

8.4 Frequency Stability

■ Test requirements

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

■ Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -10°C and +60°C. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

■ Test Result : **Comply**

■ ANT 1 data

Supply Voltage (V DC)	TEMP (°C)	Band I (5200 MHz)		Band II (5300 MHz)		Band III (5580 MHz)	
		Frequency (Hz)	Deviation (%)	Frequency (Hz)	Deviation (%)	Frequency (Hz)	Deviation (%)
5.00	+25	5,199,946,909	-0.001021	5,299,945,888	-0.001021	5,579,943,029	-0.001021
	+70	5,199,965,502	-0.000663	5,299,964,523	-0.000669	5,579,961,574	-0.000689
	+60	5,199,967,070	-0.000633	5,299,966,053	-0.000641	5,579,981,719	-0.000328
	+50	5,199,935,476	-0.001241	5,299,934,471	-0.001236	5,579,970,255	-0.000533
	+40	5,199,932,086	-0.001306	5,299,931,034	-0.001301	5,579,955,468	-0.000798
	+30	5,199,937,325	-0.001205	5,299,943,811	-0.001060	5,579,950,251	-0.000892
	+20	5,199,949,257	-0.000976	5,299,964,140	-0.000677	5,579,954,537	-0.000815
	+10	5,199,960,783	-0.000754	5,299,964,701	-0.000666	5,579,962,859	-0.000666
	0	5,199,925,230	-0.001438	5,299,922,850	-0.001456	5,579,943,695	-0.001009
4.25	+25	5,199,917,051	-0.001595	5,299,925,765	-0.001401	5,579,909,630	-0.001620
5.75	+25	5,199,928,267	-0.001380	5,299,930,892	-0.001304	5,579,886,667	-0.002031

■ ANT 2 data

Supply Voltage (V DC)	TEMP (°C)	Band I (5200 MHz)		Band II (5300 MHz)		Band III (5580 MHz)	
		Frequency (Hz)	Deviation (%)	Frequency (Hz)	Deviation (%)	Frequency (Hz)	Deviation (%)
5.00	+25	5,199,951,137	-0.000940	5,299,950,198	-0.000940	5,579,947,566	-0.000940
	+70	5,199,969,730	-0.000582	5,299,968,833	-0.000588	5,579,966,112	-0.000607
	+60	5,199,971,298	-0.000552	5,299,970,363	-0.000559	5,579,986,257	-0.000246
	+50	5,199,939,704	-0.001160	5,299,938,781	-0.001155	5,579,974,793	-0.000452
	+40	5,199,936,314	-0.001225	5,299,935,343	-0.001220	5,579,960,005	-0.000717
	+30	5,199,941,553	-0.001124	5,299,948,121	-0.000979	5,579,954,788	-0.000810
	+20	5,199,953,485	-0.000895	5,299,968,450	-0.000595	5,579,959,074	-0.000733
	+10	5,199,965,011	-0.000673	5,299,969,011	-0.000585	5,579,967,397	-0.000584
		0	5,199,929,458	-0.001357	5,299,927,159	-0.001374	5,579,948,232
4.25	+25	5,199,921,279	-0.001514	5,299,930,074	-0.001319	5,579,914,167	-0.001538
5.75	+25	5,199,932,495	-0.001298	5,299,935,201	-0.001223	5,579,891,204	-0.001950

8.5 Radiated Spurious Emission Measurements

■ Test Procedure

• FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

• FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	160.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	160.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	160.7 ~ 160.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240	3600 ~ 4000		
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

• **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

• **FCC Part 15.407 (b):** Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak 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 **EIRP of -27 dBm/MHz**.
- (2) For transmitters operating in the **5.25-5.35 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
- (3) For transmitters operating in the **5.47-5.725 GHz band**: all emissions outside of the **5.47-5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- (5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.

■ Test Procedure

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in semi anechoic chamber. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine the worst-case orientation for maximum emissions.

Radiated spurious emission measured using following Measurement Procedure of **KDB789033 D02**.

► General Requirements for Unwanted Emissions Measurements

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

▪ EUT Duty Cycle

- (1) The EUT shall be configured or modified to **transmit continuously** except as stated in (2), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
- (2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:
 - The EUT shall be configured to operate at the maximum achievable duty cycle.
 - Measure the duty cycle, x , of the transmitter output signal.
 - Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
 - The test report shall include the following additional information:
 - The reason for the duty cycle limitation.
 - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
 - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.
- (3) **Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.**

► Measurements Below 1000MHz

a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".

b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► **Measurements Above 1000MHz(Peak)**

- a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".
- b) Peak emission levels are measured by setting the analyzer as follows:
 - (1) **RBW = 1 MHz.**
 - (2) **VBW ≥ 3 MHz.**
 - (3) **Detector = Peak.**
 - (4) Sweep time = auto.
 - (5) Trace mode = max hold.
 - (6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1000MHz(Method AD)**

- (1) **RBW = 1 MHz.**
- (2) **VBW ≥ 3 MHz.**
- (3) **Detector = RMS**, if $\text{span}/(\# \text{ of points in sweep}) \leq \text{RBW}/2$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
- (4) Averaging type = power (i.e., RMS)
 - As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- (5) Sweep time = auto.
- (6) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of $1/x$, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces should be averaged.
- (7) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
 - **If power averaging (RMS) mode was used in step (4) above, the correction factor is $10 \log(1/x)$, where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
 - If linear voltage averaging mode was used in step (4) above, the correction factor is $20 \log(1/x)$, where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
 - If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11a& Band I

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
ANT 1	36 (5180MHz)	5127.900	V	Y	PK	47.05	7.37	N/A	N/A	54.42	74.00	19.58
		5127.900	V	Y	AV	36.54	7.37	3.38	N/A	47.29	54.00	6.71
		10359.960	H	Y	PK	48.56	11.30	N/A	-9.54	50.32	68.20	17.88
		-	-	-	-	-	-	-	-	-	-	-
	40 (5200MHz)	5146.750	V	Y	PK	48.16	7.42	N/A	N/A	55.58	74.00	18.42
		5147.400	V	Y	AV	36.23	7.42	3.38	N/A	47.03	54.00	6.97
		10399.600	H	Y	PK	48.33	11.33	N/A	-9.54	50.12	68.20	18.08
		-	-	-	-	-	-	-	-	-	-	-
	48 (5240MHz)	5358.140	H	Z	PK	46.24	8.10	N/A	N/A	54.34	74.00	19.66
		5416.330	H	Z	AV	34.00	8.14	3.38	N/A	45.52	54.00	8.48
		10482.480	H	Y	PK	48.41	11.42	N/A	-9.54	50.29	68.20	17.91
		-	-	-	-	-	-	-	-	-	-	-
ANT 2	36 (5180MHz)	5118.150	V	Y	PK	46.82	7.35	N/A	N/A	54.17	74.00	19.83
		5118.800	V	Y	AV	34.71	7.35	3.38	N/A	45.44	54.00	8.56
		4800.300	H	Z	PK	47.59	6.55	N/A	N/A	54.14	74.00	19.86
		4800.300	H	Z	AV	37.21	6.55	3.38	N/A	47.14	54.00	6.86
		10354.960	H	Y	PK	44.71	11.29	N/A	-9.54	46.46	68.20	21.74
		-	-	-	-	-	-	-	-	-	-	-
	40 (5200MHz)	5141.550	V	Y	PK	45.41	7.41	N/A	N/A	52.82	74.00	21.18
		5143.500	V	Y	AV	33.73	7.41	3.38	N/A	44.52	54.00	9.48
		4799.650	H	Z	PK	46.11	6.55	N/A	N/A	52.66	74.00	21.34
		4800.300	H	Z	AV	36.00	6.55	3.38	N/A	45.93	54.00	8.07
		10393.560	H	Y	PK	44.50	11.33	N/A	-9.54	46.29	68.20	21.91
		-	-	-	-	-	-	-	-	-	-	-
	48 (5240MHz)	5422.380	V	Y	PK	45.72	8.12	N/A	N/A	53.84	74.00	20.16
		5421.500	V	Y	AV	33.76	8.13	3.38	N/A	45.27	54.00	8.73
		10479.440	H	Y	PK	44.90	11.41	N/A	-9.54	46.77	68.20	21.43
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
 $Margin = Limit - Result$ / $Result = Reading + T.F + DCCF + DCF$ / $T.F = AF + CL - AG$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
 Therefore Distance Correction Factor(DCF) :- $9.54 \text{ dB} = 20 \cdot \log(1\text{m}/3\text{m})$
4. The limit is converted to field strength.
 $E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 \text{ dB} = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11a& Band II

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	
ANT 1	52 (5260MHz)	5071.350	H	Z	PK	47.18	7.22	N/A	N/A	54.40	74.00	19.60	
		5067.450	H	Z	AV	35.17	7.21	3.38	N/A	45.76	54.00	8.24	
		10522.960	H	Y	PK	48.16	11.49	N/A	-9.54	50.11	68.20	18.09	
		-	-	-	-	-	-	-	-	-	-	-	
	60 (5300MHz)	5066.800	H	Z	PK	47.09	7.21	N/A	N/A	54.30	74.00	19.70	
		5067.450	H	Z	AV	35.12	7.21	3.38	N/A	45.71	54.00	8.29	
		10599.840	H	Y	PK	48.34	11.68	N/A	-9.54	50.48	68.20	17.72	
		10601.360	H	Y	AV	34.90	11.68	3.38	-9.54	40.42	54.00	13.58	
		-	-	-	-	-	-	-	-	-	-	-	
	64 (5320MHz)	5373.100	V	Y	PK	48.66	8.14	N/A	N/A	56.80	74.00	17.20	
		5372.440	V	Y	AV	35.83	8.13	3.38	N/A	47.34	54.00	6.66	
		5372.330	H	Z	PK	47.95	8.13	N/A	N/A	56.08	74.00	17.92	
		5372.330	H	Z	AV	36.37	8.13	3.38	N/A	47.88	54.00	6.12	
		10640.720	H	Y	PK	47.24	11.78	N/A	-9.54	49.48	74.00	24.52	
		10641.440	H	Y	AV	34.03	11.78	3.38	-9.54	39.65	54.00	14.35	
		-	-	-	-	-	-	-	-	-	-	-	
	ANT 2	52 (5260MHz)	4964.750	H	Z	PK	47.48	6.95	N/A	N/A	54.43	74.00	19.57
			4968.650	H	Z	AV	35.40	6.96	3.38	N/A	45.74	54.00	8.26
10520.000			H	Y	PK	47.78	11.48	N/A	-9.54	49.72	68.20	18.48	
-			-	-	-	-	-	-	-	-	-	-	
60 (5300MHz)		4966.050	H	Z	PK	47.58	6.95	N/A	N/A	54.53	74.00	19.47	
		4969.300	H	Z	AV	34.72	6.96	3.38	N/A	45.06	54.00	8.94	
		10599.200	H	Y	PK	48.68	11.68	N/A	-9.54	50.82	68.20	17.38	
		10601.120	H	Y	AV	35.71	11.68	3.38	-9.54	41.23	54.00	12.77	
		-	-	-	-	-	-	-	-	-	-	-	
64 (5320MHz)		5383.220	H	Z	PK	49.44	8.16	N/A	N/A	57.60	74.00	16.40	
		5381.240	H	Z	AV	36.65	8.15	3.38	N/A	48.18	54.00	5.82	
		10642.160	H	Y	PK	49.42	11.78	N/A	-9.54	51.66	74.00	22.34	
		10641.120	H	Y	AV	35.55	11.78	3.38	-9.54	41.17	54.00	12.83	
		-	-	-	-	-	-	-	-	-	-	-	

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
Therefore Distance Correction Factor(DCF) :- 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11a& Band III

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
ANT 1	100 (5500MHz)	5447.460	H	Z	PK	51.40	8.06	N/A	N/A	59.46	74.00	14.54
		5447.460	H	Z	AV	39.51	8.06	3.38	N/A	50.95	54.00	3.05
		10999.720	H	Y	PK	48.18	12.66	N/A	-9.54	51.30	74.00	22.70
		11001.080	H	Y	AV	34.83	12.66	3.38	-9.54	41.33	54.00	12.67
		-	-	-	-	-	-	-	-	-	-	-
	116 (5580MHz)	5449.110	H	Z	PK	48.22	8.06	N/A	N/A	56.28	74.00	17.72
		5452.520	H	Z	AV	35.60	8.05	3.38	N/A	47.03	54.00	6.97
		11159.720	H	Y	PK	45.39	12.73	N/A	-9.54	48.58	74.00	25.42
		11158.600	H	Y	AV	32.80	12.73	3.38	-9.54	39.37	54.00	14.63
		-	-	-	-	-	-	-	-	-	-	-
	140 (5700MHz)	5446.580	H	Z	PK	47.29	8.07	N/A	N/A	55.36	74.00	18.64
		5458.790	H	Z	AV	34.79	8.04	3.38	N/A	46.21	54.00	7.79
		11399.800	H	Y	PK	47.87	12.84	N/A	-9.54	51.17	74.00	22.83
		11401.480	H	Y	AV	34.34	12.84	3.38	-9.54	41.02	54.00	12.98
		-	-	-	-	-	-	-	-	-	-	-
	ANT 2	100 (5500MHz)	5438.220	V	Y	PK	51.48	8.09	N/A	N/A	59.57	74.00
5438.440			V	Y	AV	39.46	8.09	3.38	N/A	50.93	54.00	3.07
10999.440			H	Y	PK	57.73	12.66	N/A	-9.54	60.85	74.00	13.15
11001.480			H	Y	AV	44.02	12.66	3.38	-9.54	50.52	54.00	3.48
-			-	-	-	-	-	-	-	-	-	-
116 (5580MHz)		5455.490	V	Y	PK	44.84	8.04	N/A	N/A	52.88	74.00	21.12
		5453.290	V	Y	AV	33.72	8.05	3.38	N/A	45.15	54.00	8.85
		11162.440	H	Y	PK	53.61	12.73	N/A	-9.54	56.80	74.00	17.20
		11161.280	H	Y	AV	40.39	12.73	3.38	-9.54	46.96	54.00	7.04
		-	-	-	-	-	-	-	-	-	-	-
140 (5700MHz)		5452.630	V	Y	PK	44.87	8.05	N/A	N/A	52.92	74.00	21.08
		5454.060	V	Y	AV	32.97	8.05	3.38	N/A	44.40	54.00	9.60
		11402.360	H	Y	PK	52.19	12.84	N/A	-9.54	55.49	74.00	18.51
		11401.360	H	Y	AV	38.37	12.84	3.38	-9.54	45.05	54.00	8.95
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
Therefore Distance Correction Factor(DCF) :- 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11n HT20 & Band I

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
ANT 1	36 (5180MHz)	5127.250	V	Y	PK	46.97	7.37	N/A	N/A	54.34	74.00	19.66
		5127.900	V	Y	AV	34.32	7.37	3.57	N/A	45.26	54.00	8.74
		4800.300	H	Z	PK	44.99	6.55	N/A	N/A	51.54	74.00	22.46
		4799.650	H	Z	AV	35.72	6.55	3.57	N/A	45.84	54.00	8.16
		10359.120	H	Y	PK	43.73	11.30	N/A	-9.54	45.49	68.20	22.71
		-	-	-	-	-	-	-	-	-	-	-
	40 (5200MHz)	5133.750	V	Y	PK	48.05	7.39	N/A	N/A	55.44	74.00	18.56
		5148.050	V	Y	AV	36.18	7.43	3.57	N/A	47.18	54.00	6.82
		10395.920	H	Y	PK	47.28	11.33	N/A	-9.54	49.07	68.20	19.13
		-	-	-	-	-	-	-	-	-	-	-
	48 (5240MHz)	5416.660	H	Z	PK	47.16	8.14	N/A	N/A	55.30	74.00	18.70
		5358.470	H	Z	AV	34.01	8.10	3.57	N/A	45.68	54.00	8.32
		10476.040	H	Y	PK	46.62	11.41	N/A	-9.54	48.49	68.20	19.71
		-	-	-	-	-	-	-	-	-	-	-
ANT 2	36 (5180MHz)	5148.700	V	Y	PK	45.20	7.43	N/A	N/A	52.63	74.00	21.37
		5117.500	V	Y	AV	33.50	7.34	3.57	N/A	44.41	54.00	9.59
		4799.650	H	Z	PK	46.05	6.55	N/A	N/A	52.60	74.00	21.40
		4799.650	H	Z	AV	35.71	6.55	3.57	N/A	45.83	54.00	8.17
		10360.080	V	Y	PK	42.49	11.30	N/A	-9.54	44.25	68.20	23.95
		-	-	-	-	-	-	-	-	-	-	-
	40 (5200MHz)	4799.650	H	Z	PK	48.23	6.55	N/A	N/A	54.78	74.00	19.22
		4800.300	H	Z	AV	36.91	6.55	3.57	N/A	47.03	54.00	6.97
		10396.120	H	Y	PK	44.85	11.33	N/A	-9.54	46.64	68.20	21.56
		-	-	-	-	-	-	-	-	-	-	-
	48 (5240MHz)	5428.210	V	Y	PK	46.51	8.11	N/A	N/A	54.62	74.00	19.38
		5425.130	V	Y	AV	33.86	8.12	3.57	N/A	45.55	54.00	8.45
		10481.280	H	Y	PK	44.36	11.41	N/A	-9.54	46.23	68.20	21.97
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
 $Margin = Limit - Result$ / $Result = Reading + T.F + DCCF + DCF$ / $T.F = AF + CL - AG$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
 Therefore Distance Correction Factor(DCF) :- $9.54 \text{ dB} = 20 * \log(1\text{m}/3\text{m})$
4. The limit is converted to field strength.
 $E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 \text{ dB} = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11n HT20 & Band II

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
ANT 1	52 (5260MHz)	5104.500	H	Z	PK	46.80	7.31	N/A	N/A	54.11	74.00	19.89
		5101.250	H	Z	AV	35.26	7.30	3.57	N/A	46.13	54.00	7.87
		10514.880	H	Y	PK	47.11	11.47	N/A	-9.54	49.04	68.20	19.16
	60 (5300MHz)	5140.250	H	Z	PK	47.60	7.40	N/A	N/A	55.00	74.00	19.00
		5103.200	H	Z	AV	35.76	7.31	3.57	N/A	46.64	54.00	7.36
		10600.720	H	Y	PK	46.57	11.68	N/A	-9.54	48.71	74.00	25.29
		10600.920	H	Y	AV	33.44	11.68	3.57	-9.54	39.15	54.00	14.85
		10599.920	V	Y	PK	43.53	11.68	N/A	-9.54	45.67	68.20	22.53
		10601.200	V	Y	AV	31.12	11.68	3.57	-9.54	36.83	54.00	17.17
		5372.220	H	Z	PK	49.64	8.13	N/A	N/A	57.77	74.00	16.23
	64 (5320MHz)	5372.000	H	Z	AV	37.41	8.13	3.57	N/A	49.11	54.00	4.89
		10635.720	H	Y	PK	47.34	11.76	N/A	-9.54	49.56	74.00	24.44
		10641.160	H	Y	AV	33.45	11.78	3.57	-9.54	39.26	54.00	14.74
4723.600		V	Y	PK	49.15	6.36	N/A	N/A	55.51	74.00	18.49	
ANT 2	52 (5260MHz)	4800.300	V	Y	AV	36.42	6.55	3.57	N/A	46.54	54.00	7.46
		10517.960	H	Y	PK	46.17	11.47	N/A	-9.54	48.10	68.20	20.10
		4729.450	V	Y	PK	47.41	6.38	N/A	N/A	53.79	74.00	20.21
	60 (5300MHz)	4800.300	V	Y	AV	35.84	6.55	3.57	N/A	45.96	54.00	8.04
		4799.650	H	Z	PK	46.53	6.55	N/A	N/A	53.08	74.00	20.92
		4800.300	H	Z	AV	35.91	6.55	3.57	N/A	46.03	54.00	7.97
		10601.080	H	Y	PK	46.46	11.68	N/A	-9.54	48.60	74.00	25.40
		10601.240	H	Y	AV	33.62	11.68	3.57	-9.54	39.33	54.00	14.67
		10598.560	V	Y	PK	42.34	11.67	N/A	-9.54	44.47	68.20	23.73
		10600.120	V	Y	AV	30.72	10.68	3.57	-9.54	35.43	54.00	18.57
	64 (5320MHz)	5381.240	V	Y	PK	52.05	8.15	N/A	N/A	60.20	74.00	13.80
		5381.570	V	Y	AV	38.07	8.15	3.57	N/A	49.79	54.00	4.21
		10634.680	H	Y	PK	47.26	11.76	N/A	-9.54	49.48	74.00	24.52
10638.720		H	Y	AV	33.65	11.77	3.57	-9.54	39.45	54.00	14.55	

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
Therefore Distance Correction Factor(DCF) :- 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11n HT20 & Band III

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	
ANT 1	100 (5500MHz)	5432.940	V	Y	PK	47.40	8.10	N/A	N/A	55.50	74.00	18.50	
		5437.120	V	Y	AV	35.16	8.09	3.57	N/A	46.82	54.00	7.18	
		11000.640	H	Y	PK	47.44	12.66	N/A	-9.54	50.56	74.00	23.44	
		11001.200	H	Y	AV	34.59	12.66	3.57	-9.54	41.28	54.00	12.72	
	116 (5580MHz)	5428.320	V	Y	PK	46.06	8.11	N/A	N/A	54.17	74.00	19.83	
		5432.280	V	Y	AV	33.54	8.10	3.57	N/A	45.21	54.00	8.79	
		11161.360	H	Y	PK	42.87	12.73	N/A	-9.54	46.06	74.00	27.94	
		11161.240	H	Y	AV	31.25	12.73	3.57	-9.54	38.01	54.00	15.99	
	140 (5700MHz)	5384.210	V	Y	PK	45.15	8.16	N/A	N/A	53.31	74.00	20.69	
		5432.390	V	Y	AV	33.71	8.10	3.57	N/A	45.38	54.00	8.62	
		5381.130	H	Z	PK	45.70	8.15	N/A	N/A	53.85	74.00	20.15	
		5385.090	H	Z	AV	33.13	8.16	3.57	N/A	44.86	54.00	9.14	
		11396.040	H	Y	PK	44.73	12.83	N/A	-9.54	48.02	74.00	25.98	
		11400.880	H	Y	AV	31.93	12.84	3.57	-9.54	38.80	54.00	15.20	
	ANT 2	100 (5500MHz)	5437.230	H	Z	PK	49.08	8.09	N/A	N/A	57.17	74.00	16.83
			5438.550	H	Z	AV	36.04	8.09	3.57	N/A	47.70	54.00	6.30
10999.760			H	Y	PK	53.20	12.66	N/A	-9.54	56.32	74.00	17.68	
11001.080			H	Y	AV	40.01	12.66	3.57	-9.54	46.70	54.00	7.30	
116 (5580MHz)		5458.020	H	Z	PK	45.20	8.04	N/A	N/A	53.24	74.00	20.76	
		5459.450	H	Z	AV	33.41	8.03	3.57	N/A	45.01	54.00	8.99	
		11163.840	H	Y	PK	51.61	12.73	N/A	-9.54	54.80	74.00	19.20	
		11161.240	H	Y	AV	38.23	12.73	3.57	-9.54	44.99	54.00	9.01	
140 (5700MHz)		5454.830	H	Z	PK	45.99	8.05	N/A	N/A	54.04	74.00	19.96	
		5459.780	H	Z	AV	33.37	8.03	3.57	N/A	44.97	54.00	9.03	
		11395.720	H	Y	PK	49.73	12.83	N/A	-9.54	53.02	74.00	20.98	
		11401.080	H	Y	AV	35.50	12.84	3.57	-9.54	42.37	54.00	11.63	

Note.

- No other spurious and harmonic emissions were found greater than listed emissions on above table.
- Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
Therefore Distance Correction Factor(DCF) :- 9.54 dB = 20*log(1m/3m)
- The limit is converted to field strength.
 $E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 \text{ dB} = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$
- If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11n HT40 & Band I

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
ANT 1	38 (5190MHz)	5146.750	V	Y	PK	56.19	7.42	N/A	N/A	63.61	74.00	10.39
		5146.750	V	Y	AV	36.56	7.42	4.95	N/A	48.93	54.00	5.07
		10376.640	H	Y	PK	46.39	11.31	N/A	-9.54	48.16	68.20	20.04
	46 (5230MHz)	5143.500	H	Z	PK	46.53	7.41	N/A	N/A	53.94	74.00	20.06
		5127.250	H	Z	AV	33.56	7.37	4.95	N/A	45.88	54.00	8.12
		10456.560	H	Y	PK	44.65	11.39	N/A	-9.54	46.50	68.20	21.70
ANT 2	38 (5190MHz)	5146.100	V	Y	PK	54.97	7.42	N/A	N/A	62.39	74.00	11.61
		5150.000	V	Y	AV	34.96	7.43	4.95	N/A	47.34	54.00	6.66
		10380.960	H	Y	PK	43.29	11.32	N/A	-9.54	45.07	68.20	23.13
	46 (5230MHz)	5411.160	V	Y	PK	45.70	8.15	N/A	N/A	53.85	74.00	20.15
		5423.150	V	Y	AV	33.20	8.12	4.95	N/A	46.27	54.00	7.73
		10458.480	H	Y	PK	43.26	11.39	N/A	-9.54	45.11	68.20	23.09

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
 $Margin = Limit - Result$ / $Result = Reading + T.F + DCCF + DCF$ / $T.F = AF + CL - AG$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
 Therefore Distance Correction Factor(DCF) :- $9.54 \text{ dB} = 20 \cdot \log(1\text{m}/3\text{m})$
4. The limit is converted to field strength.
 $E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 \text{ dB} = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11n HT40 & Band II

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
ANT 1	54 (5270MHz)	5138.300	H	Z	PK	47.98	7.40	N/A	N/A	55.38	74.00	18.62
		5142.200	H	Z	AV	34.22	7.41	4.95	N/A	46.58	54.00	7.42
		10536.320	H	Y	PK	45.11	11.52	N/A	-9.54	47.09	68.20	21.11
	62 (5310MHz)	5351.100	H	Z	PK	54.08	8.09	N/A	N/A	62.17	74.00	11.83
		5350.550	H	Z	AV	35.24	8.09	4.95	N/A	48.28	54.00	5.72
		10614.400	H	Y	PK	43.25	11.71	N/A	-9.54	45.42	74.00	28.58
		10618.720	H	Y	AV	31.47	11.72	4.95	-9.54	38.60	54.00	15.40
ANT 2	54 (5270MHz)	4800.300	H	Z	PK	45.66	6.55	N/A	N/A	52.21	74.00	21.79
		4800.300	H	Z	AV	34.62	6.55	4.95	N/A	46.12	54.00	7.88
		10535.600	H	Y	PK	43.36	11.52	N/A	-9.54	45.34	68.20	22.86
	62 (5310MHz)	5350.770	V	Y	PK	54.58	8.09	N/A	N/A	62.67	74.00	11.33
		5413.470	V	Y	AV	35.32	8.15	4.95	N/A	48.42	54.00	5.58
		10616.320	H	Y	PK	43.02	11.72	N/A	-9.54	45.20	74.00	28.80
		10618.800	H	Y	AV	31.47	11.72	4.95	-9.54	38.60	54.00	15.40

Note.

- No other spurious and harmonic emissions were found greater than listed emissions on above table.
- Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
Therefore Distance Correction Factor(DCF) :- 9.54 dB = 20*log(1m/3m)
- The limit is converted to field strength.
 $E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 \text{ dB} = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$
- If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz): 802.11n HT40 & Band III

Tested ANT	Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
ANT 1	102 (5510MHz)	5450.430	V	Y	PK	48.76	8.06	N/A	N/A	56.82	74.00	17.18
		5406.760	V	Y	AV	35.07	8.16	4.95	N/A	48.18	54.00	5.82
		5459.120	H	Z	PK	48.95	8.03	N/A	N/A	56.98	74.00	17.02
		5407.310	H	Z	AV	34.05	8.16	4.95	N/A	47.16	54.00	6.84
		11011.280	H	Y	PK	42.90	12.66	N/A	-9.54	46.02	74.00	27.98
		11018.640	H	Y	AV	31.09	12.67	4.95	-9.54	39.17	54.00	14.83
	110 (5550MHz)	5447.240	V	Y	PK	48.36	8.06	N/A	N/A	56.42	74.00	17.58
		5446.030	V	Y	AV	36.28	8.07	4.95	N/A	49.30	54.00	4.70
		11100.720	H	Y	PK	43.85	12.70	N/A	-9.54	47.01	74.00	26.99
		11098.720	H	Y	AV	31.05	12.70	4.95	-9.54	39.16	54.00	14.84
	134 (5670MHz)	5404.000	V	Y	PK	47.33	8.17	N/A	N/A	55.50	74.00	18.50
		5352.970	V	Y	AV	34.78	8.09	4.95	N/A	47.82	54.00	6.18
		11343.360	H	Y	PK	43.41	12.81	N/A	-9.54	46.68	74.00	27.32
		11338.800	H	Y	AV	31.20	12.81	4.95	-9.54	39.42	54.00	14.58
ANT 2	102 (5510MHz)	5459.780	H	Z	PK	56.18	8.03	N/A	N/A	64.21	74.00	9.79
		5459.450	H	Z	AV	38.00	8.03	4.95	N/A	50.98	54.00	3.02
		11027.040	H	Y	PK	49.81	12.67	N/A	-9.54	52.94	74.00	21.06
		11018.480	H	Y	AV	36.25	12.67	4.95	-9.54	44.33	54.00	9.67
	110 (5550MHz)	5448.120	H	Z	PK	50.66	8.06	N/A	N/A	58.72	74.00	15.28
		5446.580	H	Z	AV	37.00	8.07	4.95	N/A	50.02	54.00	3.98
		11096.560	H	Y	PK	50.29	12.70	N/A	-9.54	53.45	74.00	20.55
		11098.560	H	Y	AV	36.89	12.70	4.95	-9.54	45.00	54.00	9.00
	134 (5670MHz)	5448.450	H	Z	PK	46.81	8.06	N/A	N/A	54.87	74.00	19.13
		5446.250	H	Z	AV	33.63	8.07	4.95	N/A	46.65	54.00	7.35
		11336.240	H	Y	PK	47.11	12.81	N/A	-9.54	50.38	74.00	23.62
		11338.560	H	Y	AV	34.29	12.81	4.95	-9.54	42.51	54.00	11.49

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
Therefore Distance Correction Factor(DCF) :- 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
 $E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 \text{ dB} = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$
5. If peak measurement satisfy the average limit, then average measurement are not required.

8.6AC Conducted Emissions

■ **TestProcedure:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

■ **Measurement Data: Comply**

Note 1: See next pages for actual measured spectrum plots and data.

■ **Minimum Standard: FCC Part 15.207(a)/EN 55022**

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 60 *	60 to 46 *
0.5 ~ 5	60	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

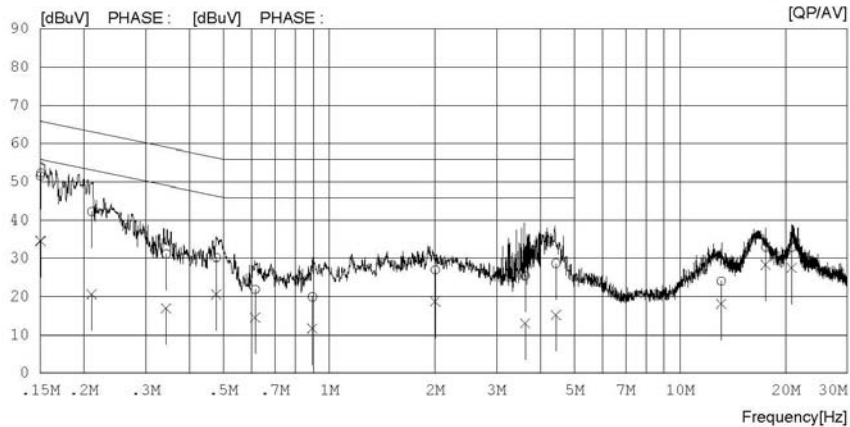
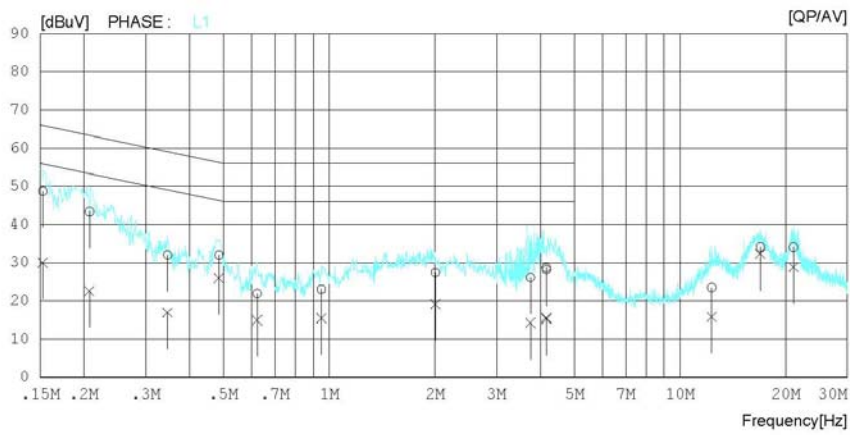
AC Line Conducted Emissions (Graph)

Test Mode: Band I & 802.11nHT40

Results of Conducted Emission

Digital EMC
Date : 2014-04-03

Model No.	: WDG720M	Reference No.	:
Type	: WIFI Transmitter	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 22 °C 41 % R.H.
Test Condition	: 802.11n(HT40)	Operator	: HyunSuSon
Memo	:		
LIMIT : FCC P15.207 QP			
FCC P15.207 AV			



AC Line Conducted Emissions (Data List)

Test Mode: Band I & 802.11n HT40

Results of Conducted Emission

Digital EMC
 Date : 2014-04-03

Model No. : WDG720M
 Type : WIFI Transmitter
 Serial No. : Identical prototype
 Test Condition : 802.11n(HT40)
 Reference No. :
 Power Supply : 120 V 60 Hz
 Temp/Humi. : 22 'C 41 % R.H.
 Operator : HyunSuSon

Memo :

LIMIT : FCC P15.207 QP
 FCC P15.207 AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15250	38.5	19.7	10.3	48.8	30.0	65.9	55.9	17.1	25.9	L1
2	0.20708	33.0	12.2	10.4	43.4	22.6	63.3	53.3	19.9	30.7	L1
3	0.34616	21.7	6.6	10.3	32.0	16.9	59.1	49.1	27.1	32.2	L1
4	0.48500	21.8	15.7	10.2	32.0	25.9	56.3	46.3	24.3	20.4	L1
5	0.62254	11.8	4.8	10.2	22.0	15.0	56.0	46.0	34.0	31.0	L1
6	0.94935	12.8	5.2	10.2	23.0	15.4	56.0	46.0	33.0	30.6	L1
7	2.00750	17.1	8.8	10.3	27.4	19.1	56.0	46.0	28.6	26.9	L1
8	3.74350	15.8	3.9	10.3	26.1	14.2	56.0	46.0	29.9	31.8	L1
9	4.16350	17.9	5.0	10.3	28.2	15.3	56.0	46.0	27.8	30.7	L1
10	4.15350	18.4	5.3	10.3	28.7	15.6	56.0	46.0	27.3	30.4	L1
11	12.31500	12.9	5.2	10.6	23.5	15.8	60.0	50.0	36.5	34.2	L1
12	16.94050	23.4	21.6	10.7	34.1	32.3	60.0	50.0	25.9	17.7	L1
13	21.05550	23.3	18.0	10.8	34.1	28.8	60.0	50.0	25.9	21.2	L1
14	0.15001	41.3	24.3	10.3	51.6	34.6	66.0	56.0	14.4	21.4	N
15	0.15056	42.1	24.2	10.3	52.4	34.5	66.0	56.0	13.6	21.5	N
16	0.21009	31.8	10.2	10.4	42.2	20.6	63.2	53.2	21.0	32.6	N
17	0.34268	20.8	6.7	10.3	31.1	17.0	59.1	49.1	28.0	32.1	N
18	0.47613	20.0	10.3	10.2	30.2	20.5	56.4	46.4	26.2	25.9	N
19	0.61446	11.7	4.4	10.2	21.9	14.6	56.0	46.0	34.1	31.4	N
20	0.89489	9.8	1.4	10.2	20.0	11.6	56.0	46.0	36.0	34.4	N
21	2.00500	16.8	8.4	10.3	27.1	18.7	56.0	46.0	28.9	27.3	N
22	3.61750	15.2	2.7	10.3	25.5	13.0	56.0	46.0	30.5	33.0	N
23	4.42500	18.4	4.9	10.3	28.7	15.2	56.0	46.0	27.3	30.8	N
24	13.10450	13.3	7.5	10.7	24.0	18.2	60.0	50.0	36.0	31.8	N
25	17.54600	22.2	17.7	10.7	32.9	28.4	60.0	50.0	27.1	21.6	N
26	20.80950	22.2	16.9	10.7	32.9	27.6	60.0	50.0	27.1	22.4	N

AC Line Conducted Emissions (Graph)

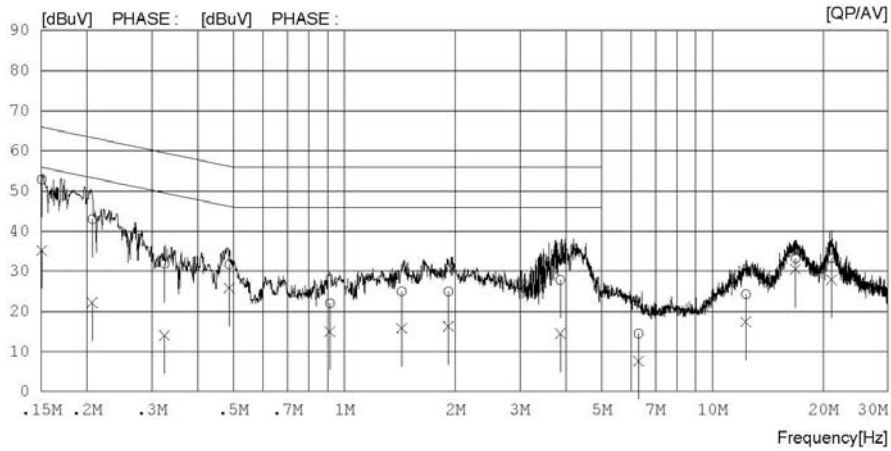
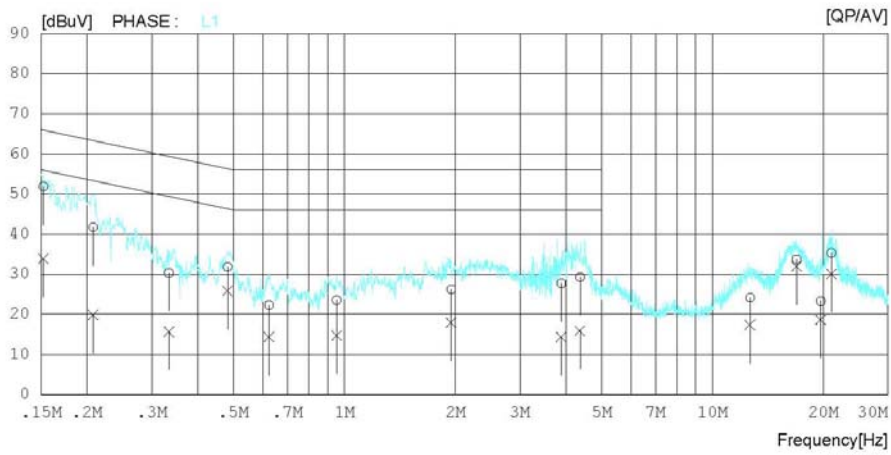
Test Mode: Band II & 802.11n HT40

Results of Conducted Emission

Digital EMC
Date: 2014-04-03

Model No.	: WDG720M	Reference No.	:
Type	: WIFI Transmitter	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 22 °C 41 % R.H.
Test Condition	: 802.11n(HT40)	Operator	: HyunSuSon

Memo :
LIMIT : FCC P15.207 QP
FCC P15.207 AV



AC Line Conducted Emissions (Data List)

Test Mode: Band II & 802.11n HT40

Results of Conducted Emission

Digital EMC
 Date : 2014-04-03

Model No. : WDG720M
 Type : WIFI Transmitter
 Serial No. : Identical prototype
 Test Condition : 802.11n(HT40)
 Reference No. :
 Power Supply : 120 V 60 Hz
 Temp/Humi. : 22 'C 41 % R.H.
 Operator : HyunSuSon

Memo :
 LIMIT : FCC P15.207 QP
 FCC P15.207 AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15203	41.5	23.5	10.3	51.8	33.8	65.9	55.9	14.1	22.1	L1
2	0.20760	31.3	9.4	10.4	41.7	19.8	63.3	53.3	21.6	33.5	L1
3	0.33329	20.0	5.4	10.3	30.3	15.7	59.4	49.4	29.1	33.7	L1
4	0.48116	21.6	15.6	10.2	31.8	25.8	56.3	46.3	24.5	20.5	L1
5	0.62371	12.0	4.2	10.2	22.2	14.4	56.0	46.0	33.8	31.6	L1
6	0.95249	13.3	4.5	10.2	23.5	14.7	56.0	46.0	32.5	31.3	L1
7	1.95200	15.9	7.6	10.3	26.2	17.9	56.0	46.0	29.8	28.1	L1
8	3.88700	17.4	4.0	10.3	27.7	14.3	56.0	46.0	28.3	31.7	L1
9	4.36950	19.0	5.6	10.3	29.3	15.9	56.0	46.0	26.7	30.1	L1
10	12.65850	13.4	6.6	10.7	24.1	17.3	60.0	50.0	35.9	32.7	L1
11	16.93800	23.0	21.2	10.7	33.7	31.9	60.0	50.0	26.3	18.1	L1
12	19.71350	12.6	7.9	10.7	23.3	18.6	60.0	50.0	36.7	31.4	L1
13	21.05500	24.5	19.2	10.8	35.3	30.0	60.0	50.0	24.7	20.0	L1
14	0.15044	42.7	24.9	10.3	53.0	35.2	66.0	56.0	13.0	20.8	N
15	0.20643	32.6	11.8	10.4	43.0	22.2	63.3	53.3	20.3	31.1	N
16	0.32458	21.6	3.7	10.3	31.9	14.0	59.6	49.6	27.7	35.6	N
17	0.48609	21.5	15.7	10.2	31.7	25.9	56.2	46.2	24.5	20.3	N
18	0.91325	11.9	4.8	10.2	22.1	15.0	56.0	46.0	33.9	31.0	N
19	1.43100	14.8	5.7	10.2	25.0	15.9	56.0	46.0	31.0	30.1	N
20	1.91800	14.7	6.0	10.3	25.0	16.3	56.0	46.0	31.0	29.7	N
21	3.85950	17.6	4.2	10.3	27.9	14.5	56.0	46.0	28.1	31.5	N
22	6.30000	4.1	-2.8	10.4	14.5	7.6	60.0	50.0	45.5	42.4	N
23	12.33150	13.7	6.8	10.6	24.3	17.4	60.0	50.0	35.7	32.6	N
24	16.83400	22.5	19.8	10.7	33.2	30.5	60.0	50.0	26.8	19.5	N
25	21.05000	22.5	17.1	10.8	33.3	27.9	60.0	50.0	26.7	22.1	N

AC Line Conducted Emissions (Graph)

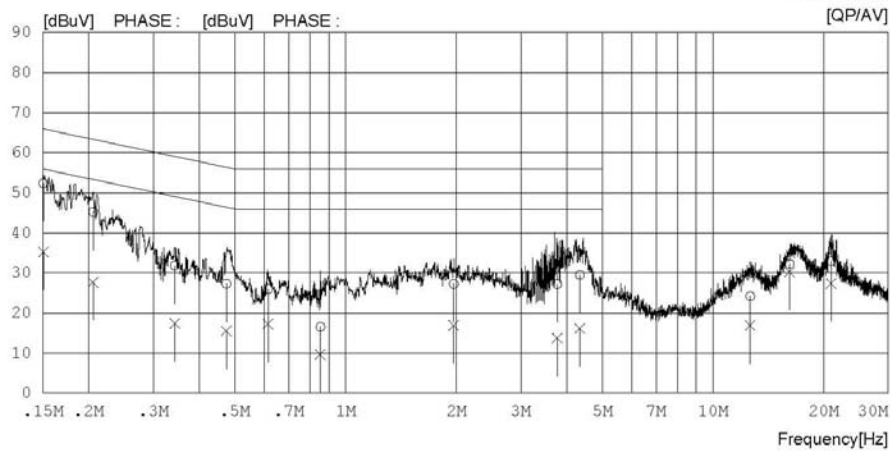
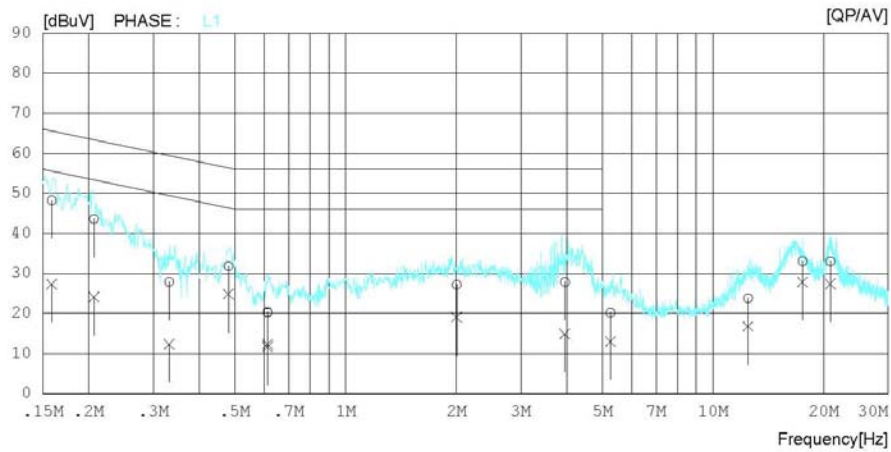
Test Mode: Band III & 802.11n HT40

Results of Conducted Emission

Digital EMC
Date : 2014-04-03

Model No.	: WDG720M	Reference No.	:
Type	: WIFI Transmitter	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 22 °C 41 % R.H.
Test Condition	: 802.11n(HT40)	Operator	: HyunSuSon

Memo :
LIMIT : FCC P15.207 QP
FCC P15.207 AV



AC Line Conducted Emissions (Data List)

Test Mode: Band III & 802.11n HT40

Results of Conducted Emission

Digital EMC
 Date : 2014-04-03

Model No.	:	WDG720M	Reference No.	:	
Type	:	WIFI Transmitter	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	22 °C 41 % R.H.
Test Condition	:	802.11n(HT40)	Operator	:	HyunSuSon

Memo :

LIMIT : FCC P15.207 QP
 FCC P15.207 AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15843	37.9	16.9	10.3	48.2	27.2	65.5	55.5	17.3	28.3	L1
2	0.20638	33.1	13.7	10.4	43.5	24.1	63.3	53.3	19.8	29.2	L1
3	0.33085	17.5	2.0	10.3	27.8	12.3	59.4	49.4	31.6	37.1	L1
4	0.47961	21.5	14.6	10.2	31.7	24.8	56.3	46.3	24.6	21.5	L1
5	0.61263	10.0	2.1	10.2	20.2	12.3	56.0	46.0	35.8	33.7	L1
6	0.61289	10.1	1.4	10.2	20.3	11.6	56.0	46.0	35.7	34.4	L1
7	2.00650	16.8	8.7	10.3	27.1	19.0	56.0	46.0	28.9	27.0	L1
8	3.95500	17.5	4.6	10.3	27.8	14.9	56.0	46.0	28.2	31.1	L1
9	5.25750	9.9	2.7	10.3	20.2	13.0	60.0	50.0	39.8	37.0	L1
10	12.47250	13.2	6.1	10.6	23.8	16.7	60.0	50.0	36.2	33.3	L1
11	17.53350	22.3	17.1	10.7	33.0	27.8	60.0	50.0	27.0	22.2	L1
12	20.86950	22.2	16.5	10.8	33.0	27.3	60.0	50.0	27.0	22.7	L1
13	0.15032	42.1	25.0	10.3	52.4	35.3	66.0	56.0	13.6	20.7	N
14	0.20554	34.8	17.3	10.4	45.2	27.7	63.4	53.4	18.2	25.7	N
15	0.34305	21.5	7.1	10.3	31.8	17.4	59.1	49.1	27.3	31.7	N
16	0.47350	17.1	5.3	10.2	27.3	15.5	56.5	46.5	29.2	31.0	N
17	0.61539	15.8	7.0	10.2	26.0	17.2	56.0	46.0	30.0	28.8	N
18	0.85416	6.4	-0.5	10.2	16.6	9.7	56.0	46.0	39.4	36.3	N
19	1.96950	17.0	6.7	10.3	27.3	17.0	56.0	46.0	28.7	29.0	N
20	3.76600	16.9	3.4	10.3	27.2	13.7	56.0	46.0	28.8	32.3	N
21	4.34000	19.2	5.9	10.3	29.5	16.2	56.0	46.0	26.5	29.8	N
22	12.63800	13.5	6.2	10.7	24.2	16.9	60.0	50.0	35.8	33.1	N
23	16.19000	21.6	19.6	10.7	32.3	30.3	60.0	50.0	27.7	19.7	N
24	20.99050	22.2	16.6	10.8	33.0	27.4	60.0	50.0	27.0	22.6	N

8.7 Occupied Bandwidth

■ **Test Requirements**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

■ **Test Configuration**

Refer to the APPENDIX I.

■ **Test Procedure :**

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02**.

1. Set span = **1.5 times to 5.0 times** the **OBW**.
2. Set resolution bandwidth (RBW) = **1 %to 5 %**of the **OBW**.
3. Set the video bandwidth (VBW)**>3 RBW**.
4. Detector = **Peak**.
5. Trace mode = **max hold**.
6. Measurement function = **99% power bandwidth function**.

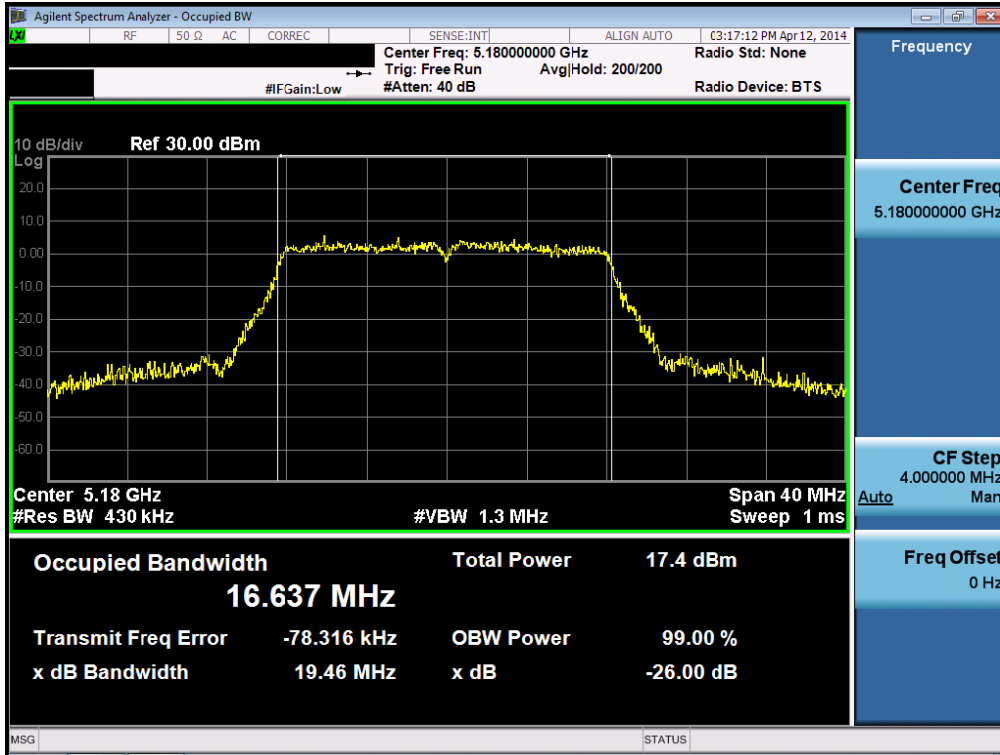
■ **Test Result: Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]	
				ANT 1	ANT 2
802.11a	Band I	36	5180	16.637	16.691
		40	5200	16.627	16.642
		48	5240	16.642	16.599
	Band II	52	5260	16.684	16.640
		60	5300	16.622	16.589
		64	5320	16.681	16.603
	Band III	100	5500	16.636	16.673
		116	5580	16.670	16.623
		140	5700	16.623	16.617
802.11n (HT20)	Band I	36	5180	17.546	17.559
		40	5200	17.594	17.574
		48	5240	17.592	17.548
	Band II	52	5260	17.627	17.574
		60	5300	17.683	17.554
		64	5320	17.610	17.553
	Band III	100	5500	17.594	17.646
		116	5580	17.637	17.534
		140	5700	17.610	17.612
802.11n (HT40)	Band I	38	5190	35.983	35.876
		46	5230	35.933	35.940
	Band II	54	5270	35.902	35.888
		62	5310	35.986	35.875
	Band III	102	5510	35.943	35.905
		110	5550	35.977	35.928
		134	5670	35.914	35.971

RESULT PLOTS

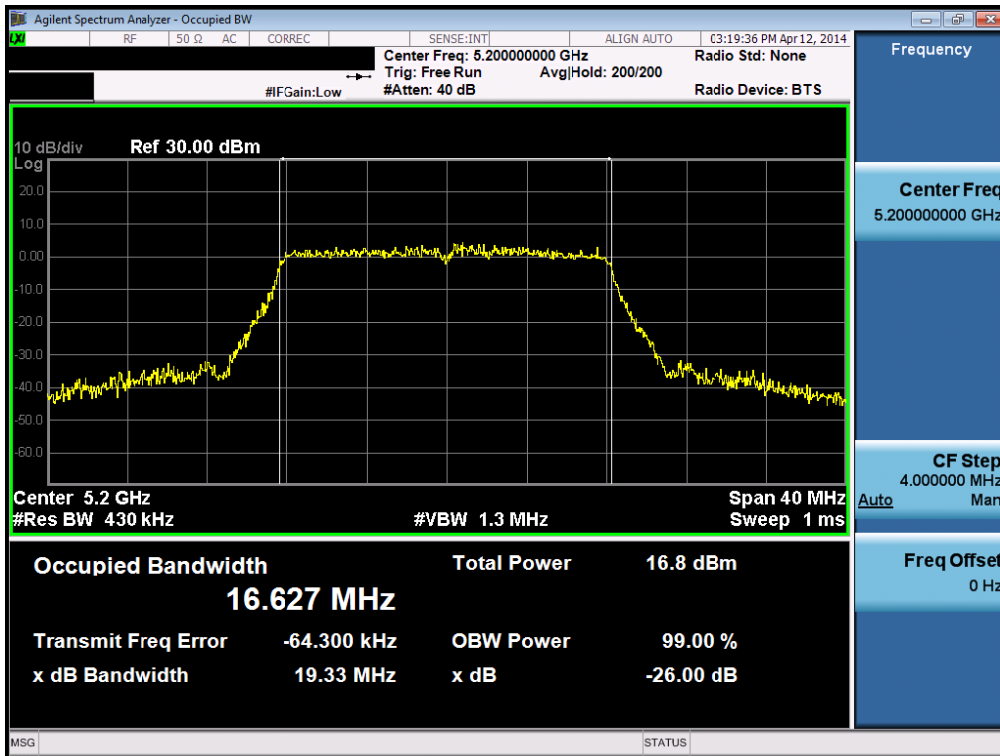
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.36



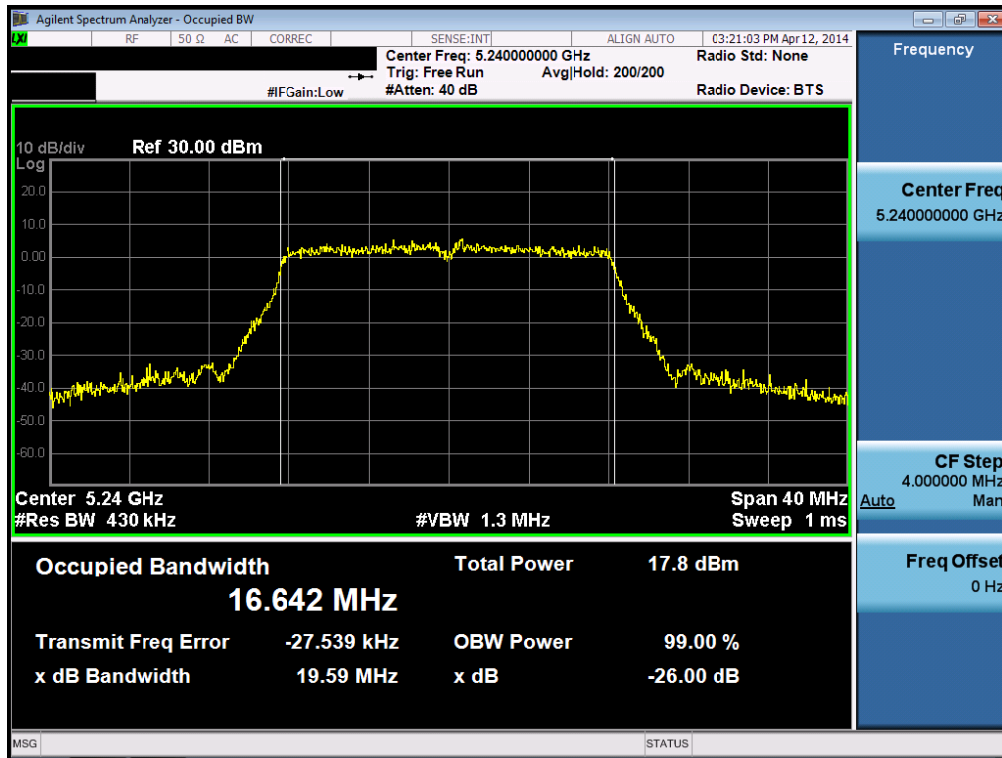
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.40



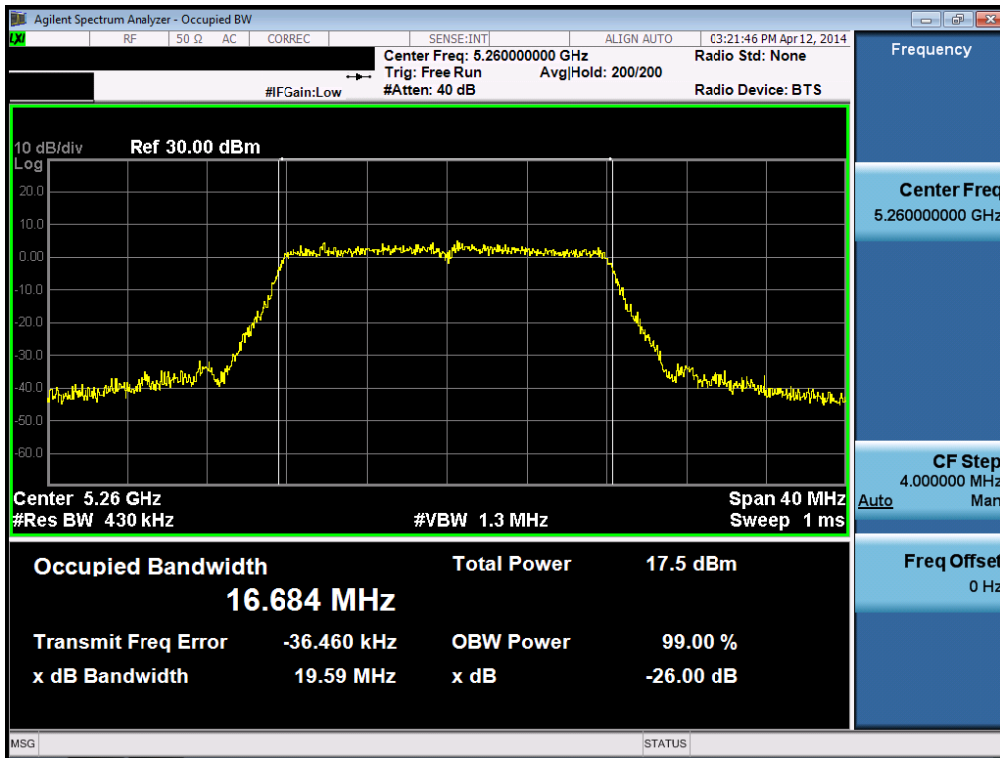
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.48



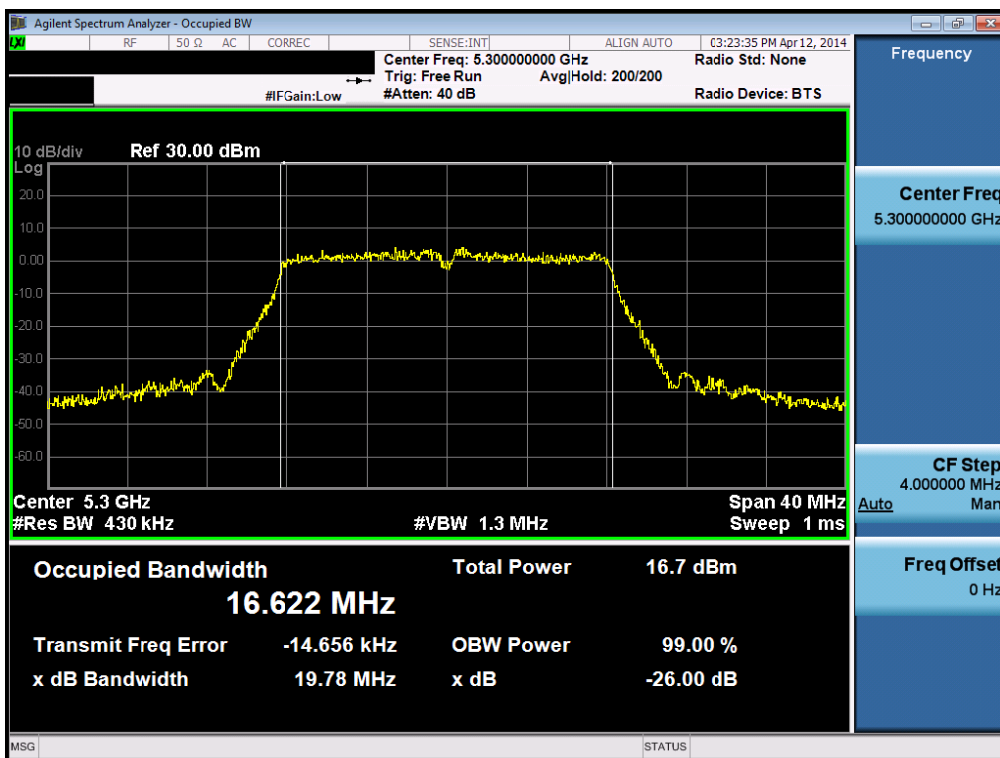
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.52



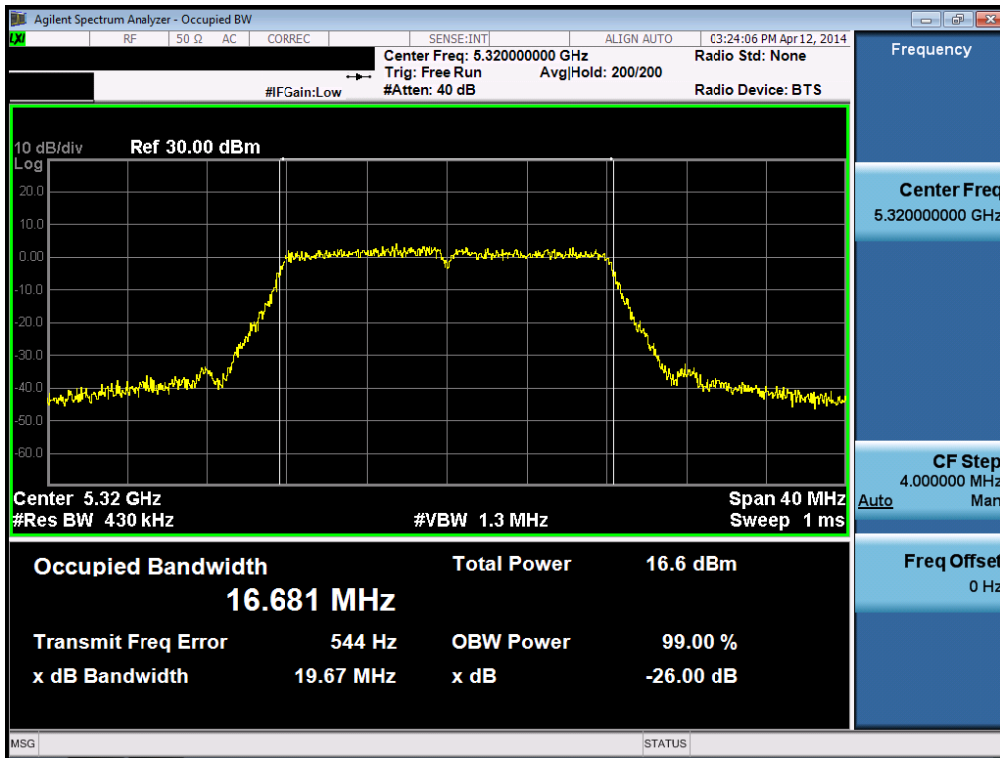
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.60



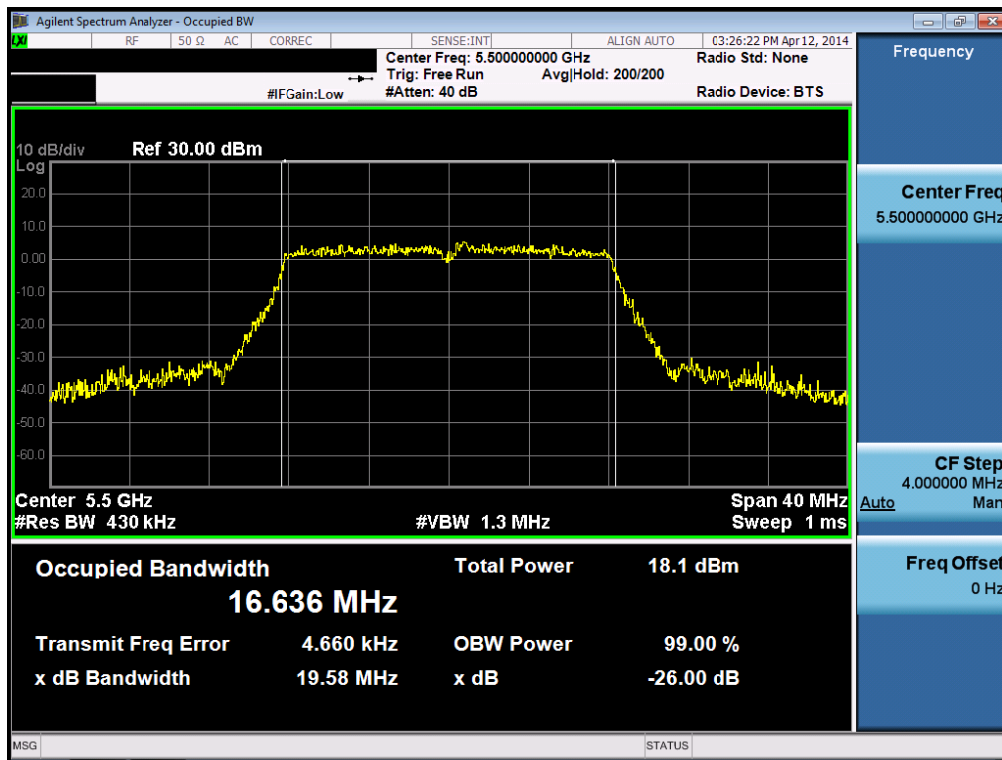
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.64



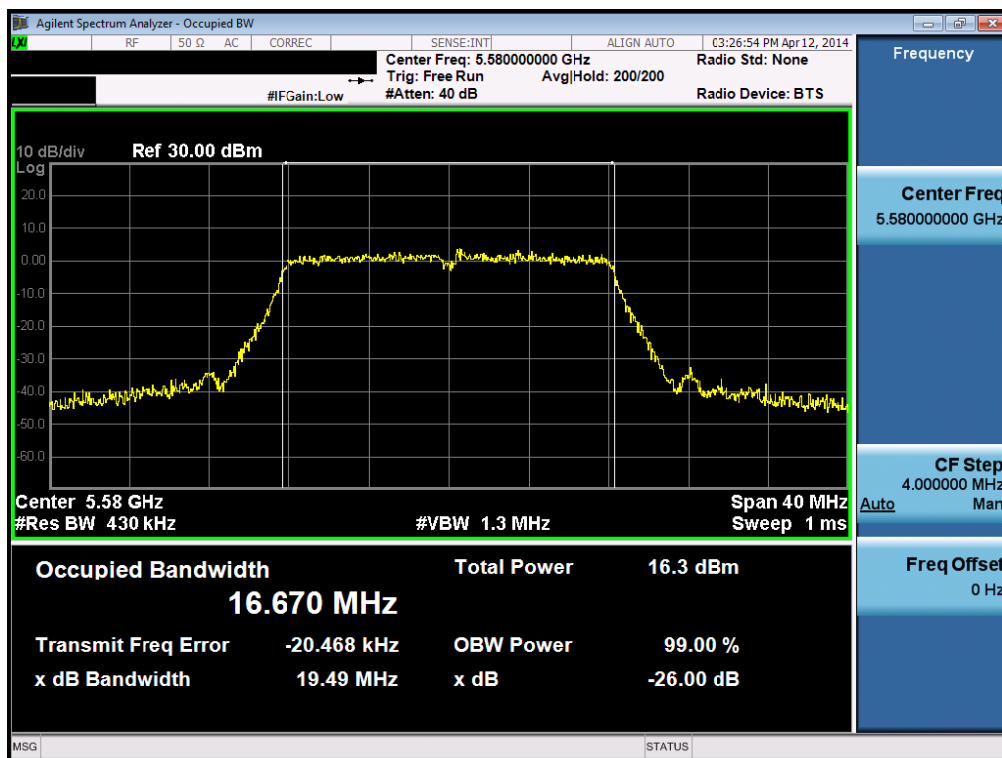
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.100



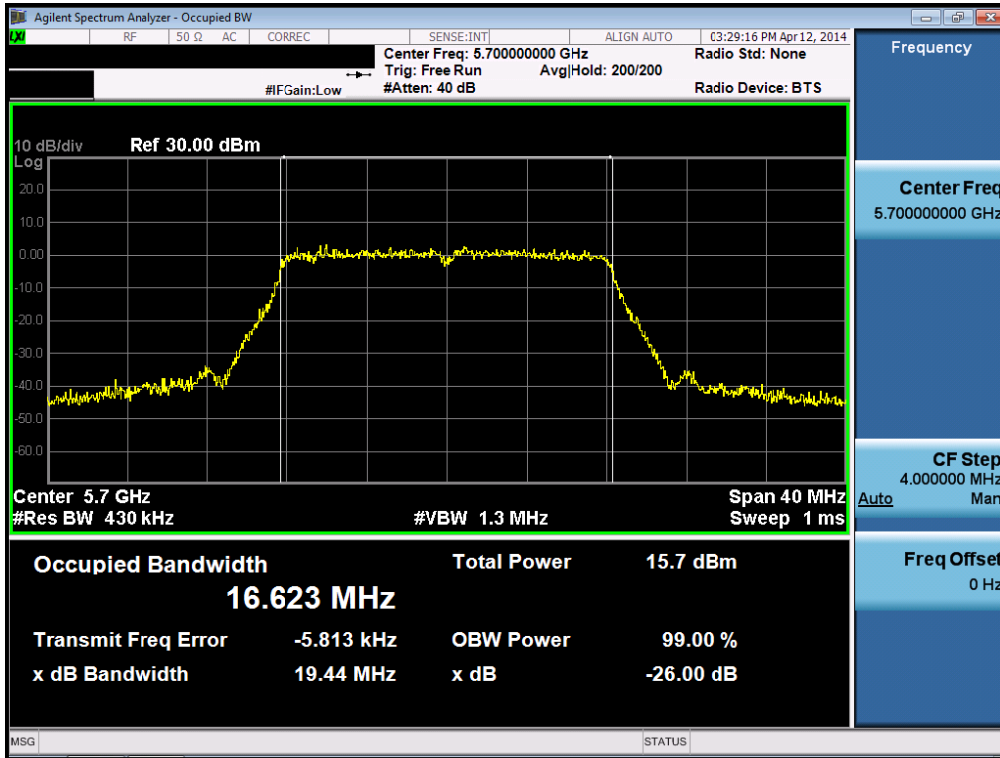
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a& Ch.116



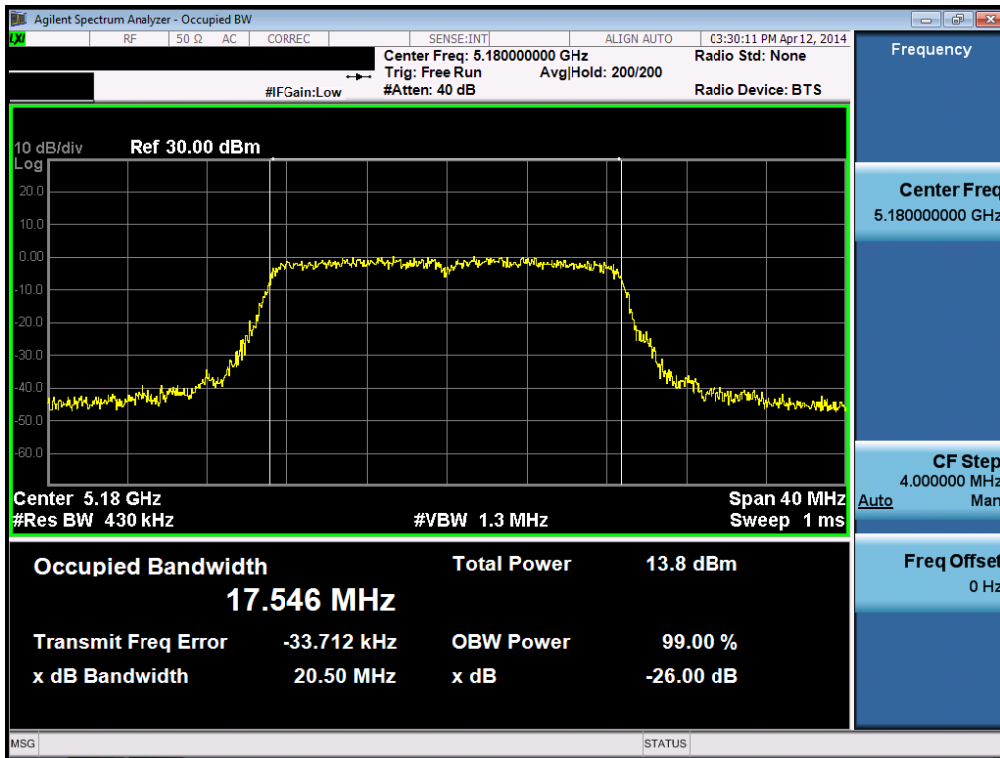
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11a & Ch.140



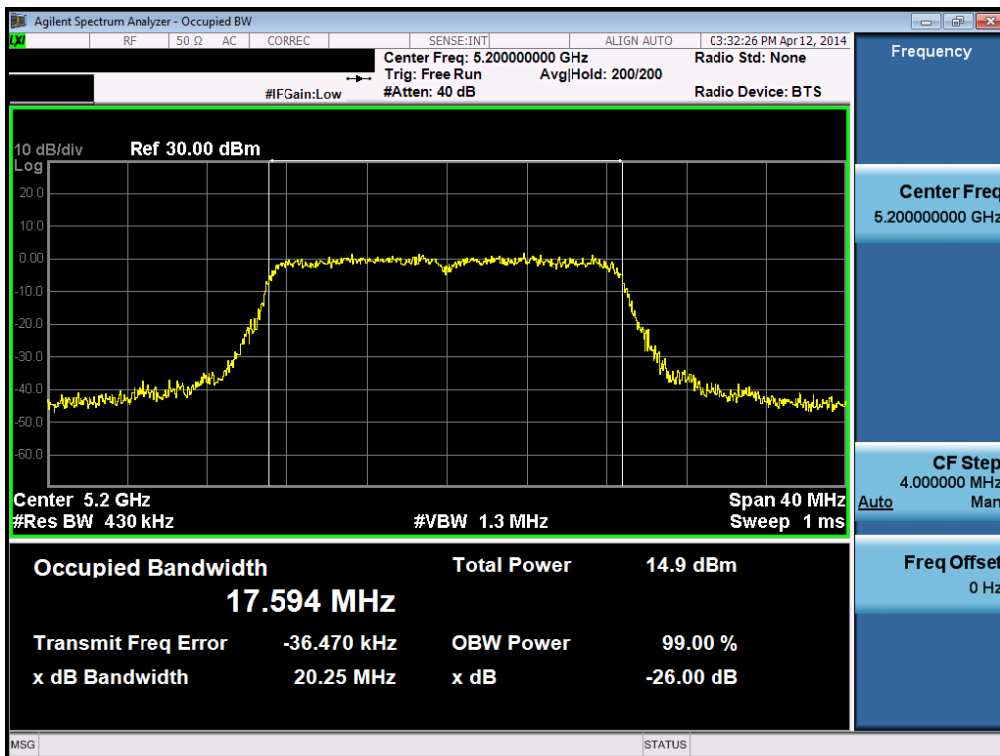
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT20& Ch.36



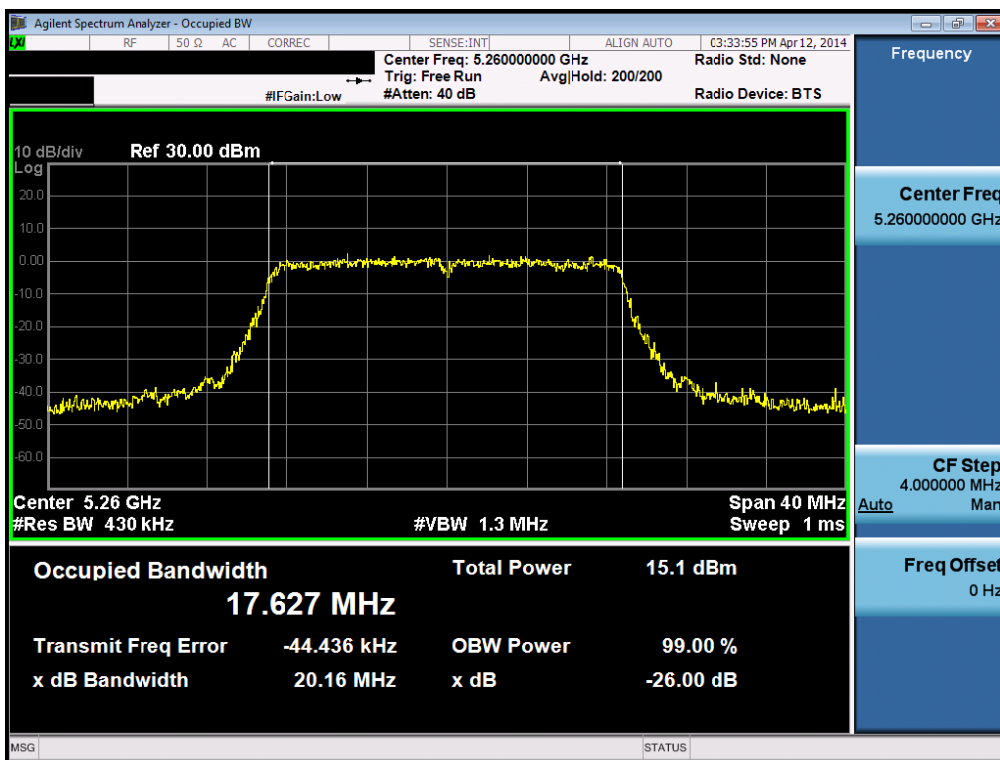
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT20&Ch.40



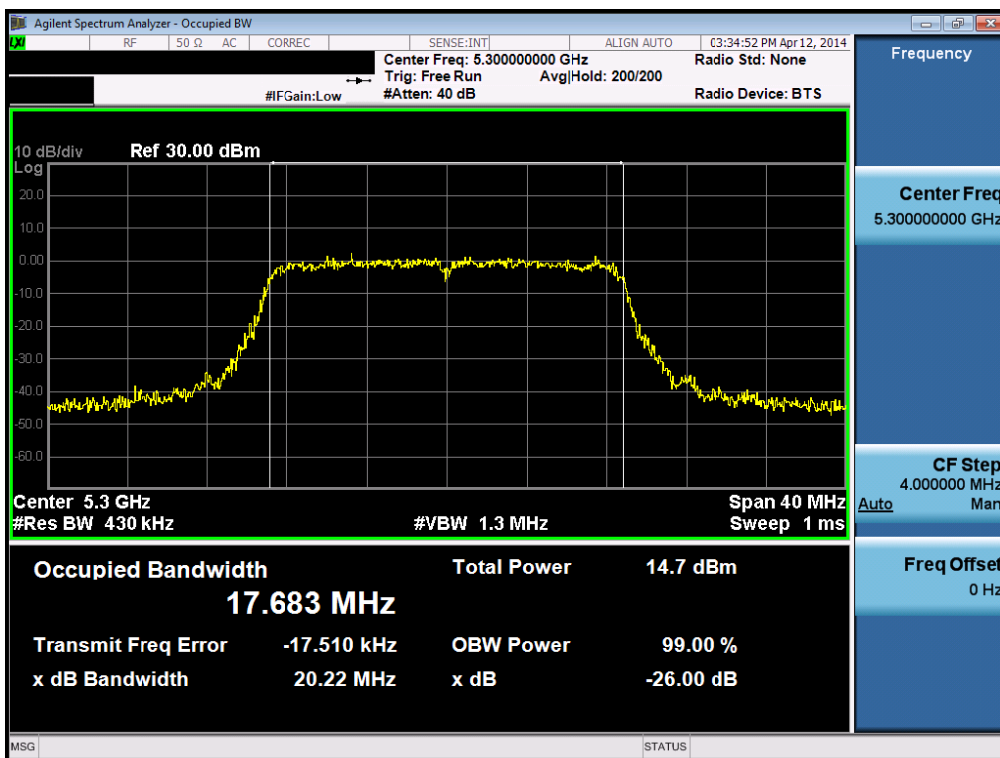
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT20& Ch.52



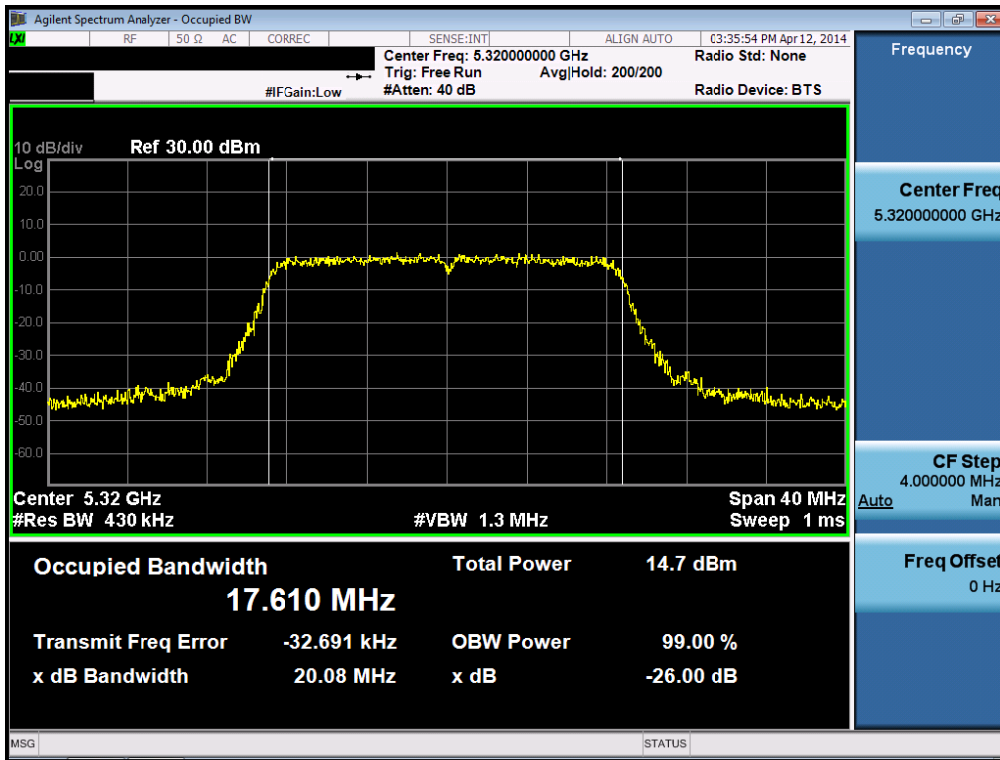
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT20& Ch.60



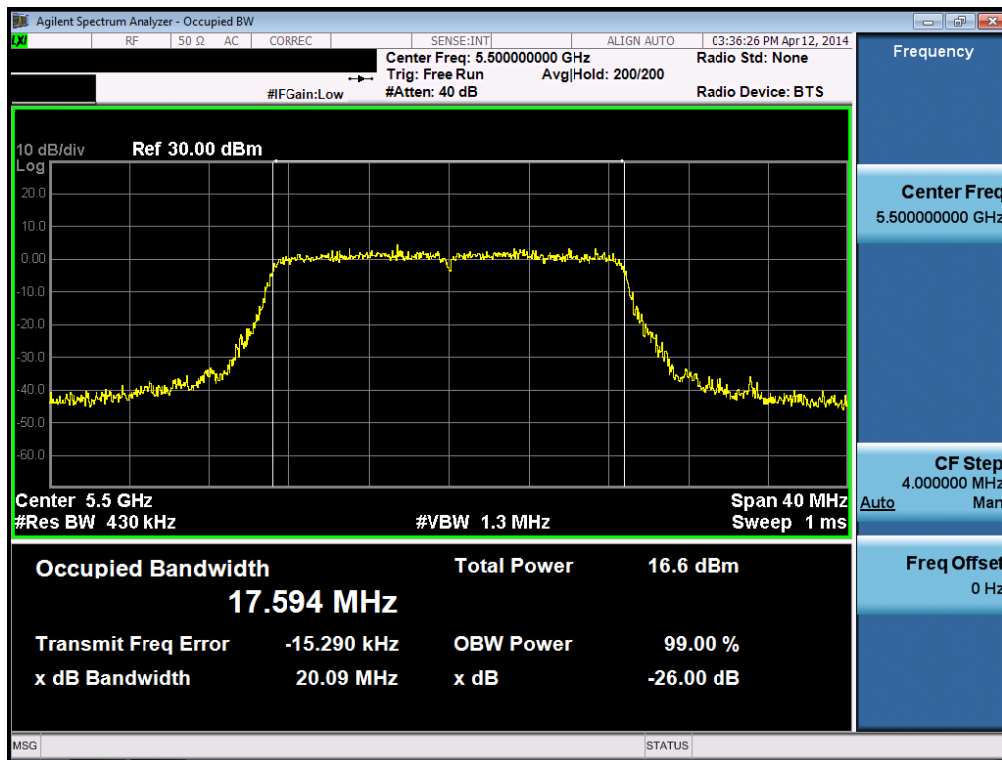
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT20& Ch.64



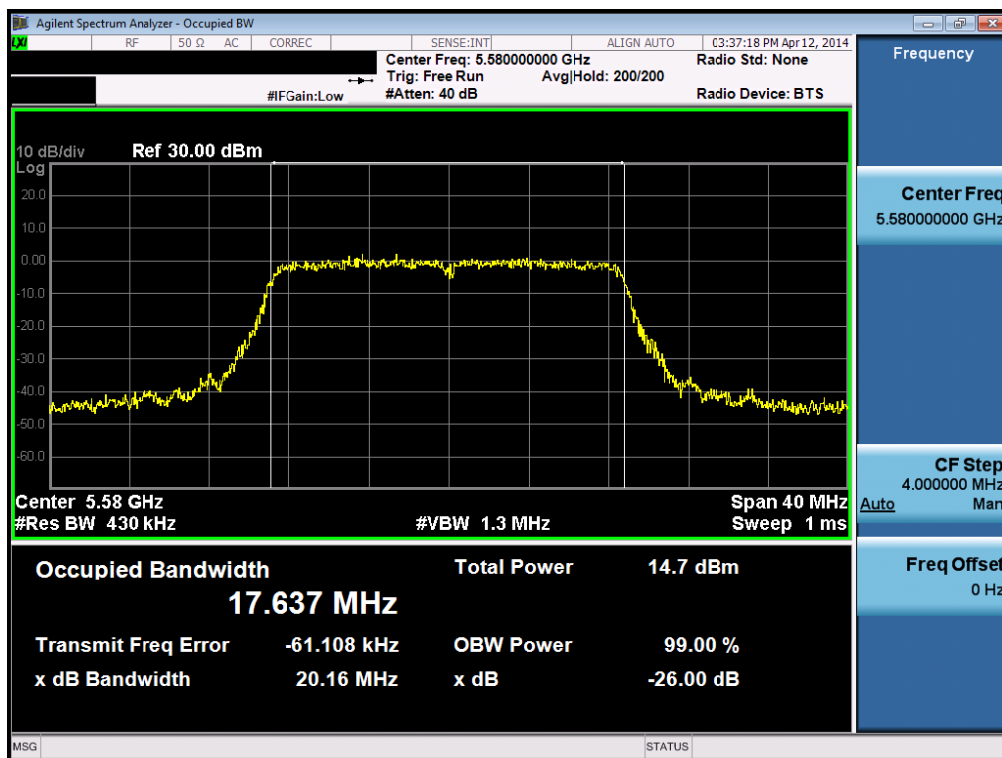
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT20& Ch.100



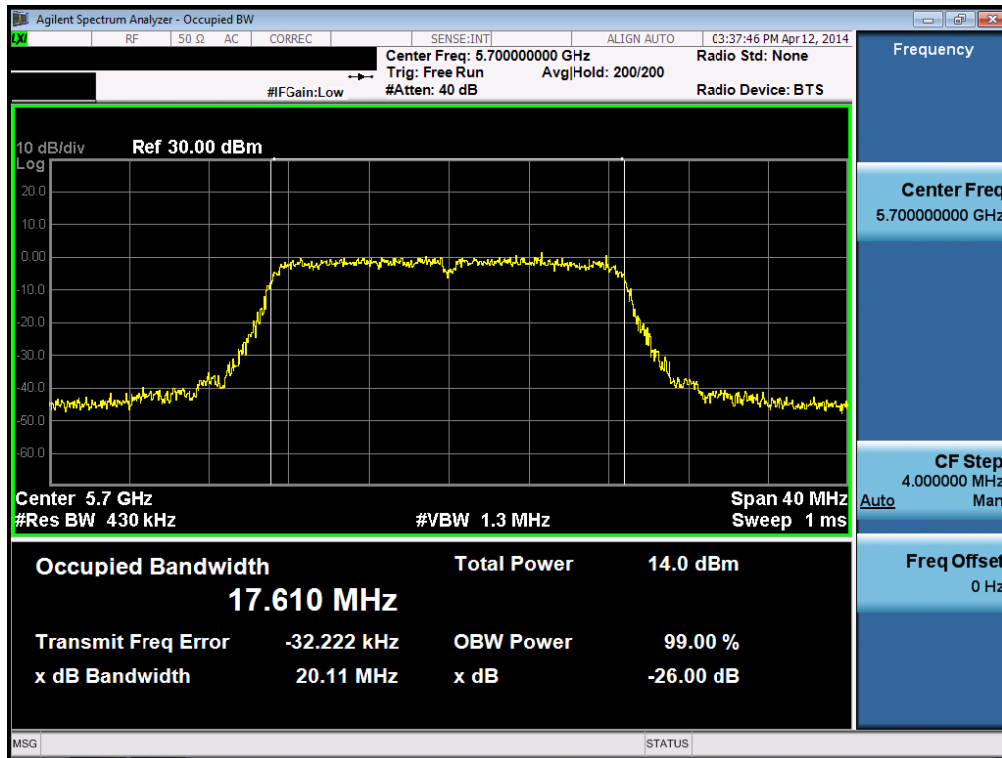
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT20& Ch.116



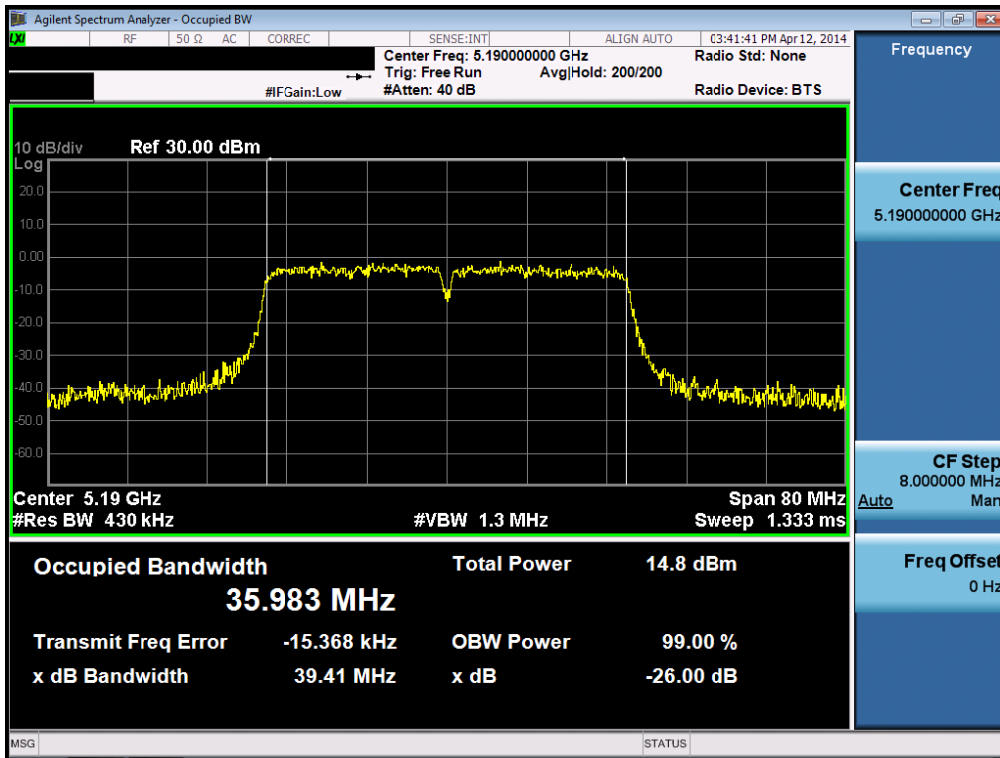
Occupied Bandwidth 99%

Test Mode: ANT 1 &802.11n HT20& Ch.140



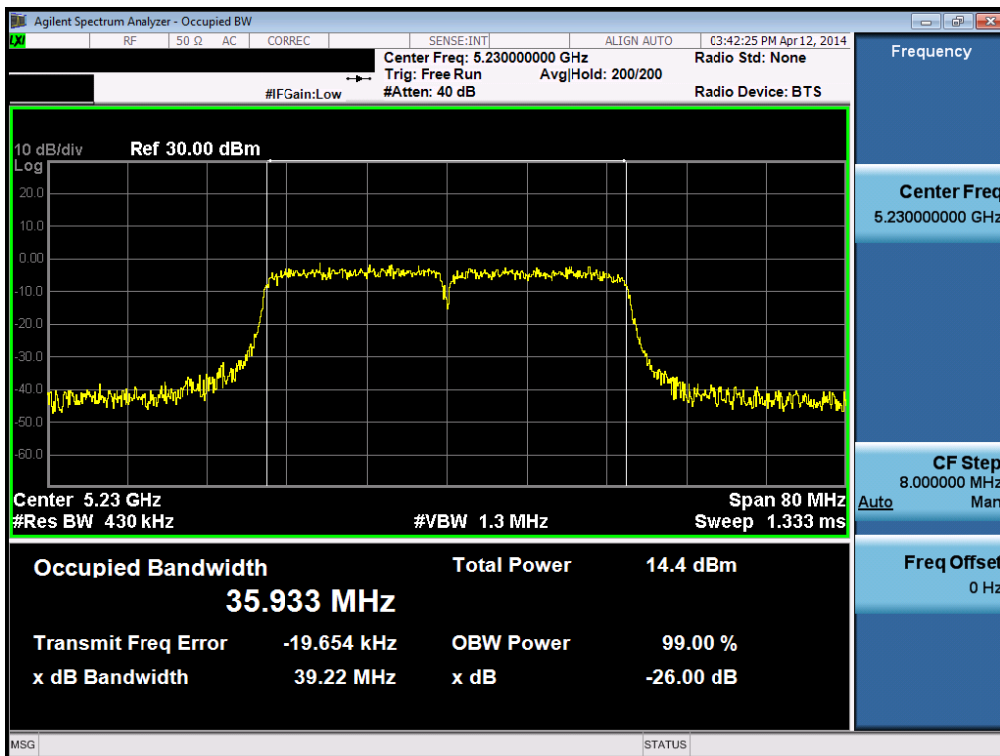
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT40& Ch.38



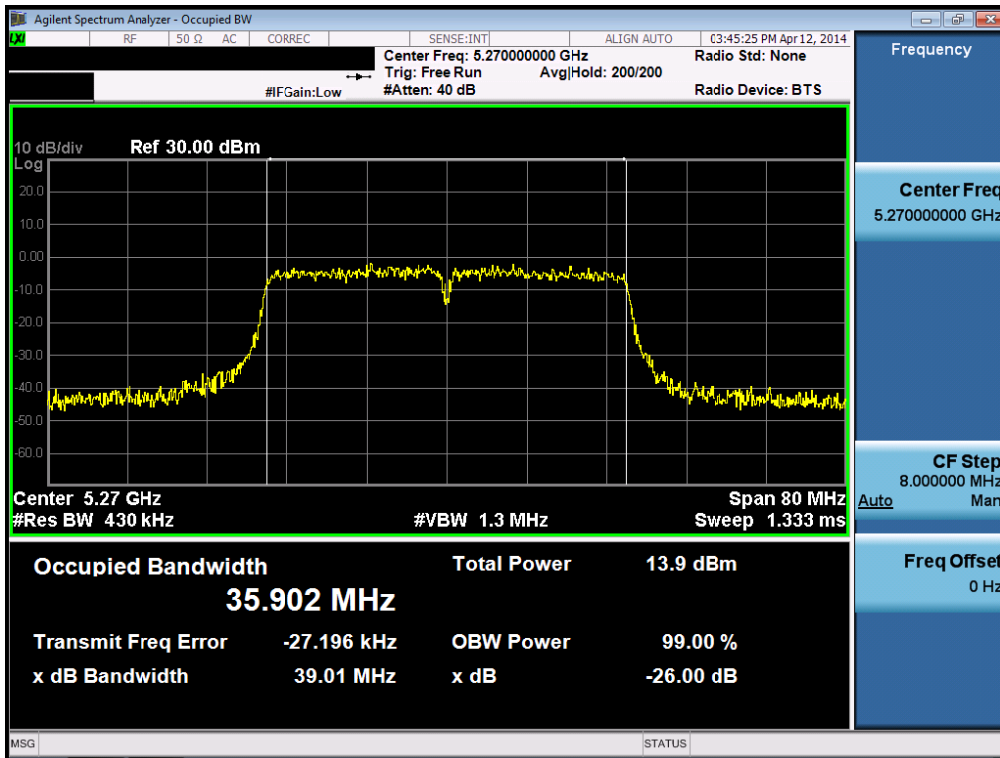
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT40&Ch.46



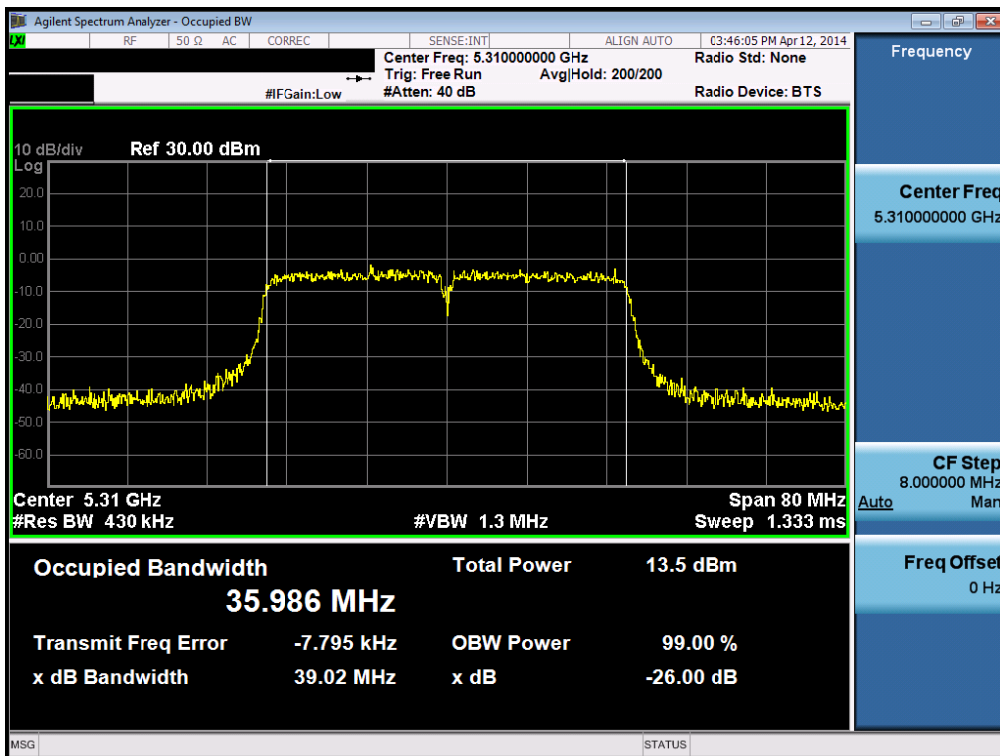
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT40& Ch.54



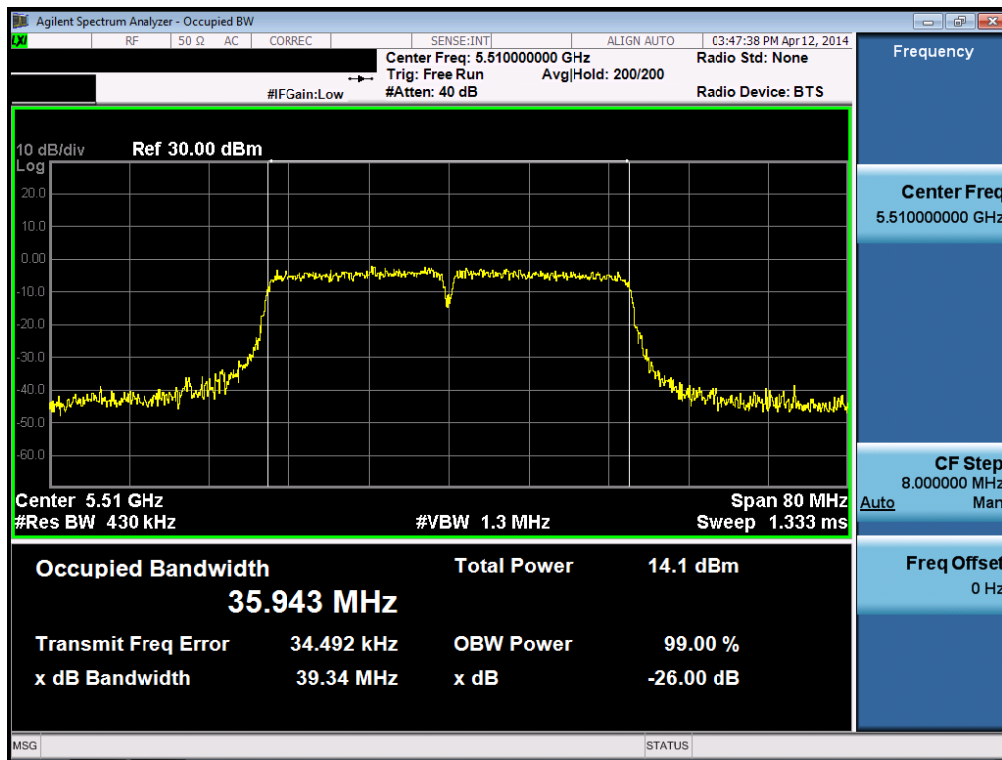
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT40& Ch.62



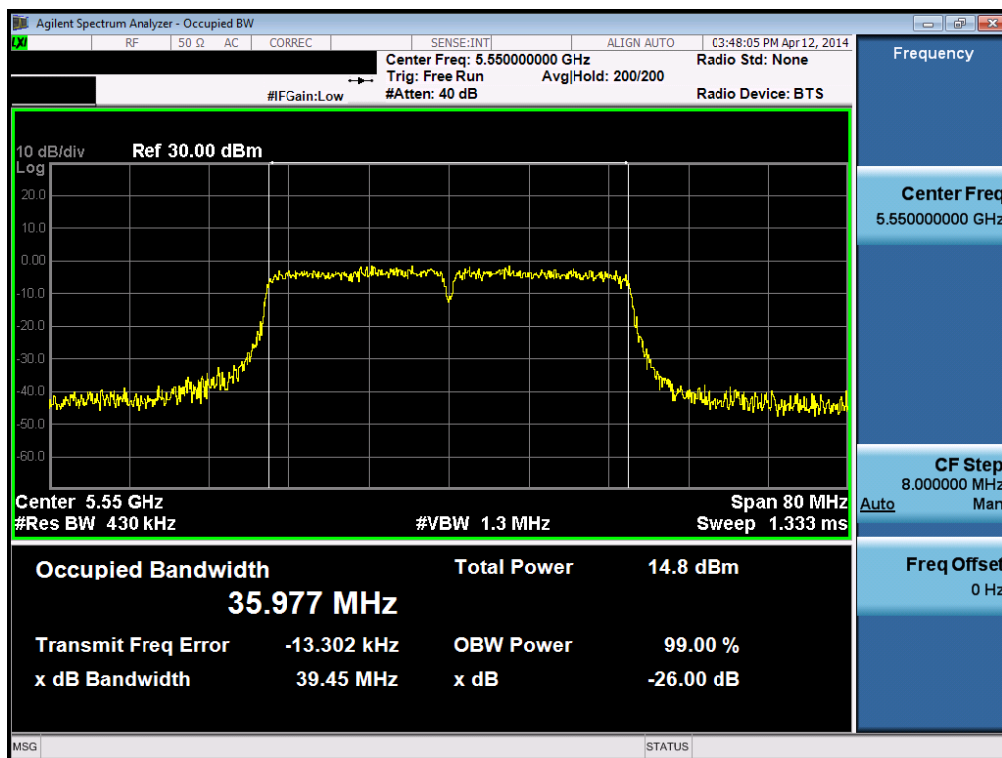
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT40& Ch.102



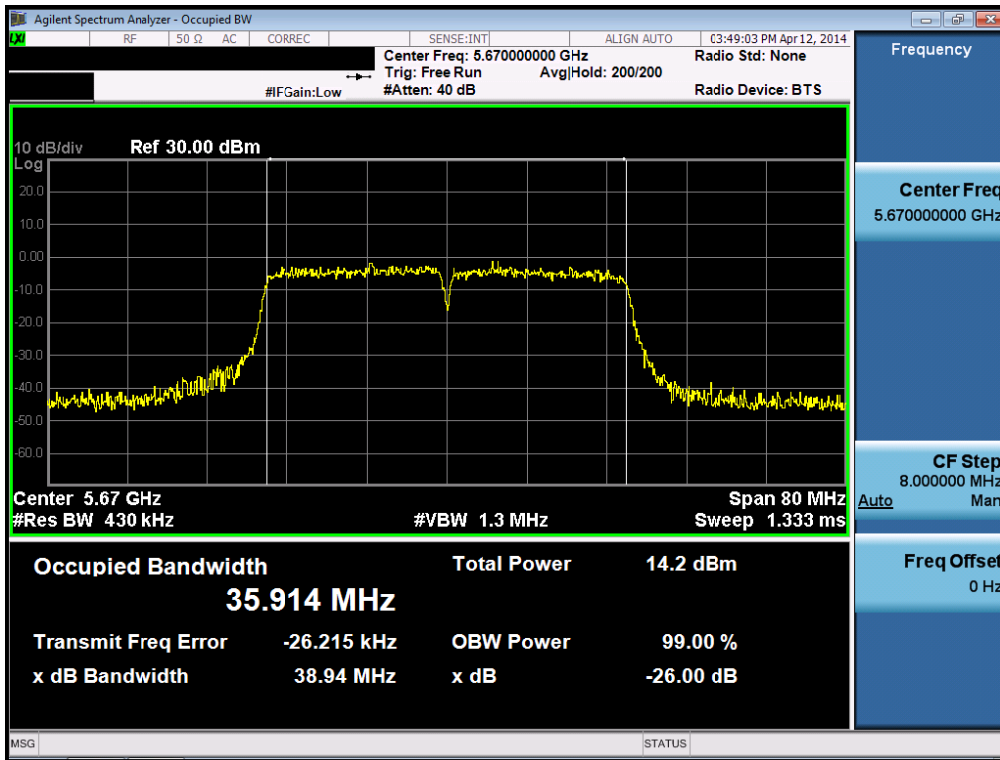
Occupied Bandwidth 99%

Test Mode: ANT 1 & 802.11n HT40& Ch.110



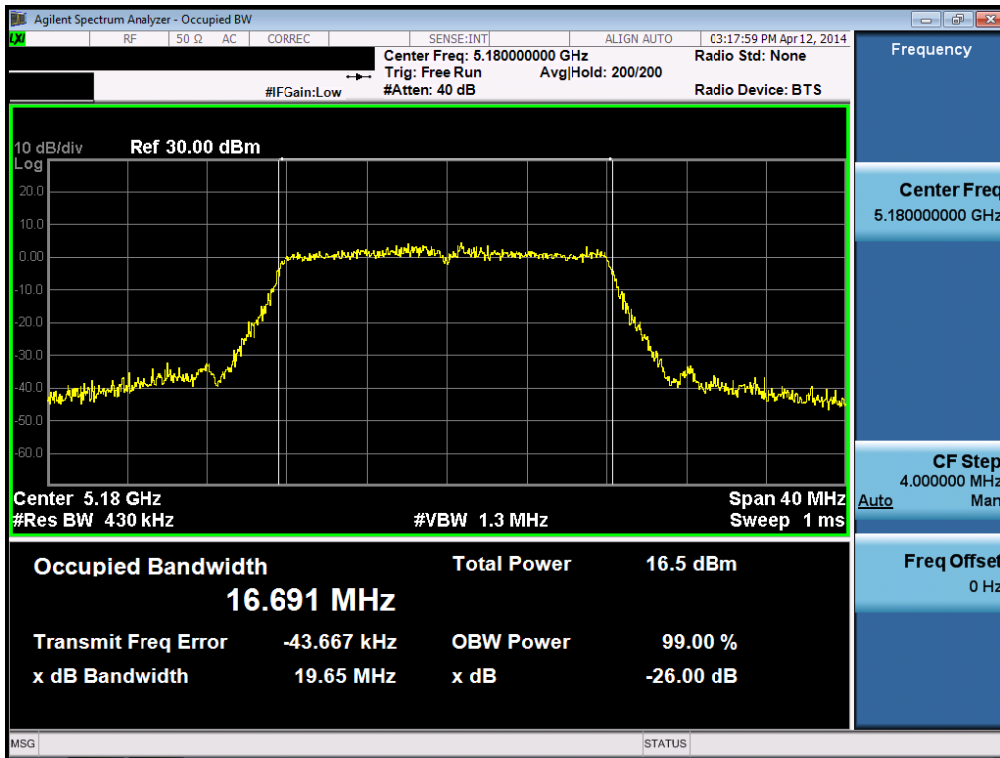
Occupied Bandwidth 99%

Test Mode: ANT 1 &802.11n HT40& Ch.134



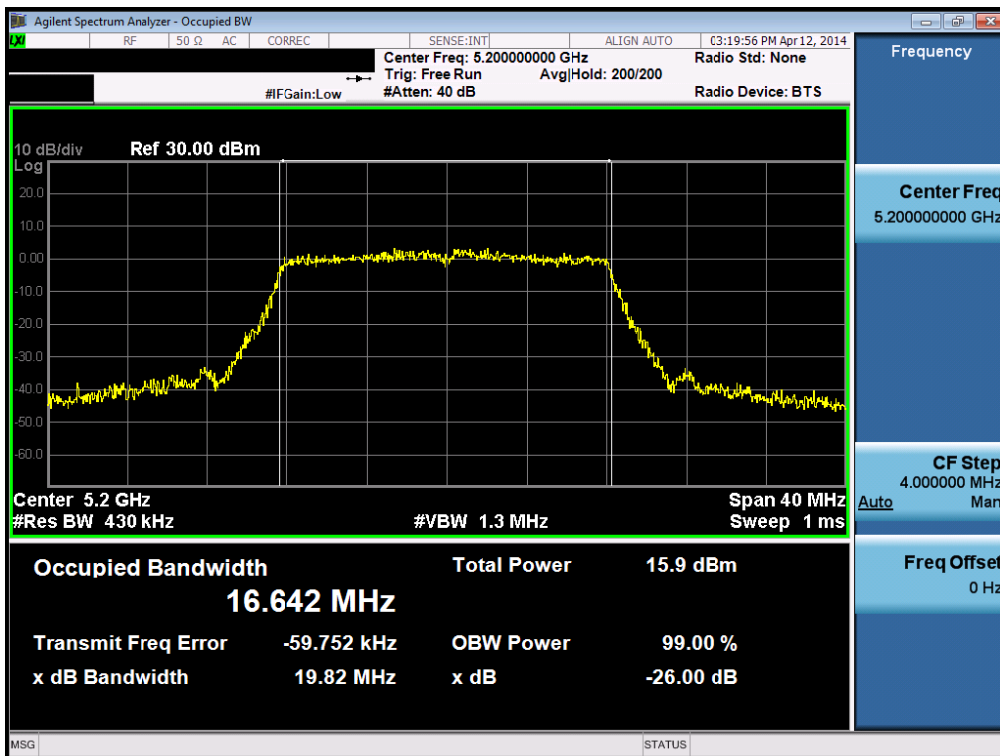
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a& Ch.36



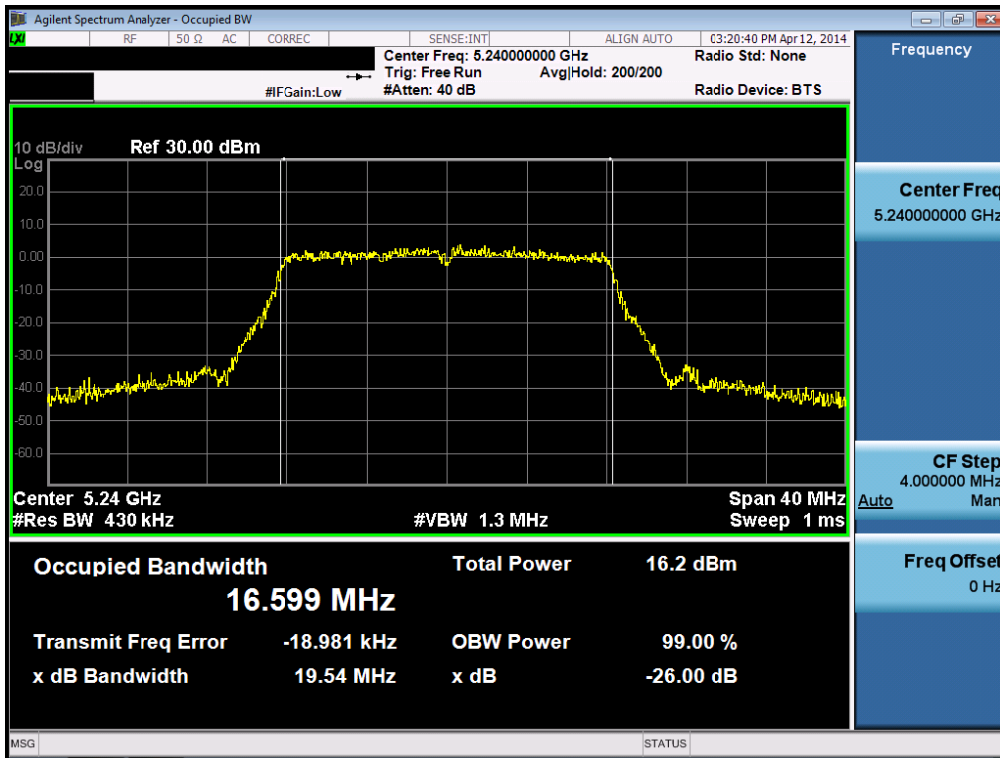
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a& Ch.40



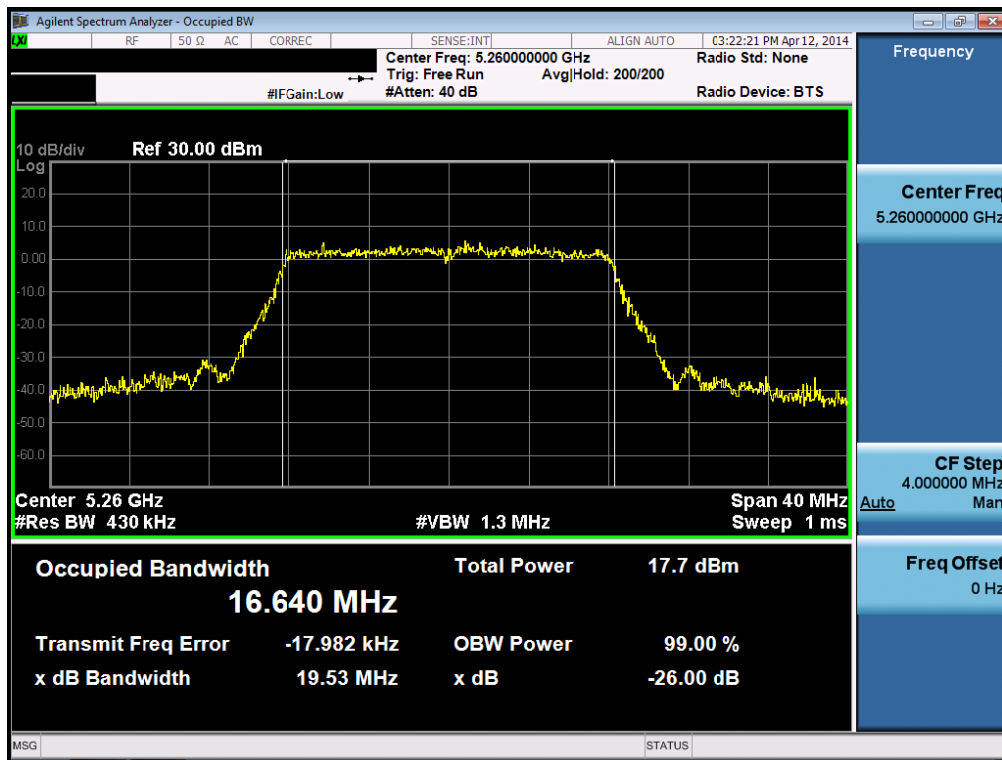
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a& Ch.48



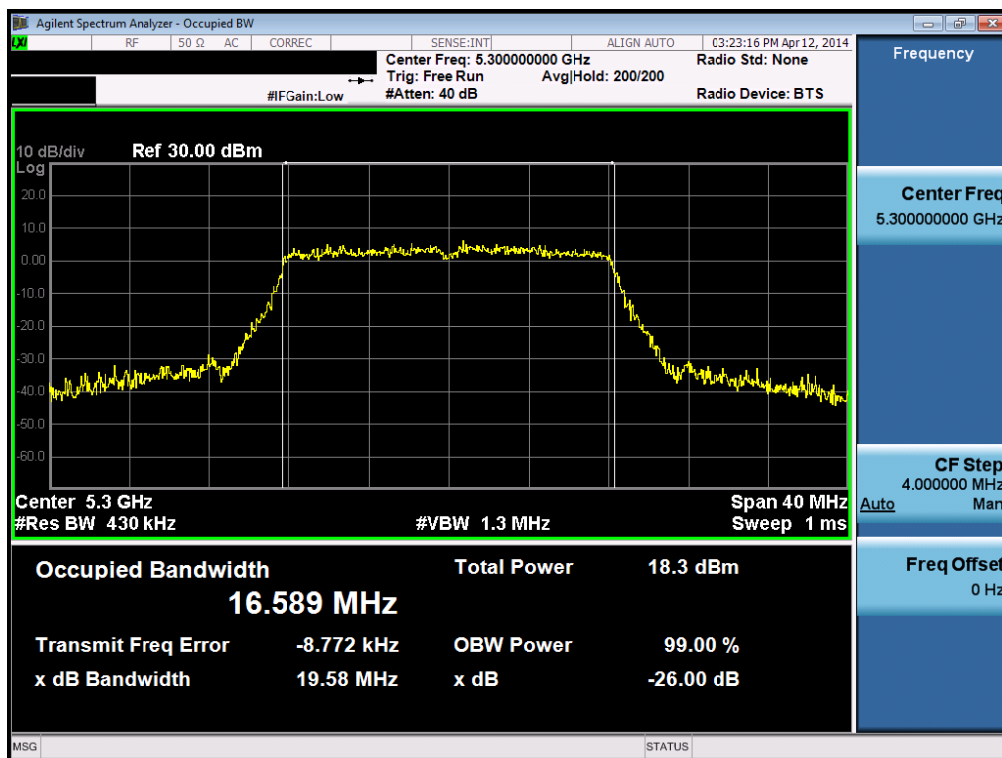
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a& Ch.52



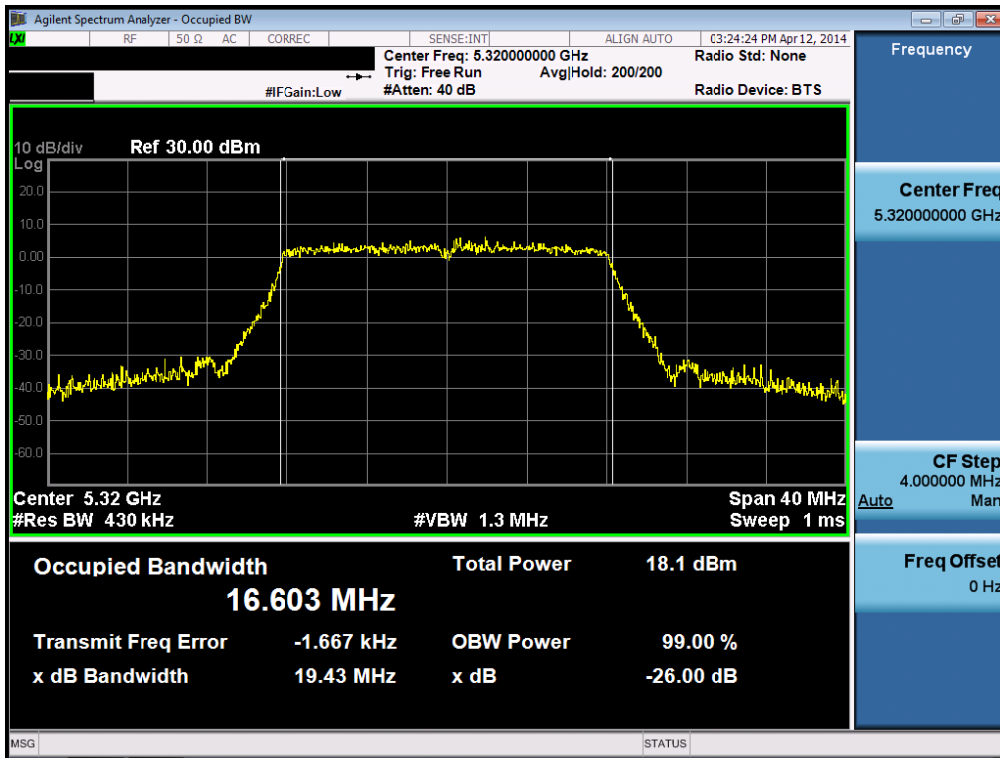
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a&Ch.60



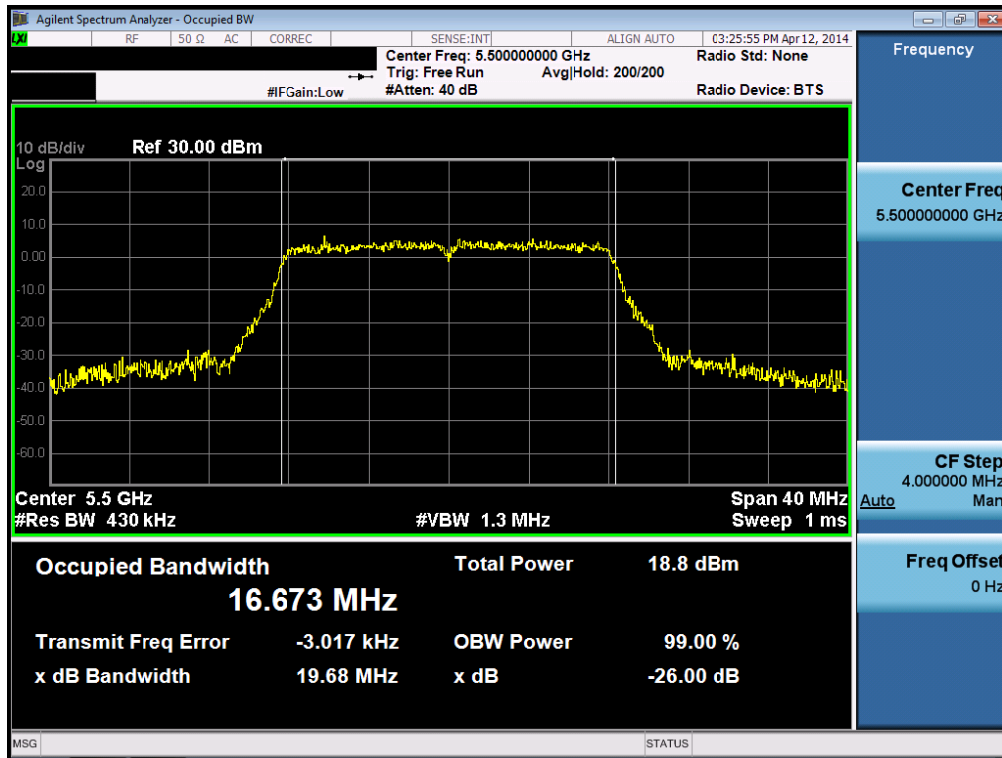
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a& Ch.64



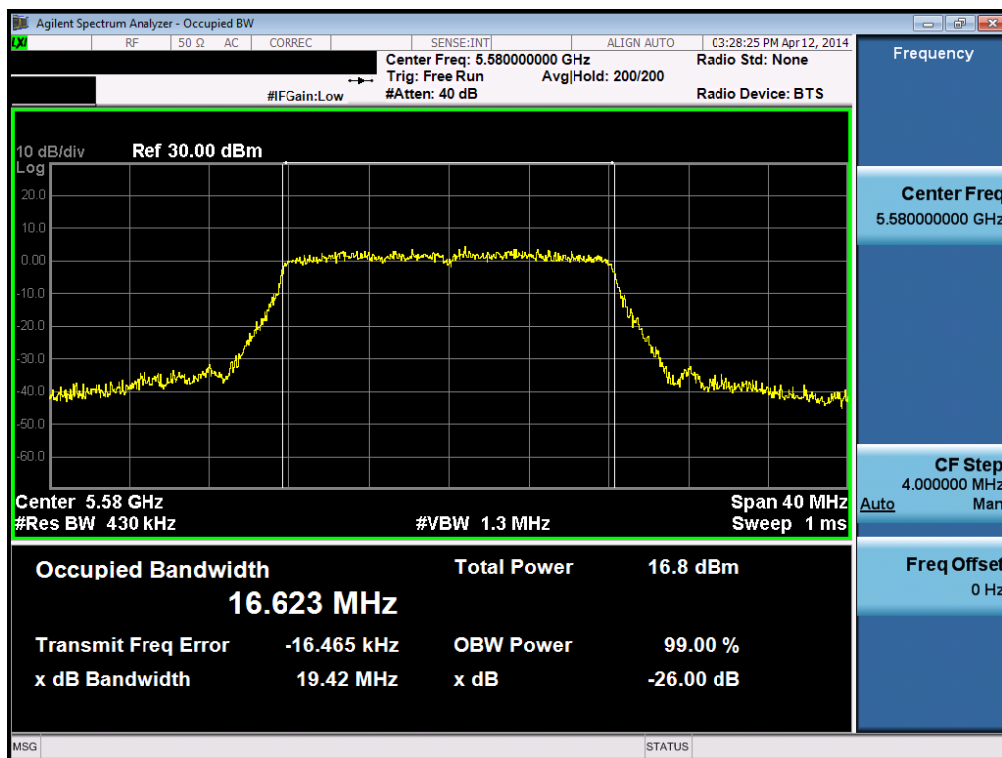
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a& Ch.100



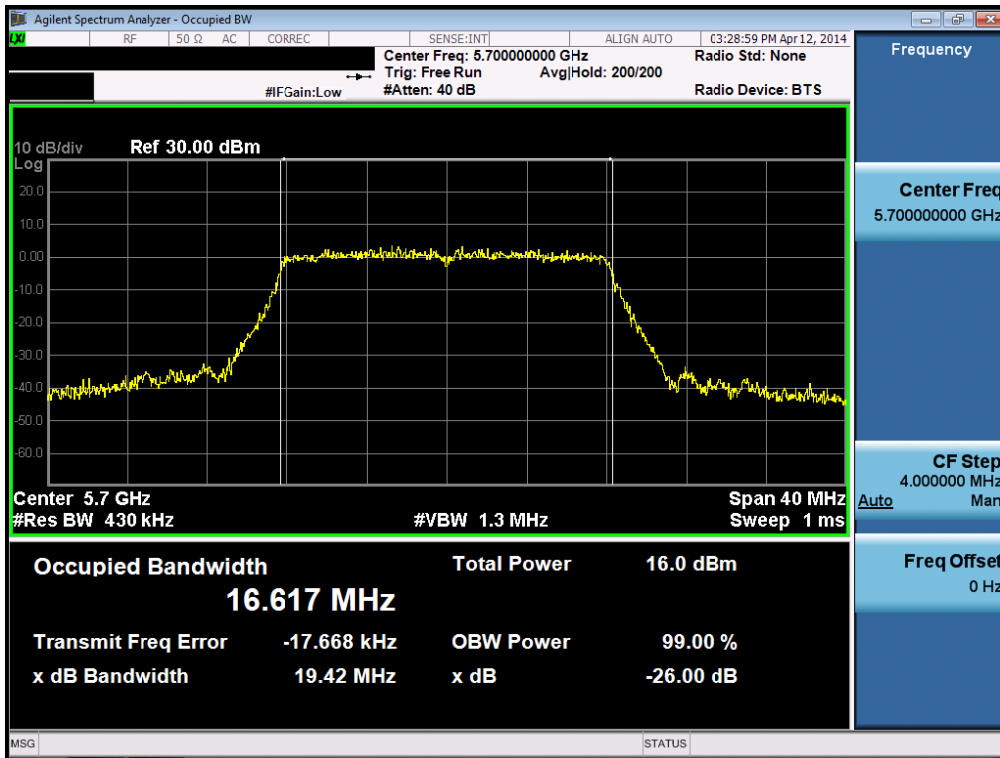
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a& Ch.116



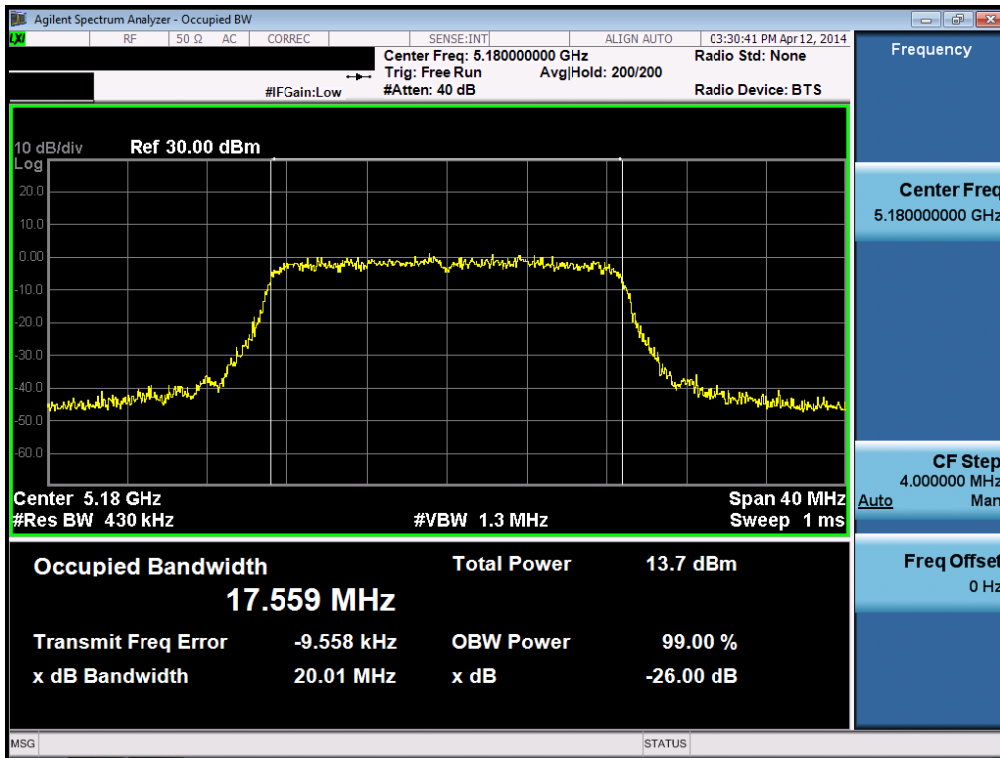
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11a & Ch.140



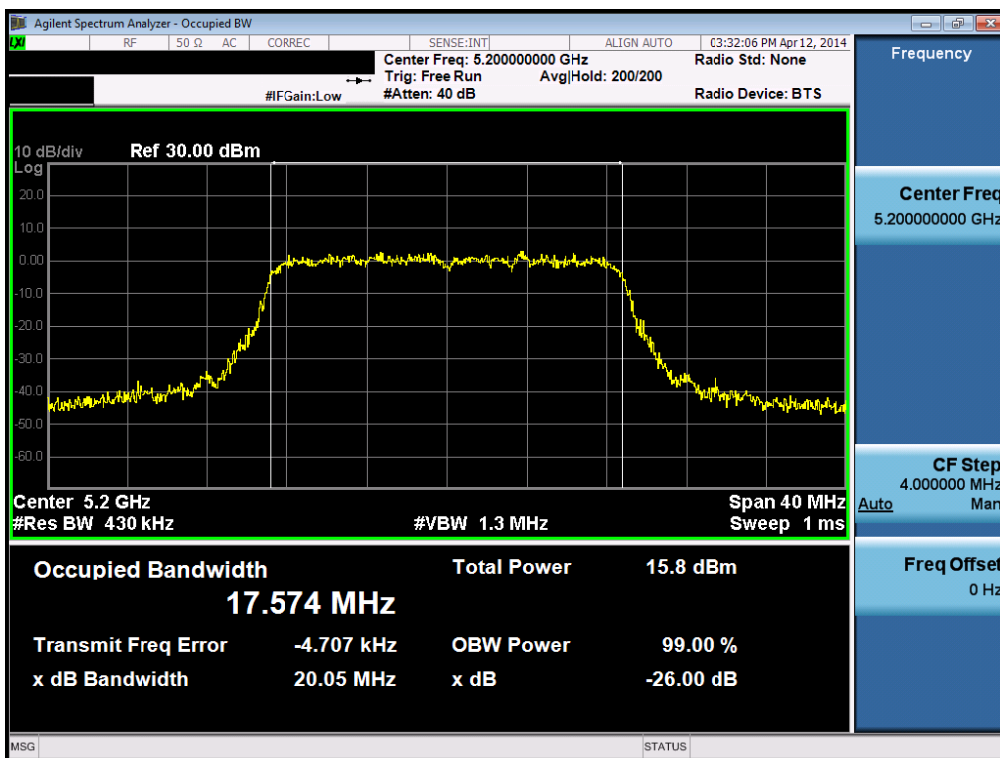
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20& Ch.36



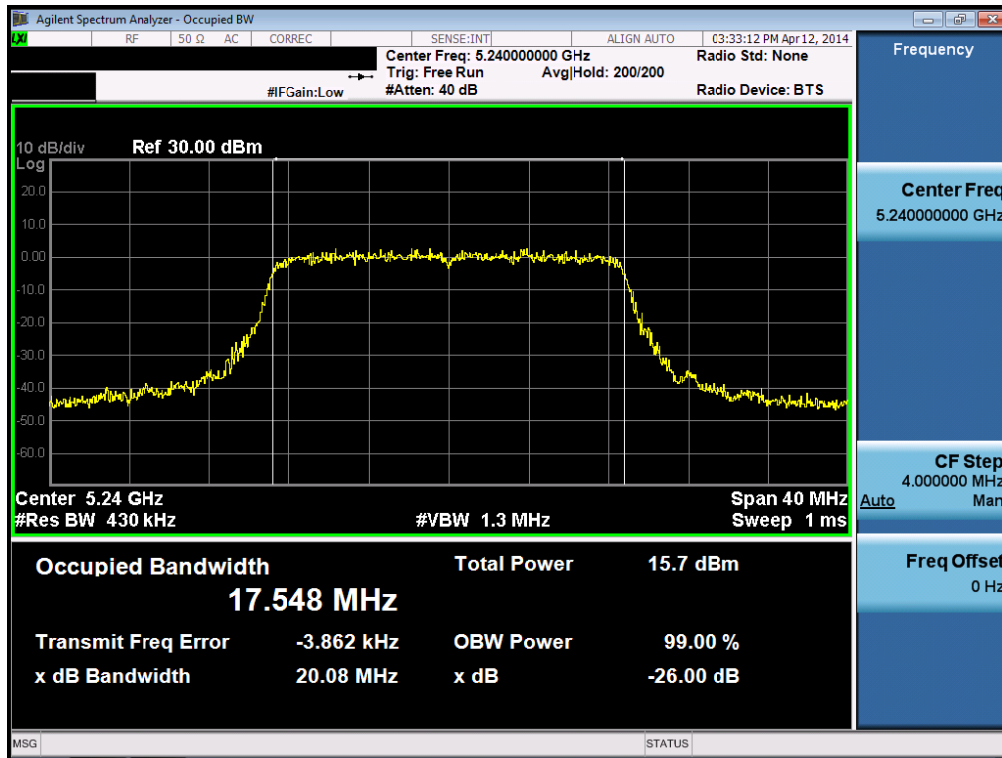
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20&Ch.40



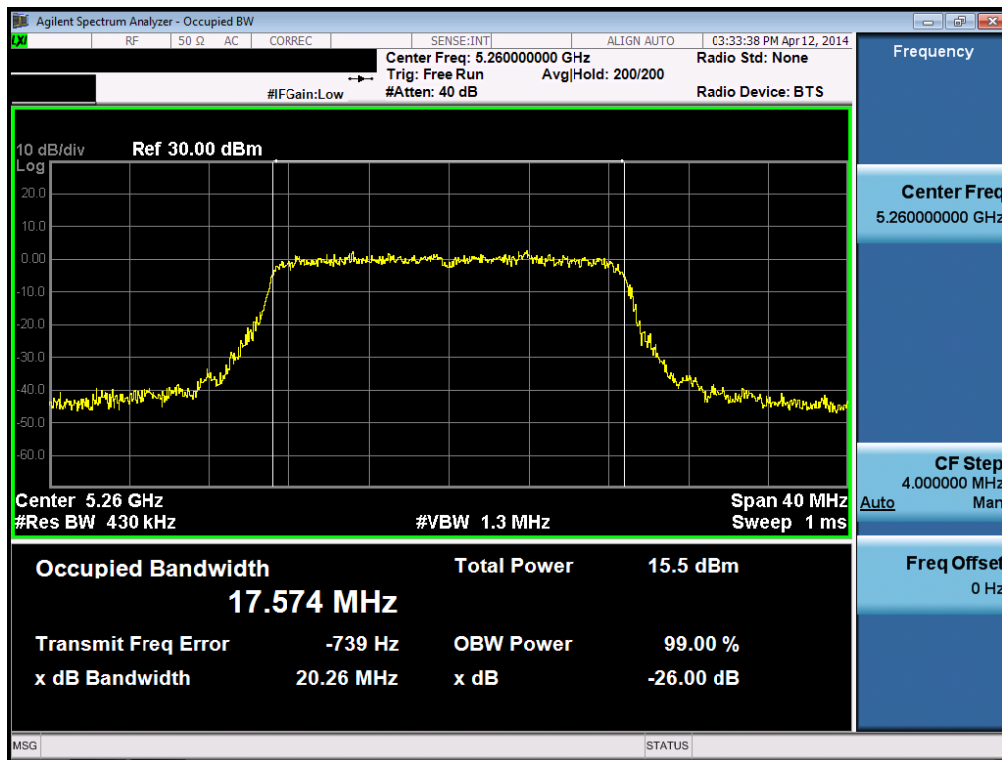
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20& Ch.48



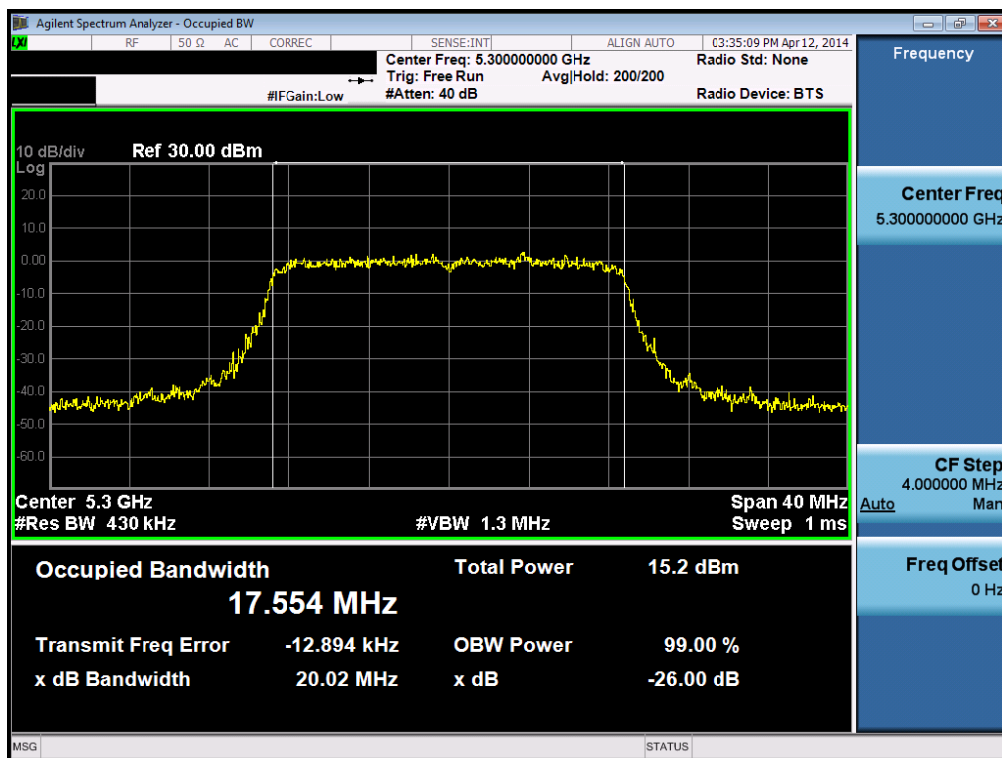
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20& Ch.52



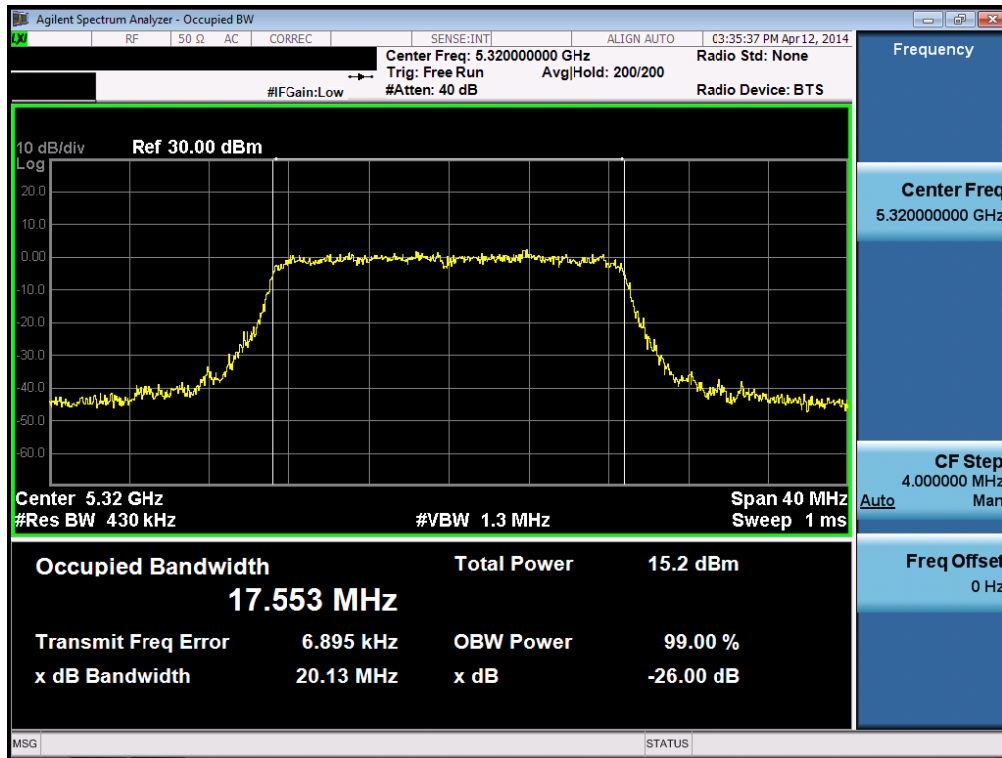
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20& Ch.60



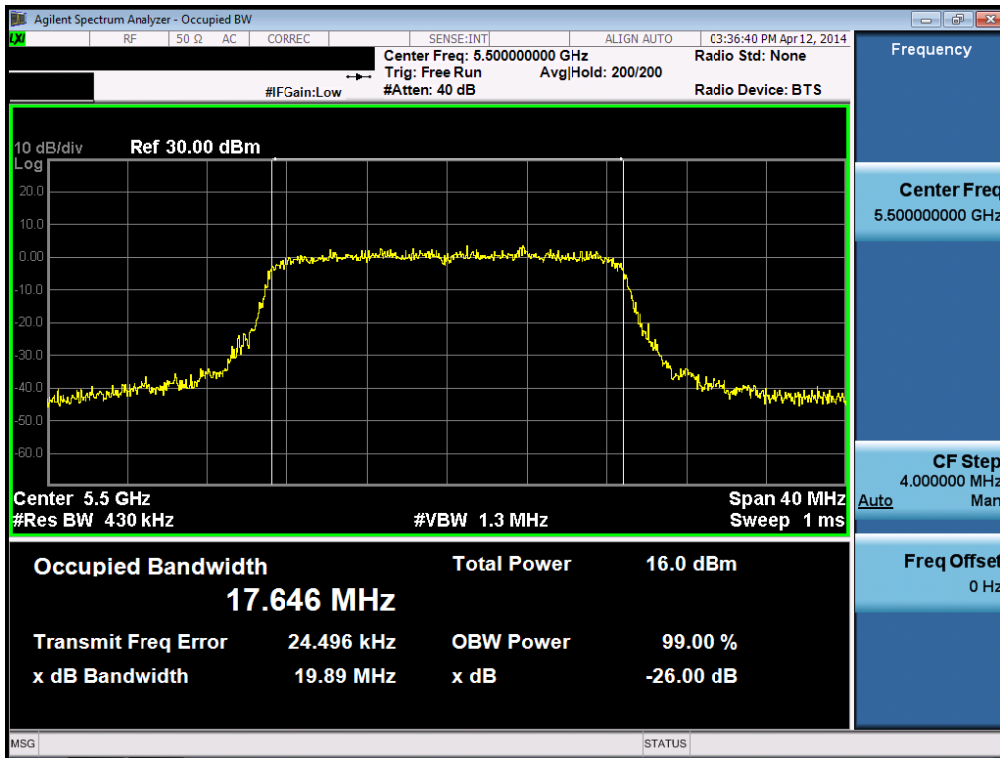
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20& Ch.64



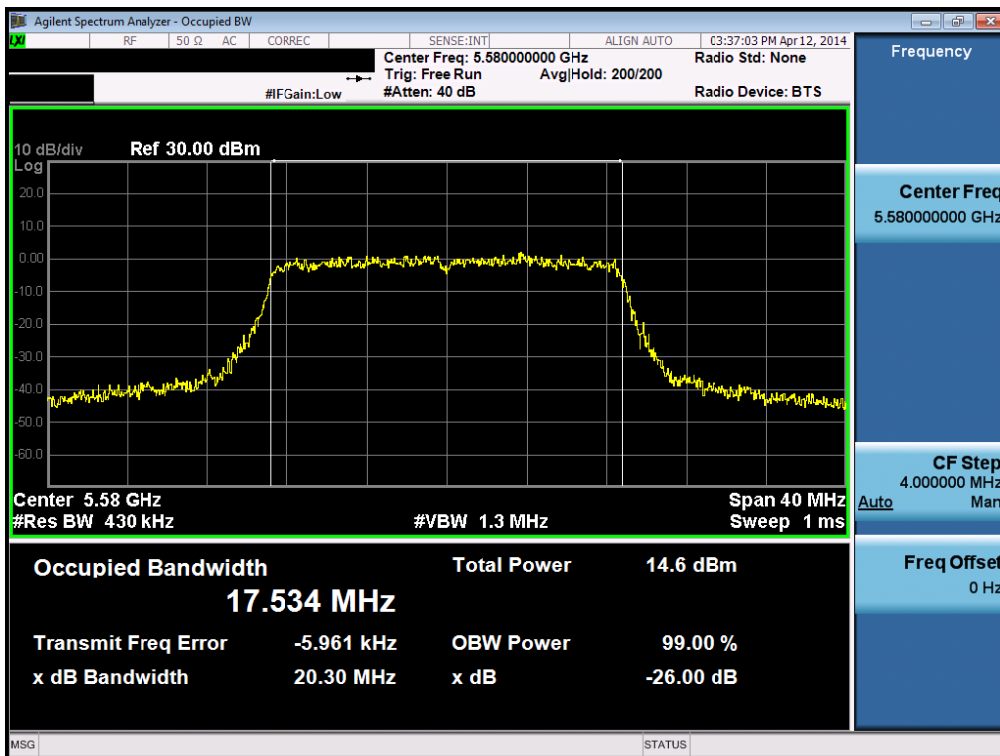
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20& Ch.100



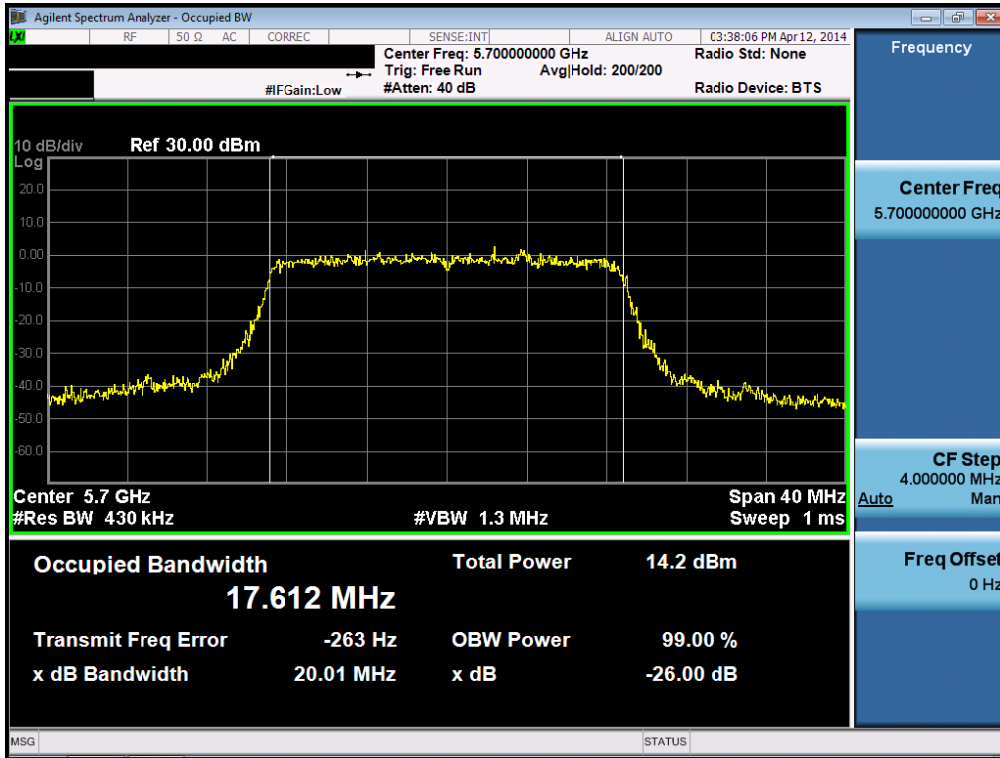
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT20& Ch.116



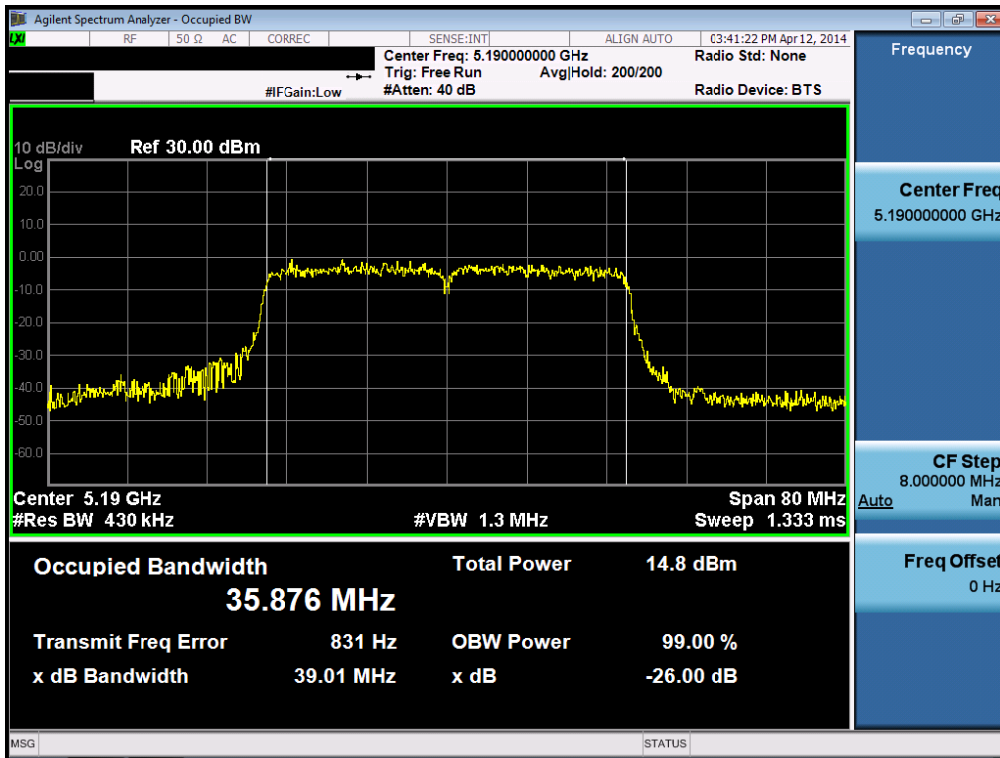
Occupied Bandwidth 99%

Test Mode: ANT 2&802.11n HT20& Ch.140



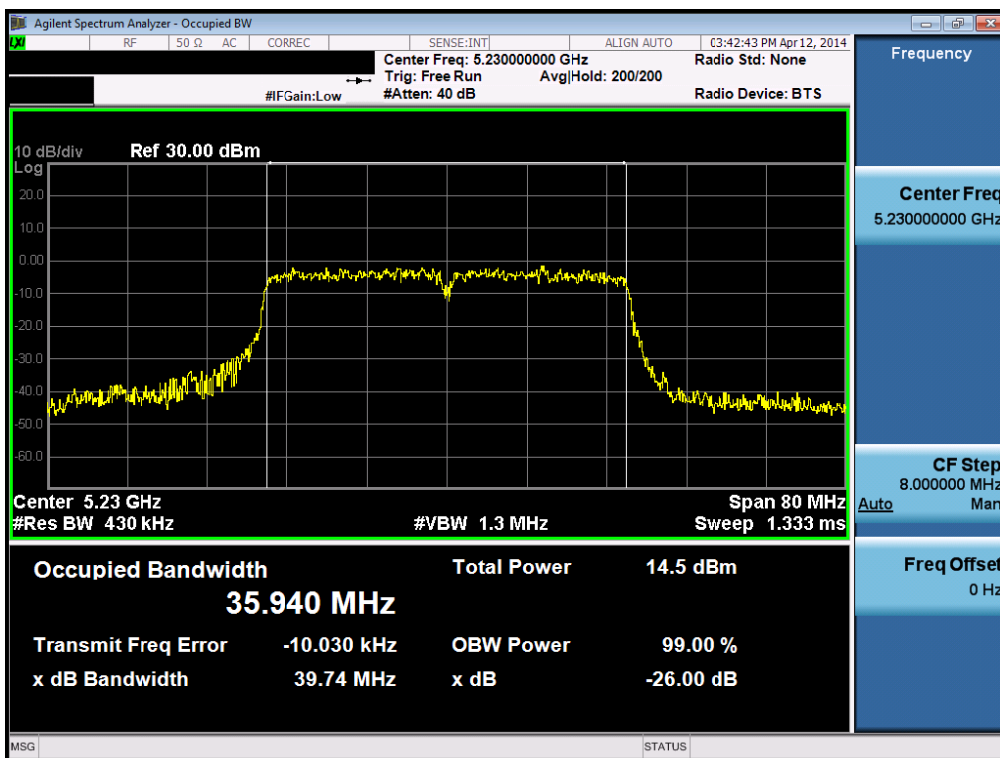
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT40& Ch.38



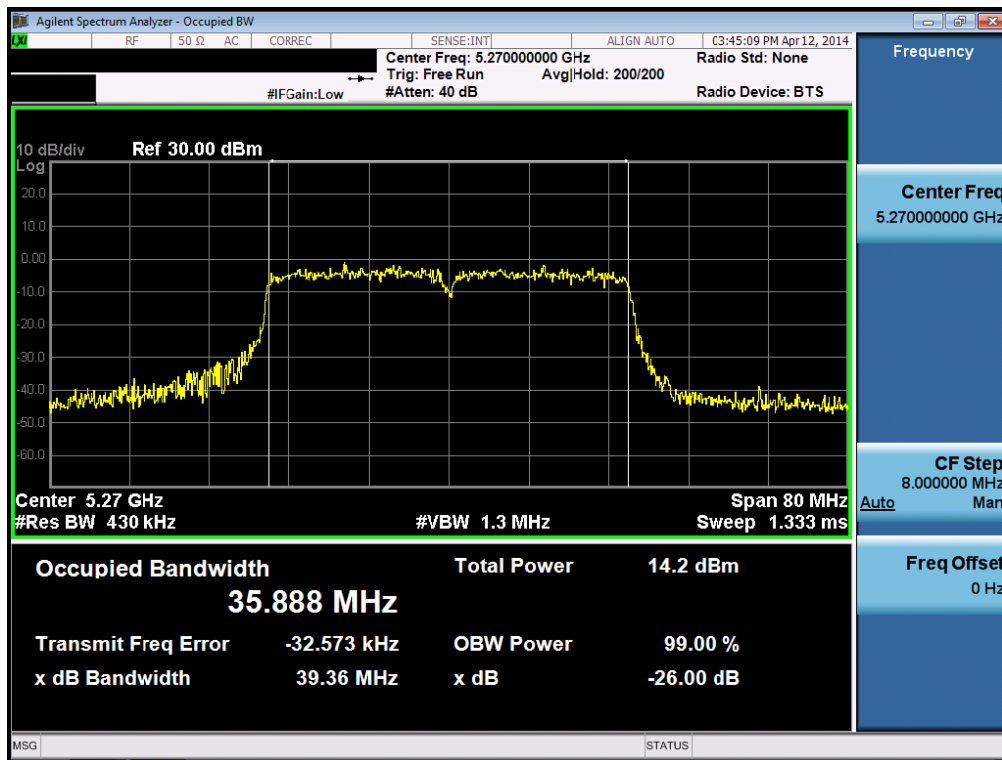
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT40&Ch.46



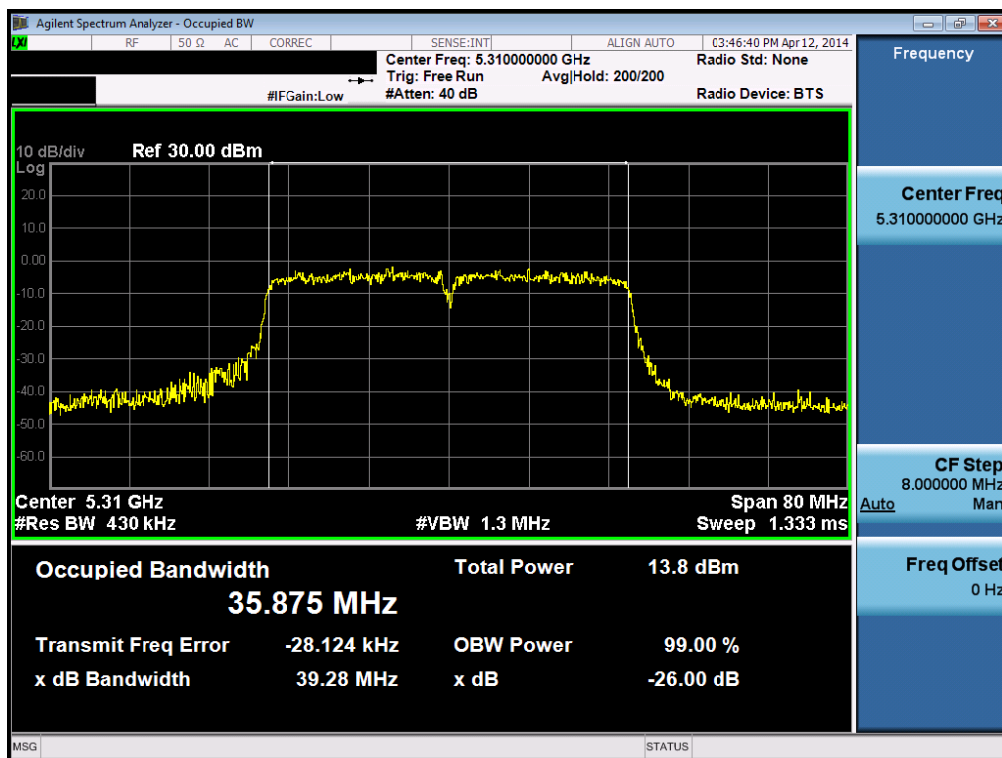
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT40& Ch.54



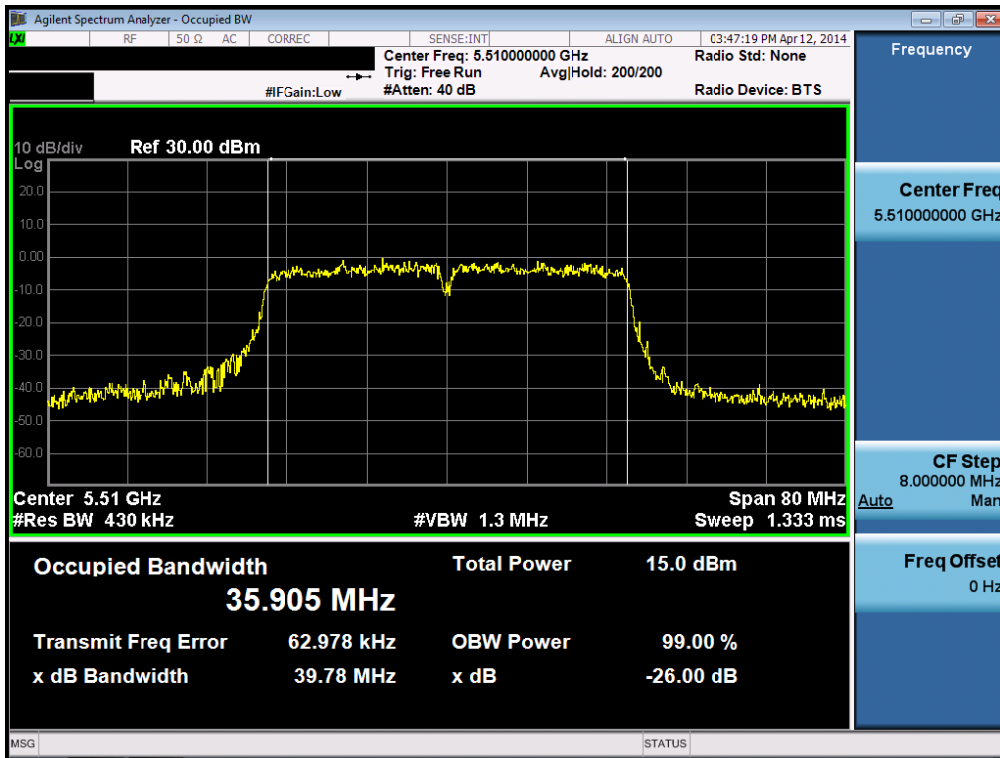
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT40& Ch.62



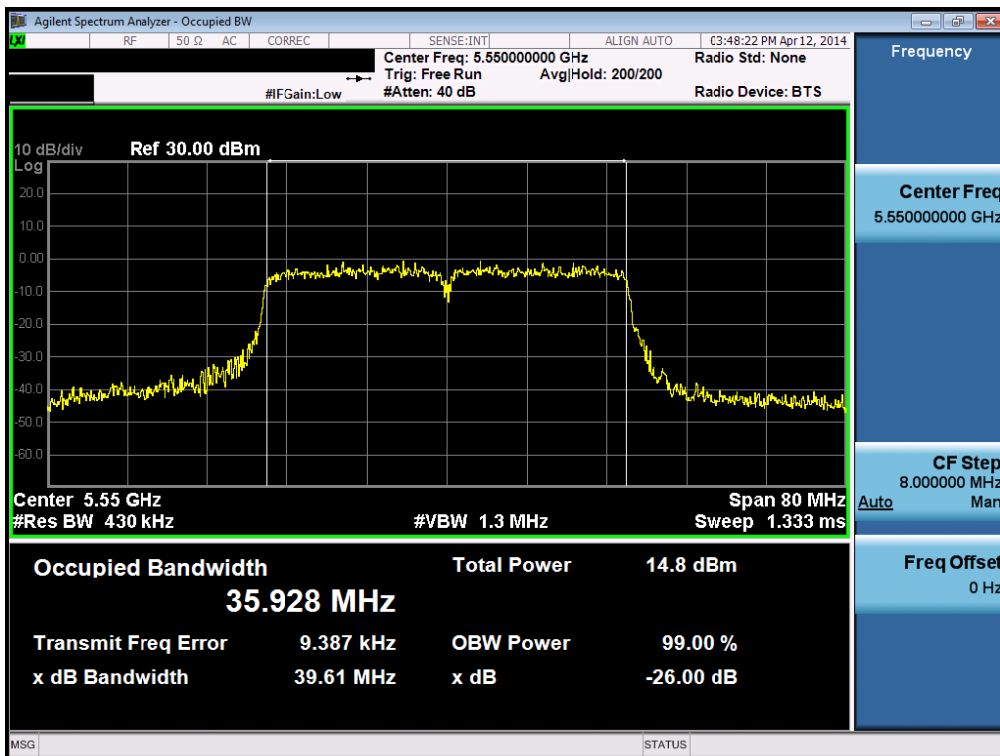
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT40& Ch.102



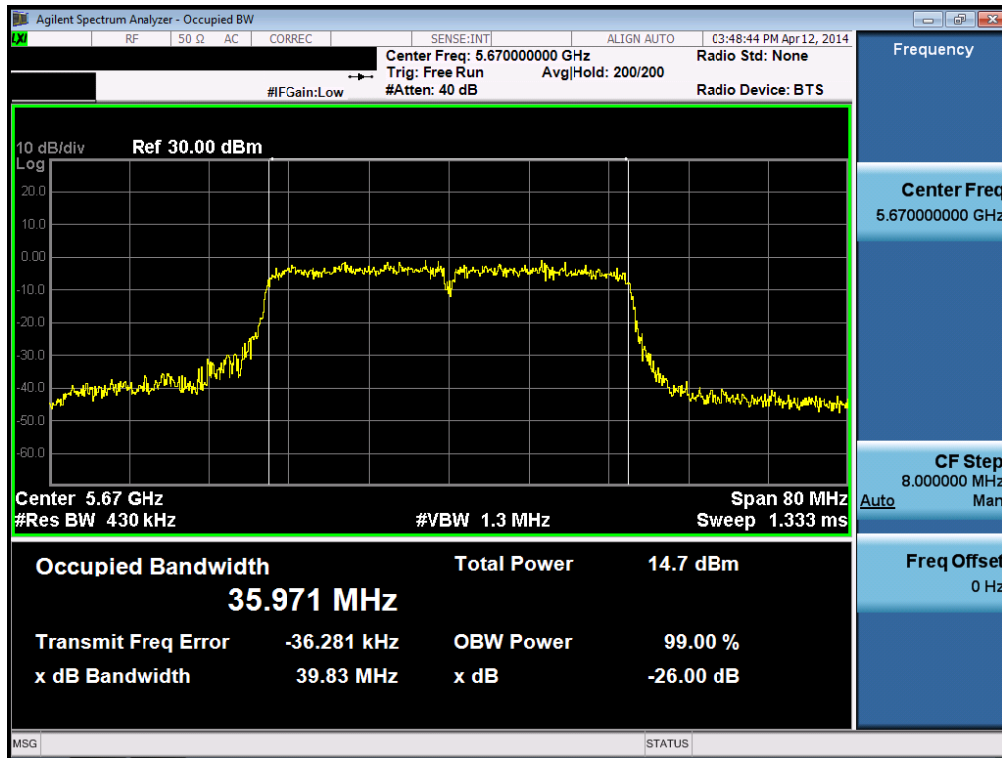
Occupied Bandwidth 99%

Test Mode: ANT 2& 802.11n HT40& Ch.110



Occupied Bandwidth 99%

Test Mode: ANT 2&802.11n HT40& Ch.134



9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	N9030A	13/10/29	14/10/29	MY53310140
Spectrum Analyzer	Agilent	N9020A	14/01/07	15/01/07	MY49100833
Spectrum Analyzer	R&S	FSQ26	14/02/07	15/02/07	200445
Harmonic Mixer for FSQ	OML	WR28	14/02/07	15/02/07	KA100224-1
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A	13/10/29	14/10/29	1338004
		MA2411B			1306053
		MA2490A			1249303
Vector Signal Generator	Rohde Schwarz	SMJ100A	14/01/07	15/01/07	100148
Signal Generator	Rohde Schwarz	SMF100A	13/07/22	14/07/22	102341
Digital Multimeter	H.P	34401A	14/02/27	15/02/27	3146A13475
DC Power Supply	Agilent	66332A	13/10/21	14/10/21	US37474353
Thermo hygrometer	BODYCOM	BJ5478	13/06/01	14/06/01	120612-1
Temp &Humi Test Chamber	SJ Science	TEMI850-10	14/02/28	15/02/28	SJ-TH-S50-120203
Attenuator(3dB)	SMAJK	SMAJK-2-3	13/10/22	14/10/22	3
High-pass filter	Wainwright	WHNX8.5	13/09/12	14/09/12	1
Amplifier (22dB)	H.P	8447E	14/01/07	15/01/07	2945A02865
Amplifier (30dB)	Agilent	8449B	14/02/27	15/02/27	3008A00370
LOOP Antenna	Schwarzbeck	FMZB1513	12/09/24	14/09/24	1513-128
BILOG ANTENNA	SCHAFFNER	CBL6112B	12/11/06	14/11/06	2737
Horn Antenna	ETS	3115	13/02/28	15/02/28	00021097
Horn Antenna	ETS	3117	13/06/14	15/06/14	00140394
HORN ANT	A.H.Systems	SAS-574	13/03/20	15/03/20	154
EMI TEST RECEIVER	R&S	ESU	14/01/07	15/01/07	100014
LISN	SCHWARZBECK	NNLK8121	13/08/12	14/08/12	NNLK8121-580

APPENDIX I

Duty Cycle Information

TEST PROCEDURE

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure of **KDB789033 D02**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW \geq EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW \geq RBW.
4. Set detector = peak.
5. Note: The zero-span measurement method shall not be used unless both **RBW and VBW are $> 50/T$** , where T is defined in section B)1)a), and **the number of sweep points across duration T exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

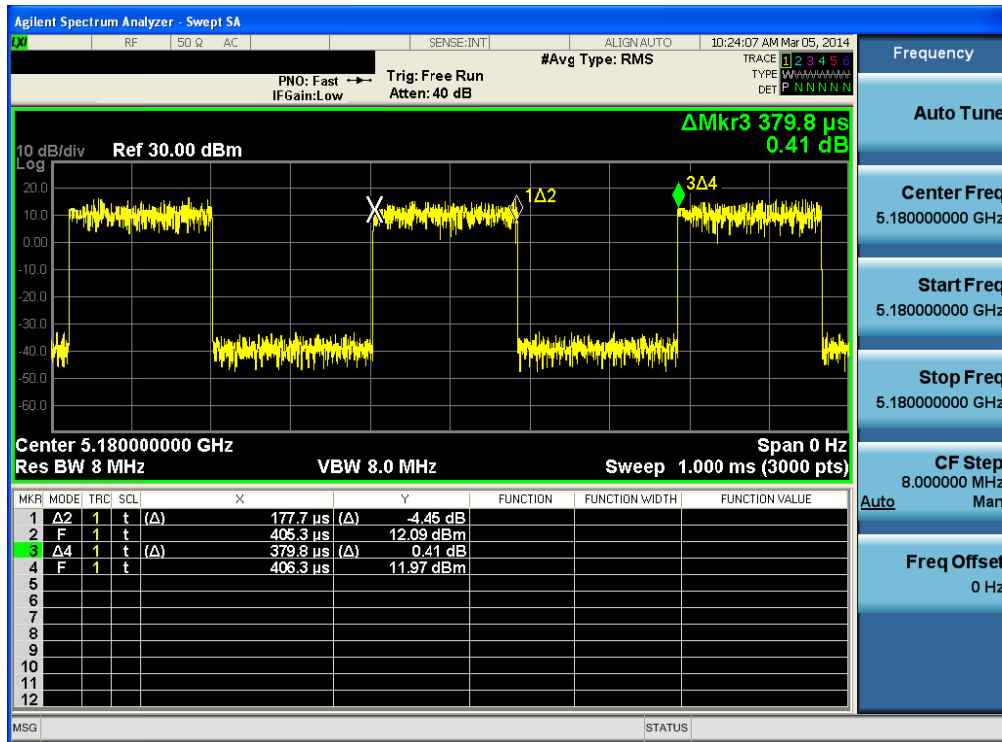
($T =$ **On time** of the above table since the EUT operates with above fixed DutyCycle and it is the minimum On time)

TEST DATA

Mode	Tested ANT	Channel	Tested Frequency [MHz]	Maximum Achievable Duty Cycle (x) = On / (On+Off)			Duty Cycle Correction Factor [dB]
				OnTime [ms]	On+OffTime [ms]	x	
802.11a	ANT 1	40	5180	0.178	0.380	0.46	3.38
802.11n (HT20)		40	5260	0.166	0.370	0.44	3.57
802.11n (HT40)		46	5670	0.097	0.298	0.32	4.95

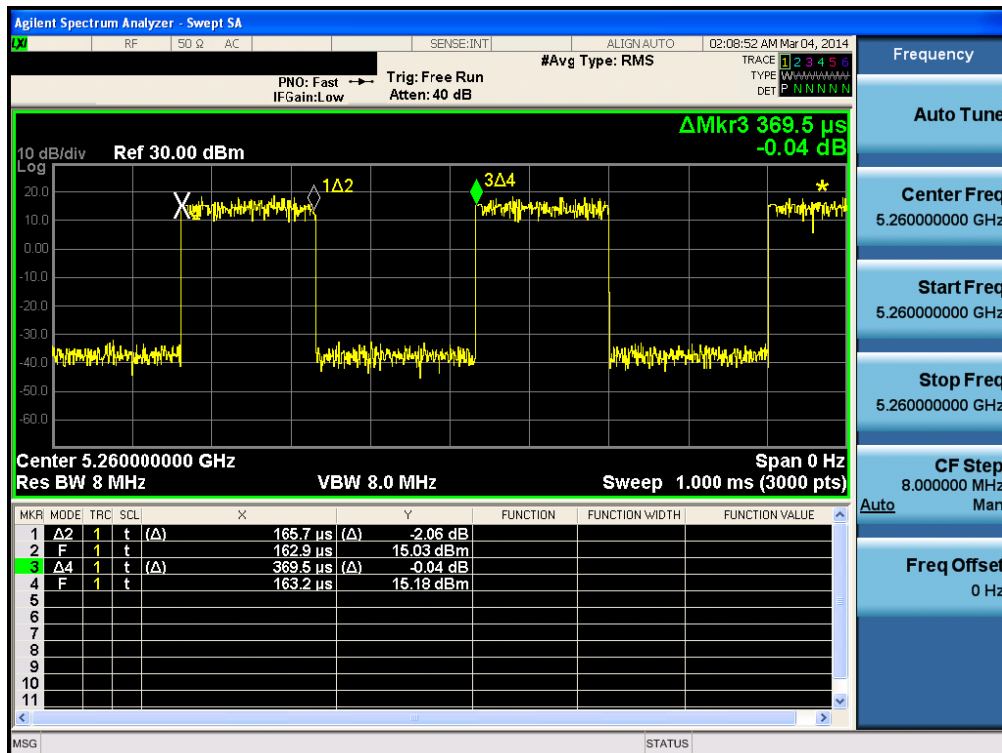
Duty Cycle

Test Mode: ANT 1 &802.11a& Ch.36



Duty Cycle

Test Mode: ANT 1 &802.11n HT20& Ch.52



Duty Cycle

Test Mode: ANT 1 & 802.11n HT40& Ch.134

