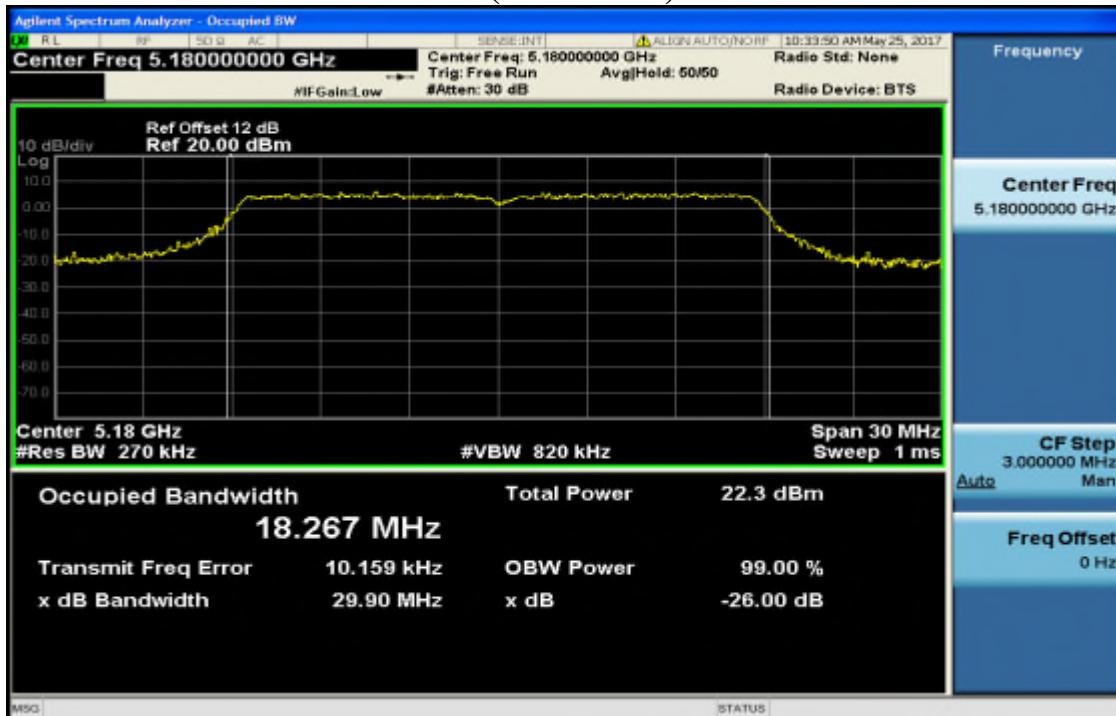


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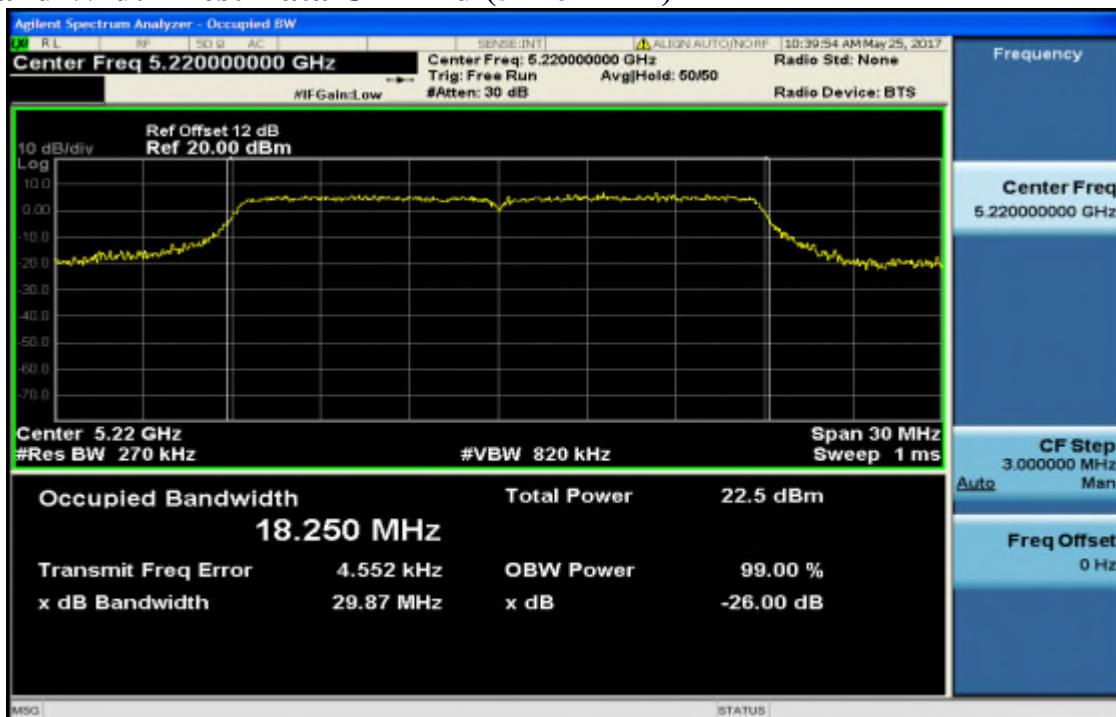
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802.11n HT20, 5150~5250 MHz (Main) 26dB Band Width Test Data CH-Low (5180 MHz)



26dB Band Width Test Data CH-Mid (5220 MHz)



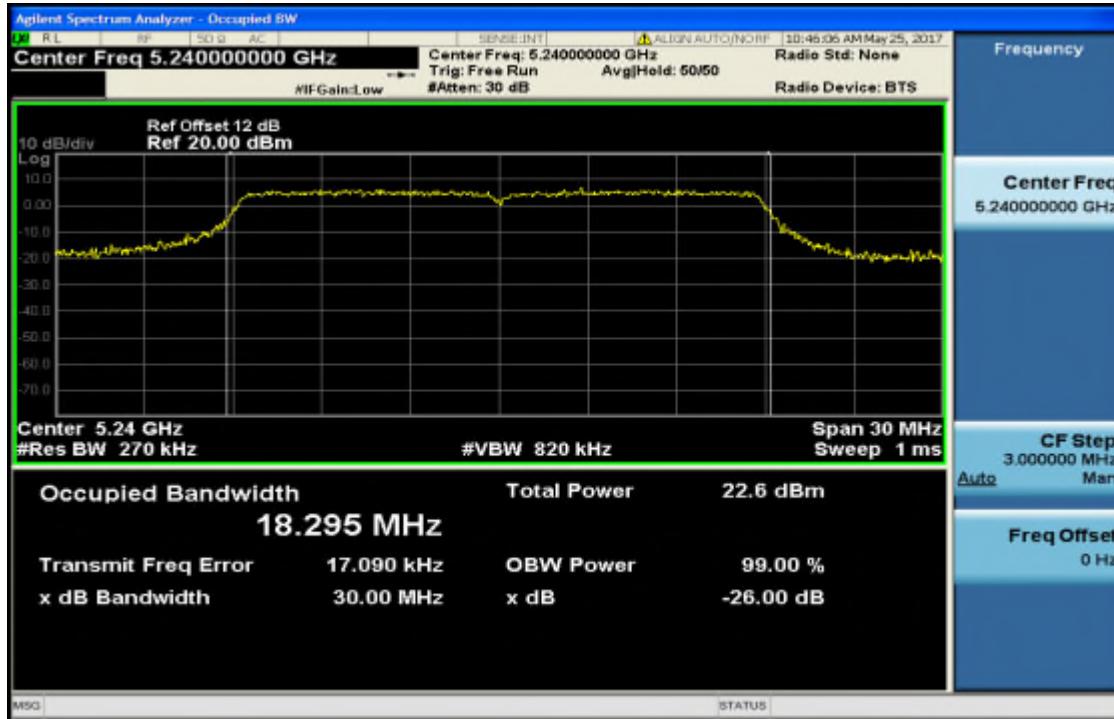
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26dB Band Width Test Data CH-High (5240 MHz)

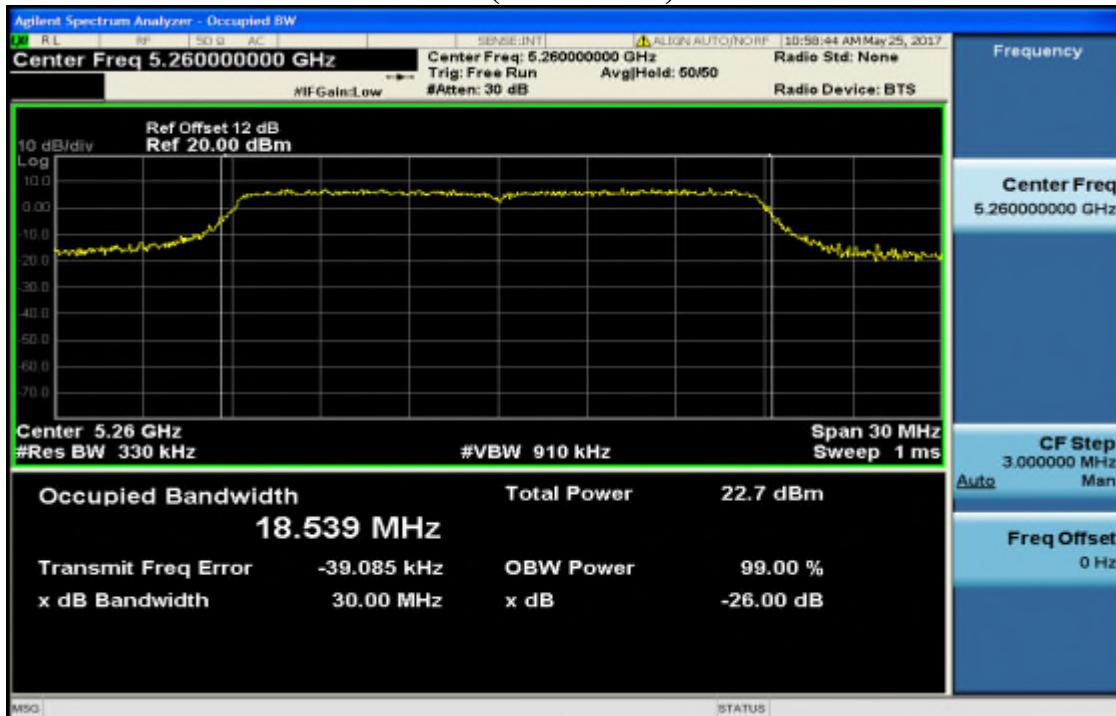


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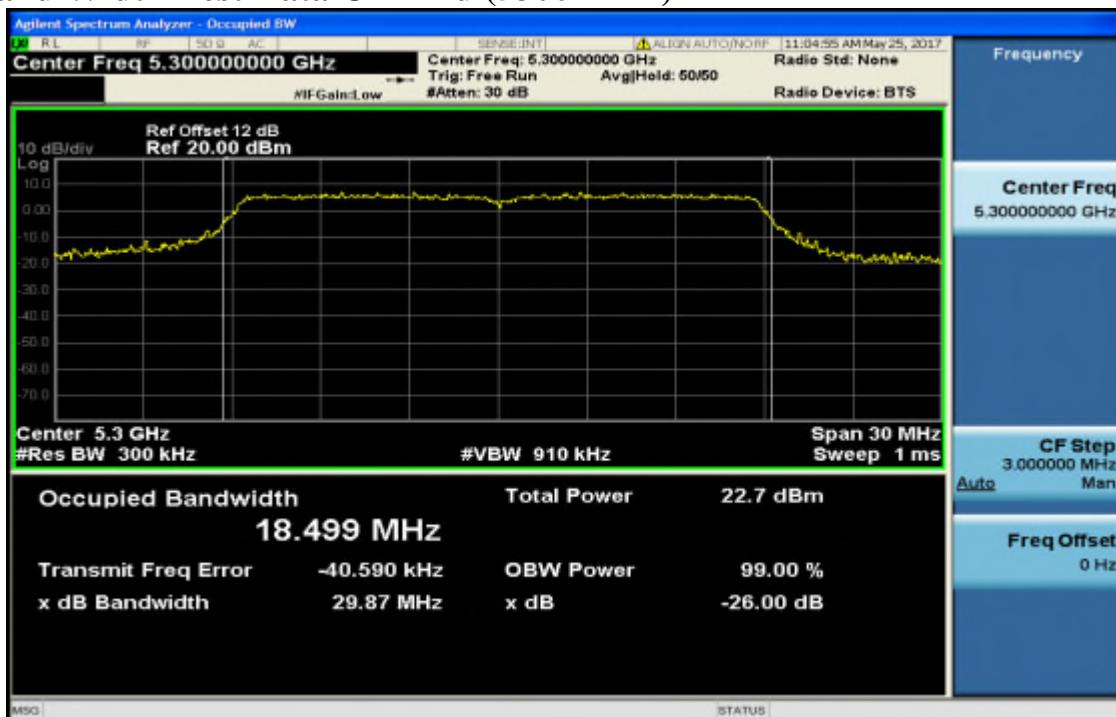
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802.11n HT20, 5250~5350 MHz (Main) 26dB Band Width Test Data CH-Low (5260 MHz)



26dB Band Width Test Data CH-Mid (5300 MHz)

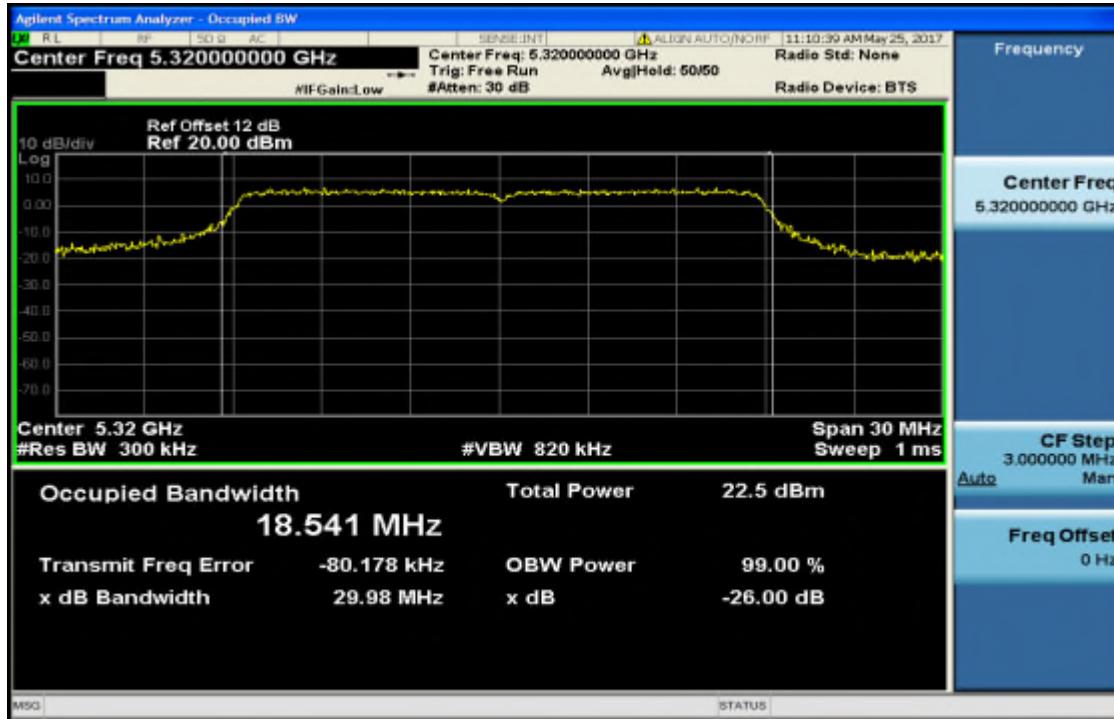


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26dB Band Width Test Data CH-High (5320 MHz)

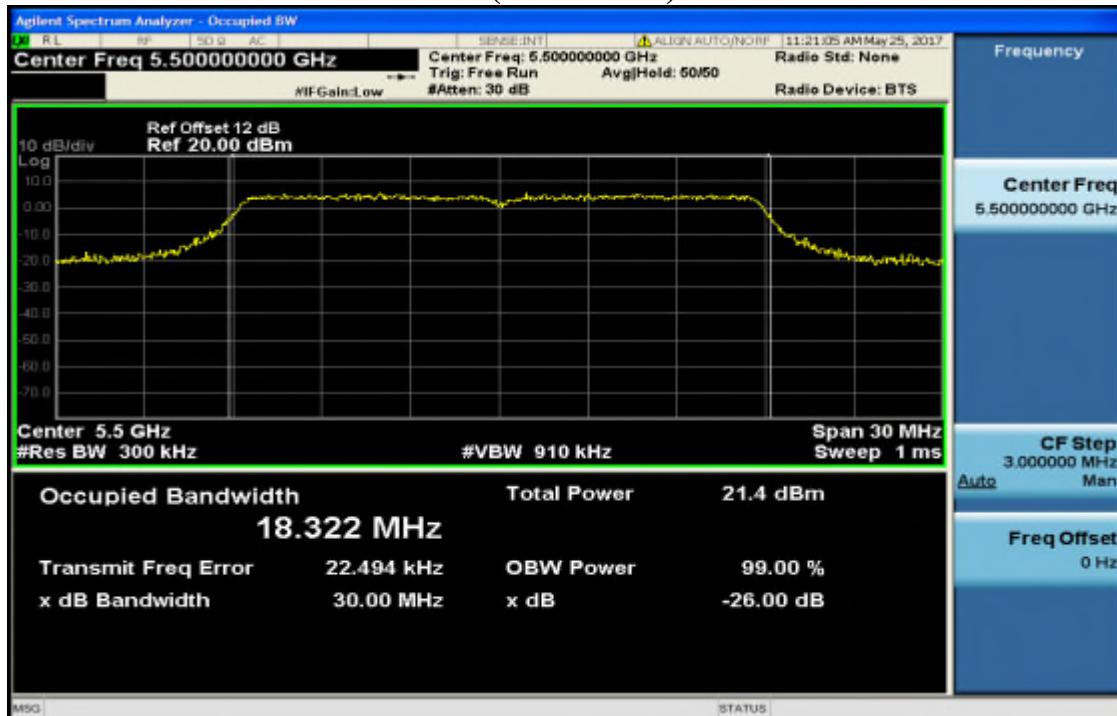


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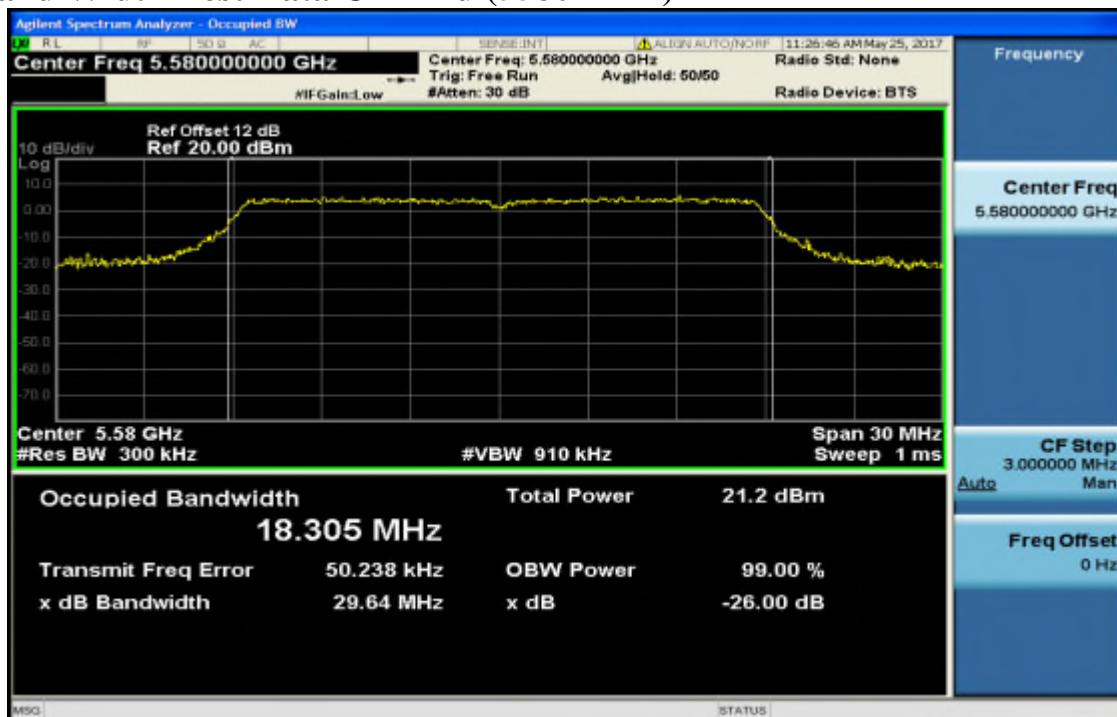
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802.11n HT20, 5470~5725 MHz (Main) 26dB Band Width Test Data CH-Low (5500 MHz)



26dB Band Width Test Data CH-Mid (5580 MHz)

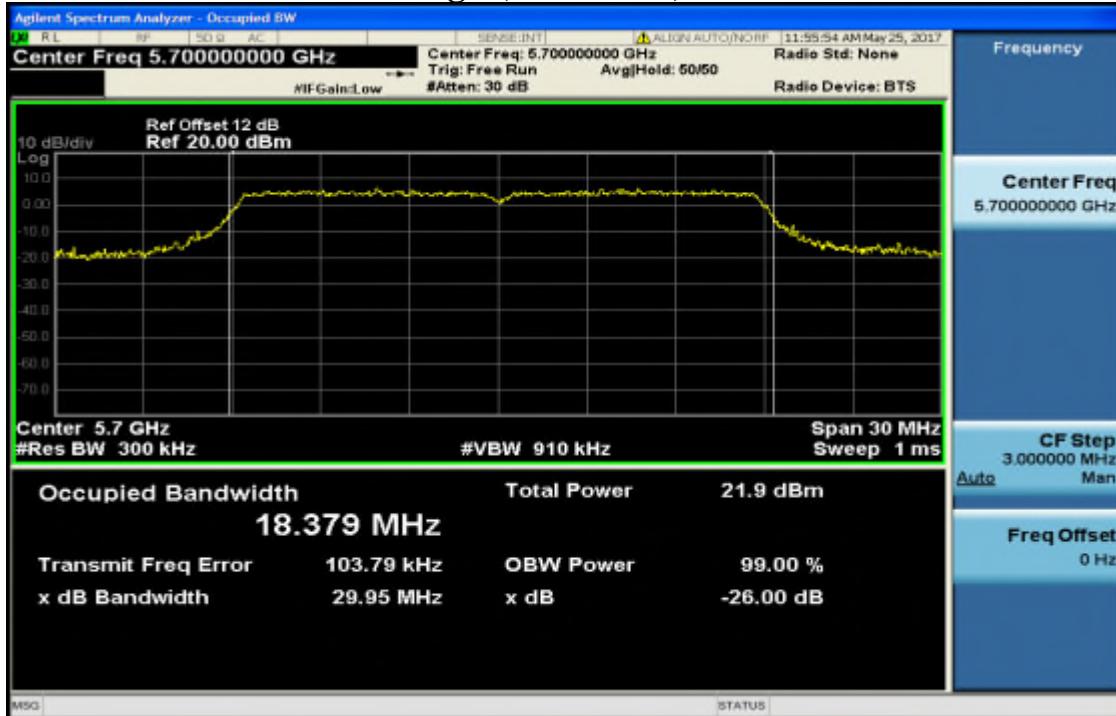


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26dB Band Width Test Data CH-High (5700 MHz)



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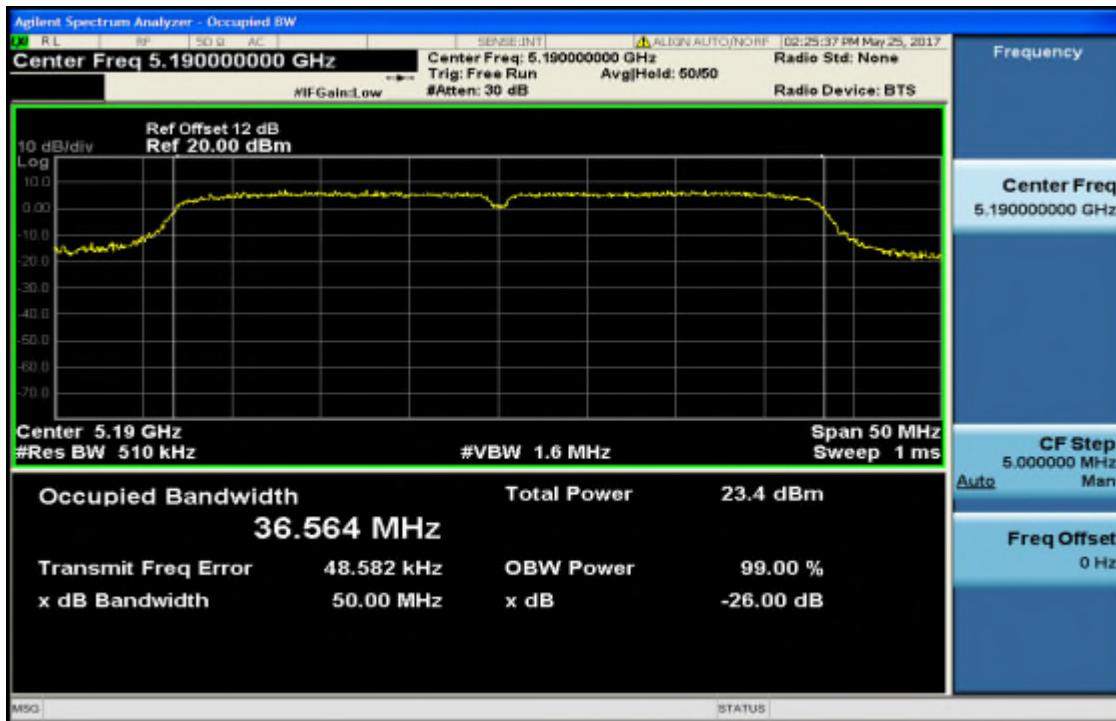
t (886-2) 2299-3279

f (886-2) 2298-0488

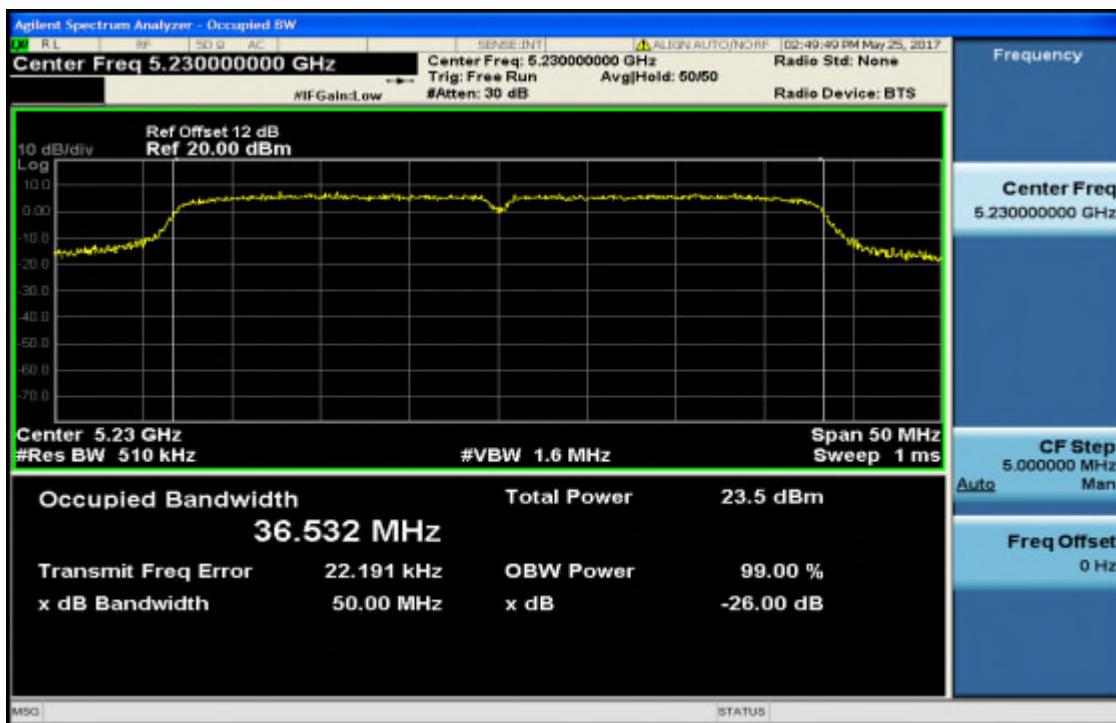
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802.11n HT40, 5150~5250 MHz (Main) 26dB Band Width Test Data CH-Low (5190 MHz)



26dB Band Width Test Data CH-High (5230 MHz)



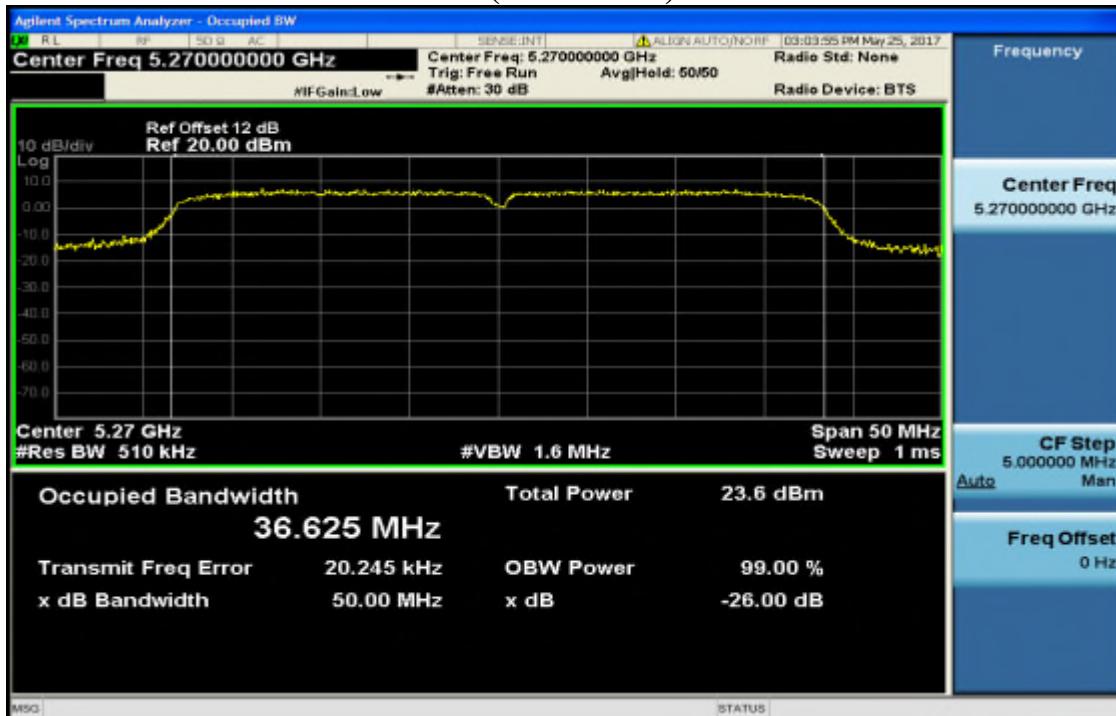
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802.11n HT40, 5250~5350 MHz (Main) 26dB Band Width Test Data CH-Low (5270 MHz)



26dB Band Width Test Data CH-High (5310MHz)



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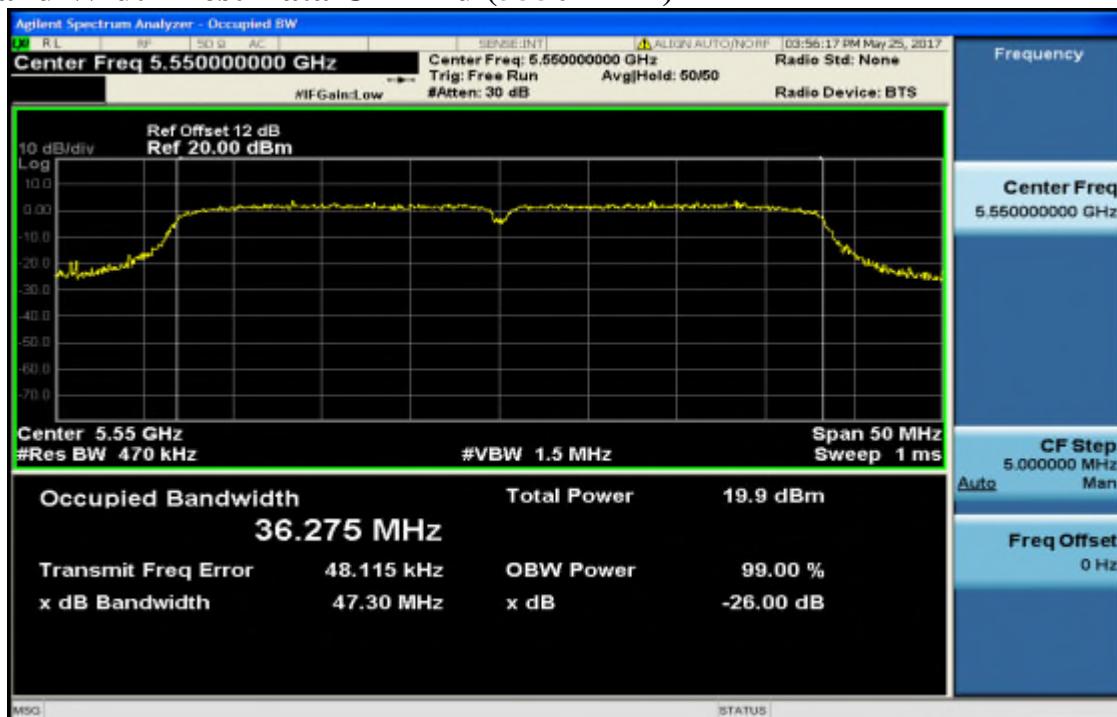
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802.11n HT40, 5470~5725 MHz (Main) 26dB Band Width Test Data CH-Low (5510 MHz)



26dB Band Width Test Data CH-Mid (5550 MHz)

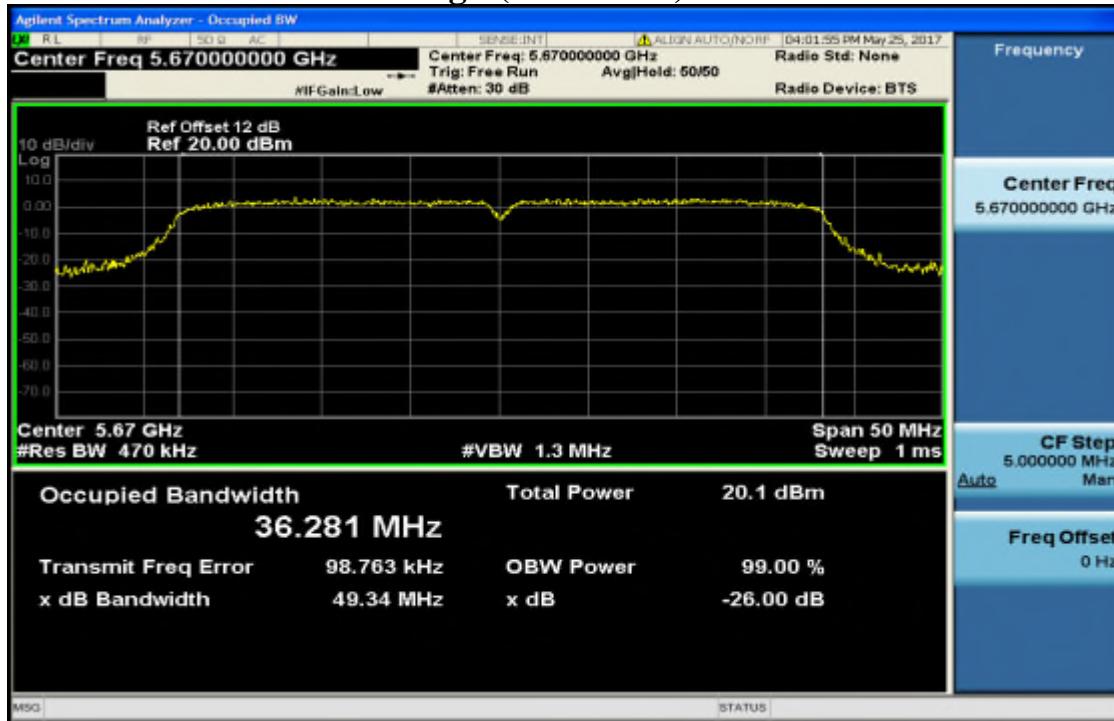


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26dB Band Width Test Data CH-High (5670 MHz)



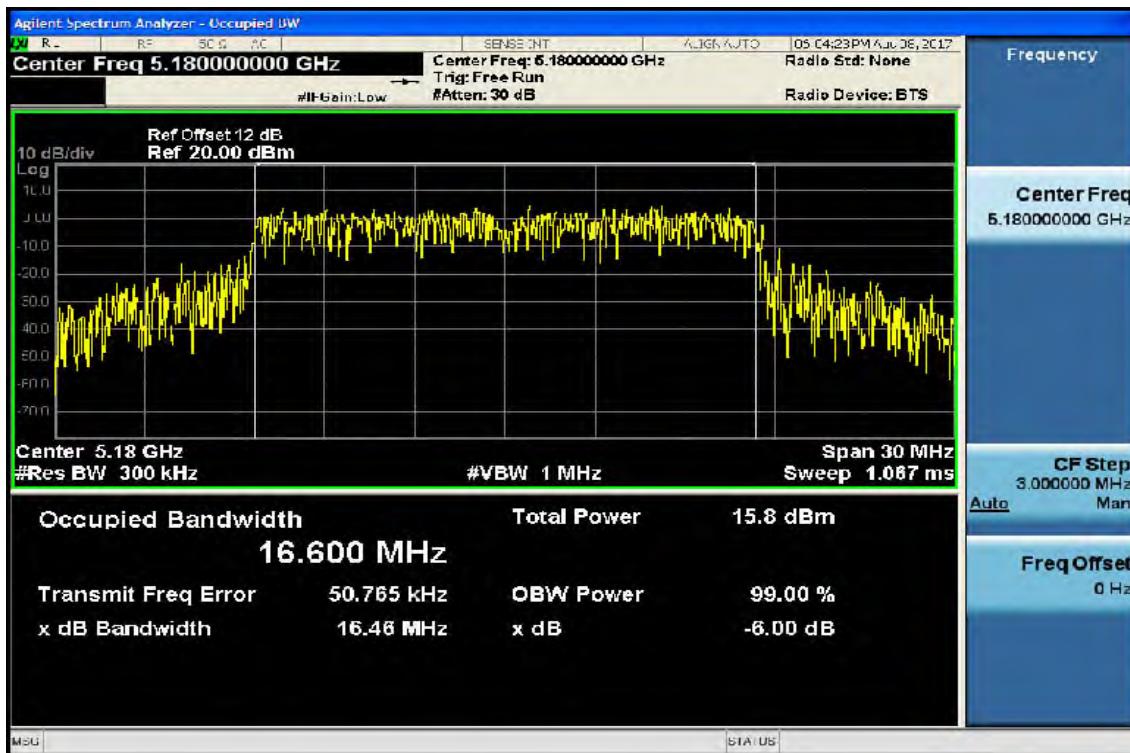
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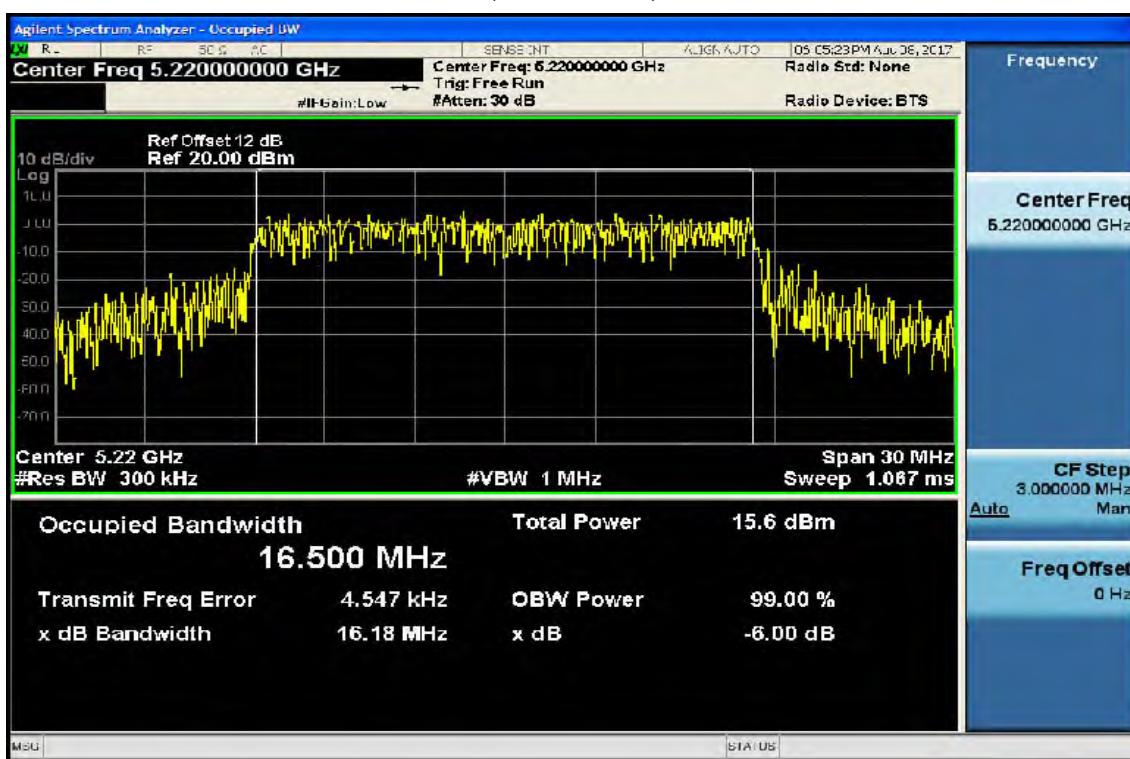
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802.11a, 5150~5250 MHz (Main)

99% Band Width Test Data CH-Low (5180MHz)



99% Band Width Test Data CH-Mid (5220MHz)



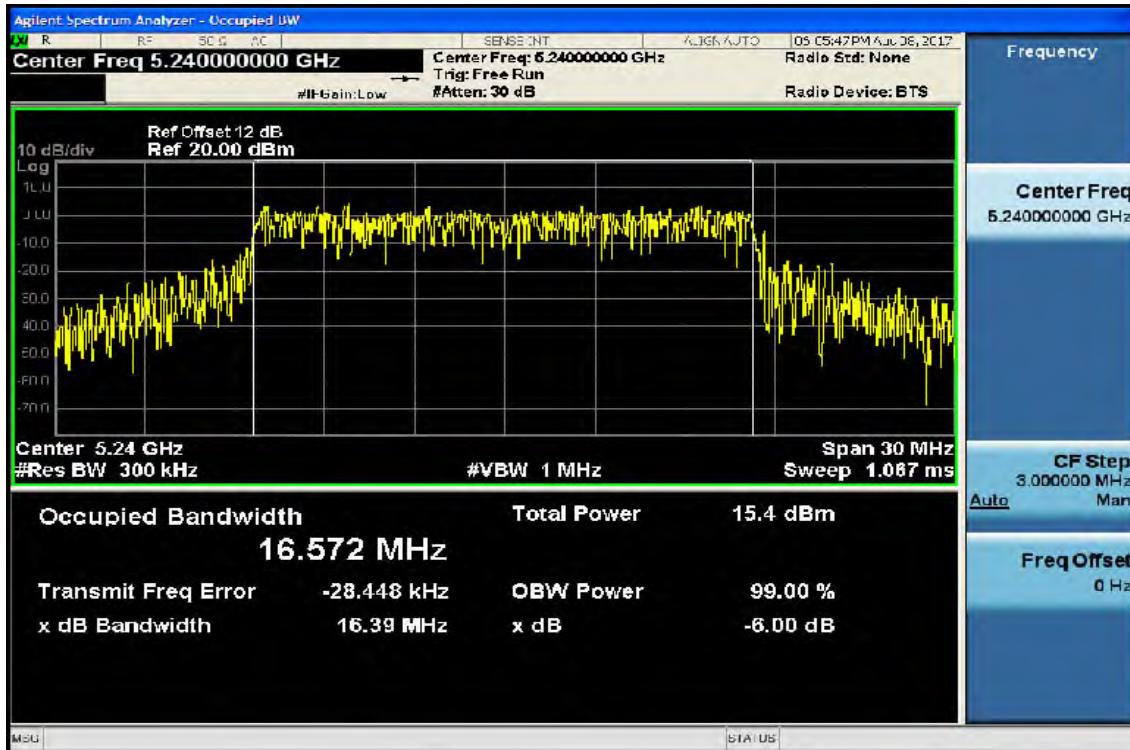
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99% Band Width Test Data CH-High (5240MHz)



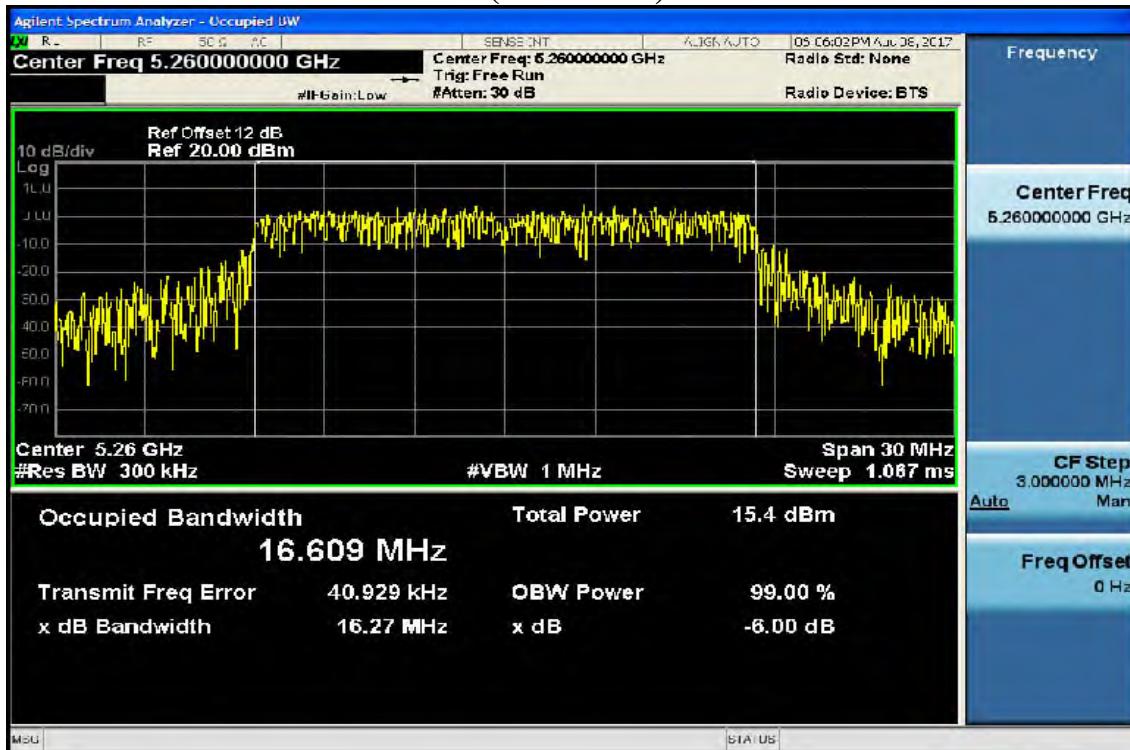
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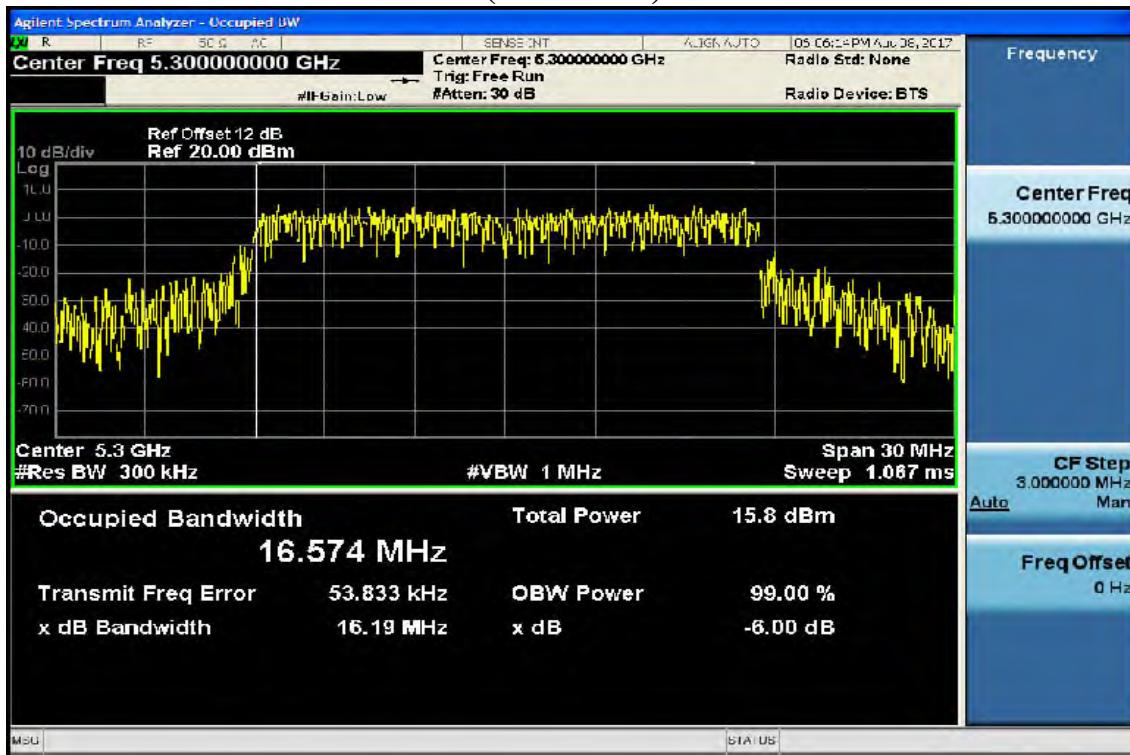
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802.11a, 5250~5350 MHz (Main)

99% Band Width Test Data CH-Low (5260MHz)



99% Band Width Test Data CH-Mid (5300MHz)



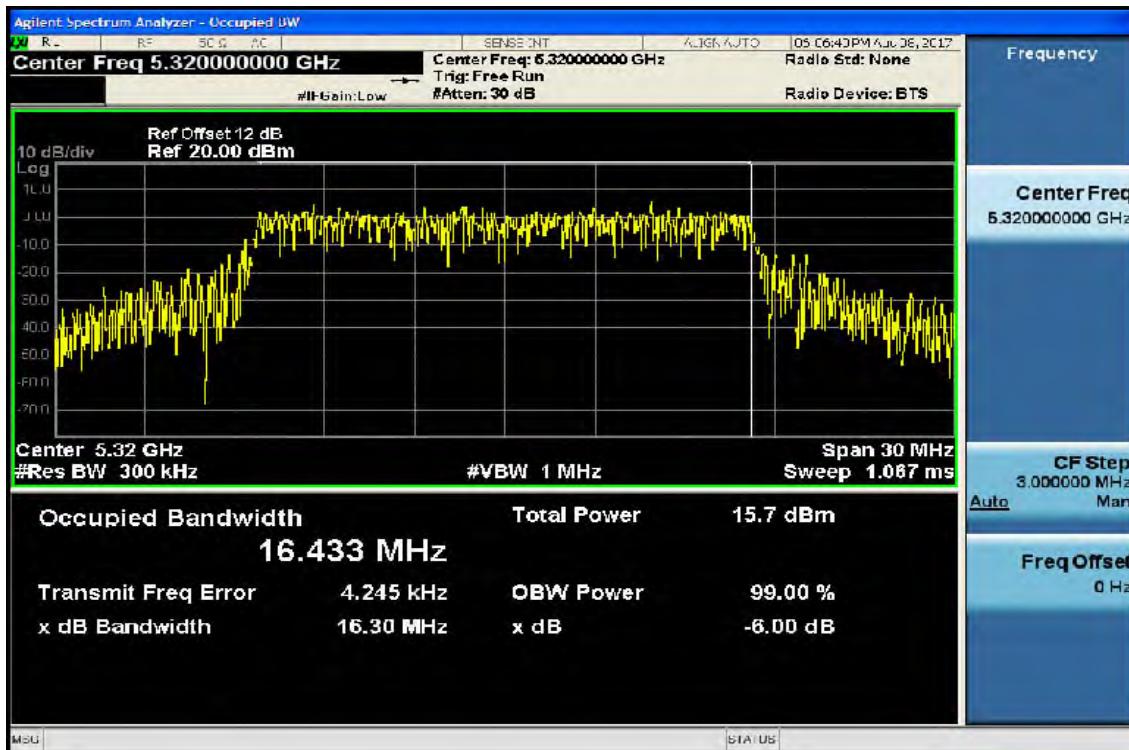
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99% Band Width Test Data CH-High (5320MHz)



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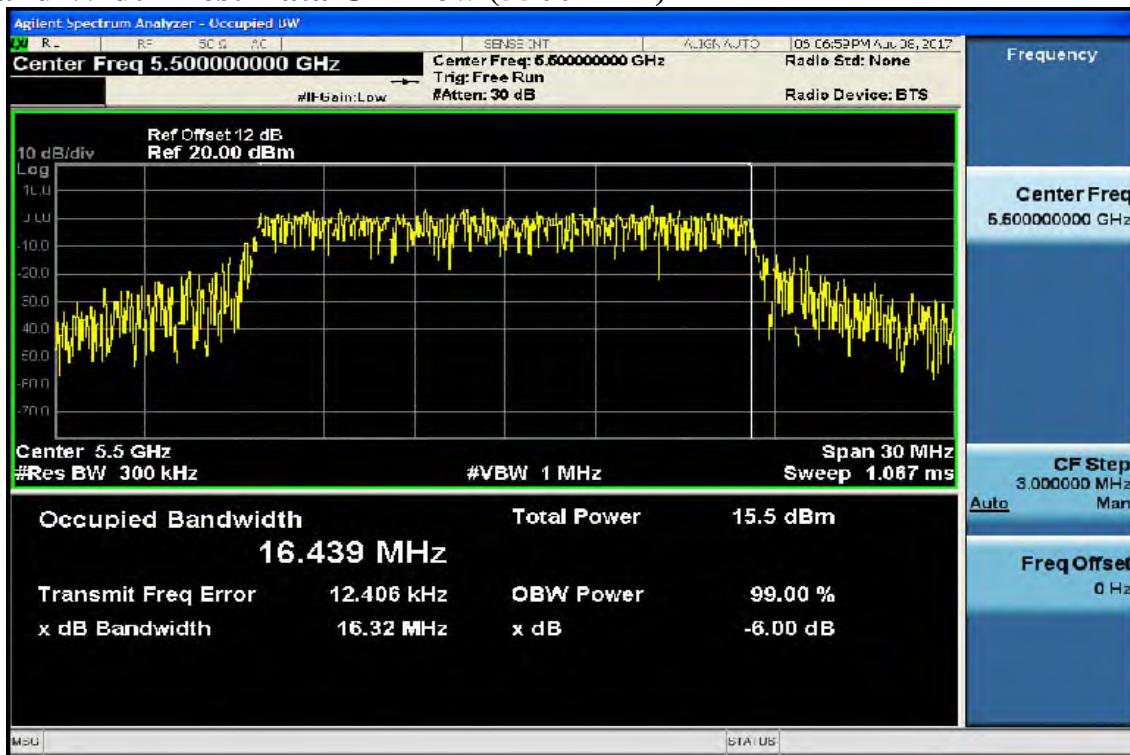
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f (886-2) 2298-0488

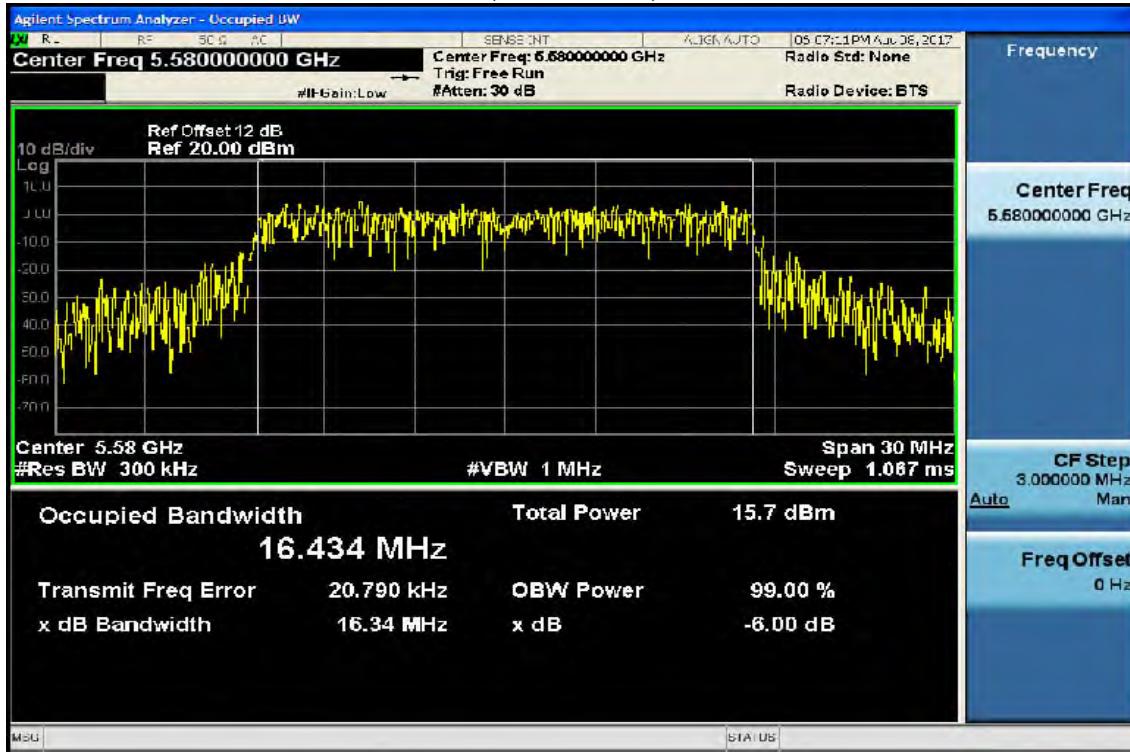
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802.11a, 5470~5725 MHz (Main) 99% Band Width Test Data CH-Low (5500MHz)



99% Band Width Test Data CH-Mid (5580MHz)



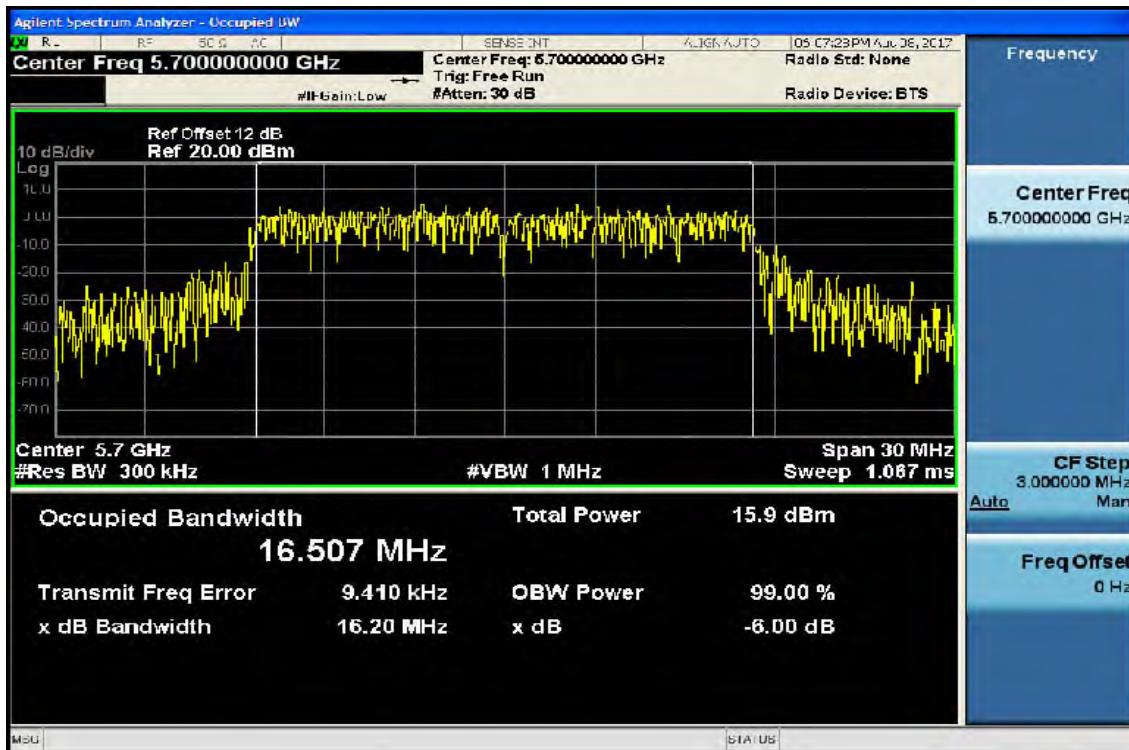
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99% Band Width Test Data CH-High (5700MHz)



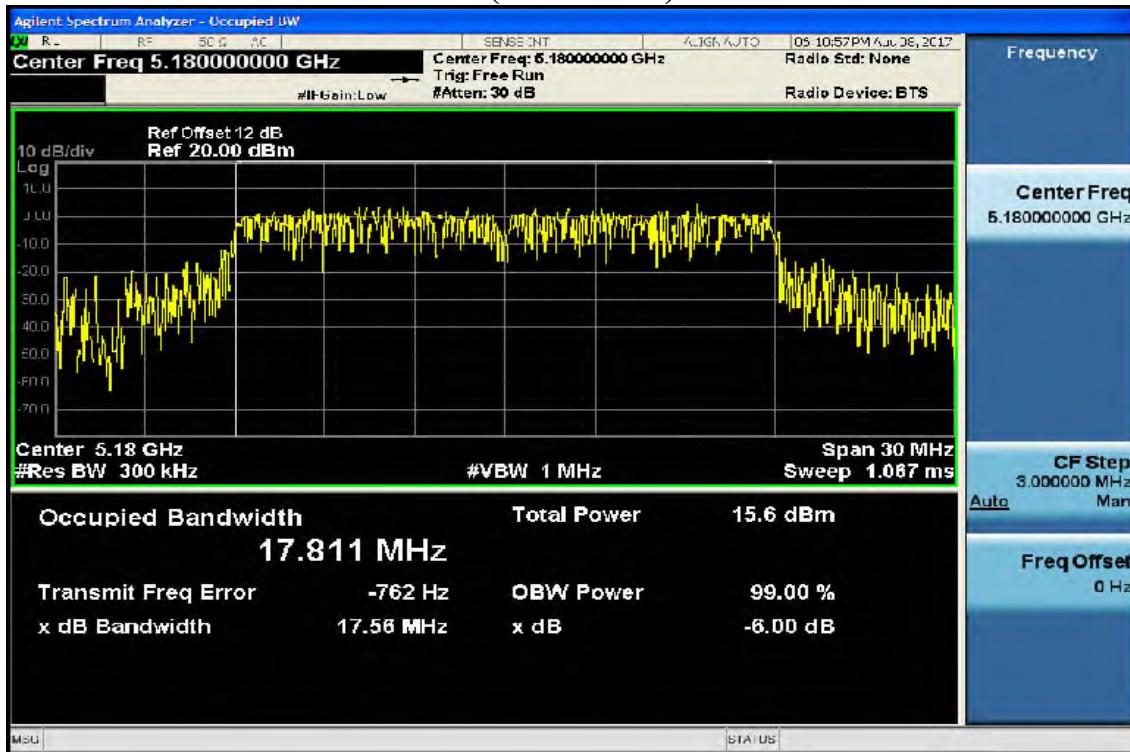
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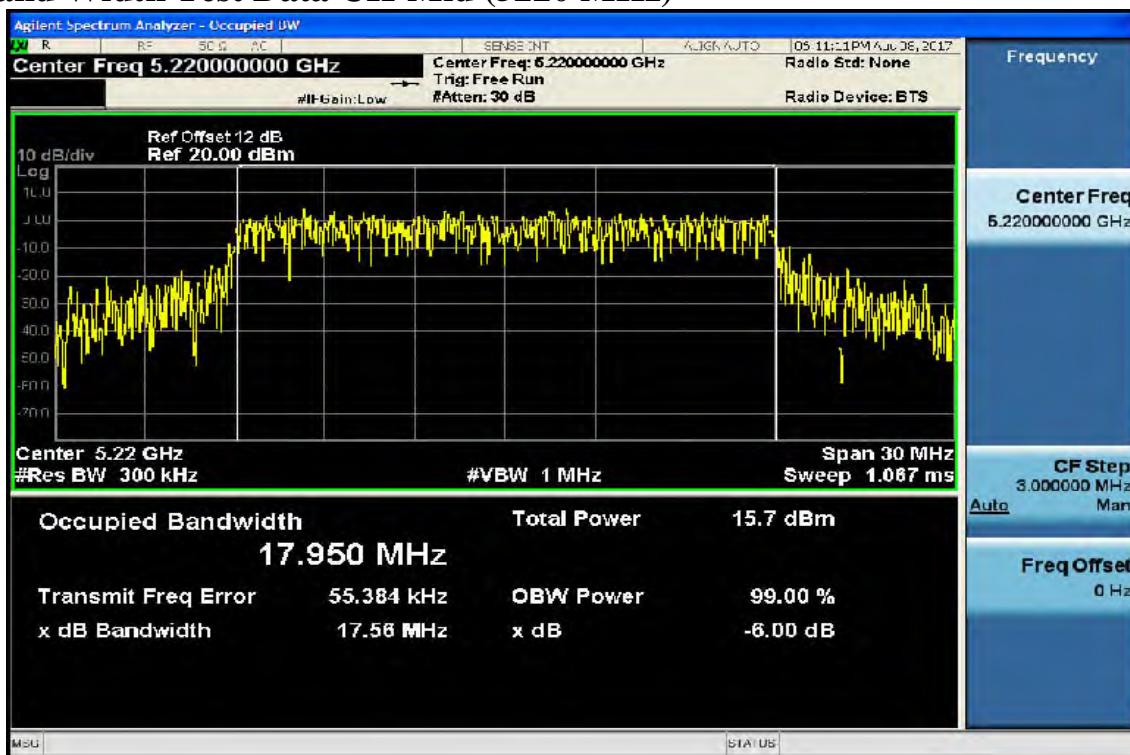
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802.11n HT20, 5150~5250 MHz (Main) 99% Band Width Test Data CH-Low (5180 MHz)



99% Band Width Test Data CH-Mid (5220 MHz)

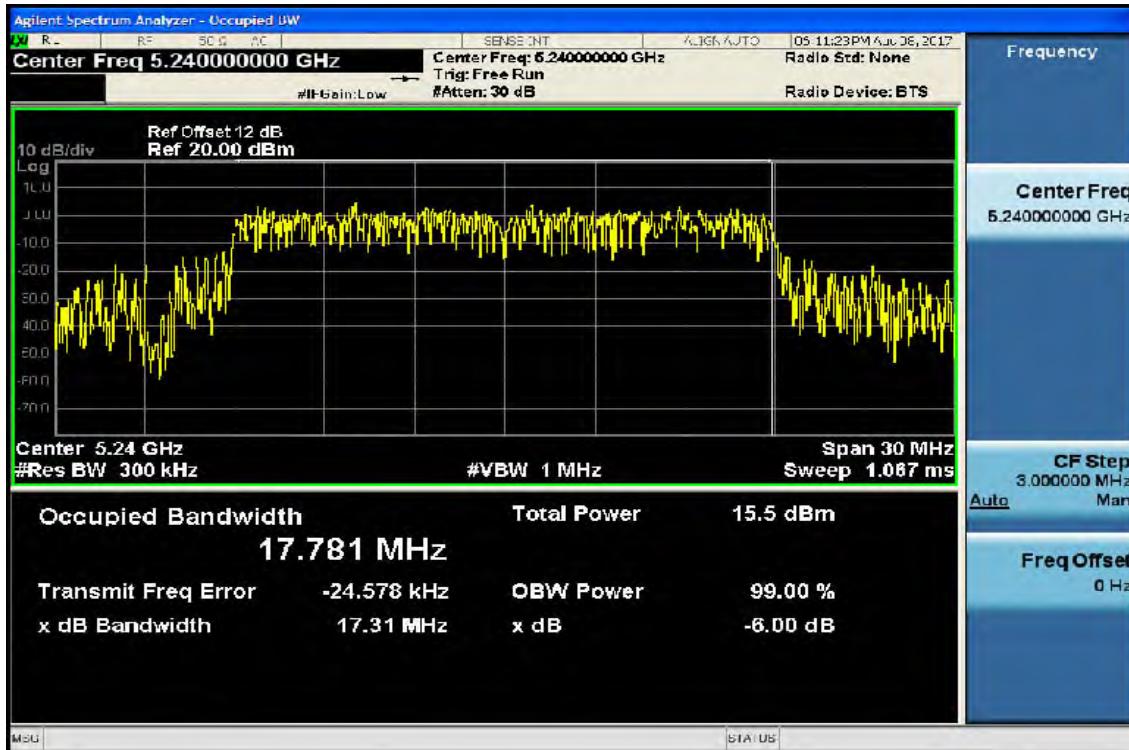


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99% Band Width Test Data CH-High (5240 MHz)

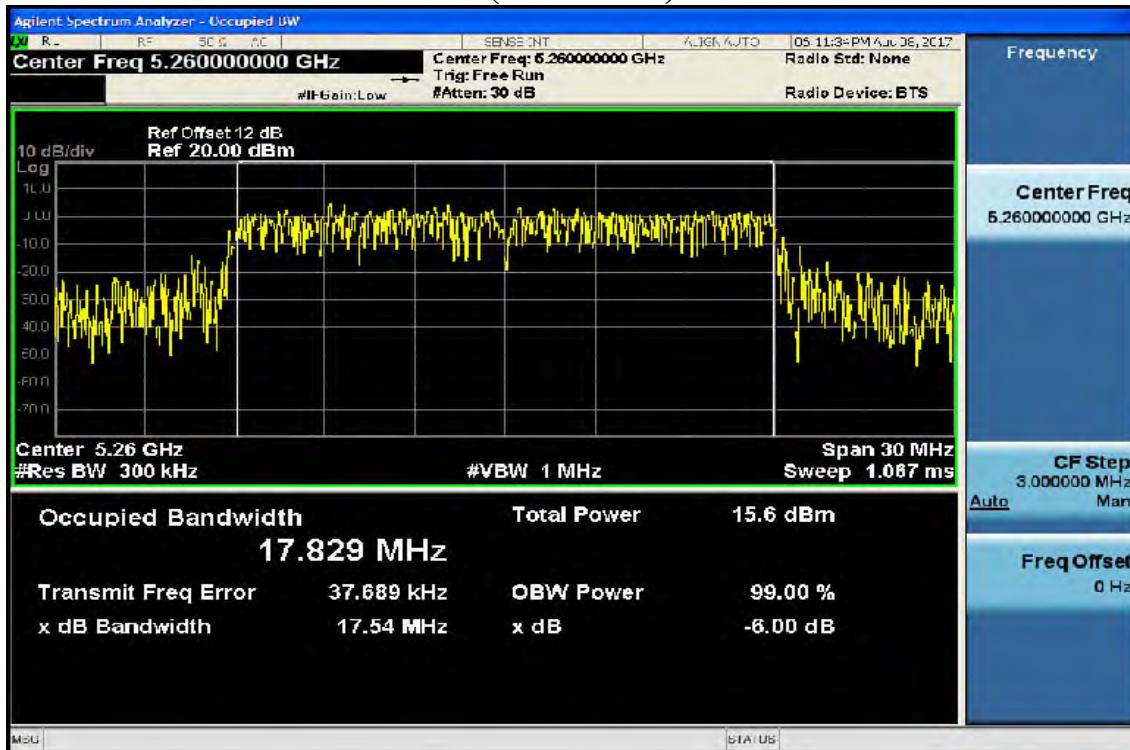


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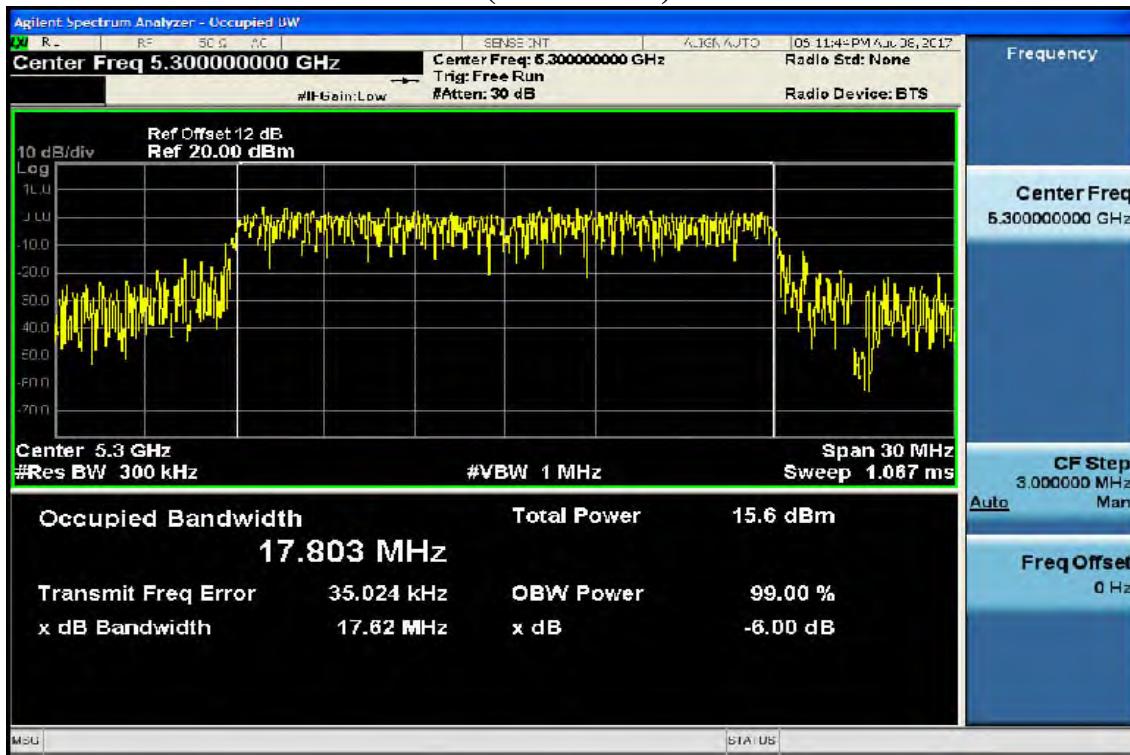
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802.11n HT20, 5250~5350 MHz (Main) 99% Band Width Test Data CH-Low (5260 MHz)



99% Band Width Test Data CH-Mid (5300 MHz)



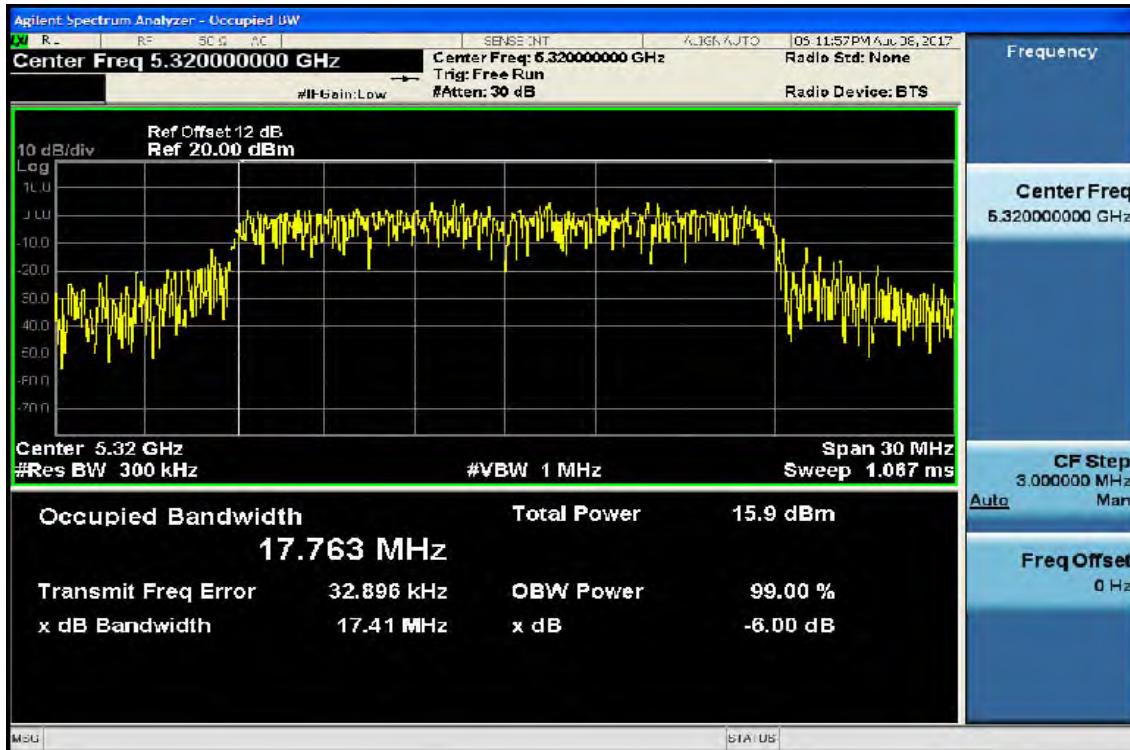
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99% Band Width Test Data CH-High (5320 MHz)

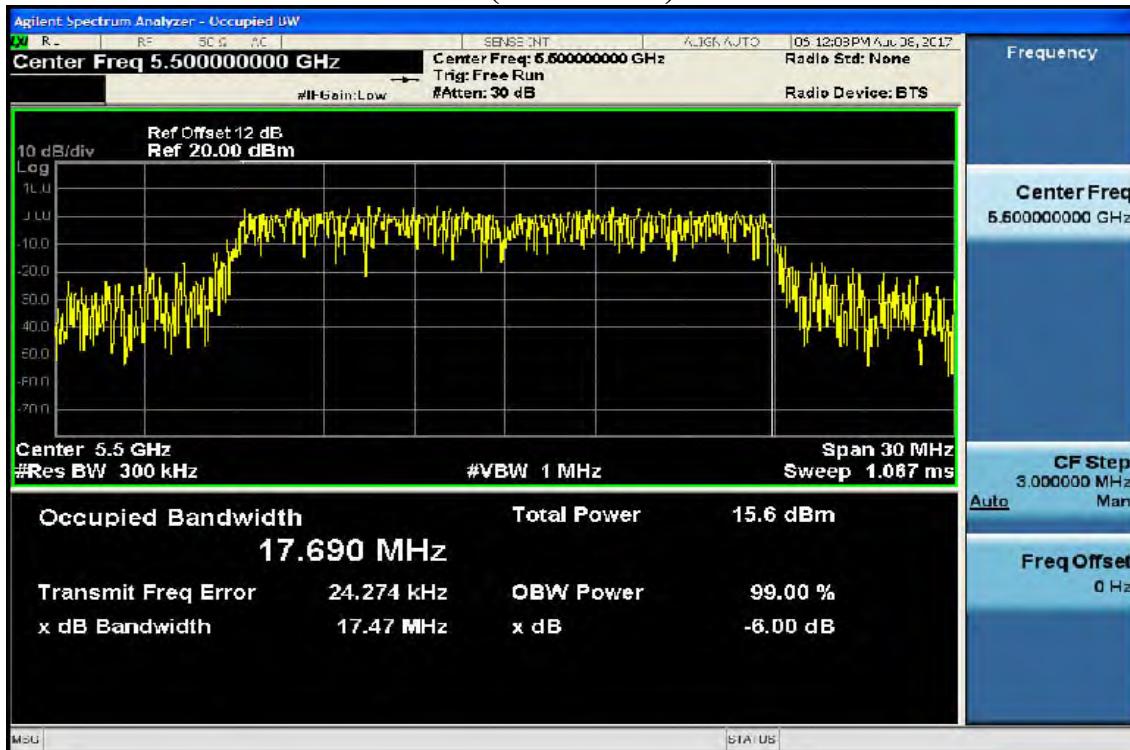


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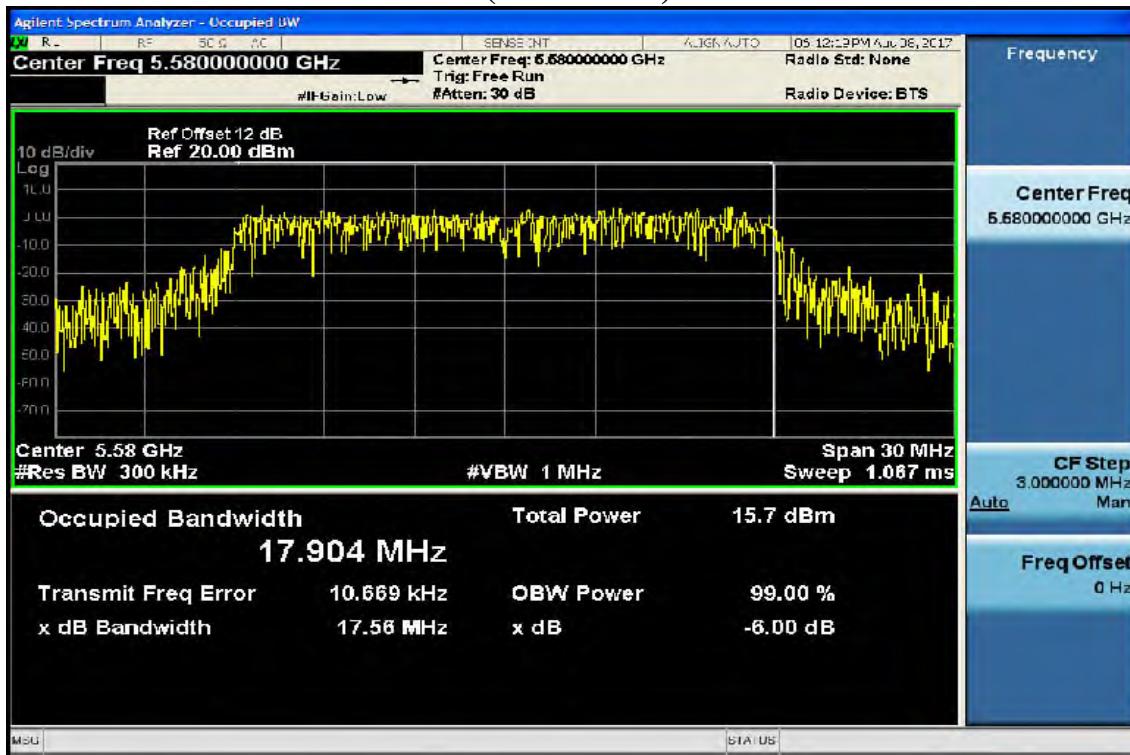
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802.11n HT20, 5470~5725 MHz (Main) 99% Band Width Test Data CH-Low (5500 MHz)



99% Band Width Test Data CH-Mid (5580 MHz)



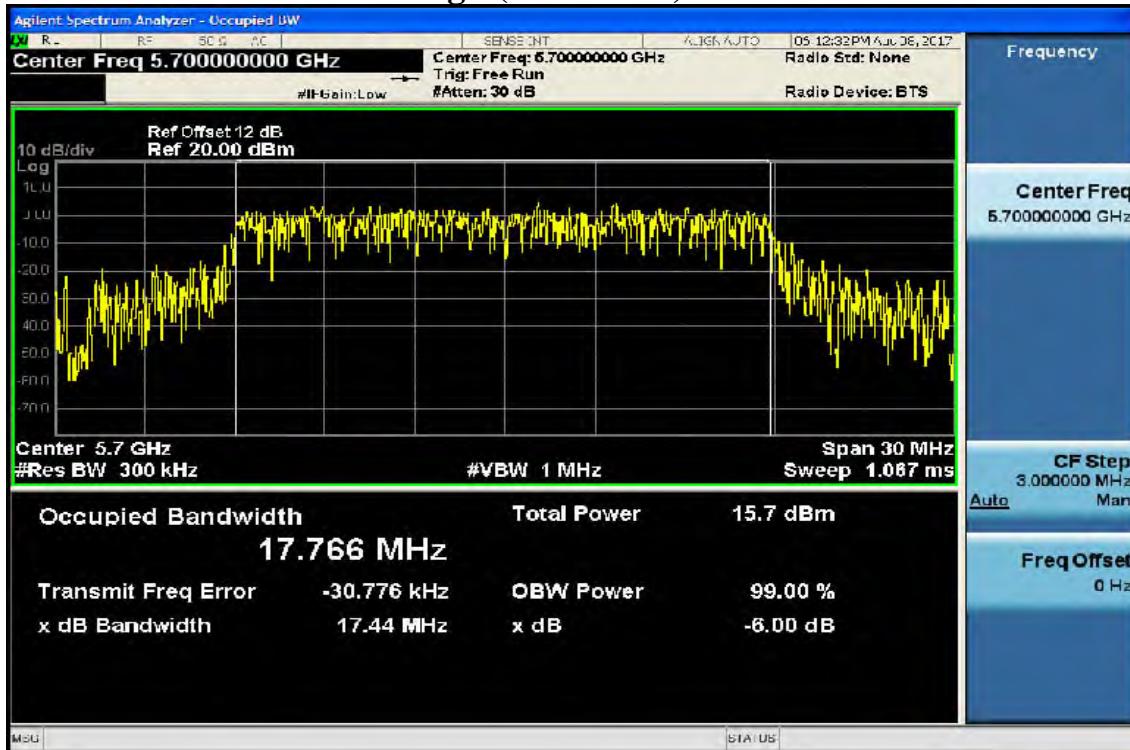
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99% Band Width Test Data CH-High (5700 MHz)



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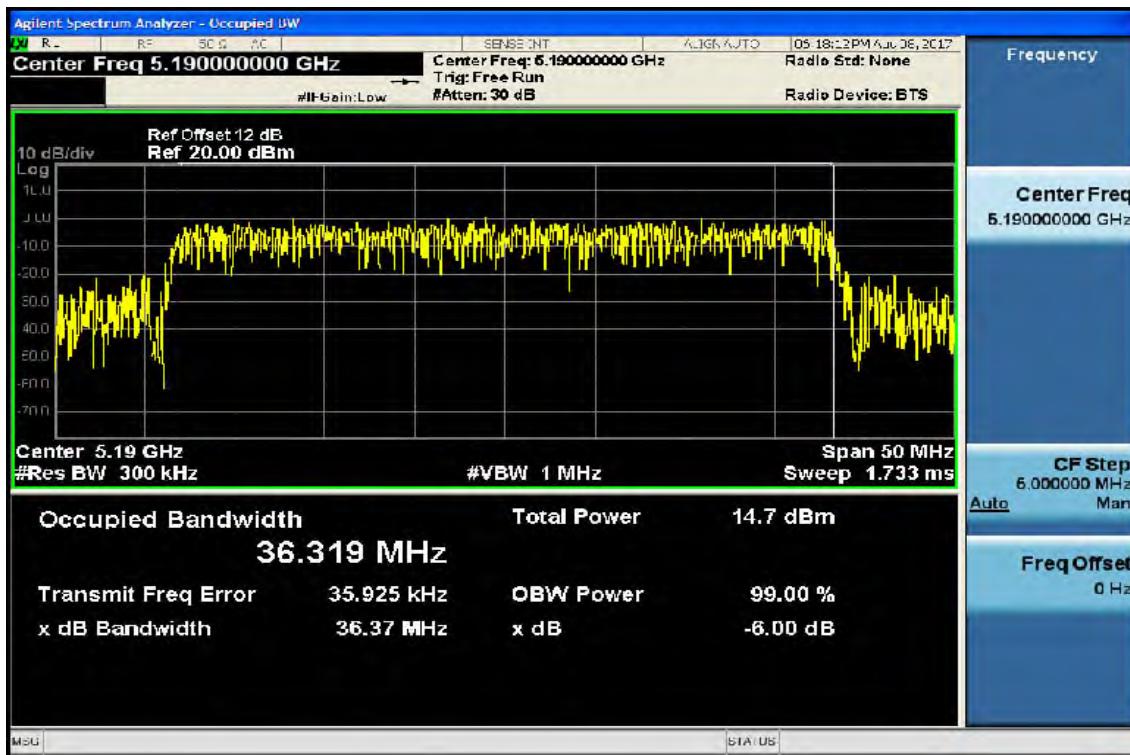
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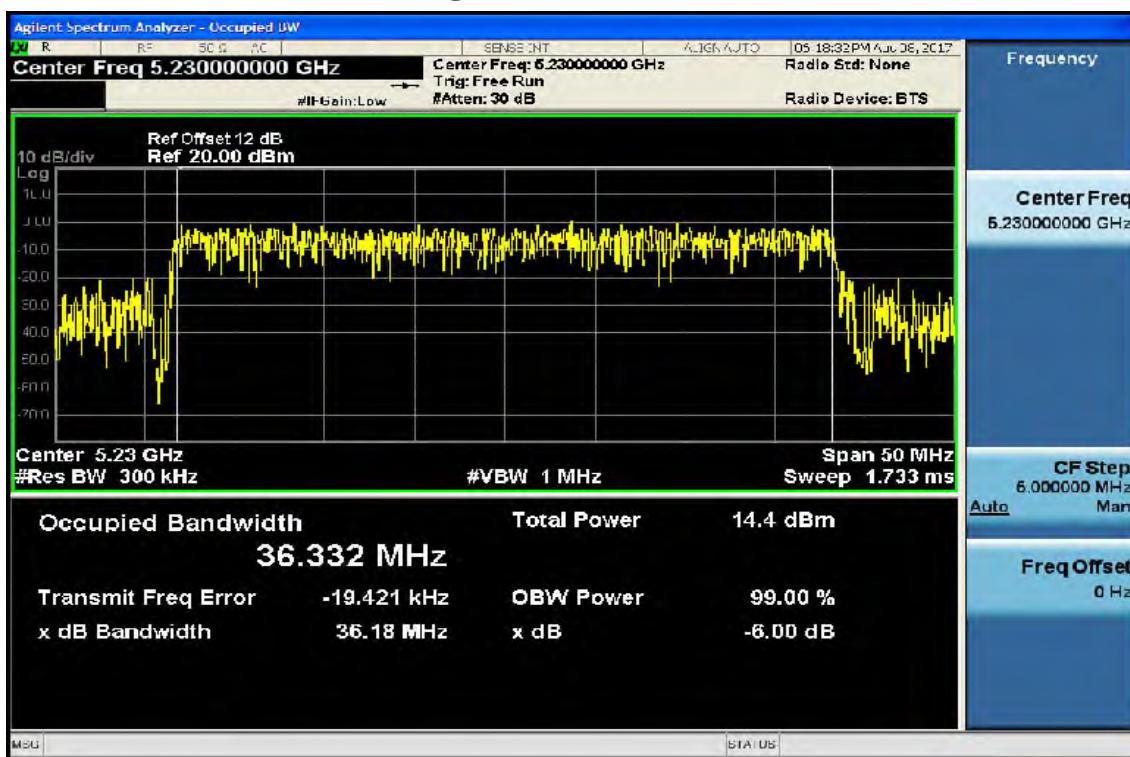
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802.11n HT40, 5150~5250 MHz (Main)

99% Band Width Test Data CH-Low (5190 MHz)



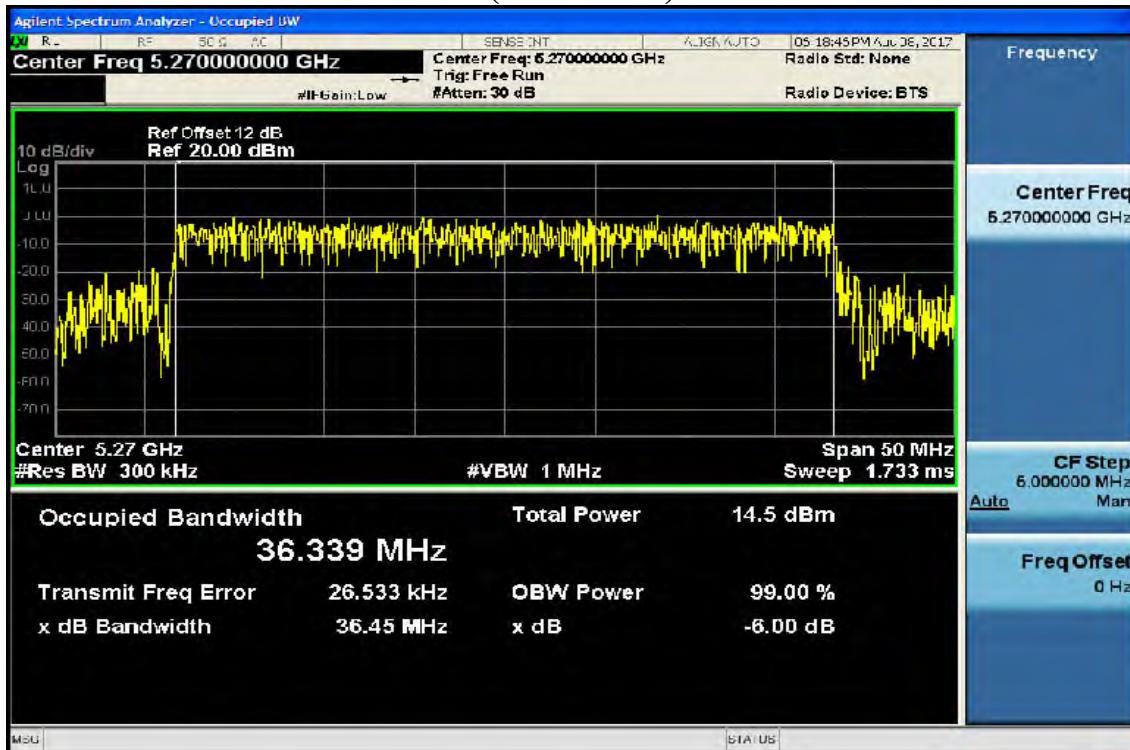
99% Band Width Test Data CH-High (5230 MHz)



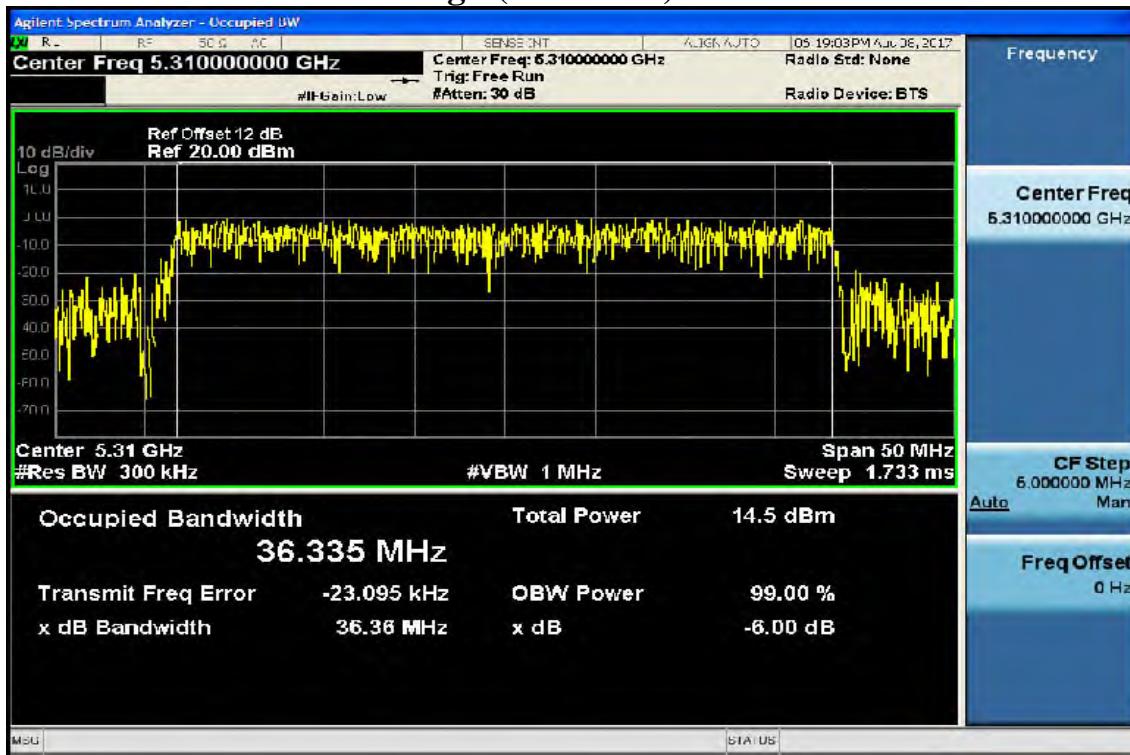
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802.11n HT40, 5250~5350 MHz (Main) 99% Band Width Test Data CH-Low (5270 MHz)



99% Band Width Test Data CH-High (5310MHz)



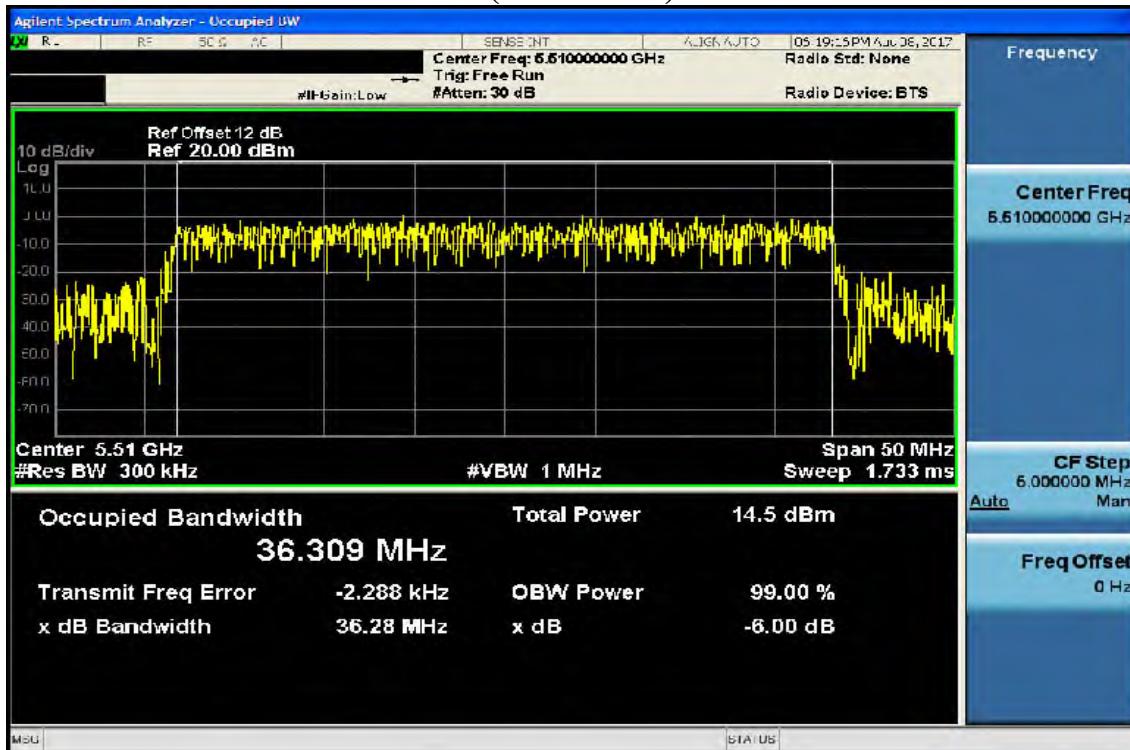
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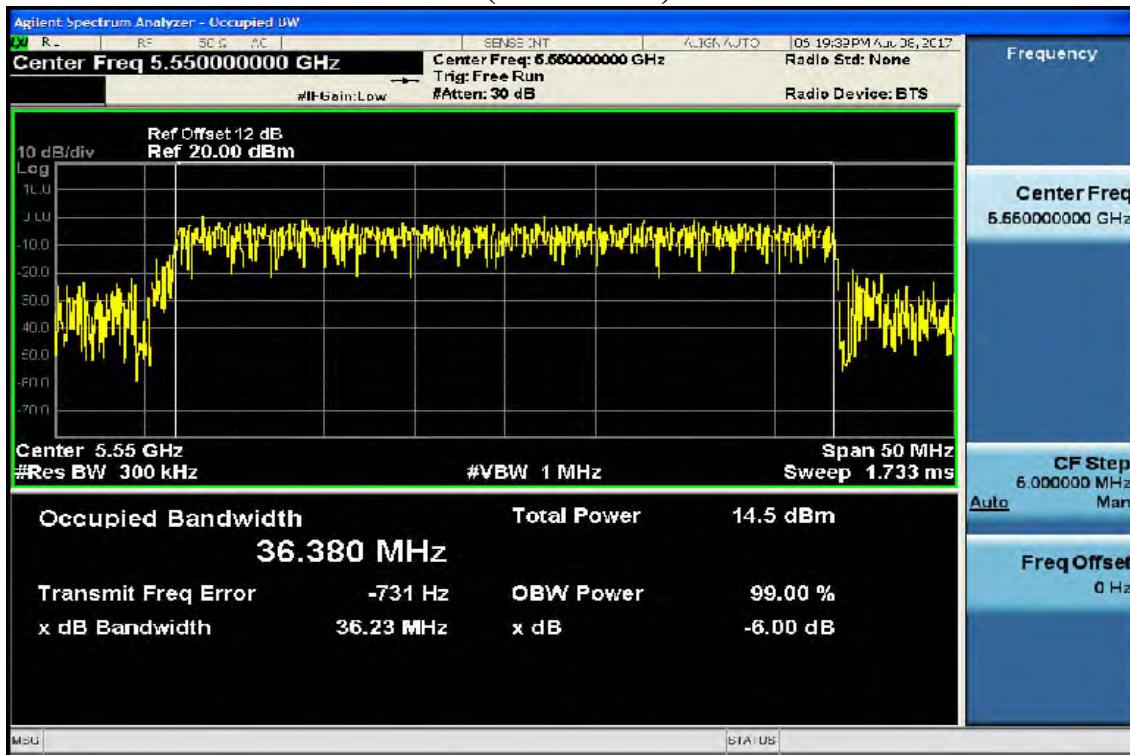
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802.11n HT40, 5470~5725 MHz (Main) 99% Band Width Test Data CH-Low (5510 MHz)



99% Band Width Test Data CH-Mid (5550 MHz)



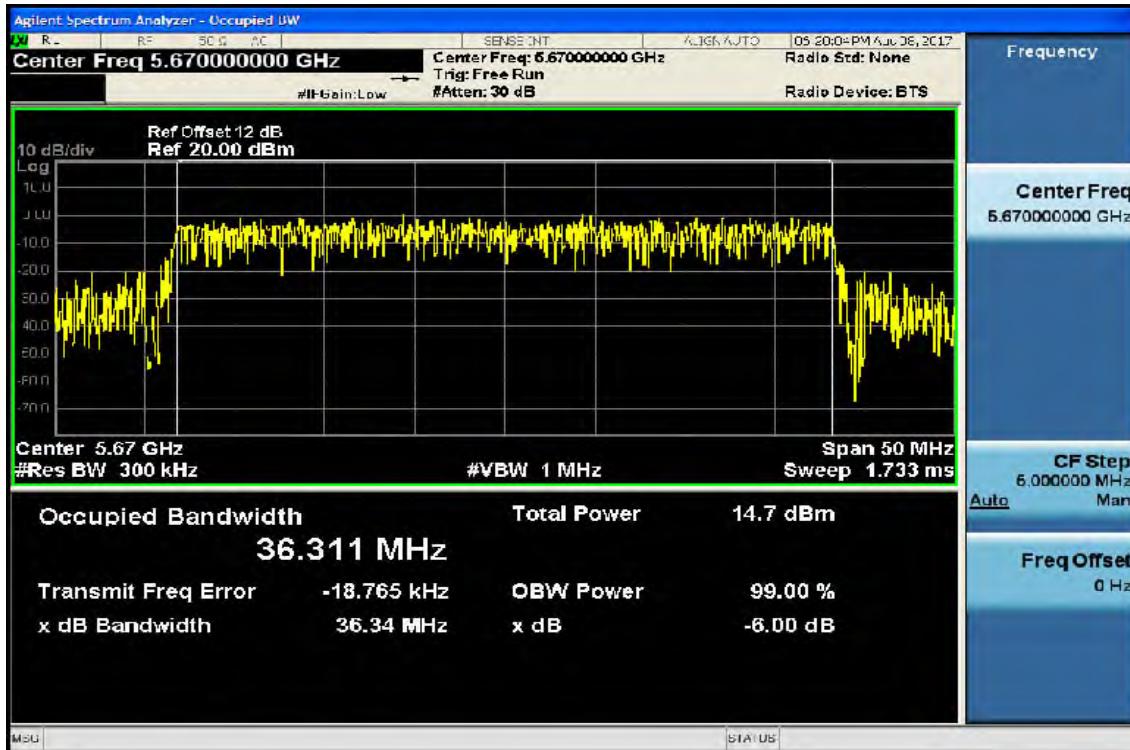
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99% Band Width Test Data CH-High (5670 MHz)



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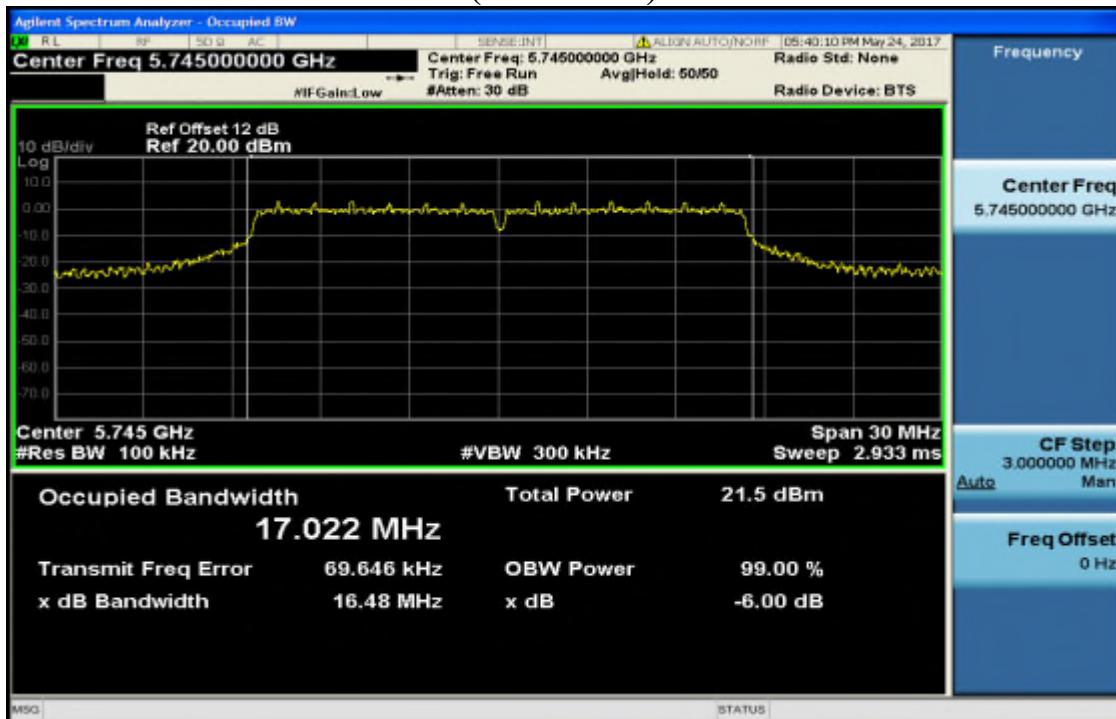
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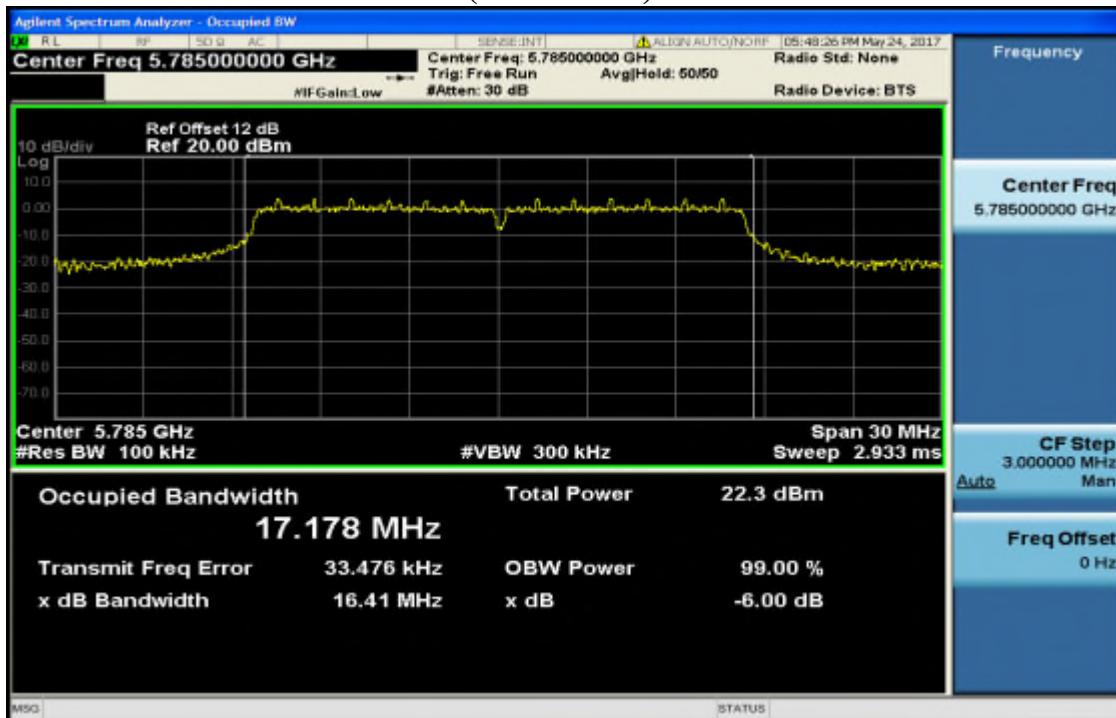
6dB Band Width measure with Peak detector for FCC

802.11a, 5725~5850 MHz (Main)

6dB Band Width Test Data CH-Low (5745 MHz)



6dB Band Width Test Data CH-Mid (5785 MHz)

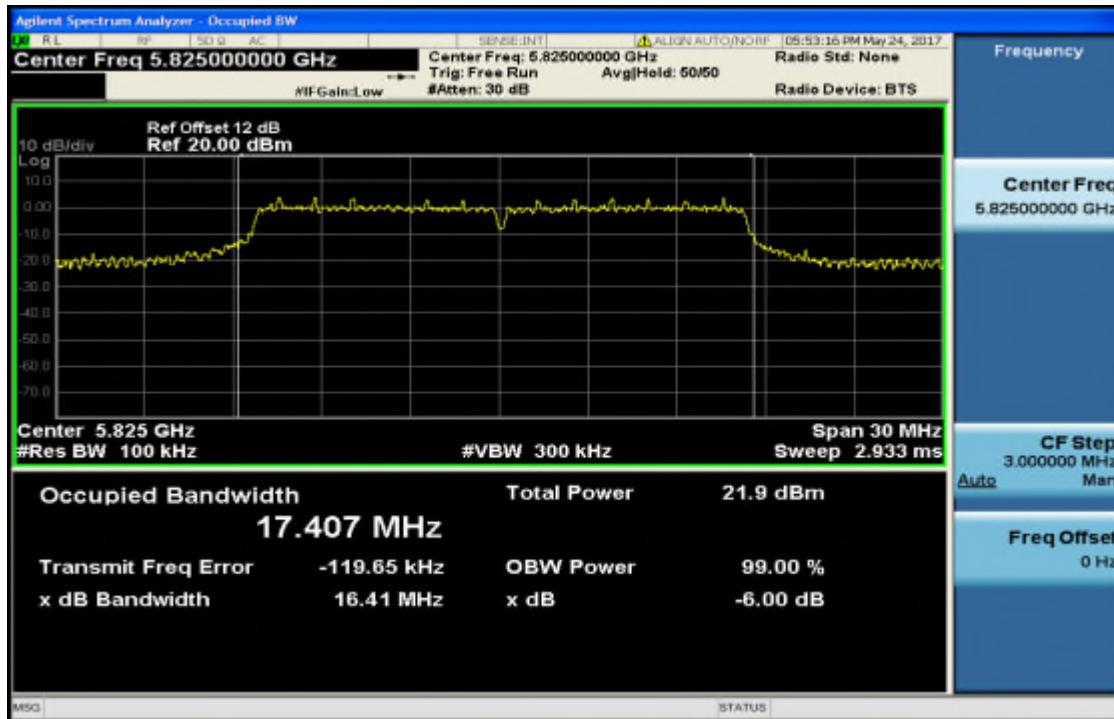


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6dB Band Width Test Data CH-High (5825 MHz)

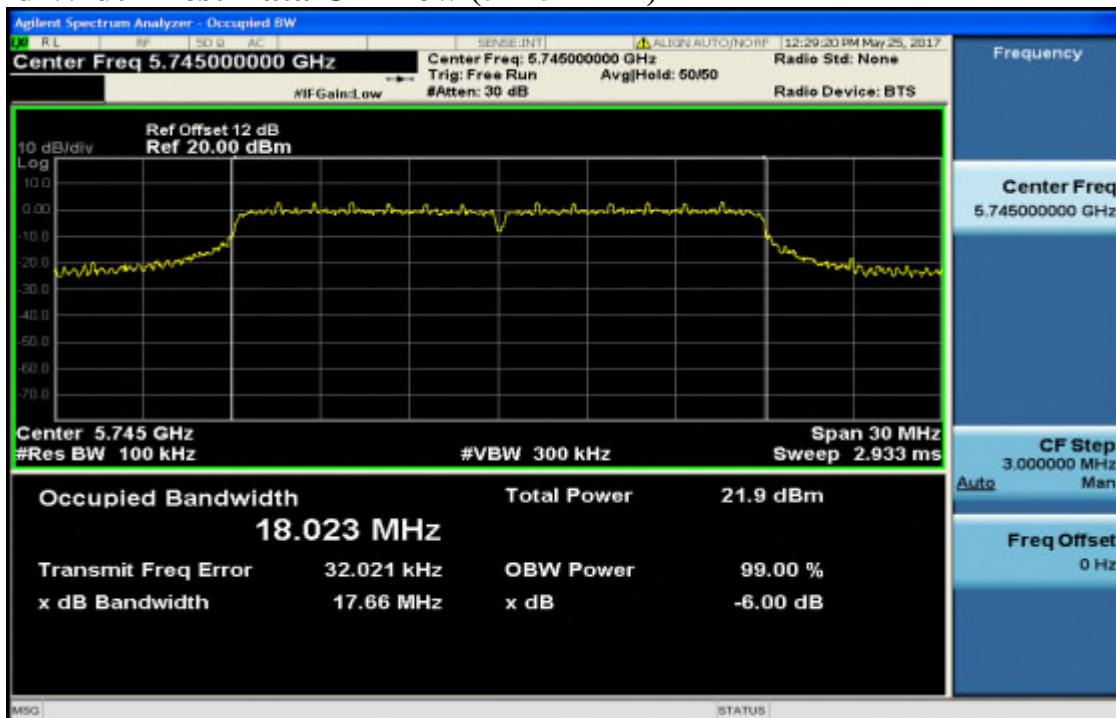


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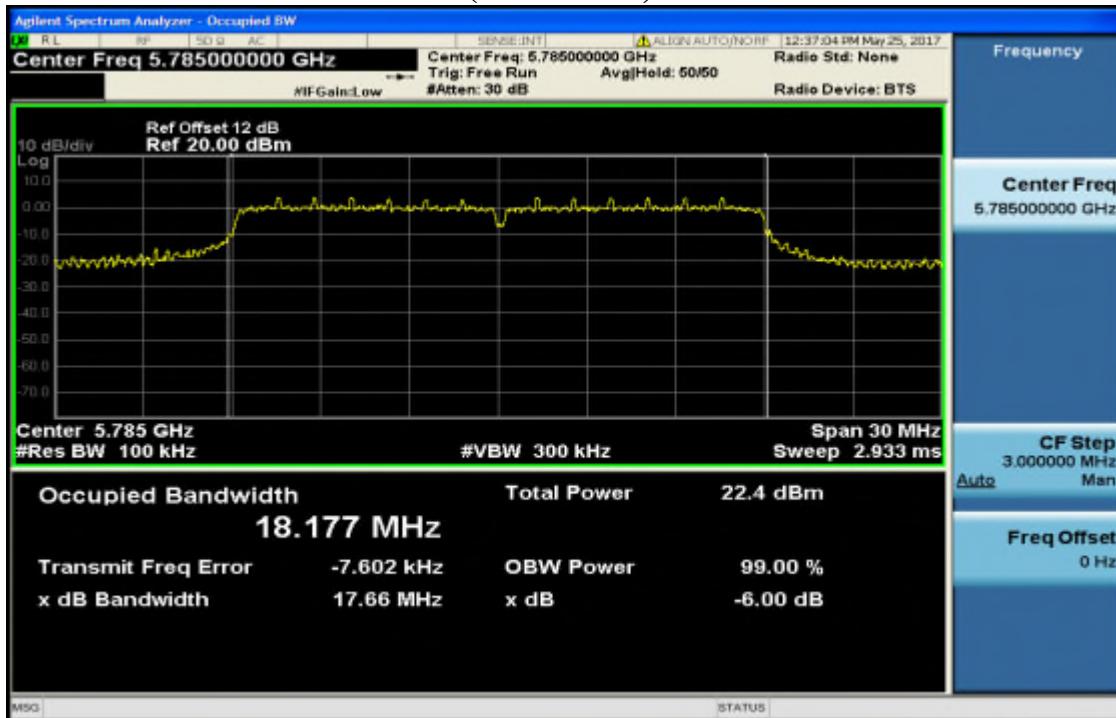
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802.11n_HT20, 5725~5850 MHz (Main) 6dB Band Width Test Data CH-Low (5745 MHz)



6dB Band Width Test Data CH-Mid (5785 MHz)

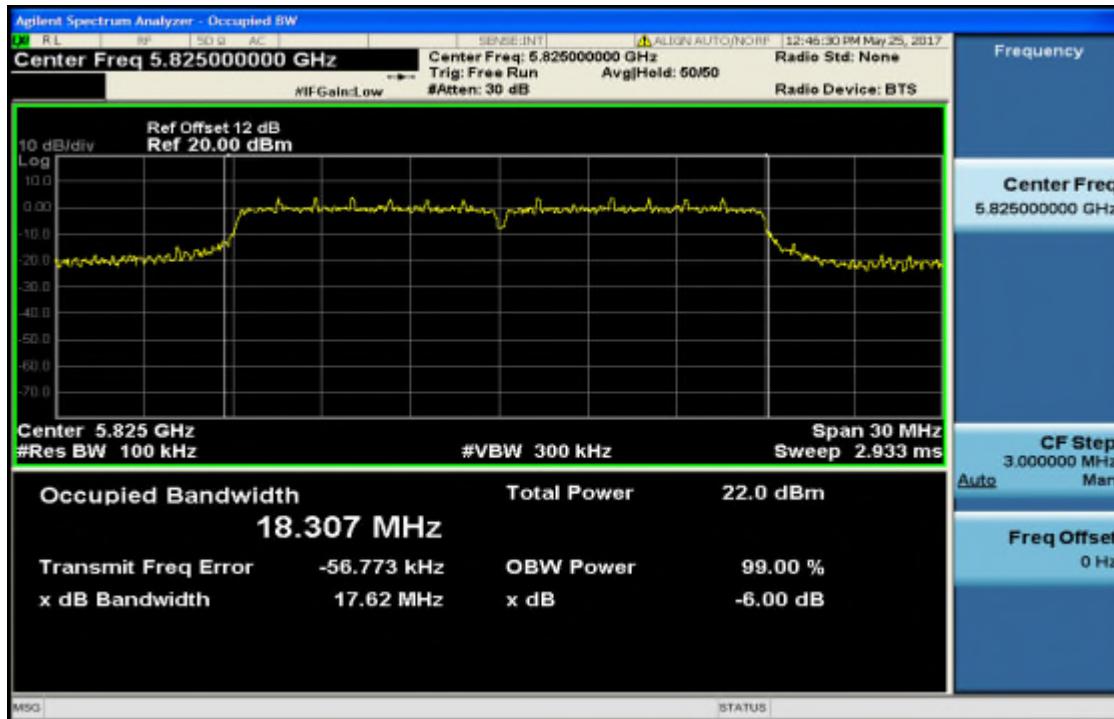


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6dB Band Width Test Data CH-High (5825 MHz)

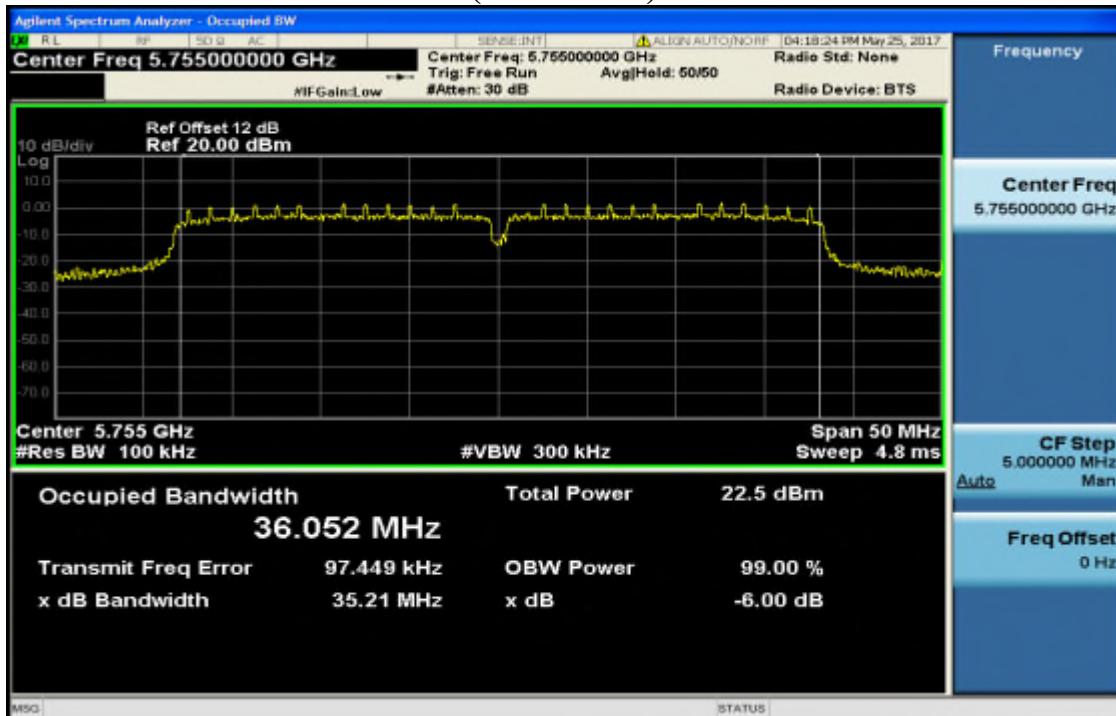


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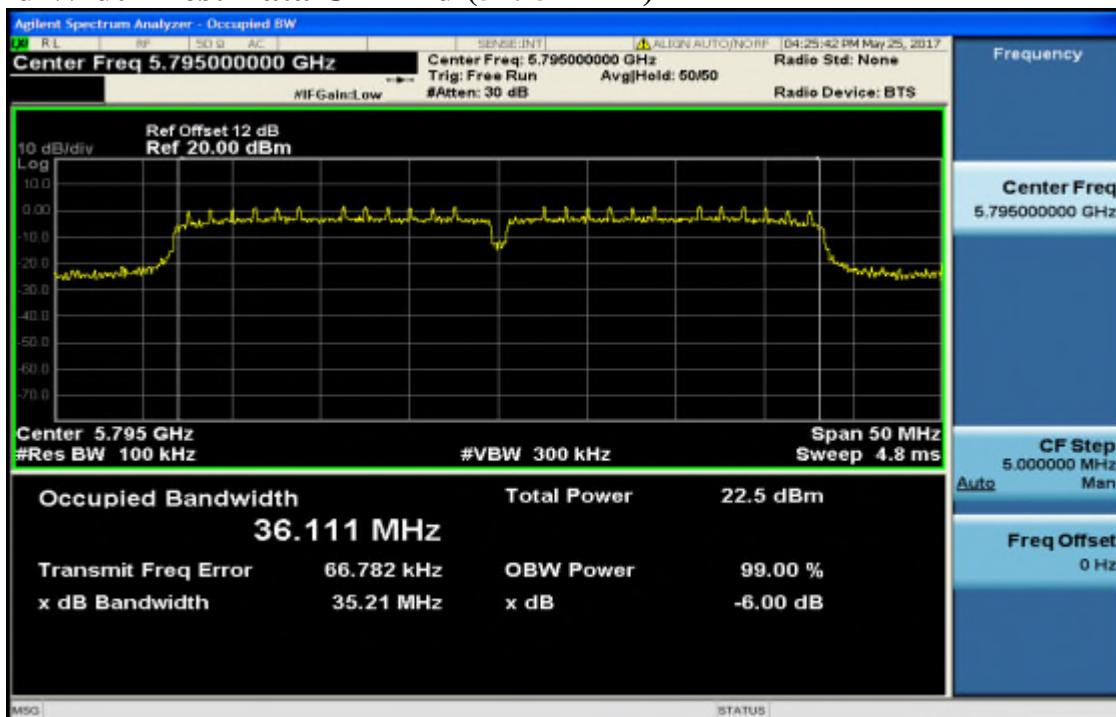
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802.11n_HT40, 5725~5850 MHz (Main) 6dB Band Width Test Data CH-Low (5755 MHz)



6dB Band Width Test Data CH-Mid (5795 MHz)



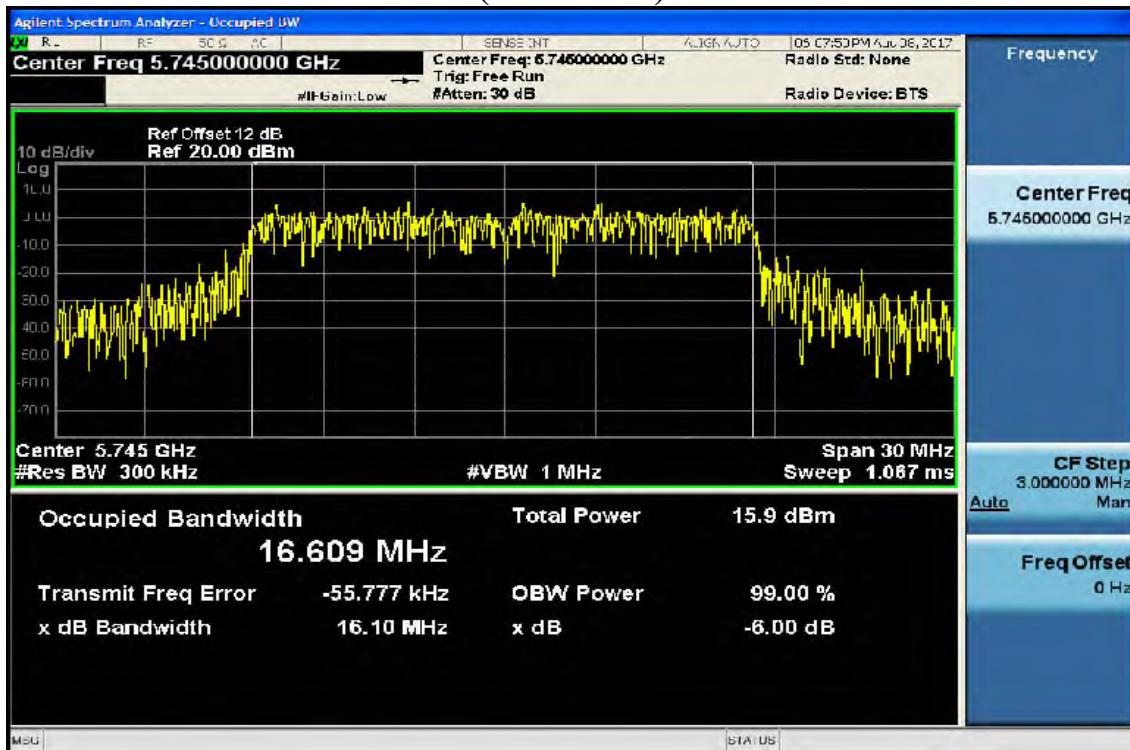
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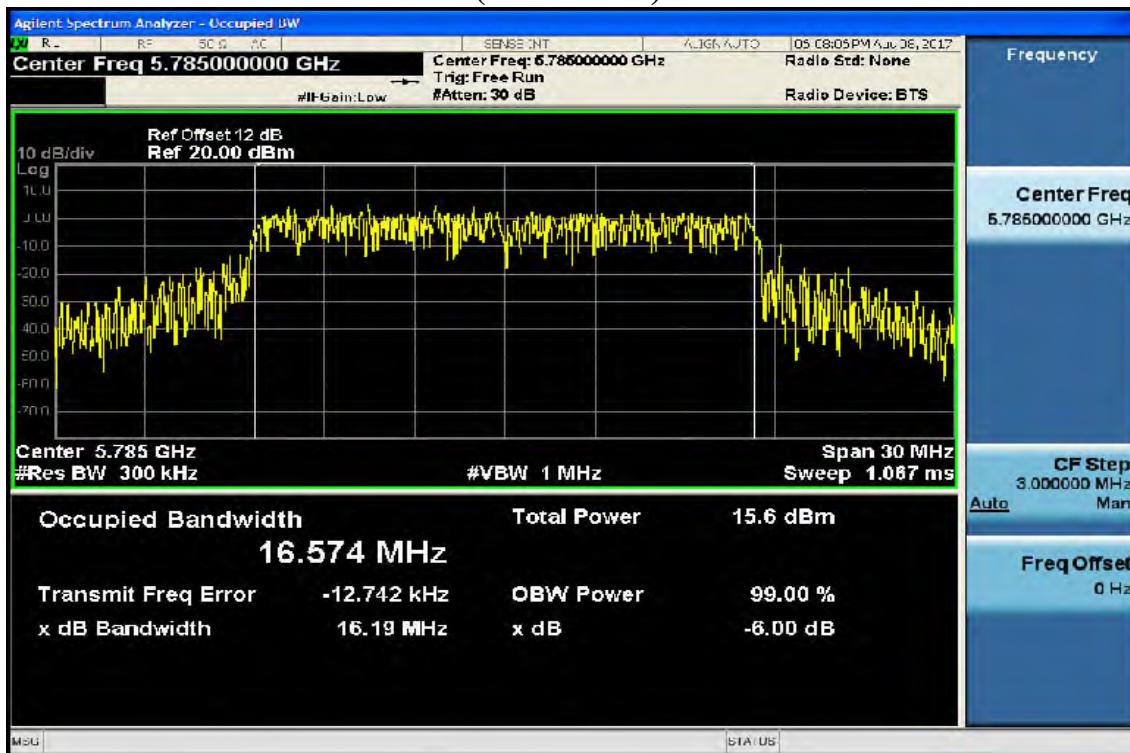
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6dB Band Width measure with Average detector for IC 802.11a, 5725~5850 MHz (Main)

6dB Band Width Test Data CH-Low (5745 MHz)



6dB Band Width Test Data CH-Mid (5785 MHz)

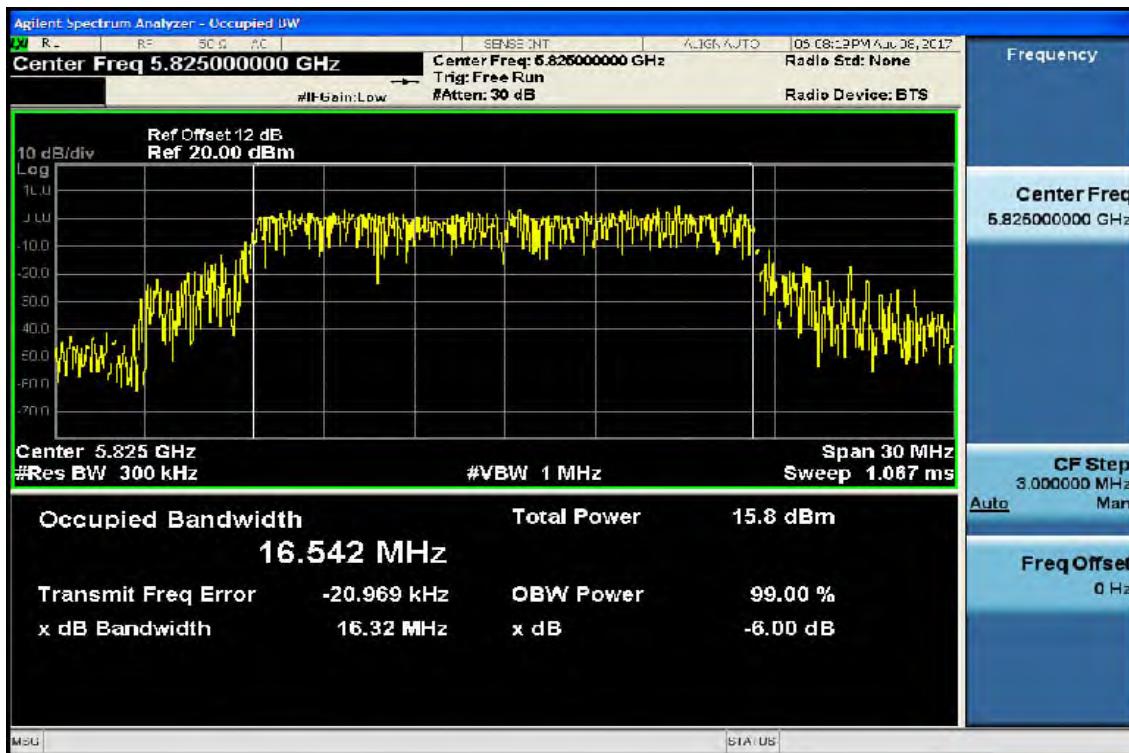


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6dB Band Width Test Data CH-High (5825 MHz)



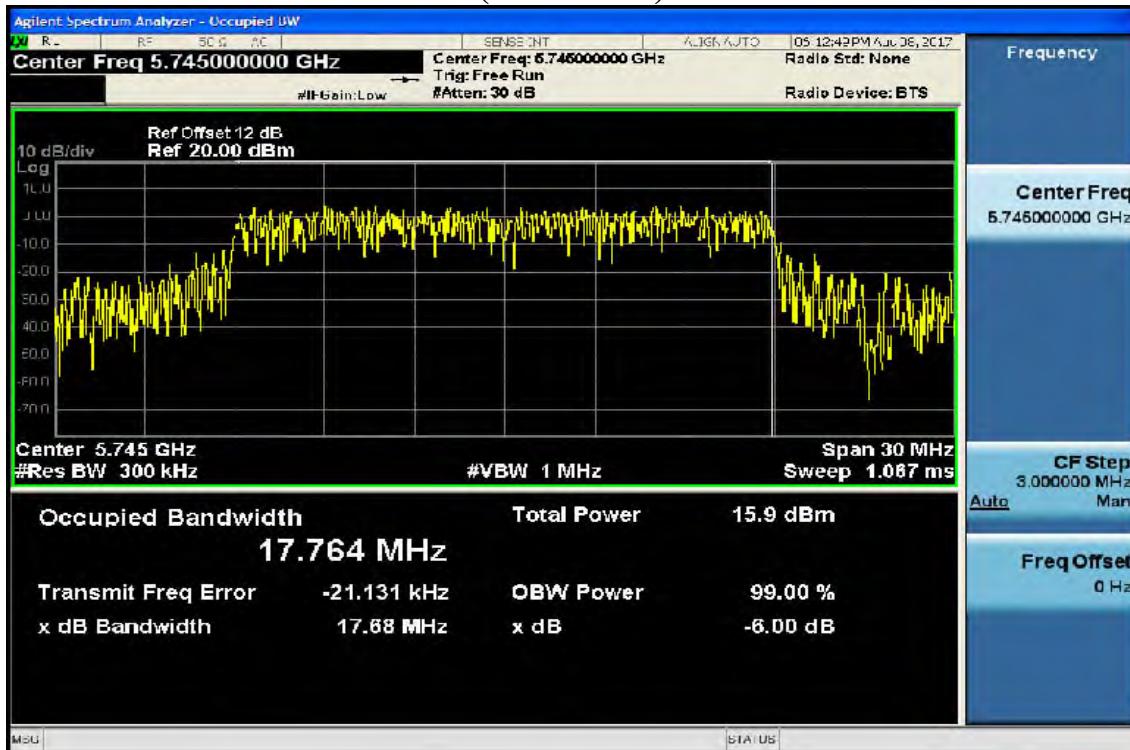
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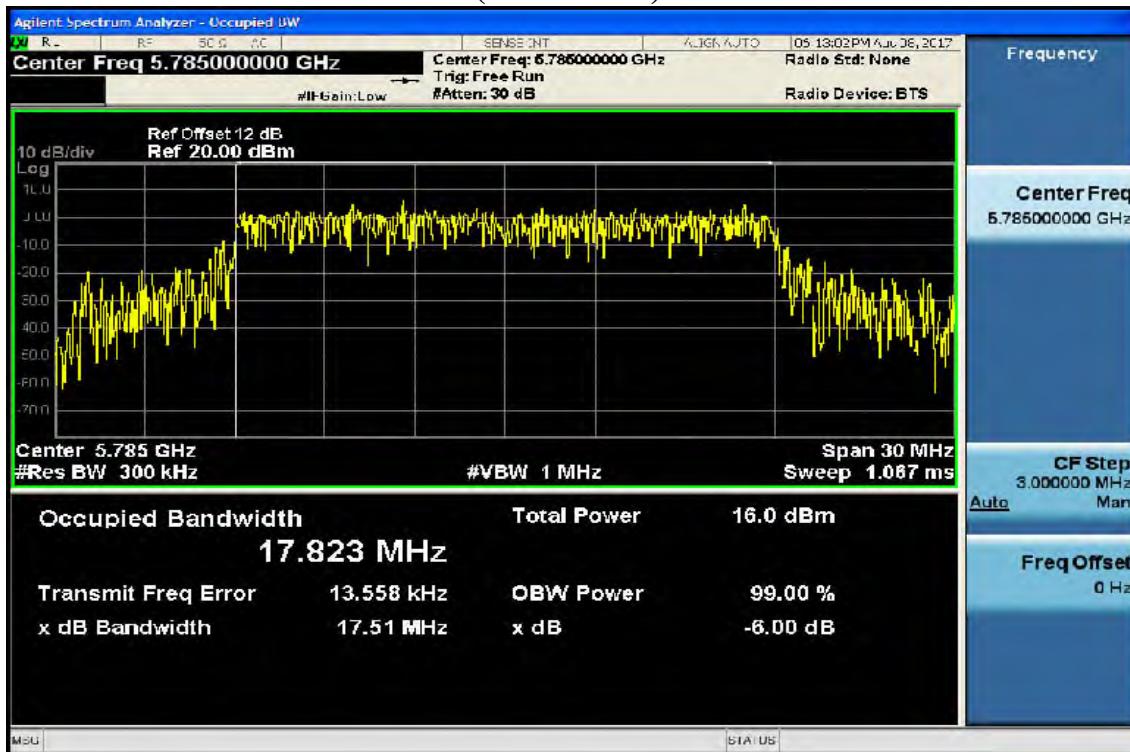
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802.11n_HT20, 5725~5850 MHz (Main)

6dB Band Width Test Data CH-Low (5745 MHz)



6dB Band Width Test Data CH-Mid (5785 MHz)



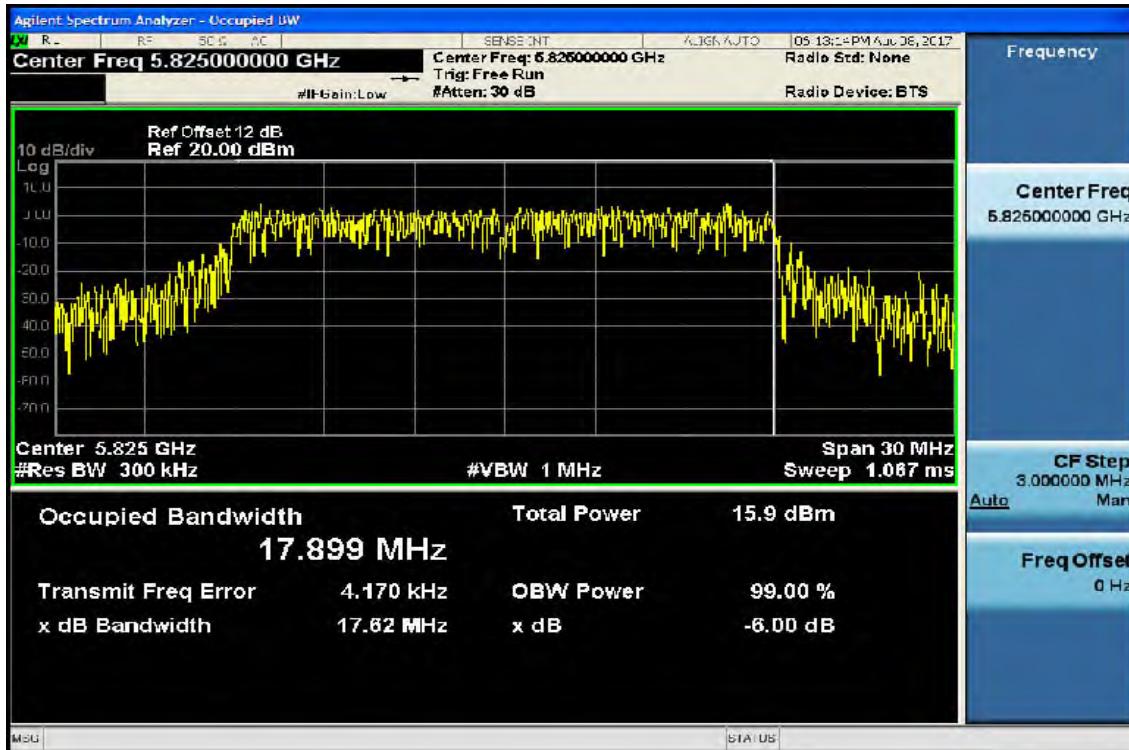
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6dB Band Width Test Data CH-High (5825 MHz)



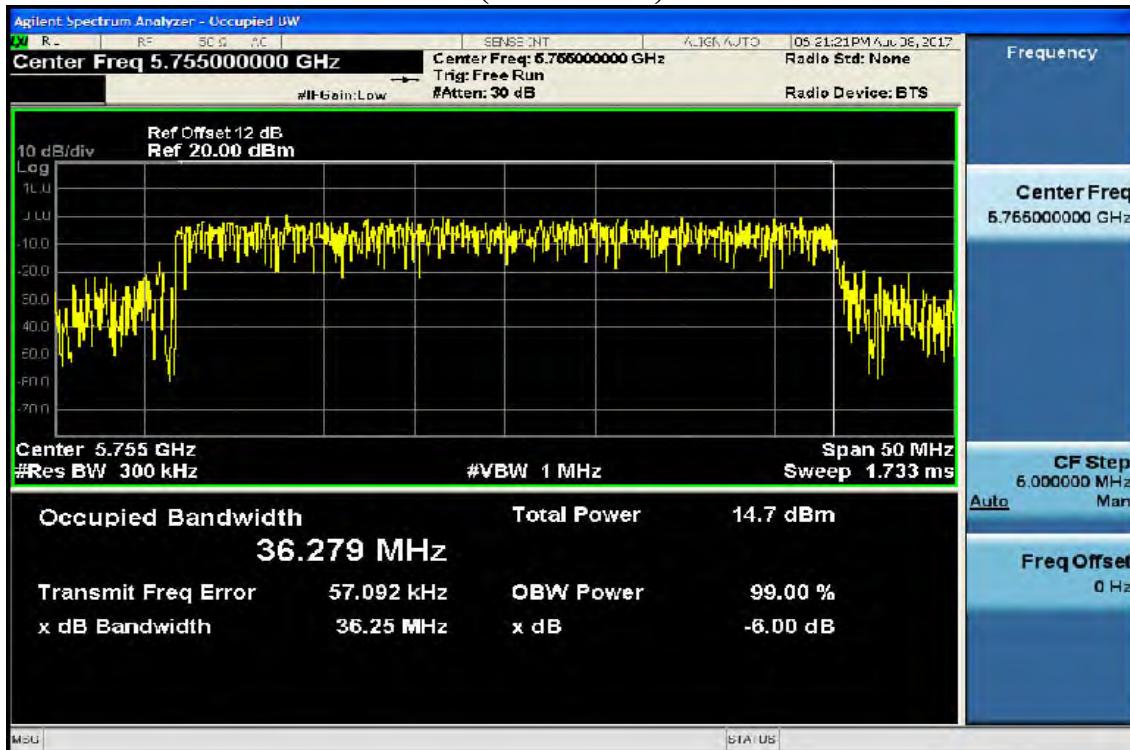
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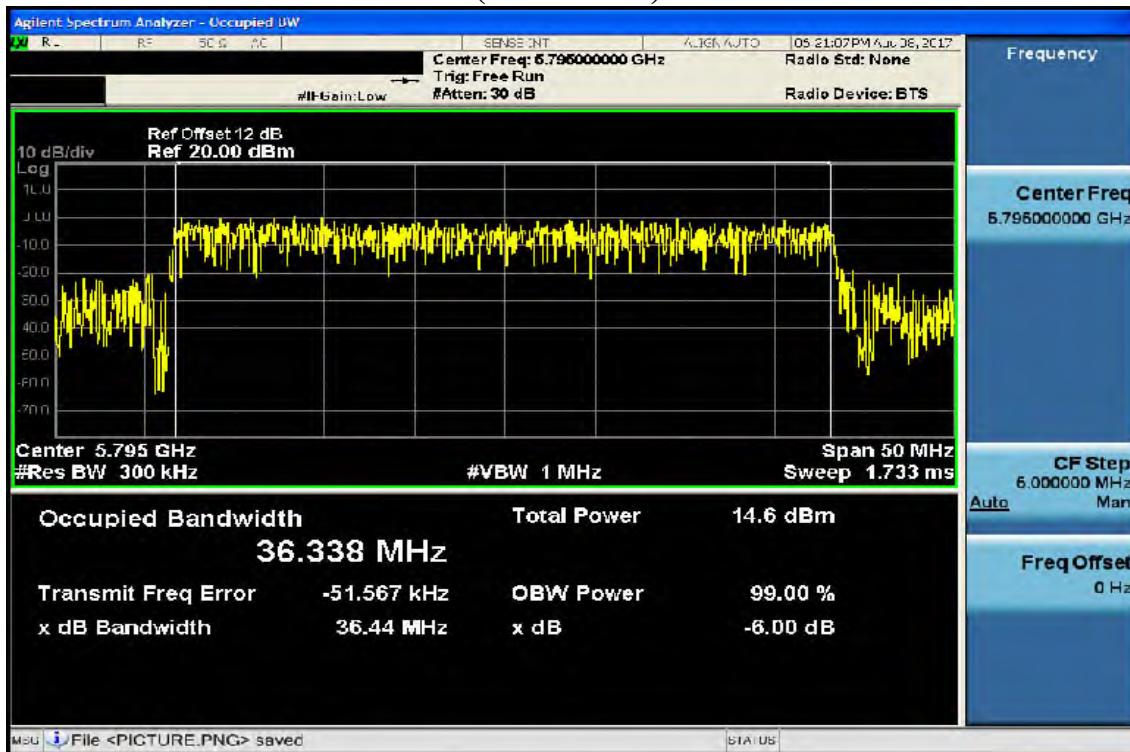
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802.11n_HT40, 5725~5850 MHz (Main)

6dB Band Width Test Data CH-Low (5755 MHz)



6dB Band Width Test Data CH-Mid (5795 MHz)



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

FCC

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1	Access Point (Mater device)		1 Watt(30dBm)
	Fixed point-to-point Acess Ponit		1 Watt(30dBm)
	✓	Mobile and portable clinet device	250mW(23.98dBm)
U-NII-2A	✓	250mW(23.98dBm) or 11dBm+10 log B	
U-NII-2C	✓	250mW(23.98dBm) or 11dBm+10 log B	
U-NII-3	✓	1 Watt(30dBm)	

IC

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm
5250~5350 MHz	Conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$ EIRP shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm
5470-5600 MHz and 5650-5725 MHz	Conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$ EIRP shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm
5725~5850 MHz	Conducted output power shall not exceed 1 W

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

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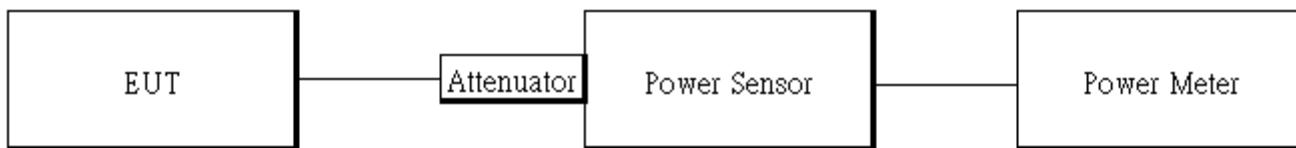
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9.3 Measurement Equipment Used

Refer to section 8.3 for details.

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018

9.4 Test Set-up



9.5 Measurement Result

FCC

802.11a_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6M	15.45	35.061	23.98	PASS
44	5220	6M	15.91	38.978	23.98	PASS
48	5240	6M	15.98	39.612	23.98	PASS
52	5260	6M	16.10	40.721	23.98 or $11+10\log(B) = 25.77$	PASS
60	5300	6M	16.29	42.542	23.98 or $11+10\log(B) = 25.77$	PASS
64	5320	6M	16.36	43.234	23.98 or $11+10\log(B) = 25.77$	PASS
100	5500	6M	14.66	29.230	23.98 or $11+10\log(B) = 25.72$	PASS
116	5580	6M	14.18	26.171	23.98 or $11+10\log(B) = 25.72$	PASS
140	5700	6M	15.54	35.795	23.98 or $11+10\log(B) = 25.77$	PASS
149	5745	6M	13.81	24.034	30	PASS
157	5785	6M	14.26	26.658	30	PASS
165	5825	6M	13.62	23.005	30	PASS

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802.11n_HT20_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	15.53	35.767	23.98	PASS
44	5220	MCS0	16.00	39.855	23.98	PASS
48	5240	MCS0	15.99	39.764	23.98	PASS
52	5260	MCS0	16.07	40.503	23.98 or $11+10\log(B) = 25.77$	PASS
60	5300	MCS0	16.06	40.410	23.98 or $11+10\log(B) = 25.75$	PASS
64	5320	MCS0	16.31	42.804	23.98 or $11+10\log(B) = 25.77$	PASS
100	5500	MCS0	14.53	28.411	23.98 or $11+10\log(B) = 25.77$	PASS
116	5580	MCS0	14.33	27.132	23.98 or $11+10\log(B) = 25.72$	PASS
140	5700	MCS0	15.58	36.181	23.98 or $11+10\log(B) = 25.76$	PASS
149	5745	MCS0	13.88	24.462	30	PASS
157	5785	MCS0	14.33	27.132	30	PASS
165	5825	MCS0	13.64	23.147	30	PASS

802.11n_HT40_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	16.36	43.270	23.98	PASS
46	5230	MCS0	16.54	45.101	23.98	PASS
54	5270	MCS0	16.50	44.688	23.98 or $11+10\log(B) = 27.99$	PASS
62	5310	MCS0	16.32	42.873	23.98 or $11+10\log(B) = 27.99$	PASS
102	5510	MCS0	14.07	25.538	23.98 or $11+10\log(B) = 27.99$	PASS
110	5550	MCS0	13.02	20.053	23.98 or $11+10\log(B) = 27.75$	PASS
134	5670	MCS0	13.01	20.007	23.98 or $11+10\log(B) = 27.93$	PASS
151	5755	MCS0	13.95	24.842	30	PASS
159	5795	MCS0	14.29	26.865	30	PASS

*** Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.**

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IC

802.11a_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)		RESULT
52	5260	16.10	40.721	23.98	or $11+10\log(B) = 23.20$	PASS
60	5300	16.29	42.542	23.98	or $11+10\log(B) = 23.19$	PASS
64	5320	16.36	43.234	23.98	or $11+10\log(B) = 23.16$	PASS
100	5500	14.66	29.230	23.98	or $11+10\log(B) = 23.16$	PASS
116	5580	14.18	26.171	23.98	or $11+10\log(B) = 23.16$	PASS
140	5700	15.54	35.795	23.98	or $11+10\log(B) = 23.18$	PASS
149	5745	13.81	24.034	30		PASS
157	5785	14.26	26.658	30		PASS
165	5825	13.62	23.005	30		PASS

802.11n_HT20_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)		RESULT
52	5260	16.07	40.503	23.98	or $11+10\log(B) = 23.50$	PASS
60	5300	16.06	40.410	23.98	or $11+10\log(B) = 23.50$	PASS
64	5320	16.31	42.804	23.98	or $11+10\log(B) = 23.52$	PASS
100	5500	14.53	28.411	23.98	or $11+10\log(B) = 23.52$	PASS
116	5580	14.33	27.132	23.98	or $11+10\log(B) = 23.52$	PASS
140	5700	15.58	36.181	23.98	or $11+10\log(B) = 23.51$	PASS
149	5745	13.88	24.462	30		PASS
157	5785	14.33	27.132	30		PASS
165	5825	13.64	23.147	30		PASS

802.11n_HT40_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)		RESULT
54	5270	16.50	44.688	23.98	or $11+10\log(B) = 26.57$	PASS
62	5310	16.32	42.873	23.98	or $11+10\log(B) = 26.58$	PASS
102	5510	14.07	25.538	23.98	or $11+10\log(B) = 26.59$	PASS
110	5550	13.02	20.053	23.98	or $11+10\log(B) = 26.57$	PASS
134	5670	13.01	20.007	23.98	or $11+10\log(B) = 26.59$	PASS
151	5755	13.95	24.842	30		PASS
159	5795	14.29	26.865	30		PASS

*** Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average**

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802.11a_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)		RESULT	
36	5180	15.45	3.370	18.82	76.177	23.01	or $10+10\log(B)=$	22.20	PASS
44	5220	15.91	3.370	19.28	84.688	23.01	or $10+10\log(B)=$	22.17	PASS
48	5240	15.98	3.370	19.35	86.064	23.01	or $10+10\log(B)=$	22.19	PASS
52	5260	16.10	3.230	19.33	85.669	30	or $17+10\log(B)=$	29.20	PASS
60	5300	16.29	3.230	19.52	89.500	30	or $17+10\log(B)=$	29.19	PASS
64	5320	16.36	3.230	19.59	90.954	30	or $17+10\log(B)=$	29.16	PASS
100	5500	14.66	1.510	16.17	41.383	30	or $17+10\log(B)=$	29.16	PASS
116	5580	14.18	1.510	15.69	37.053	30	or $17+10\log(B)=$	29.16	PASS
140	5700	15.54	1.510	17.05	50.678	30	or $17+10\log(B)=$	29.18	PASS

802.11n_HT20_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)		RESULT	
36	5180	15.53	3.370	18.90	77.712	23.01	or $10+10\log(B)=$	22.51	PASS
44	5220	16.00	3.370	19.37	86.594	23.01	or $10+10\log(B)=$	22.54	PASS
48	5240	15.99	3.370	19.36	86.395	23.01	or $10+10\log(B)=$	22.50	PASS
52	5260	16.07	3.230	19.30	85.209	30	or $17+10\log(B)=$	29.51	PASS
60	5300	16.06	3.230	19.29	85.013	30	or $17+10\log(B)=$	29.50	PASS
64	5320	16.31	3.230	19.54	90.051	30	or $17+10\log(B)=$	29.50	PASS
100	5500	14.53	1.510	16.04	40.224	30	or $17+10\log(B)=$	29.48	PASS
116	5580	14.33	1.510	15.84	38.414	30	or $17+10\log(B)=$	29.53	PASS
140	5700	15.58	1.510	17.09	51.226	30	or $17+10\log(B)=$	29.50	PASS

802.11n_HT40_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)		RESULT	
38	5190	16.36	3.370	19.73	94.013	23.01	or $10+10\log(B)=$	25.60	PASS
46	5230	16.54	3.370	19.91	97.991	23.01	or $10+10\log(B)=$	25.60	PASS
54	5270	16.50	3.230	19.73	94.013	30	or $17+10\log(B)=$	32.60	PASS
62	5310	16.32	3.230	19.55	90.196	30	or $17+10\log(B)=$	32.60	PASS
102	5510	14.07	1.510	15.58	36.157	30	or $17+10\log(B)=$	32.60	PASS
110	5550	13.02	1.510	14.53	28.391	30	or $17+10\log(B)=$	32.61	PASS
134	5670	13.01	1.510	14.52	28.326	30	or $17+10\log(B)=$	32.60	PASS

* Note: EIRP = Average Power + Gain

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10 PEAK POWER SPECTRAL DENSITY

10.1 Standard Applicable

FCC

OPERATION Band	EUT CATEGORY	LIMIT
U-NII-1	Access Point (Mater device)	17dBm/ MHz
	Fixed point-to-point Acess Ponit	
	✓ Mobile and portable clinet device	11dBm/ MHz
U-NII-2A	✓	11dBm/ MHz
U-NII-2C	✓	11dBm/ MHz
U-NII-3	✓	30dBm/ 500kHz

IC

OPERATION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP spectral density 10 dBm / MHz
5250~5350 MHz	11dBm / MHz
5470-5600 MHz and 5650-5725 MHz	11dBm / MHz
5725~5850 MHz	30dBm / 500 kHz

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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10.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

For U-NII-3 Band:

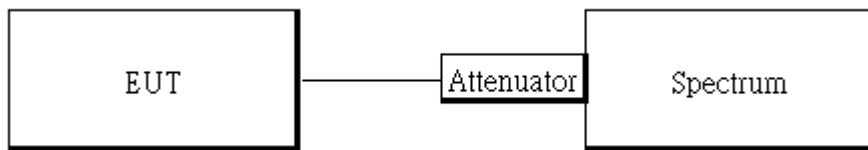
Set RBW=500 kHz, VBW \geq 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

5. User the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

10.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HU-BER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018

10.4 Test Set-up



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10.5 Measurement Result

POWER DENSITY 802.11a MODE				POWER DENSITY 802.11n HT20 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	-2.07	17	-19.07	5180	-4.60	17	-21.60
5220	-0.04	17	-17.04	5220	-3.14	17	-20.14
5240	1.29	17	-15.71	5240	-2.77	17	-19.77
5260	-0.58	11	-11.58	5260	-2.22	11	-13.22
5300	-1.71	11	-12.71	5300	-2.17	11	-13.17
5320	-1.39	11	-12.39	5320	-3.15	11	-14.15
5500	-2.07	11	-13.07	5500	-4.19	11	-15.19
5580	-4.30	11	-15.30	5580	-4.35	11	-15.35
5700	-0.46	11	-11.46	5700	-3.46	11	-14.46
5745	8.49	30	-21.51	5745	7.74	30	-22.26
5785	8.89	30	-21.11	5785	8.29	30	-21.71
5825	8.34	30	-21.66	5825	8.41	30	-21.59

POWER DENSITY 802.11n HT40 MODE			
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5190	-8.87	17	-25.87
5230	-9.77	17	-26.77
5270	-7.8	11	-18.80
5310	-7.9	11	-18.90
5510	-11.52	11	-22.52
5550	-11.98	11	-22.98
5670	-10.84	11	-21.84
5755	5.18	30	-24.82
5795	4.93	30	-25.07

EIRP

EIRP spectral density 802.11a MODE						EIRP spectral density 802.11n HT20 MODE					
Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)	Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)
5180	-2.07	3.37	1.30	10	-12.07	5180	-4.60	3.37	-1.23	10	-14.60
5220	-0.04	3.37	3.33	10	-10.04	5220	-3.14	3.37	0.23	10	-13.14
5240	1.29	3.37	4.66	10	-8.71	5240	-2.77	3.37	0.60	10	-12.77

EIRP spectral density 802.11n HT40 MODE					
Freq. (MHz)	PPSD (dBm)	Ant. Gain (dBi)	EIRP SD (dBm)	Limit (dBm)	Margin (dB)
5180	-8.87	3.37	-5.50	10	-18.87
5220	-9.77	3.37	-6.40	10	-19.77

Note:

SISO offset=

12 dB

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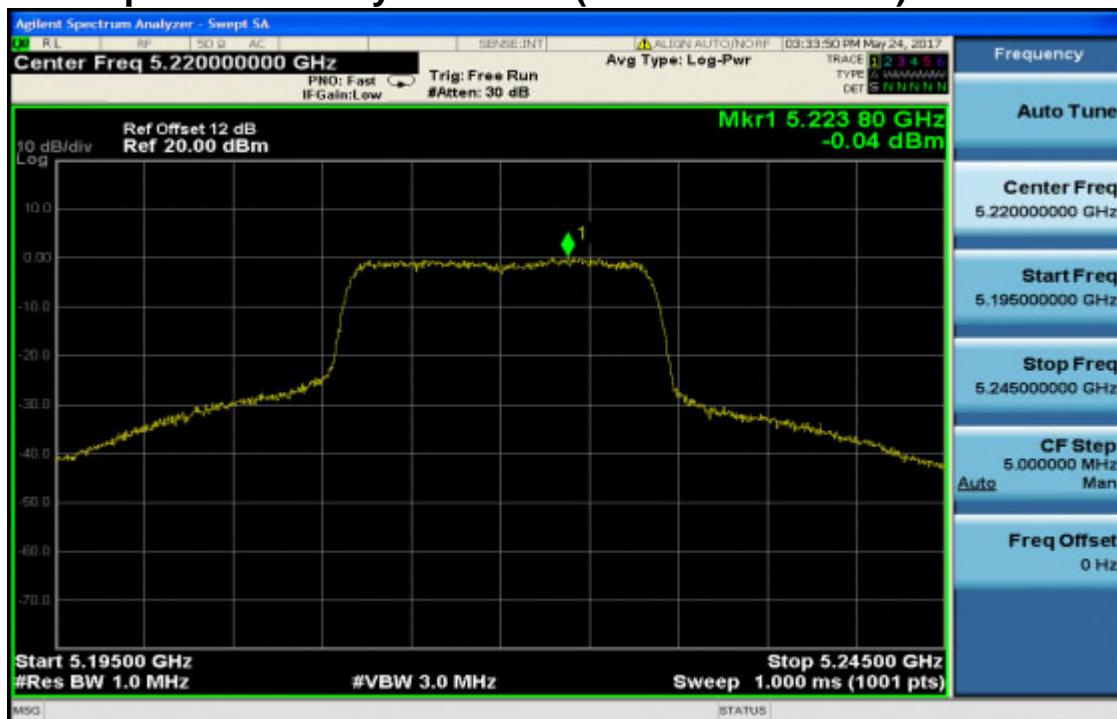
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802.11a 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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802.11a 5250~5350 MHz

Peak Power Spectral Density Data Plot (CH Low 5260 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5300 MHz)



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Peak Power Spectral Density Data Plot (CH High 5320 MHz)



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802.11a 5470~5725 MHz

Peak Power Spectral Density Data Plot (CH Low 5500 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5580 MHz)



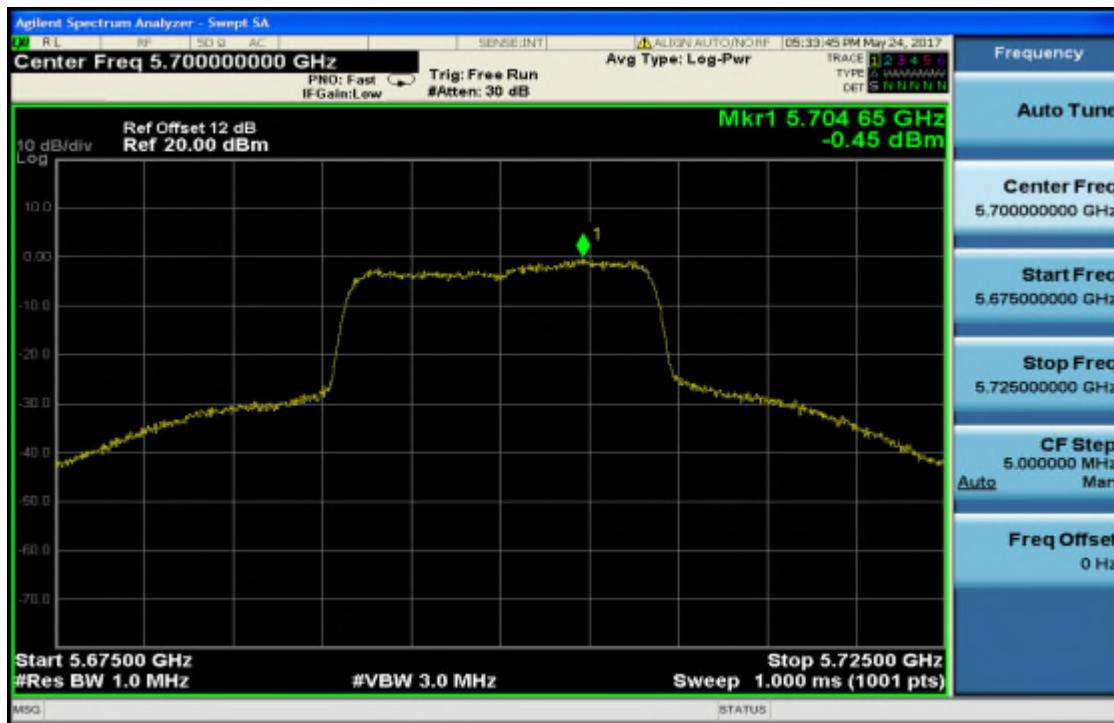
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Peak Power Spectral Density Data Plot (CH High 5700 MHz)



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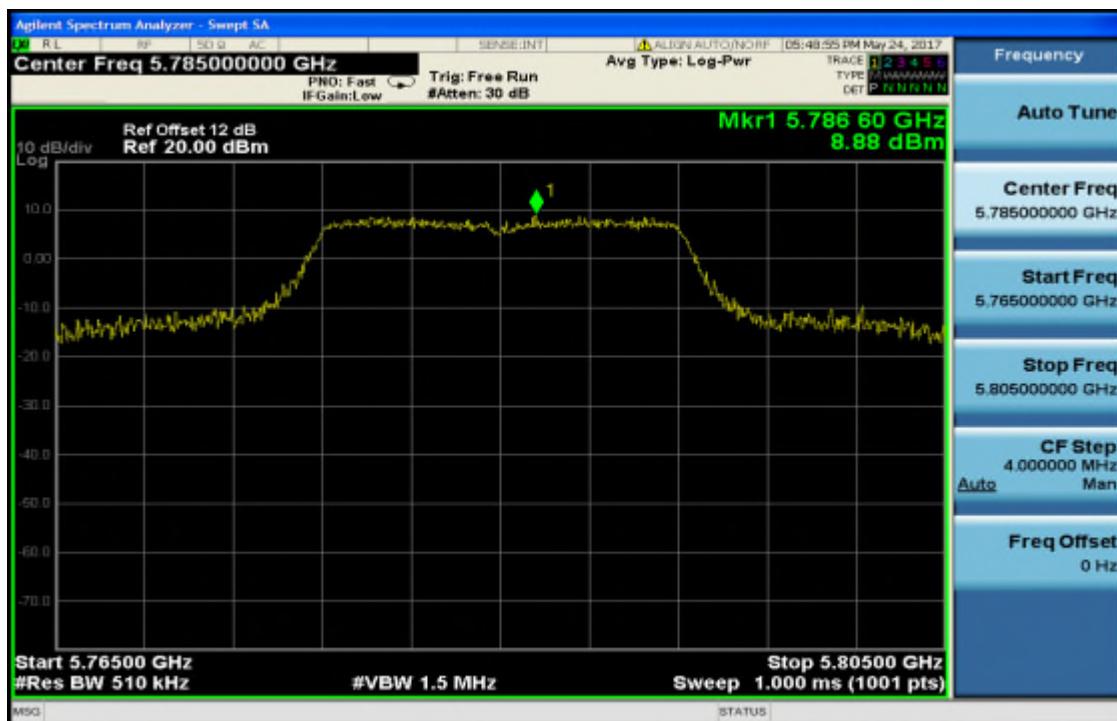
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802.11a 5725~5850 MHz

Peak Power Spectral Density Data Plot (CH Low 5745 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



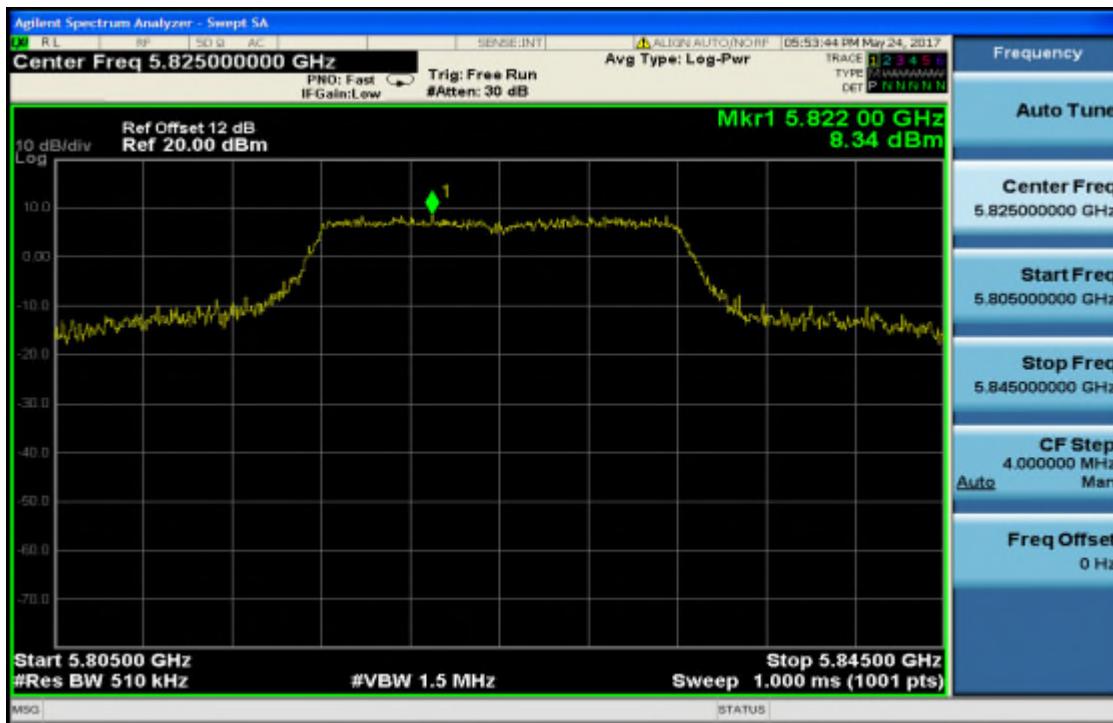
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Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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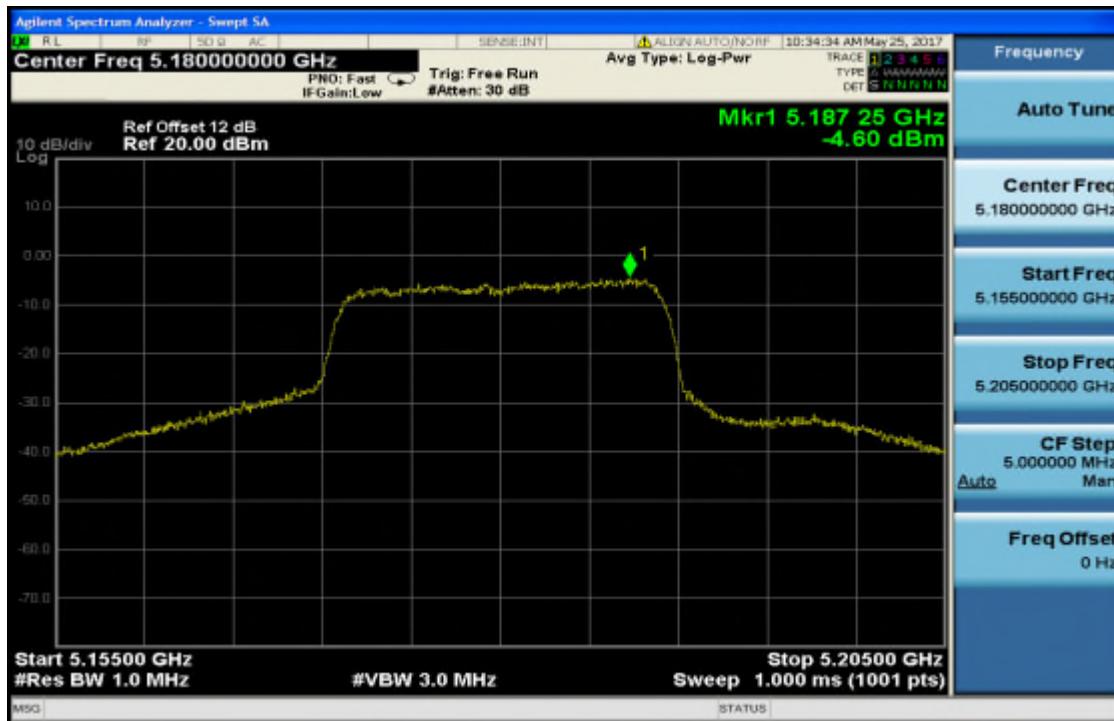
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802.11n HT20, 5150~5250 MHz

Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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802.11n HT20, 5250~5350 MHz Peak Power Spectral Density Data Plot (CH Low 5260MHz)



Peak Power Spectral Density Data Plot (CH Mid 5300 MHz)



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Peak Power Spectral Density Data Plot (CH High 5320 MHz)



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802.11n HT20, 5470~5725 MHz Peak Power Spectral Density Data Plot (CH Low 5500 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5580MHz)



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Peak Power Spectral Density Data Plot (CH High 5700 MHz)



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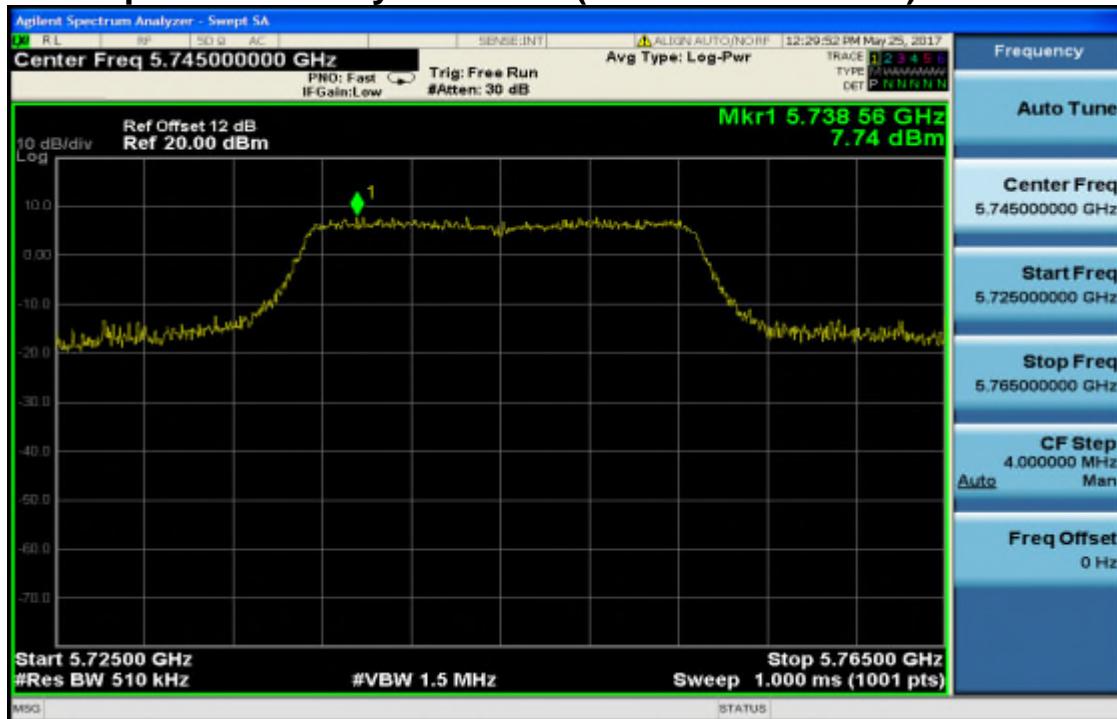
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802.11n HT20, 5725~5850 MHz

Peak Power Spectral Density Data Plot (CH Low 5745 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



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Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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802.11n HT40, 5150~5250 MHz Peak Power Spectral Density Data Plot (CH Low 5190 MHz)



Peak Power Spectral Density Data Plot (CH High 5230 MHz)



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802.11n HT40, 5250~5350 MHz Peak Power Spectral Density Data Plot (CH Low 5270 MHz)



Peak Power Spectral Density Data Plot (CH High 5310 MHz)



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802.11n HT40, 5470~5725 MHz Peak Power Spectral Density Data Plot (CH Low 5510 MHz)



Peak Power Spectral Density Data Plot (CH Mid 5550 MHz)



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Peak Power Spectral Density Data Plot (CH High 5670 MHz)



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802.11n HT40, 5725~5850 MHz Peak Power Spectral Density Data Plot (CH Low 5755 MHz)



Peak Power Spectral Density Data Plot (CH High 5795 MHz)



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11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

11.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m	
	PK: 74 (dB μ V/m)	AV 54 (dB μ V/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1) RSS-247 6.2.1.2	PK: -27 (dBm/MHz)	PK: 68.3 (dB μ V/m)
15.407(b)(2) RSS-247 6.2.2.2		
15.407(b)(3) RSS-247 6.2.3.2		
15.407(b)(4)(i) RSS-247 6.2.4.2	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dB μ V/m) *1 PK:105.2 (dB μ V/m) *2 PK: 110.8(dB μ V/m) *3 PK:122.2 (dB μ V/m) *4

*1 beyond 75 MHz or more above of the bandedge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

EIRP = $(E^*d)^2 / 30$, where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts..

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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (dB μ V/m)

11.2 Measurement Equipment Used

SGS 966 Chamber No.C					
EQUIPMENT	EQUIPMENT	EQUIPMENT	EQUIPMENT	EQUIPMENT	EQUIPMENT
TYPE	TYPE	TYPE	TYPE	TYPE	TYPE
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2016	09/19/2017
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/01/2016	07/31/2017
Pre-Amplifier	Agilent	8447D	2944A07676	01/05/2017	01/04/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/05/2017	01/04/2018
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2016	06/30/2017
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018

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