

6. 6dB & 26dB & 99% Bandwidth Test

6.1. Test Equipment

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|---------------------|--------------|----------------------|------------|-----------|---------------|
| 1. | PXA Signal Analyzer | Agilent | N9030A | MY51380221 | Sep.08,18 | 1 Year |
| 2. | Attenuator | Agilent | 8491B | MY39269170 | Oct.14,18 | 1 Year |
| 3. | RF Cable | Hubersuhner | SUCOFLEX106 | 505239/6 | Apr.23,18 | 1 Year |
| 4. | RF Cable | EMCI | EMC102-KM-KM 3500 | 170702 | May.13,19 | 1 Year |

6.2. Limit

6dB Bandwidth should be not less than 500kHz

6.3. Test Procedure

6dB Bandwidth:

The transmitter output was connected to a spectrum analyzer, The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300 KHz VBW for signal width below 20MHz and 300KHz RBW ,1MHz VBW for Above 20MHz signal Bandwidth.

26dB Bandwidth:

- (a) Set RBW = approximately 1% of the emission bandwidth.
- (b) Set the VBW > RBW.
- (c) Detector = Peak.
- (d) Trace mode = max hold.
- (e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

99% Occupied bandwidth:

Use the test method described in ANSI C63.10 Section 6.9.2:

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.4. Test Results

5180-5240MHz Band

| | | |
|-----------------------------|-------------------------|--------------------------|
| EUT: BCM dual band 2*2 WiFi | | |
| M/N: 50-0102-BC-22 | | |
| Test date: 2019-01-16 | Pressure: 102.5±1.0 kpa | Humidity: 53.1±3.0% |
| Tested by: Garry | Test site: RF site | Temperature: 22.6±0.6 °C |

26dB bandwidth:

| Test Mode | Frequency (MHz) | 26dB Bandwidth (MHz) | | Limit (KHz) |
|------------------|-----------------|----------------------|-------|-------------|
| | | ANT0 | ANT1 | |
| 11a | 5180 | 21.41 | 21.38 | N/A |
| | 5200 | 21.33 | 21.43 | N/A |
| | 5240 | 21.33 | 21.41 | N/A |
| 11n HT20 | 5180 | 21.75 | 21.71 | N/A |
| | 5200 | 21.46 | 21.08 | N/A |
| | 5240 | 21.59 | 21.19 | N/A |
| 11n HT40 | 5190 | 40.02 | 39.62 | N/A |
| | 5230 | 39.77 | 39.69 | N/A |
| 11ac VHT20 | 5180 | 21.70 | 21.31 | N/A |
| | 5200 | 21.68 | 21.19 | N/A |
| | 5240 | 21.55 | 21.11 | N/A |
| 11ac VHT40 | 5190 | 40.12 | 40.02 | N/A |
| | 5230 | 39.88 | 40.25 | N/A |
| 11ac VHT80 | 5210 | 81.58 | 81.56 | N/A |
| Conclusion: PASS | | | | |

99% Occupied bandwidth:

| Test Mode | Frequency (MHz) | 99% bandwidth (MHz) | | Limit (KHz) |
|------------------|-----------------|---------------------|--------|-------------|
| | | ANT0 | ANT1 | |
| 11a | 5180 | 16.865 | 16.873 | N/A |
| | 5200 | 16.892 | 16.777 | N/A |
| | 5240 | 16.857 | 16.805 | N/A |
| 11n HT20 | 5180 | 17.910 | 17.906 | N/A |
| | 5200 | 17.903 | 17.875 | N/A |
| | 5240 | 17.883 | 17.804 | N/A |
| 11n HT40 | 5190 | 36.296 | 36.291 | N/A |
| | 5230 | 36.328 | 36.345 | N/A |
| 11ac VHT20 | 5180 | 17.923 | 17.808 | N/A |
| | 5200 | 17.881 | 17.915 | N/A |
| | 5240 | 17.871 | 17.869 | N/A |
| 11ac VHT40 | 5190 | 36.312 | 36.361 | N/A |
| | 5230 | 36.309 | 36.337 | N/A |
| 11ac VHT80 | 5210 | 75.711 | 75.744 | N/A |
| Conclusion: PASS | | | | |

5260-5320MHz Band:

26dB bandwidth

| | | |
|-----------------------------|-------------------------|--------------------------|
| EUT: BCM dual band 2*2 WiFi | | |
| M/N: 50-0102-BC-22 | | |
| Test date: 2019-01-16~23 | Pressure: 102.3±1.0 kpa | Humidity: 51.6±3.0% |
| Tested by: Garry | Test site: RF site | Temperature: 22.5±0.6 °C |

| Test Mode | Frequency (MHz) | 26dB Bandwidth (MHz) | | Limit (KHz) |
|------------|-----------------|----------------------|-------|-------------|
| | | ANT0 | ANT1 | |
| 11a | 5260 | 21.30 | 21.07 | N/A |
| | 5300 | 21.33 | 21.38 | N/A |
| | 5320 | 21.33 | 21.26 | N/A |
| 11n HT20 | 5260 | 21.54 | 21.53 | N/A |
| | 5300 | 21.49 | 21.80 | N/A |
| | 5320 | 21.73 | 21.71 | N/A |
| 11n HT40 | 5270 | 39.64 | 40.05 | N/A |
| | 5310 | 39.56 | 40.26 | N/A |
| 11ac VHT20 | 5260 | 21.56 | 21.45 | N/A |
| | 5300 | 21.62 | 21.41 | N/A |
| | 5320 | 21.65 | 21.80 | N/A |
| 11ac VHT40 | 5270 | 39.86 | 40.14 | N/A |
| | 5310 | 39.83 | 40.03 | N/A |
| 11ac VHT80 | 5290 | 81.35 | 81.73 | N/A |

Conclusion: PASS

5500-5700MHz Band:

26dB bandwidth

| | | |
|-----------------------------|-------------------------|--------------------------|
| EUT: BCM dual band 2*2 WiFi | | |
| M/N: 50-0102-BC-22 | | |
| Test date: 2019-01-23 | Pressure: 102.3±1.0 kpa | Humidity: 51.6±3.0% |
| Tested by: Garry | Test site: RF site | Temperature: 22.5±0.6 °C |

| Test Mode | Frequency (MHz) | 26dB Bandwidth (MHz) | | Limit (KHz) |
|------------|-----------------|----------------------|-------|-------------|
| | | ANT0 | ANT1 | |
| 11a | 5500 | 21.15 | 21.47 | N/A |
| | 5600 | 21.32 | 21.45 | N/A |
| | 5700 | 21.29 | 21.39 | N/A |
| 11n HT20 | 5500 | 21.77 | 21.63 | N/A |
| | 5600 | 21.45 | 21.62 | N/A |
| | 5700 | 21.65 | 21.46 | N/A |
| 11n HT40 | 5510 | 39.66 | 39.92 | N/A |
| | 5590 | 39.49 | 39.99 | N/A |
| | 5670 | 39.66 | 40.13 | N/A |
| 11ac VHT20 | 5500 | 21.42 | 21.60 | N/A |
| | 5600 | 21.55 | 21.80 | N/A |
| | 5700 | 21.43 | 21.85 | N/A |
| 11ac VHT40 | 5510 | 39.74 | 39.93 | N/A |
| | 5590 | 39.71 | 40.18 | N/A |
| | 5670 | 39.60 | 40.29 | N/A |
| 11ac VHT80 | 5530 | 81.10 | 82.08 | N/A |
| | 5610 | 81.75 | 82.37 | N/A |

Conclusion: PASS

5745-5825MHz Band:

6dB bandwidth

| | | |
|-----------------------------|-------------------------|--------------------------|
| EUT: BCM dual band 2*2 WiFi | | |
| M/N: 50-0102-BC-22 | | |
| Test date: 2019-02-19 | Pressure: 102.7±1.0 kpa | Humidity: 54.1±3.0% |
| Tested by: Garry | Test site: RF site | Temperature: 23.4±0.6 °C |

| Test Mode | Frequency (MHz) | 6dB Bandwidth (MHz) | | Limit (KHz) |
|------------------|-----------------|---------------------|-------|-------------|
| | | ANT0 | ANT1 | |
| 11a | 5745 | 16.36 | 16.34 | ≥ 500 |
| | 5785 | 16.37 | 16.33 | ≥ 500 |
| | 5825 | 16.37 | 16.32 | ≥ 500 |
| 11n HT20 | 5745 | 17.59 | 17.56 | ≥ 500 |
| | 5785 | 17.60 | 17.30 | ≥ 500 |
| | 5825 | 17.60 | 17.56 | ≥ 500 |
| 11n HT40 | 5755 | 36.07 | 35.94 | ≥ 500 |
| | 5795 | 36.39 | 36.06 | ≥ 500 |
| 11ac VHT20 | 5745 | 17.59 | 17.53 | ≥ 500 |
| | 5785 | 17.58 | 17.31 | ≥ 500 |
| | 5825 | 17.56 | 17.34 | ≥ 500 |
| 11ac VHT40 | 5755 | 36.17 | 36.04 | ≥ 500 |
| | 5795 | 36.13 | 36.08 | ≥ 500 |
| 11ac VHT80 | 5775 | 75.62 | 75.41 | ≥ 500 |
| Conclusion: PASS | | | | |

26dB bandwidth

| | | |
|-----------------------------|-------------------------|--------------------------|
| EUT: BCM dual band 2*2 WiFi | | |
| M/N: 50-0102-BC-22 | | |
| Test date: 2019-01-23 | Pressure: 102.7±1.0 kpa | Humidity: 54.1±3.0% |
| Tested by: Garry | Test site: RF site | Temperature: 23.4±0.6 °C |

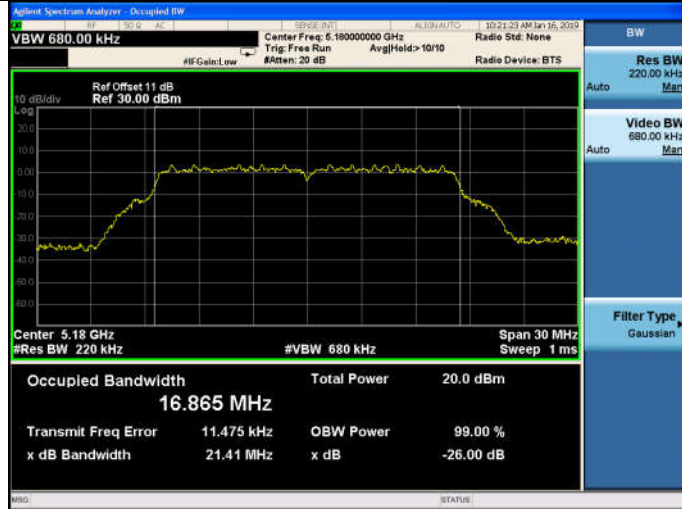
| Test Mode | Frequency (MHz) | 26dB Bandwidth (MHz) | | Limit (KHz) |
|------------|-----------------|----------------------|-------|-------------|
| | | ANT0 | ANT1 | |
| 11a | 5745 | 21.38 | 21.61 | N/A |
| | 5785 | 21.36 | 21.58 | N/A |
| | 5825 | 21.32 | 21.50 | N/A |
| 11n HT20 | 5745 | 21.55 | 21.62 | N/A |
| | 5785 | 21.73 | 21.48 | N/A |
| | 5825 | 21.46 | 21.61 | N/A |
| 11n HT40 | 5755 | 39.65 | 40.32 | N/A |
| | 5795 | 39.73 | 40.29 | N/A |
| 11ac VHT20 | 5745 | 21.52 | 21.66 | N/A |
| | 5785 | 21.45 | 21.56 | N/A |
| | 5825 | 21.63 | 21.66 | N/A |
| 11ac VHT40 | 5755 | 39.71 | 40.12 | N/A |
| | 5795 | 39.74 | 40.22 | N/A |
| 11ac VHT80 | 5775 | 81.39 | 82.11 | N/A |

Conclusion: PASS

5180-5240MHz Band:
26dB bandwidth & 99% Occupied bandwidth
ANT 0

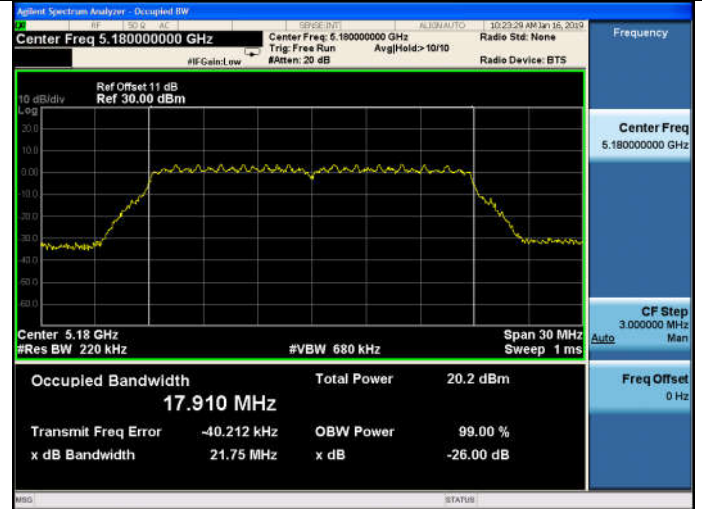
11a

5180MHz

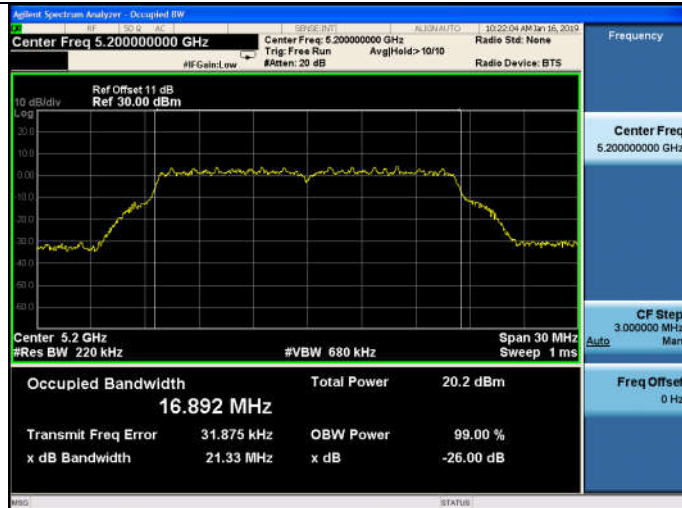


11n HT20

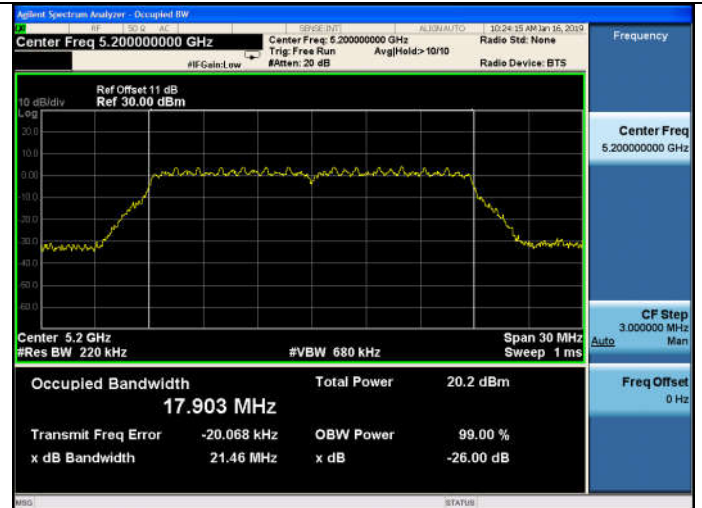
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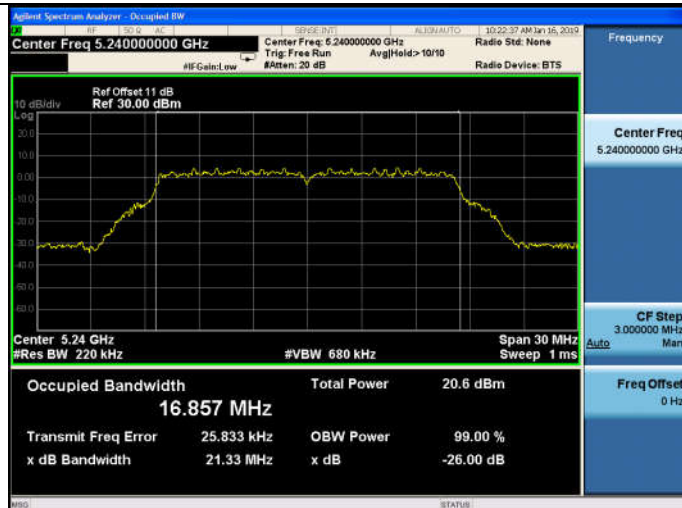
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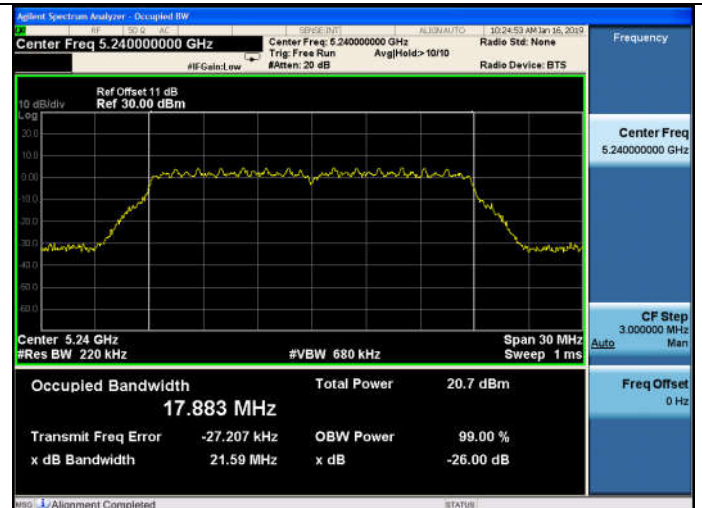
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5240MHz

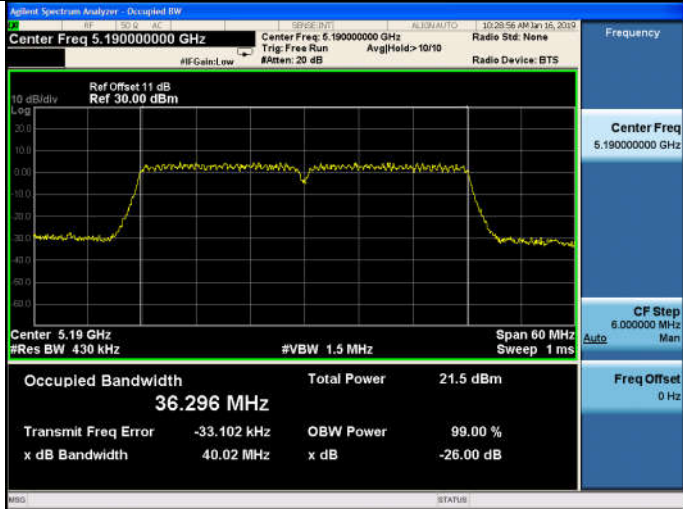


5240MHz

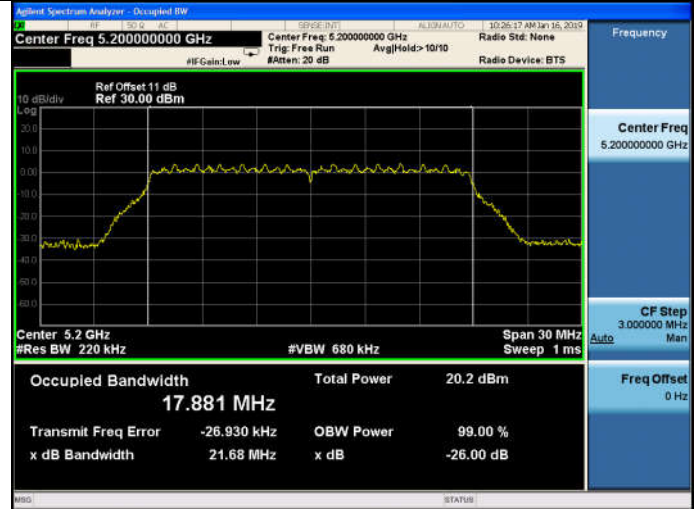


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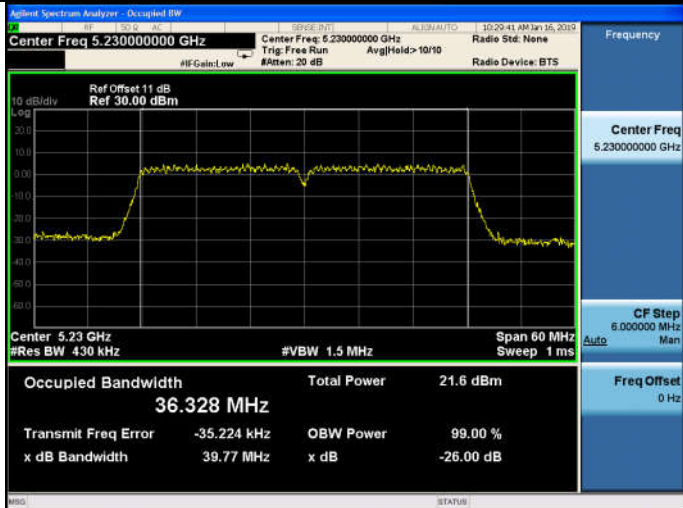
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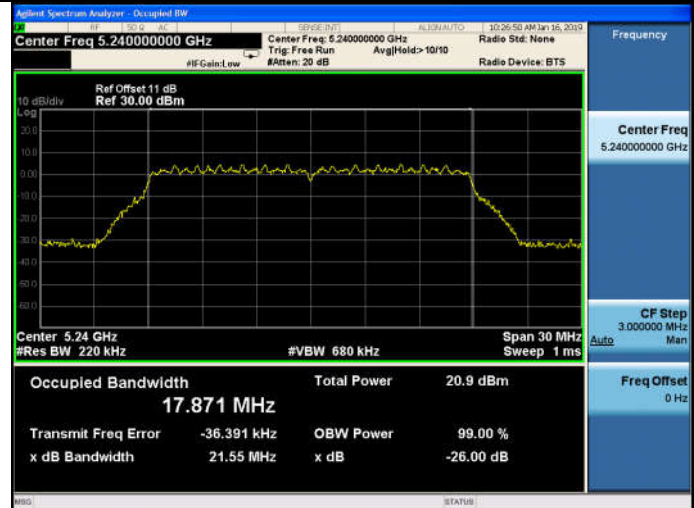
5200MHz



5230MHz

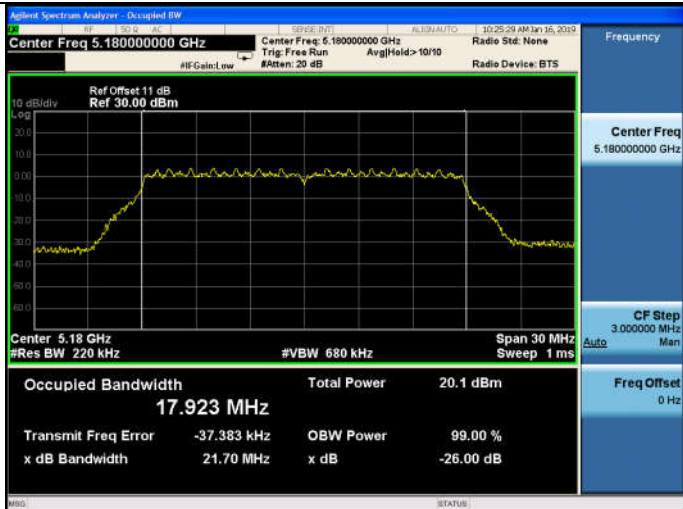


5240MHz



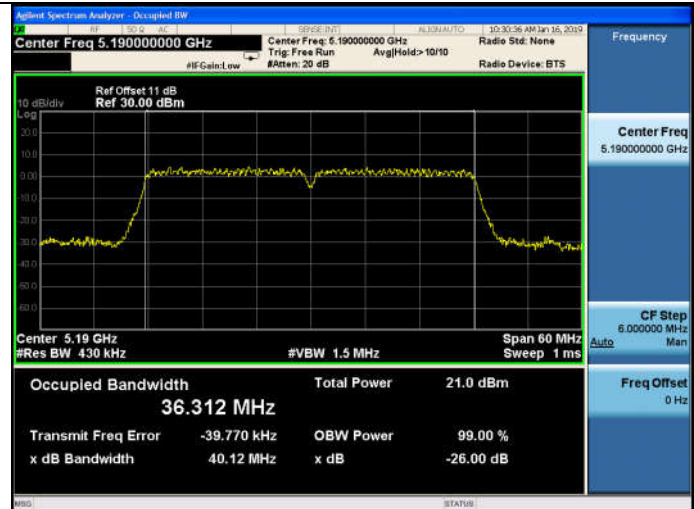
11ac VHT20

5180MHz

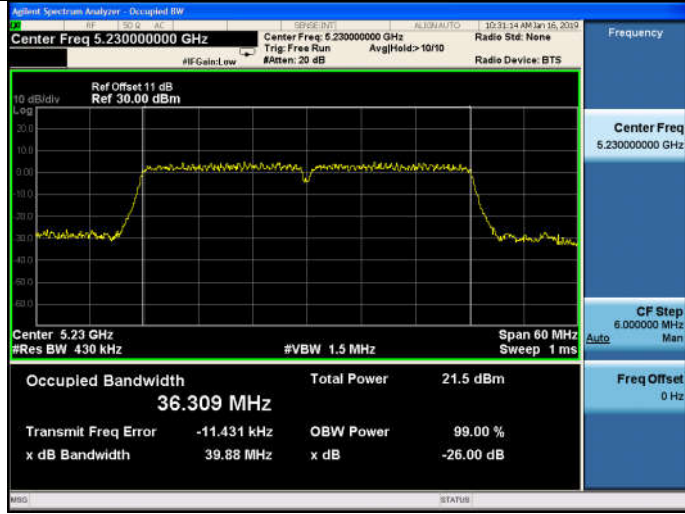


11ac VHT40

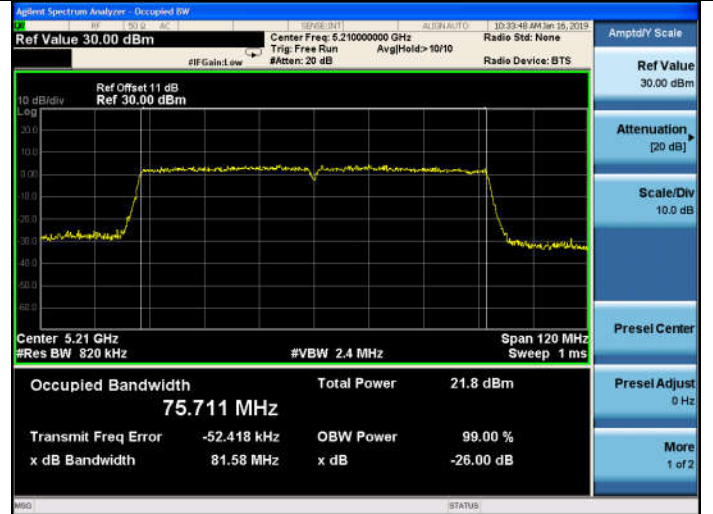
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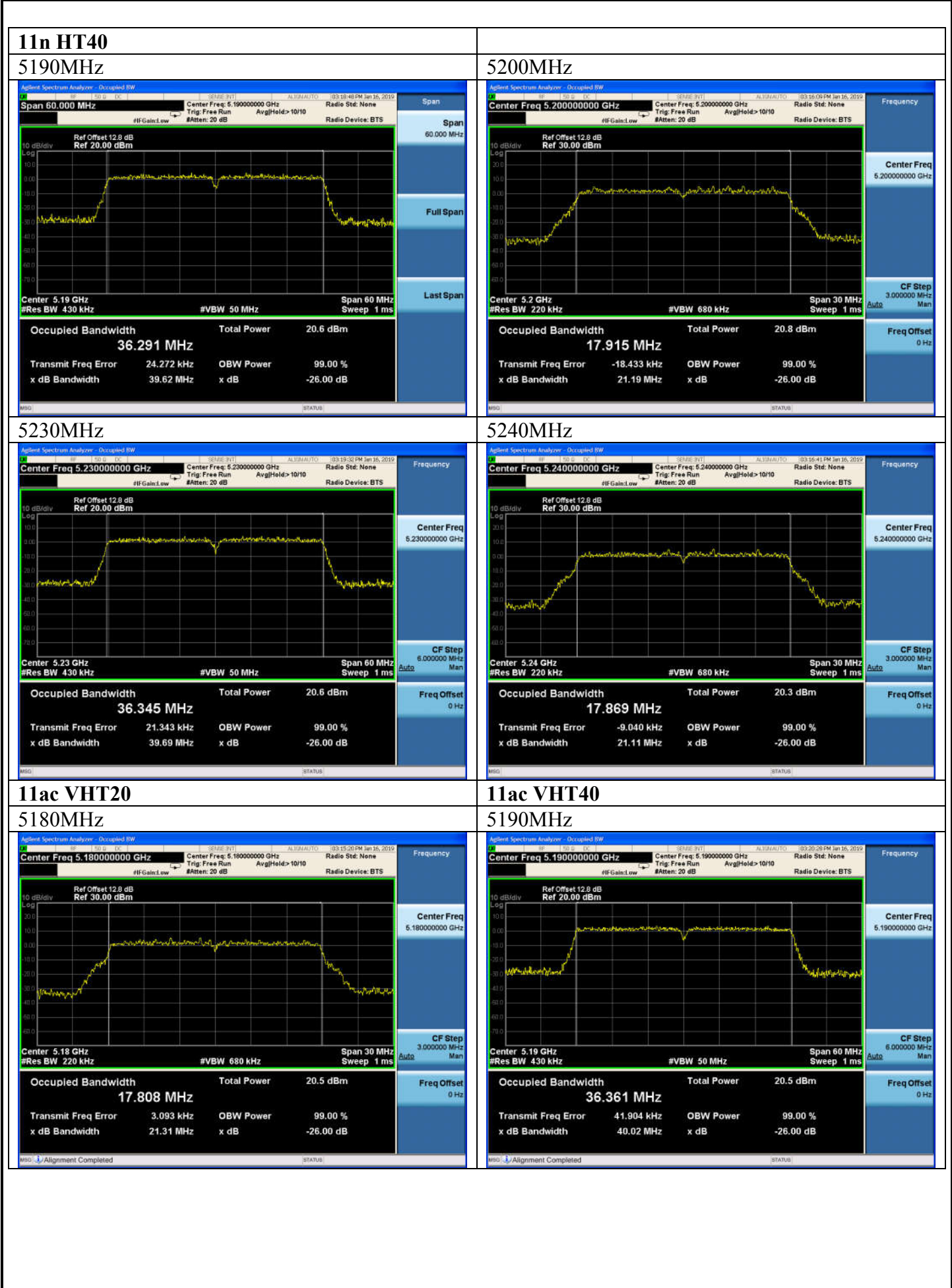


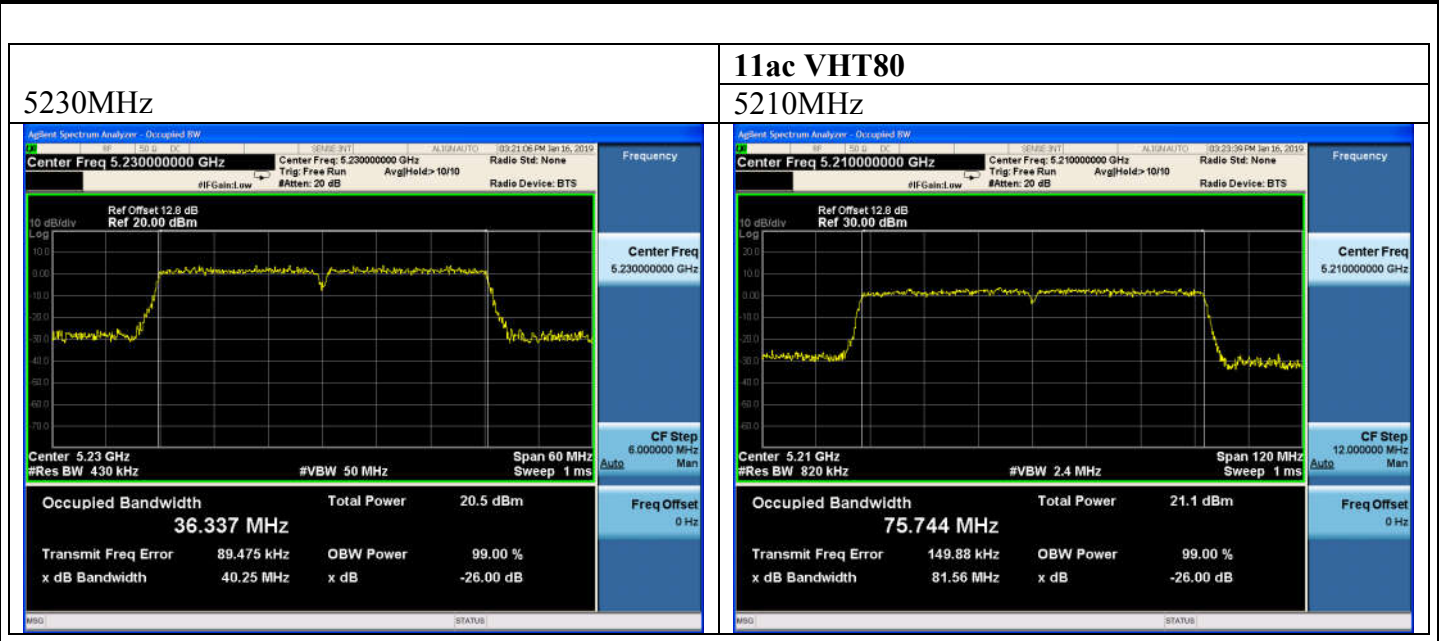
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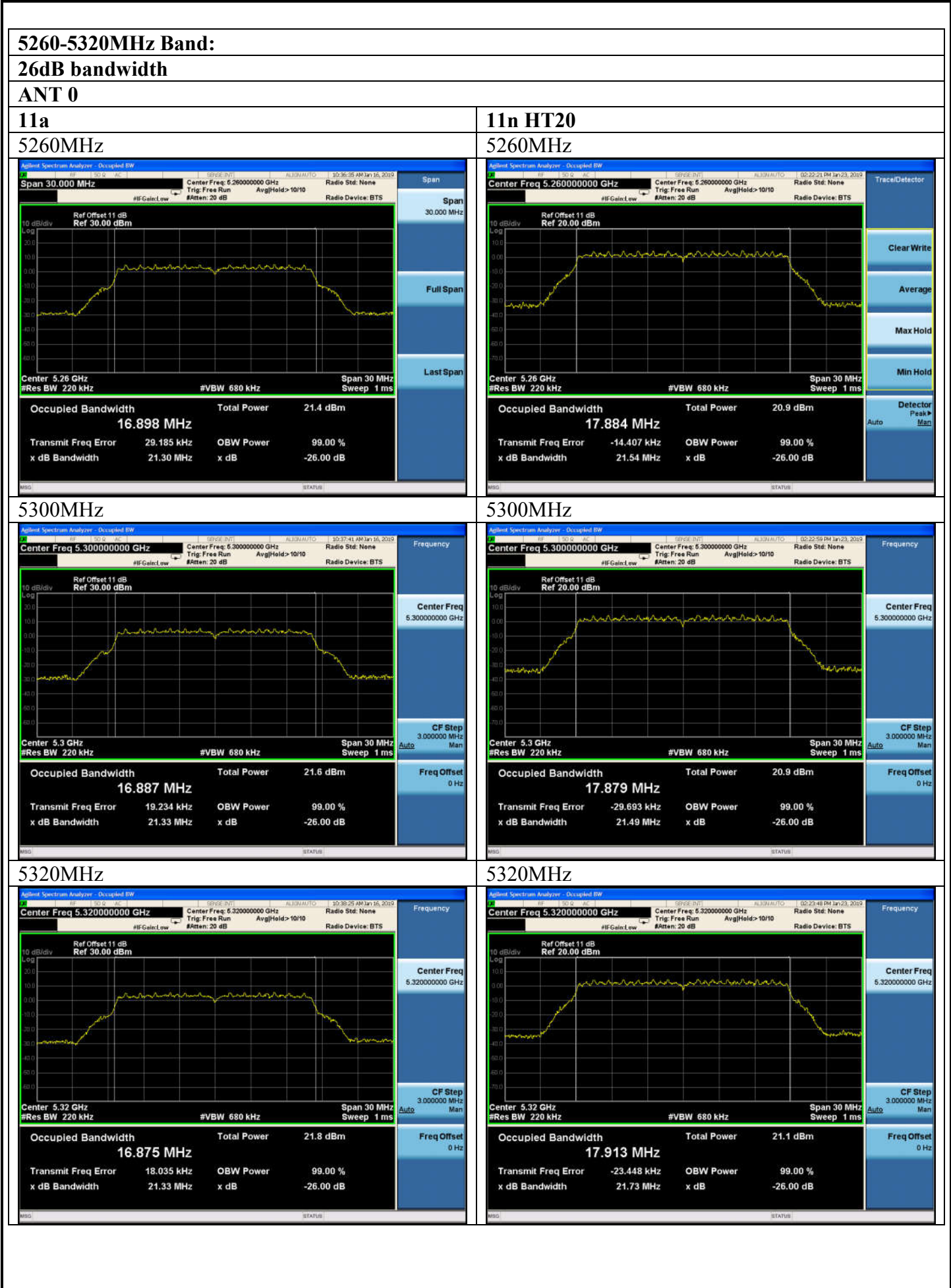


11ac VHT80
5210MHz



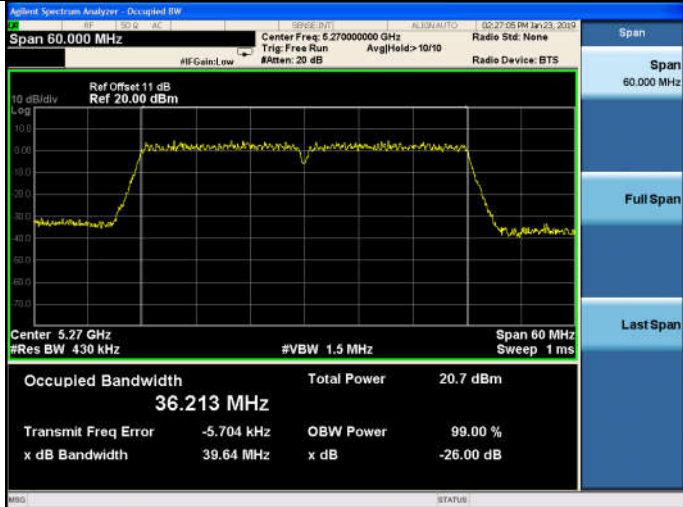




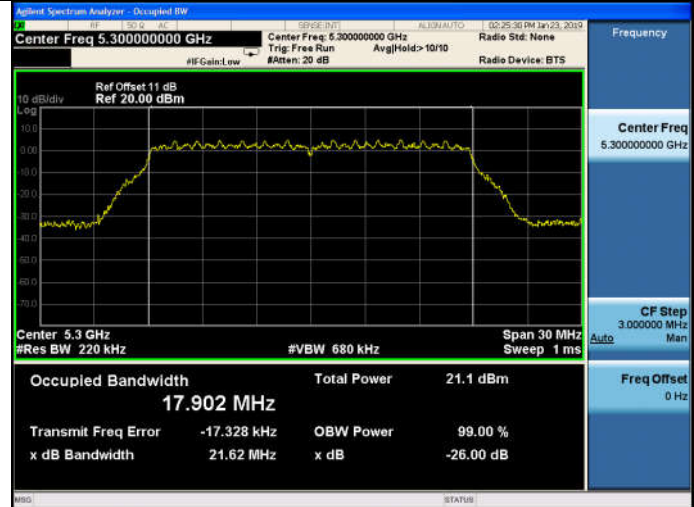


11n HT40

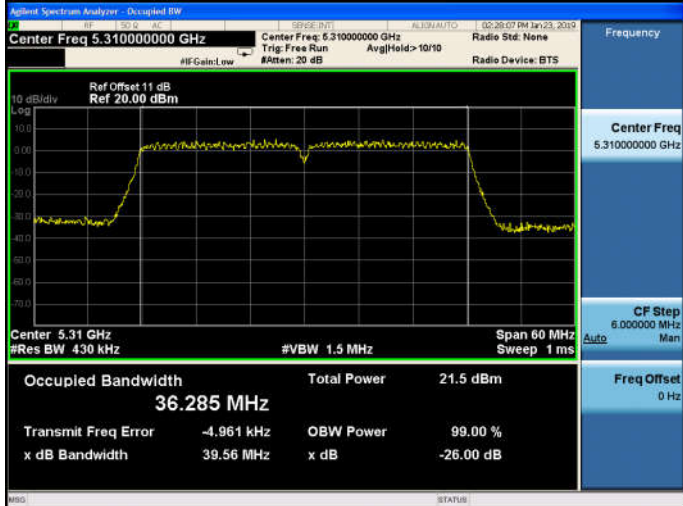
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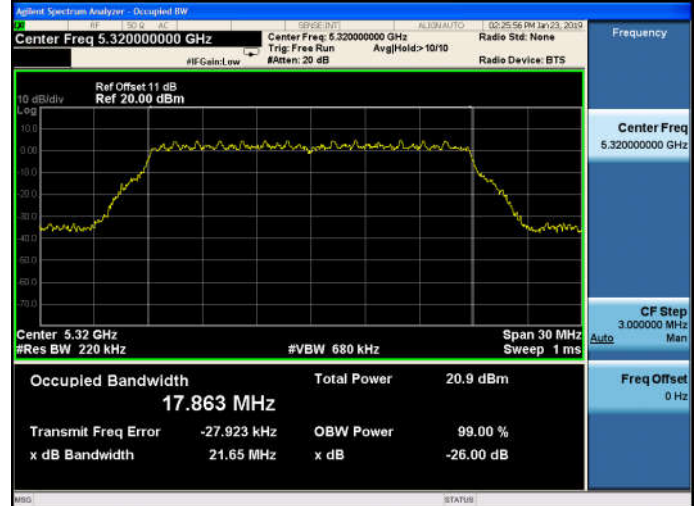
5300MHz



5310MHz

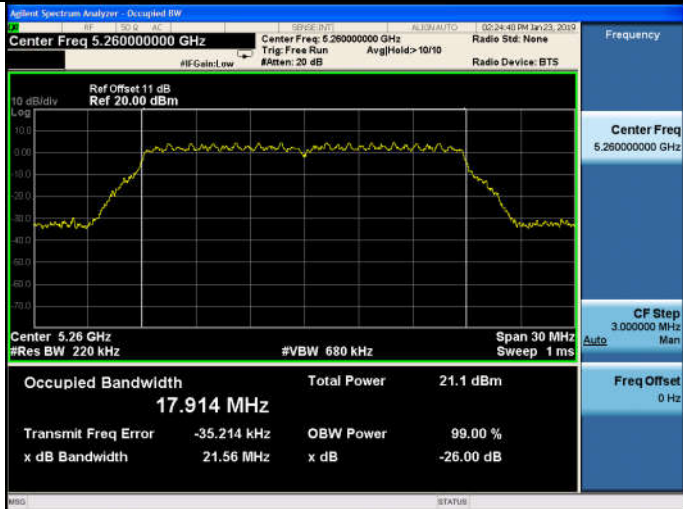


5320MHz



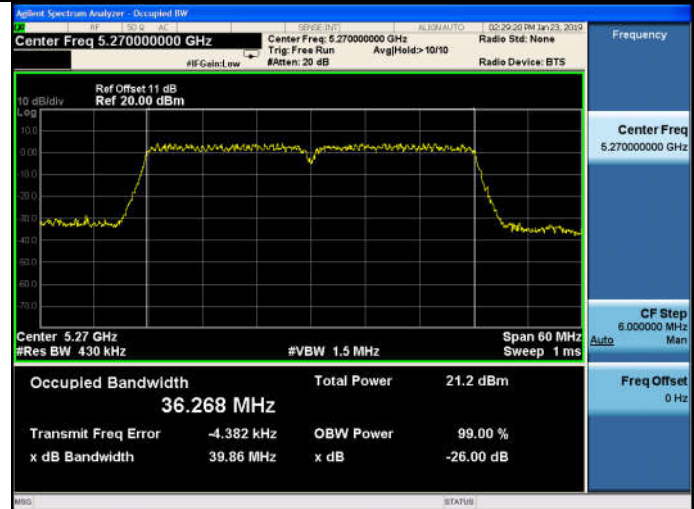
11ac VHT20

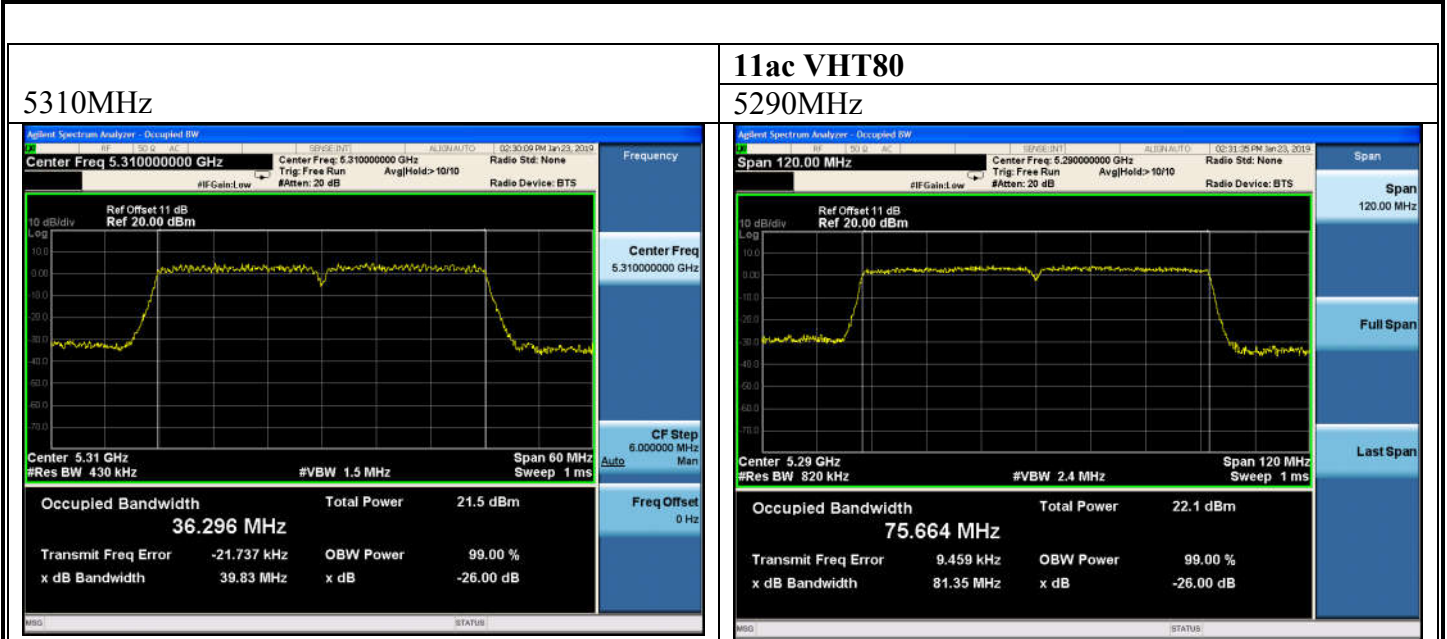
5260MHz



11ac VHT40

5270MHz





5260-5320MHz Band:

26dB bandwidth

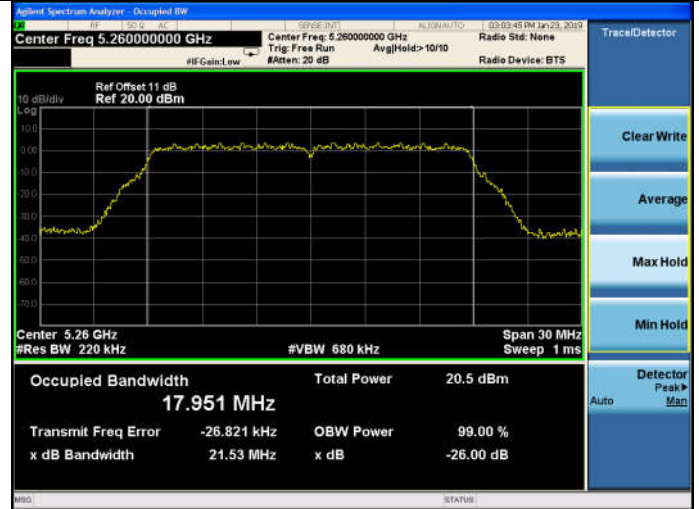
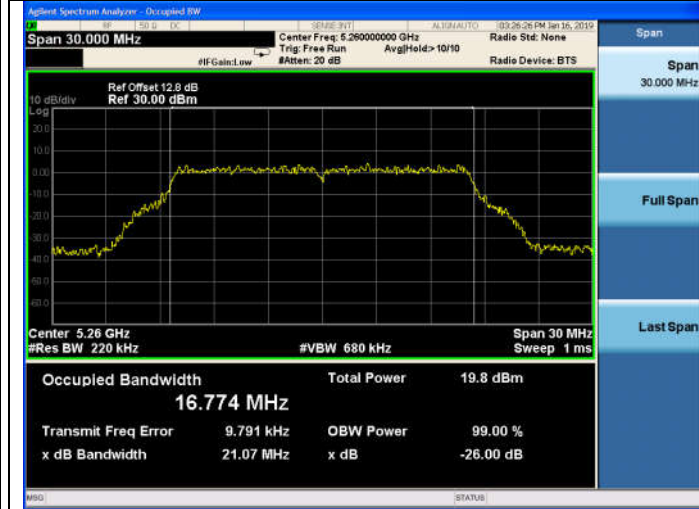
ANT 1

11a

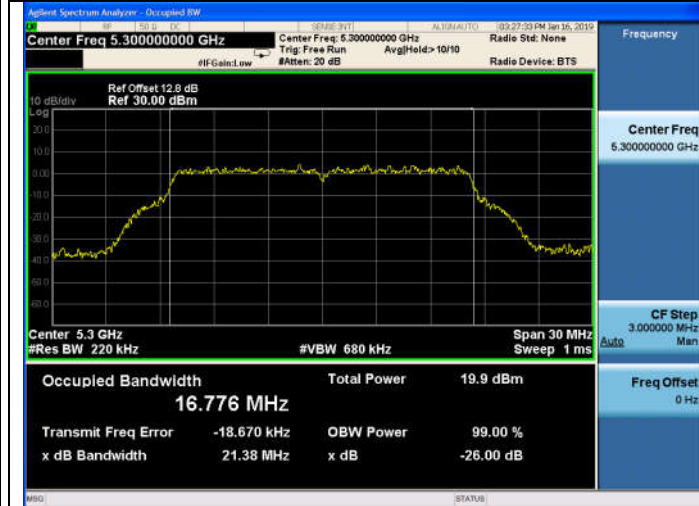
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11n HT20

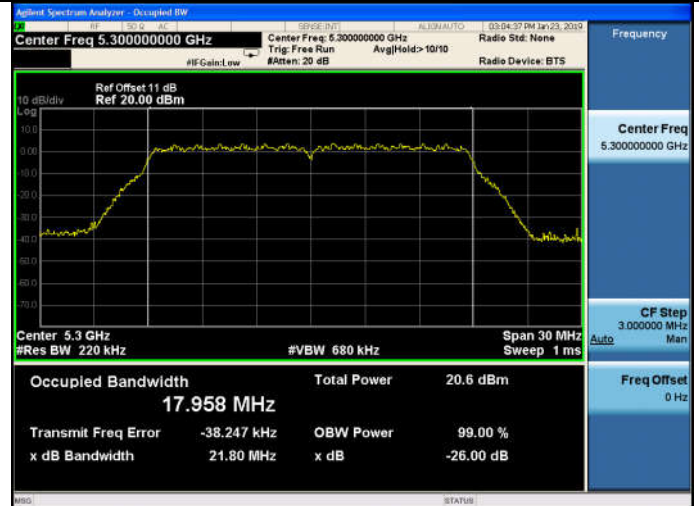
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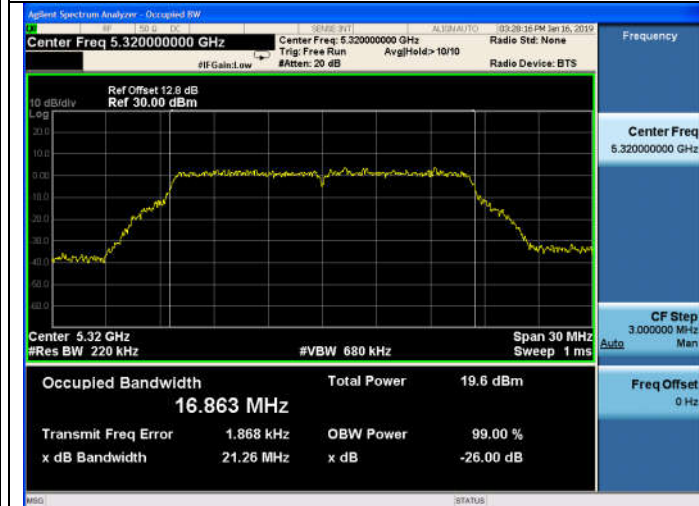
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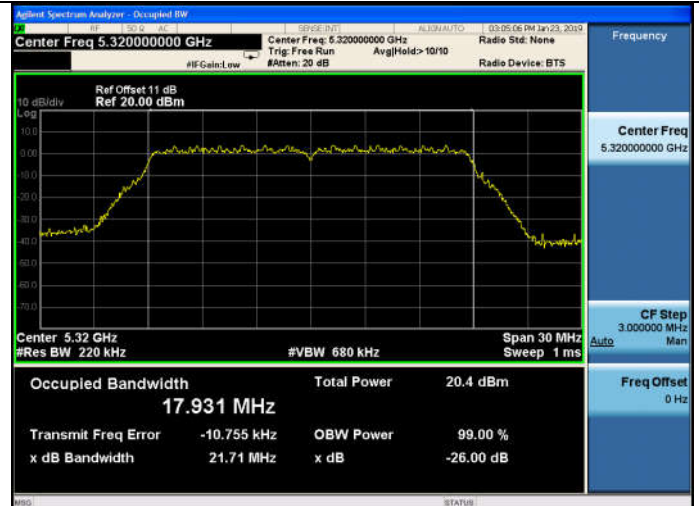
5300MHz



5320MHz

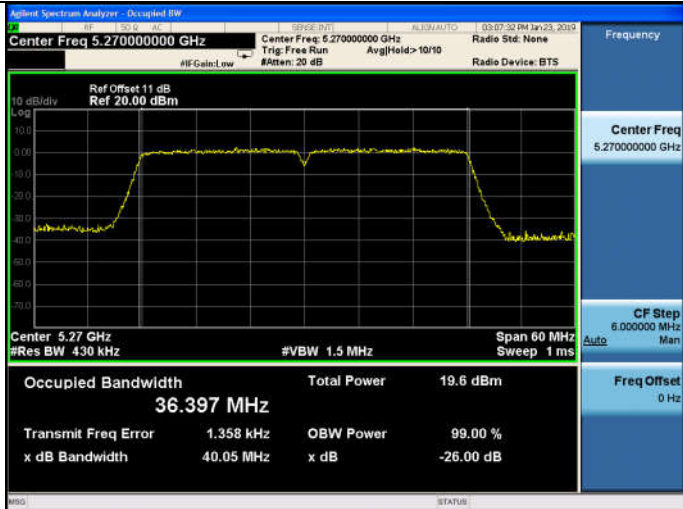


5320MHz

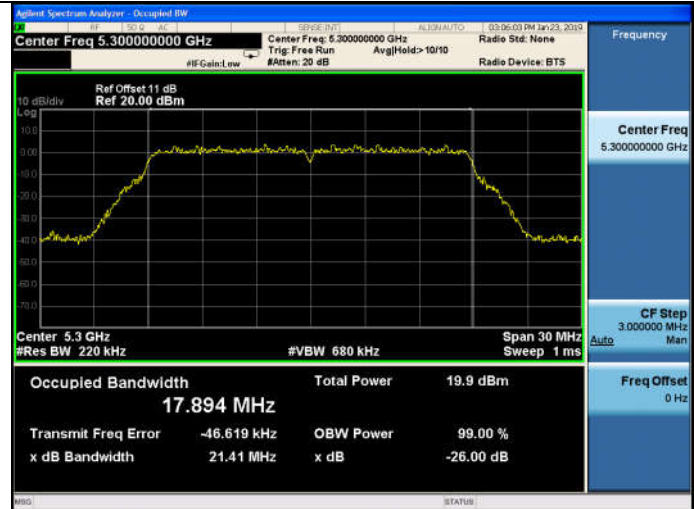


11n HT40

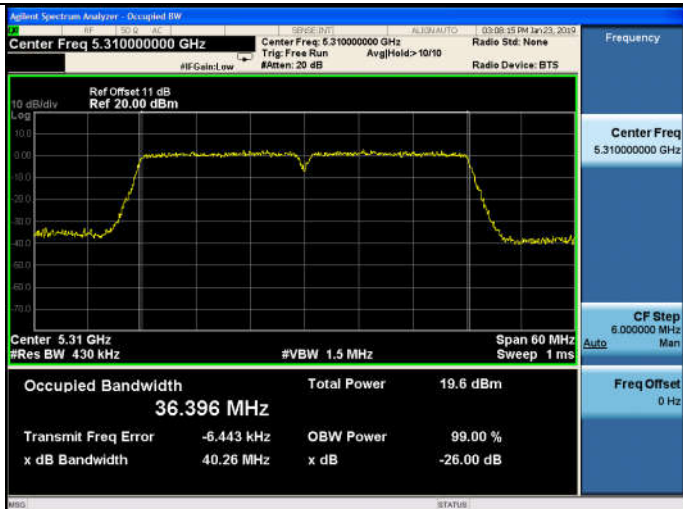
5270MHz



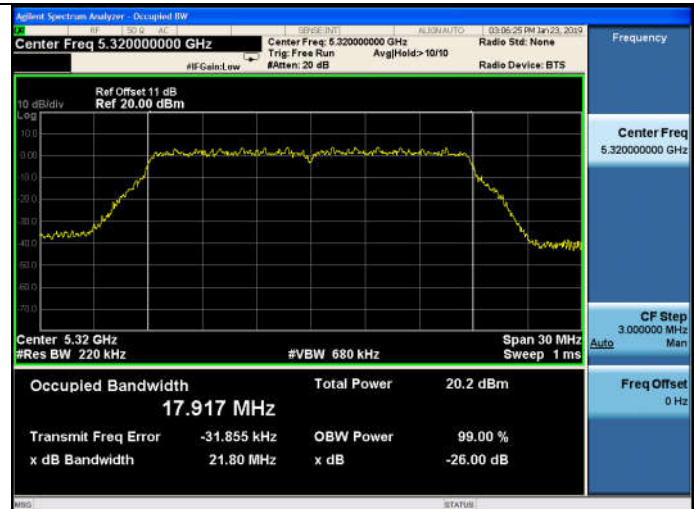
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5310MHz

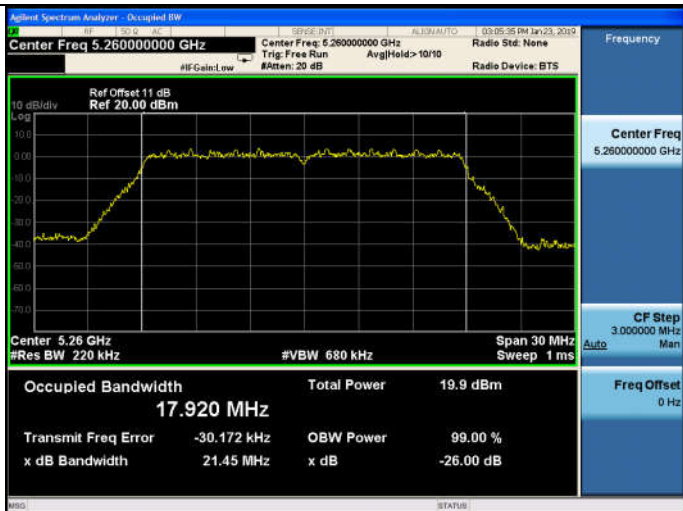


5320MHz



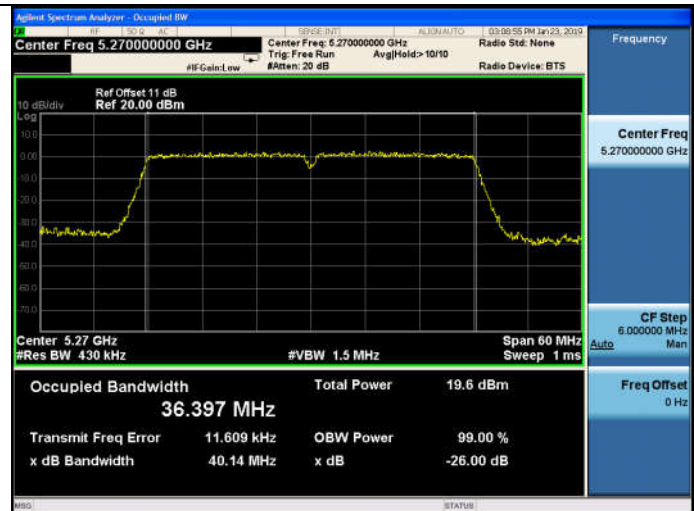
11ac VHT20

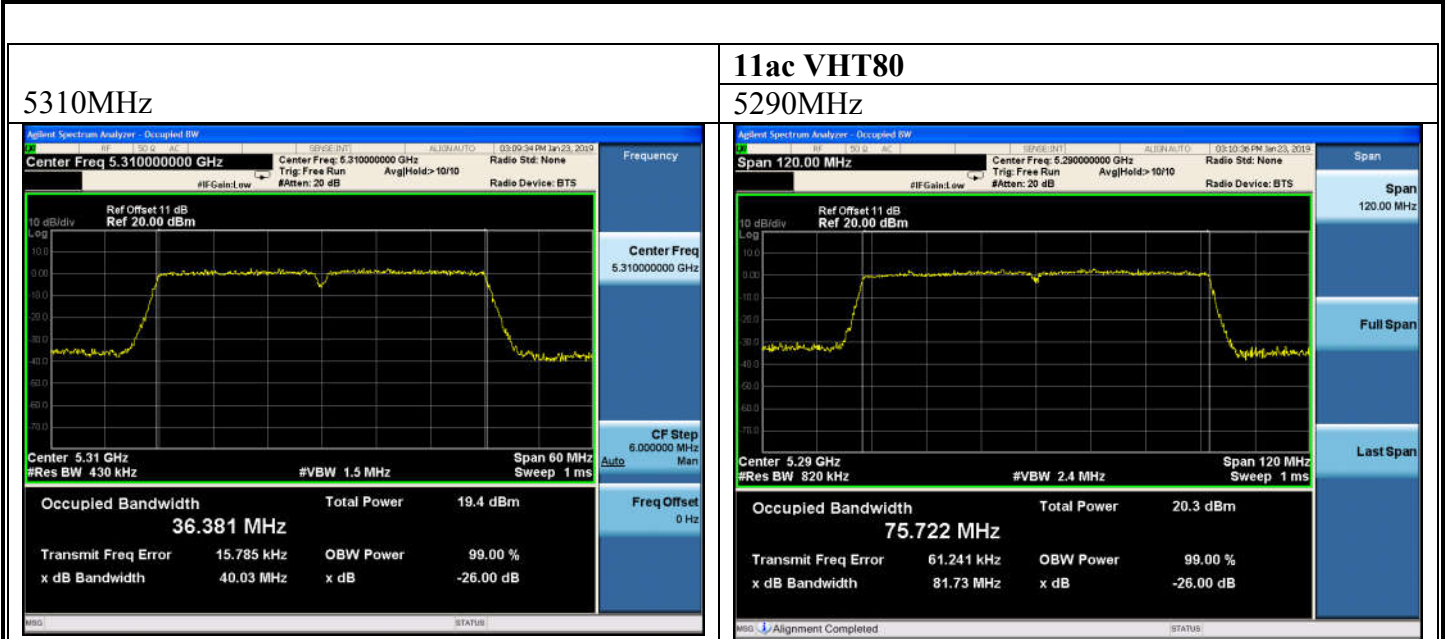
5260MHz



11ac VHT40

5270MHz





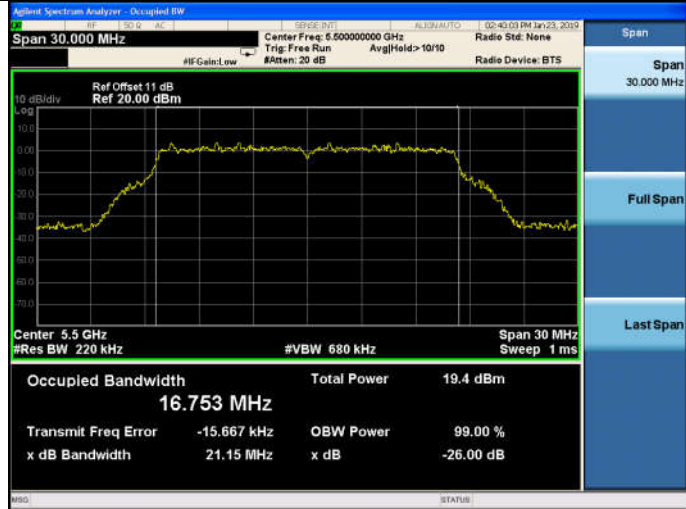
5500-5700MHz Band:

26dB bandwidth

ANT 0

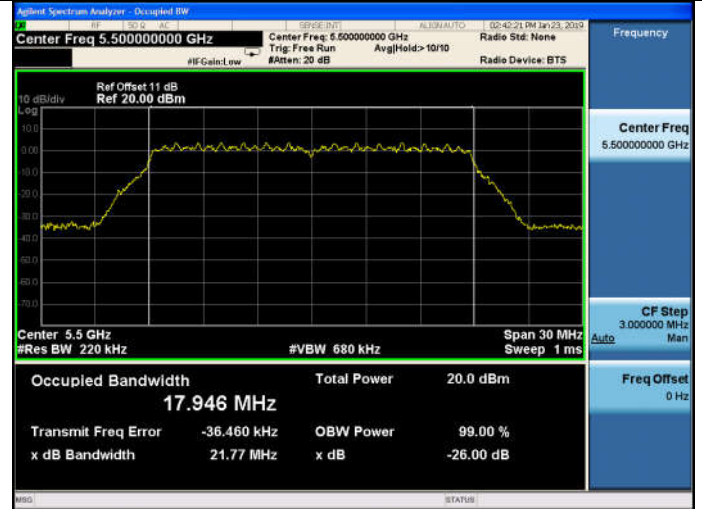
11a

5500MHz

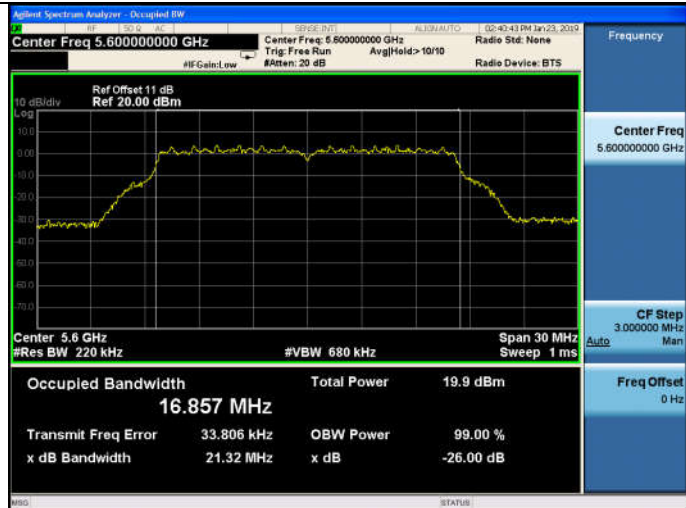


11n HT20

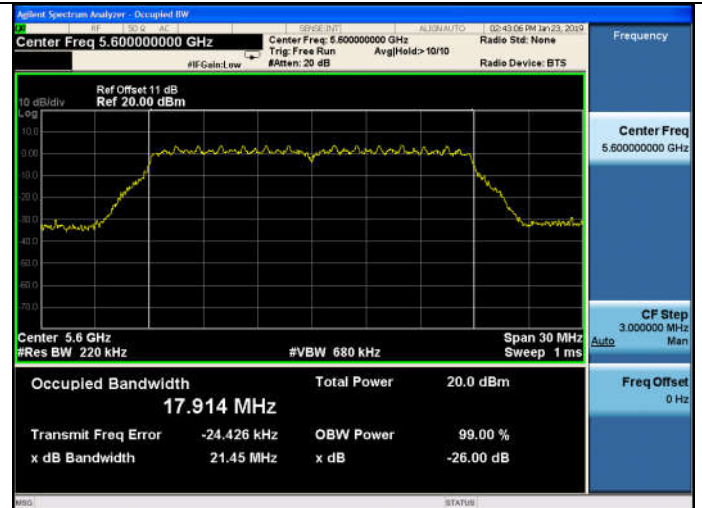
5500MHz



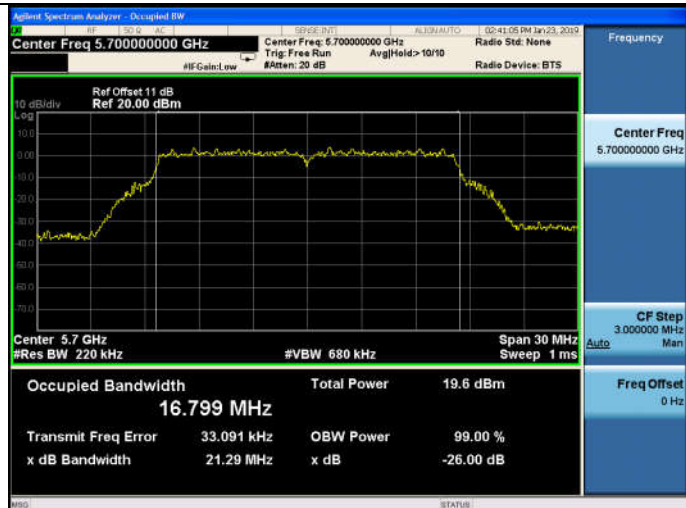
5600MHz



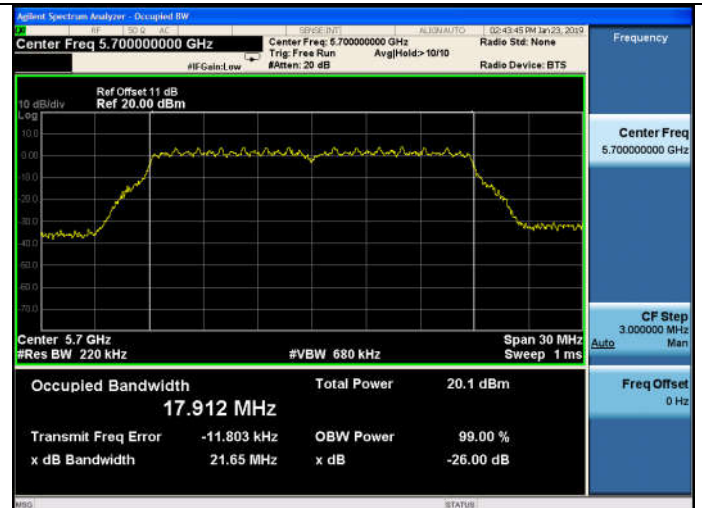
5600MHz



5700MHz

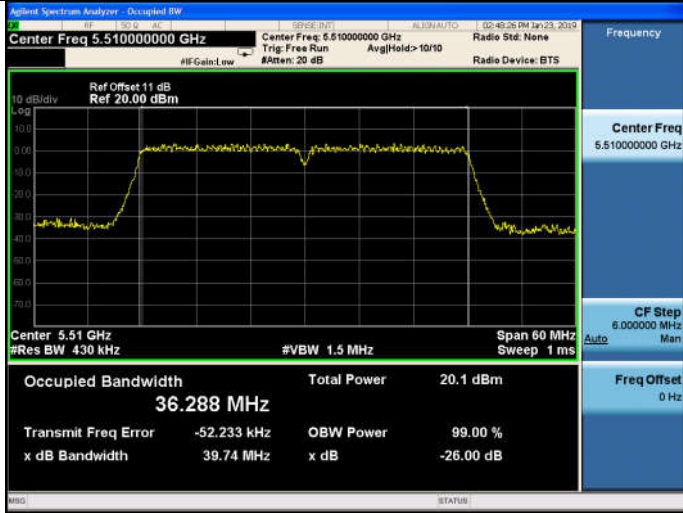


5700MHz

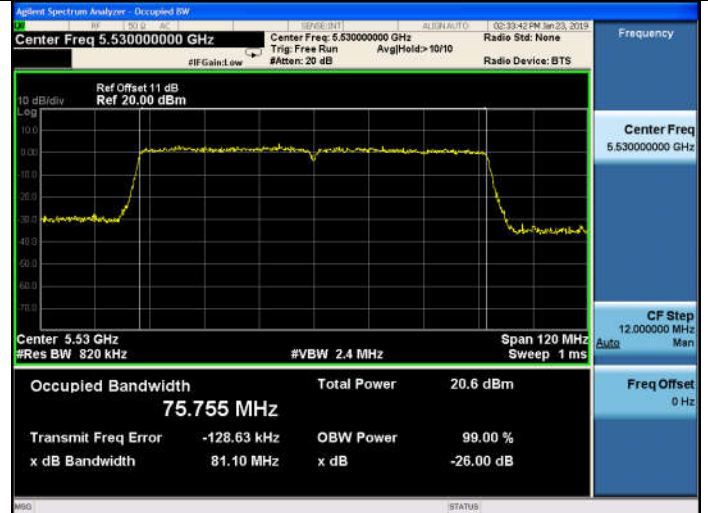


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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>11n HT40 5510MHz</p> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 5.510000000 GHz</p> <p>Span 60.000 MHz</p> <p>Ref Offset 11 dB Ref 20.00 dBm</p> <p>Occupied Bandwidth 36.289 MHz</p> <p>Total Power 19.7 dBm</p> <p>Transmit Freq Error -56.540 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 39.66 MHz</p> <p>x dB -26.00 dB</p> | <p>11ac VHT20 5500MHz</p> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 5.500000000 GHz</p> <p>Span 30 MHz</p> <p>Ref Offset 11 dB Ref 20.00 dBm</p> <p>Occupied Bandwidth 17.889 MHz</p> <p>Total Power 19.7 dBm</p> <p>Transmit Freq Error -29.055 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 21.42 MHz</p> <p>x dB -26.00 dB</p> |
| <p>5590MHz</p> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 5.590000000 GHz</p> <p>Span 60 MHz</p> <p>Ref Offset 11 dB Ref 20.00 dBm</p> <p>Occupied Bandwidth 36.312 MHz</p> <p>Total Power 19.8 dBm</p> <p>Transmit Freq Error -26.331 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 39.49 MHz</p> <p>x dB -26.00 dB</p> | <p>5600MHz</p> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 5.600000000 GHz</p> <p>Span 30 MHz</p> <p>Ref Offset 11 dB Ref 20.00 dBm</p> <p>Occupied Bandwidth 17.883 MHz</p> <p>Total Power 19.5 dBm</p> <p>Transmit Freq Error -13.338 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 21.55 MHz</p> <p>x dB -26.00 dB</p> |
| <p>5670MHz</p> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 5.670000000 GHz</p> <p>Span 60 MHz</p> <p>Ref Offset 11 dB Ref 20.00 dBm</p> <p>Occupied Bandwidth 36.272 MHz</p> <p>Total Power 19.7 dBm</p> <p>Transmit Freq Error -29.098 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 39.66 MHz</p> <p>x dB -26.00 dB</p> | <p>5700MHz</p> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 5.700000000 GHz</p> <p>Span 30 MHz</p> <p>Ref Offset 11 dB Ref 20.00 dBm</p> <p>Occupied Bandwidth 17.872 MHz</p> <p>Total Power 19.5 dBm</p> <p>Transmit Freq Error -16.321 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 21.43 MHz</p> <p>x dB -26.00 dB</p> |

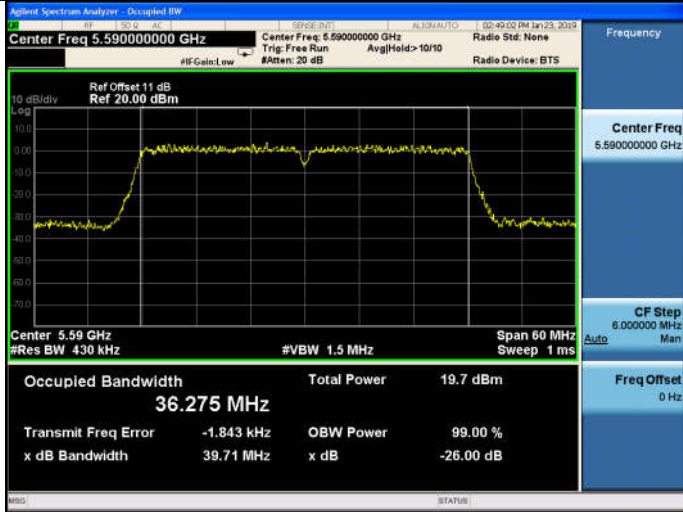
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5510MHz



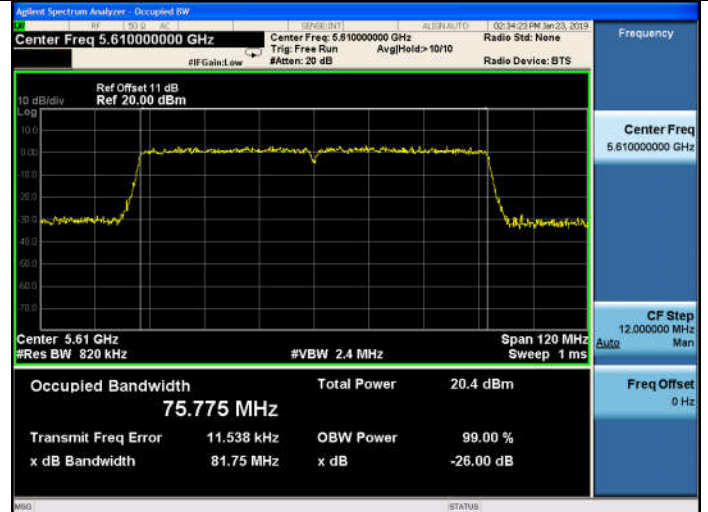
11ac VHT80
5530MHz



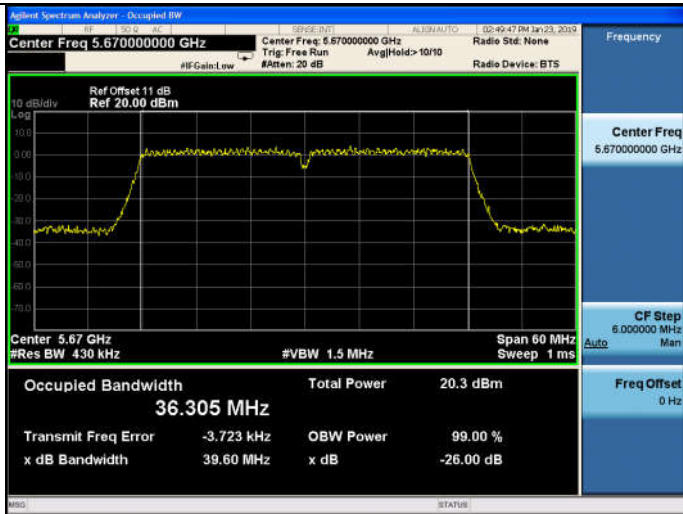
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5610MHz



5670MHz



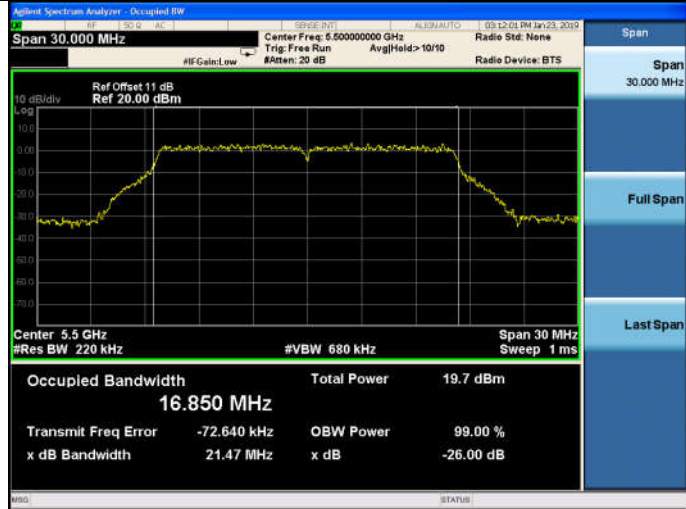
5500-5700MHz Band:

26dB bandwidth

ANT 1

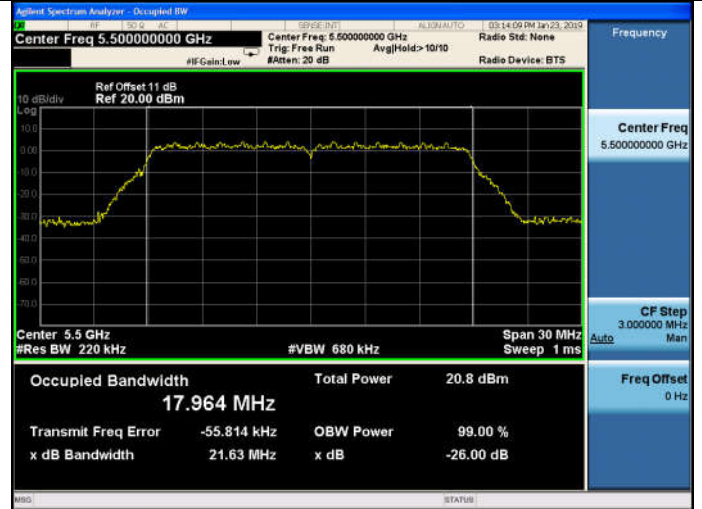
11a

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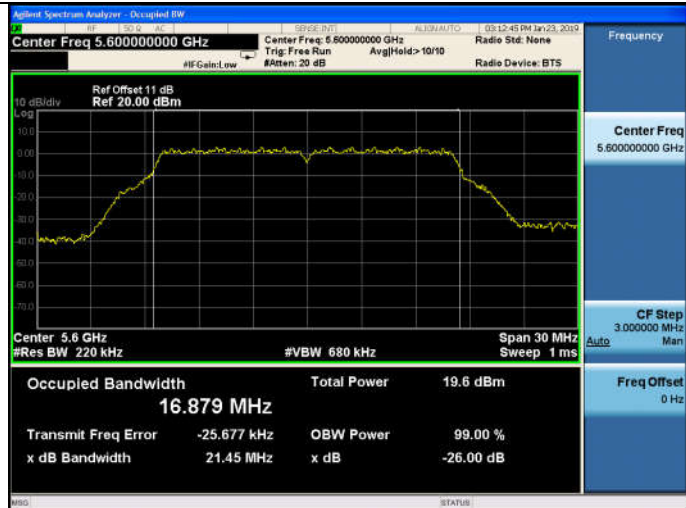


11n HT20

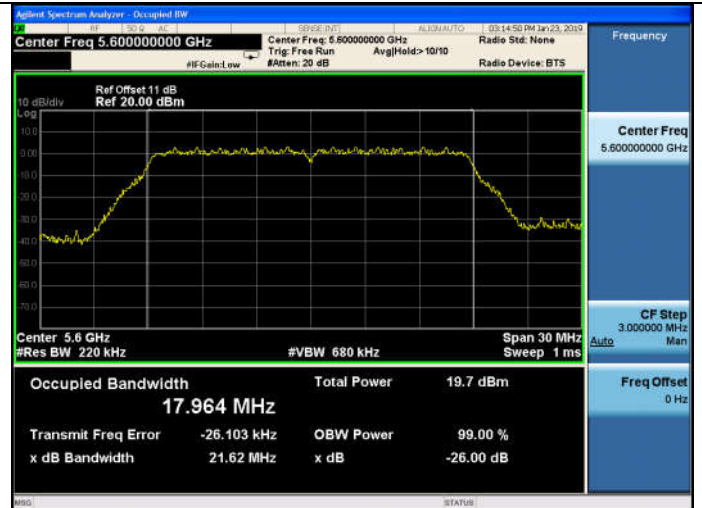
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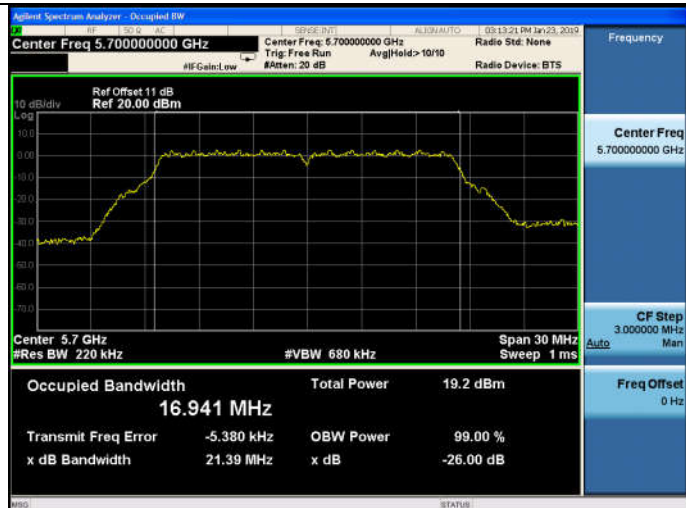
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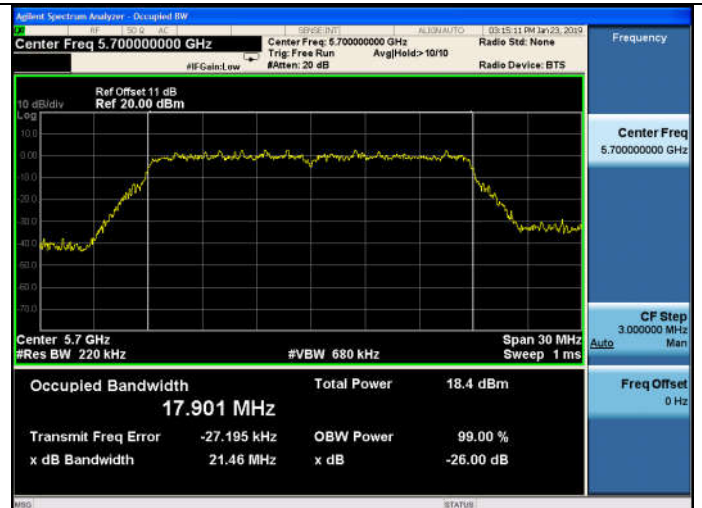
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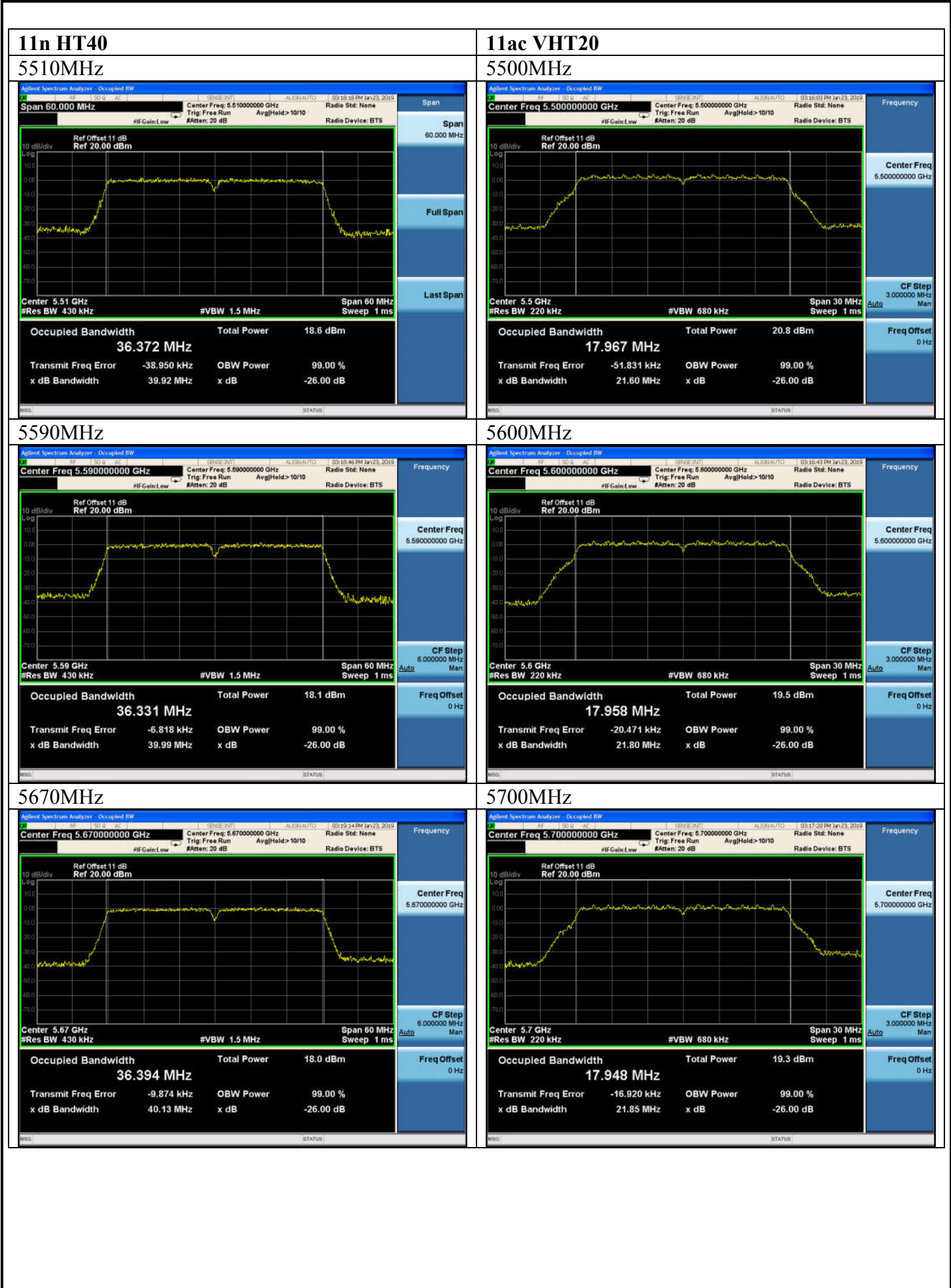


5700MHz

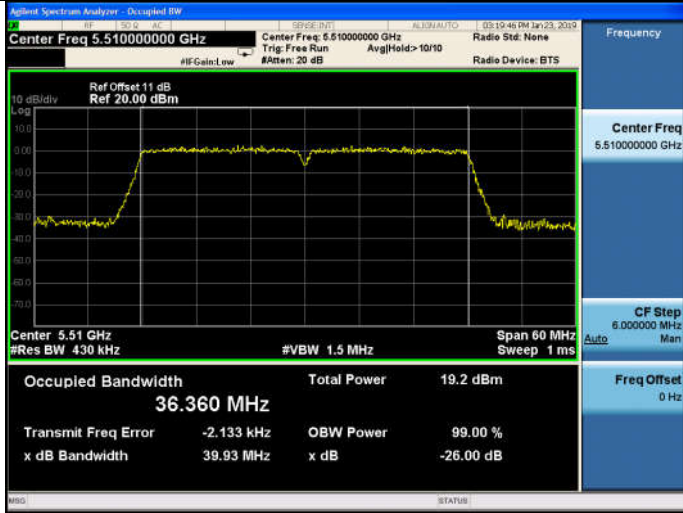


5700MHz

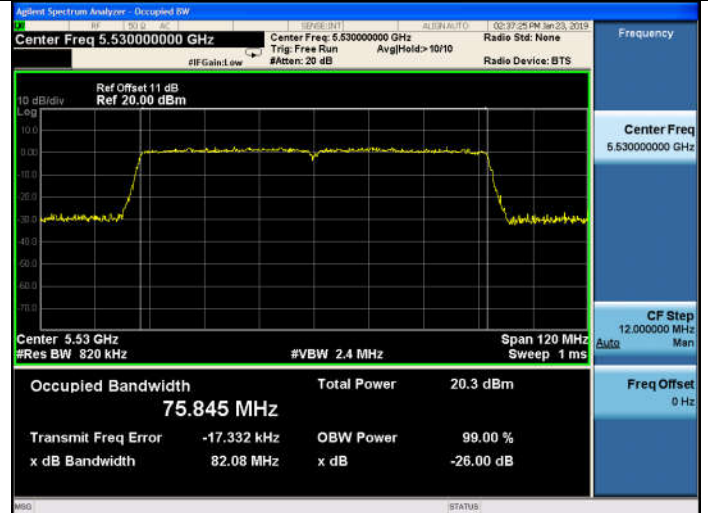




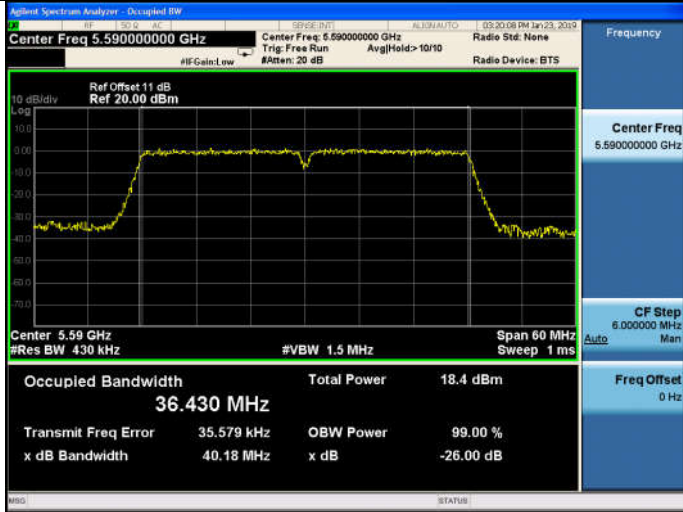
11ac VHT40
5510MHz



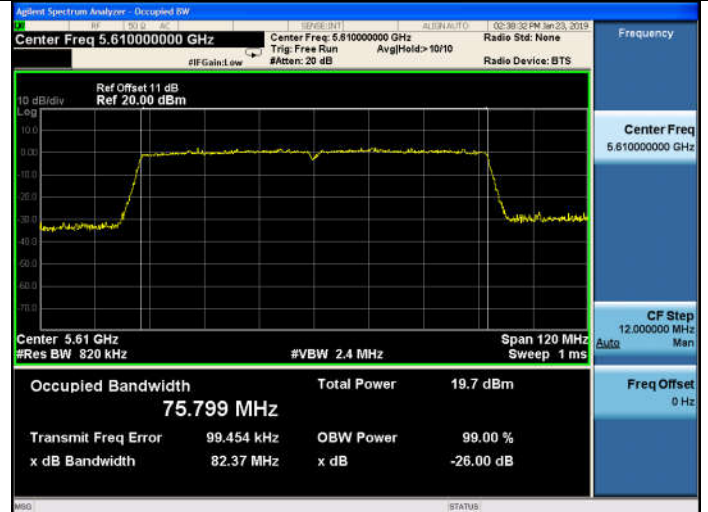
11ac VHT80
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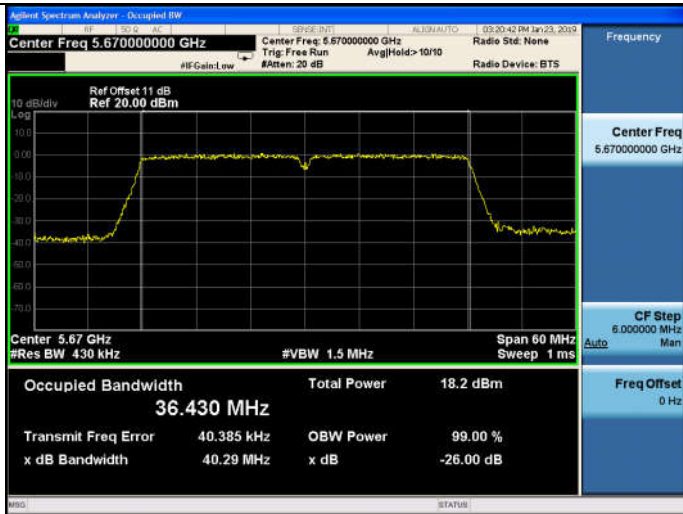
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5610MHz



5670MHz



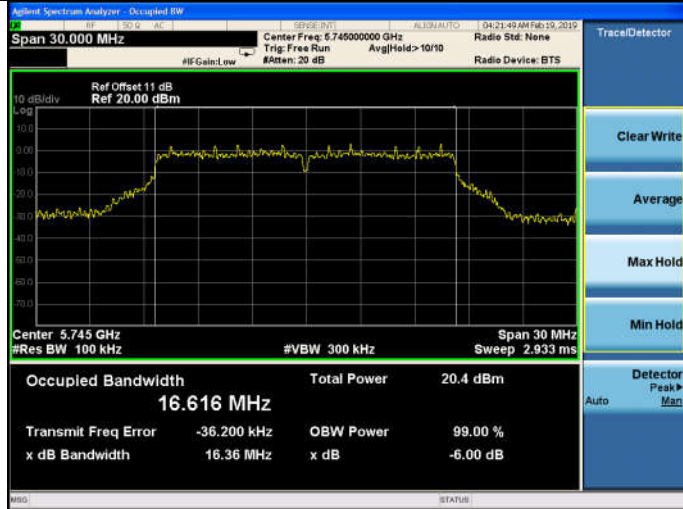
5745-5825MHz Band:

6dB bandwidth

ANT 0

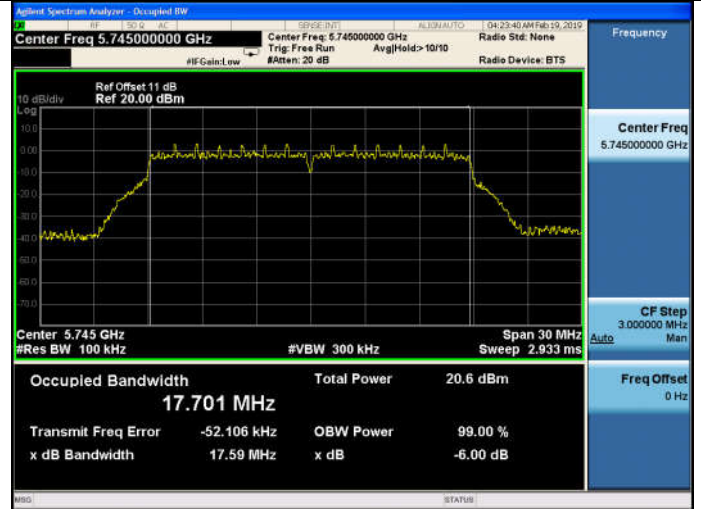
11a

5745MHz

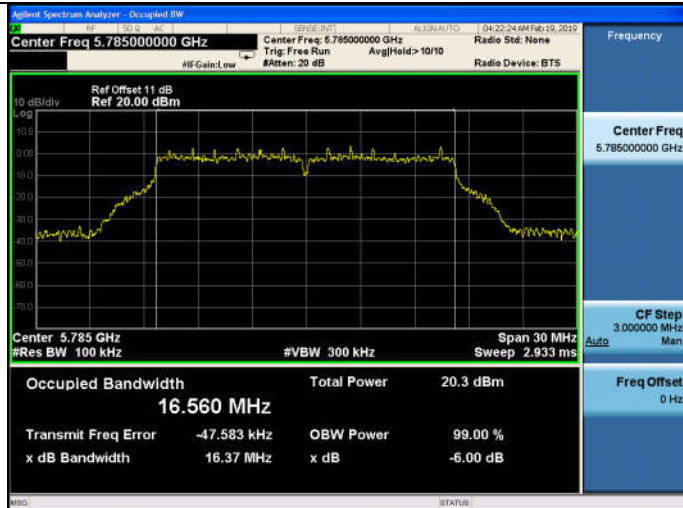


11n HT20

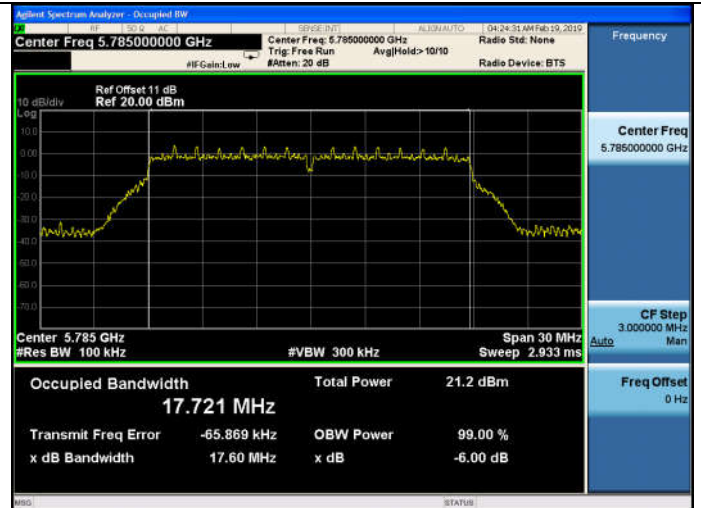
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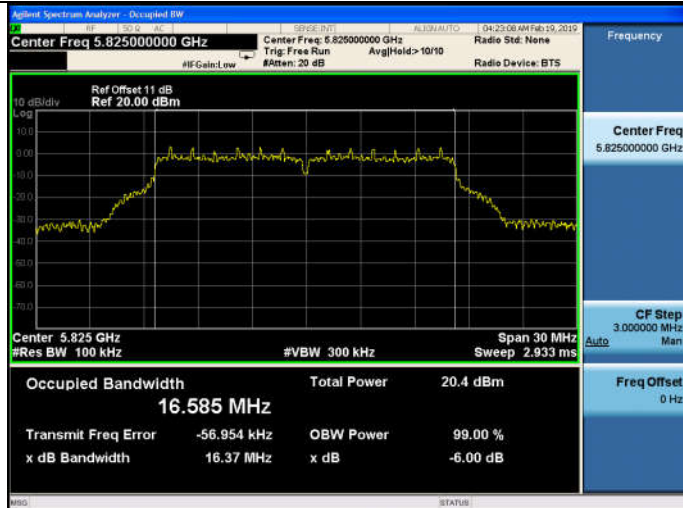
5785MHz



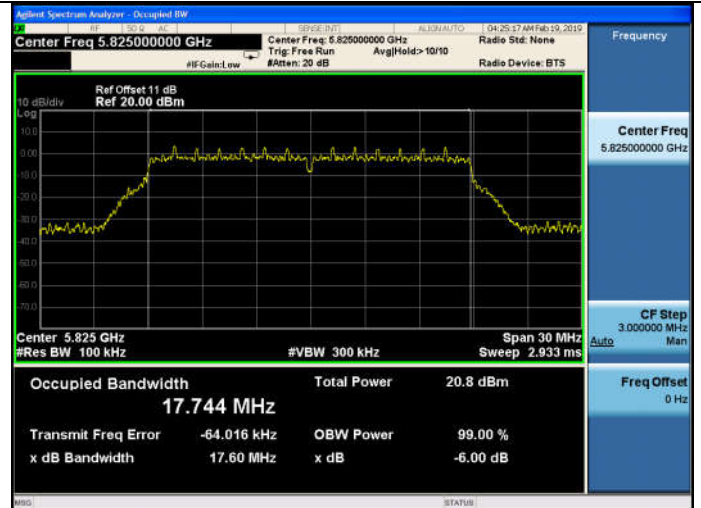
5785MHz



5825MHz

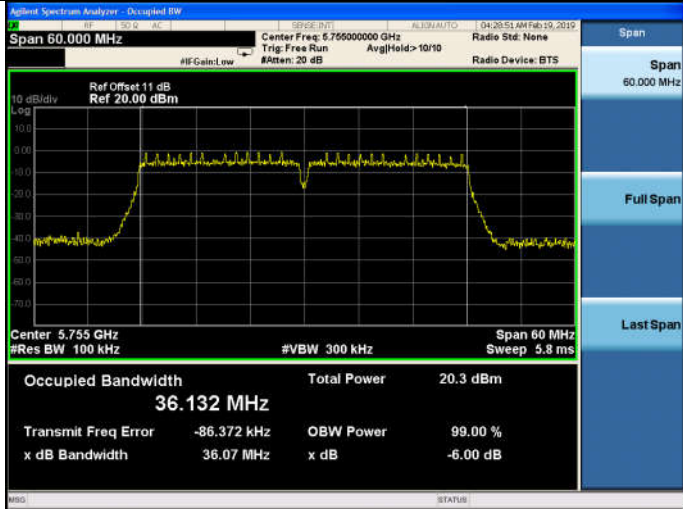


5825MHz

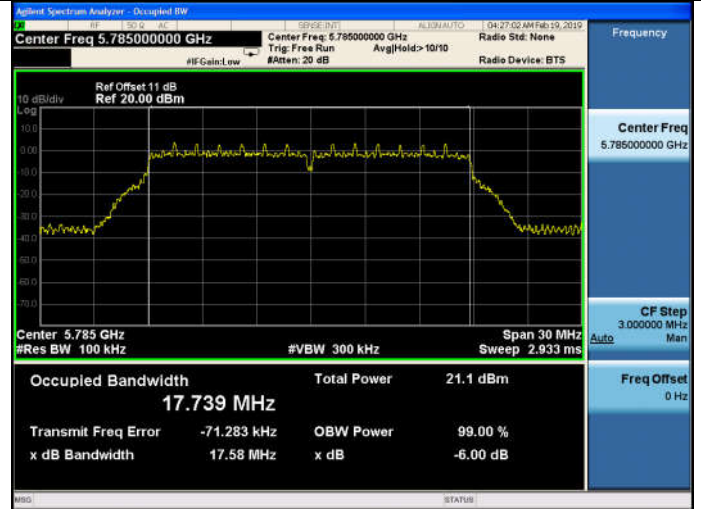


11n HT40

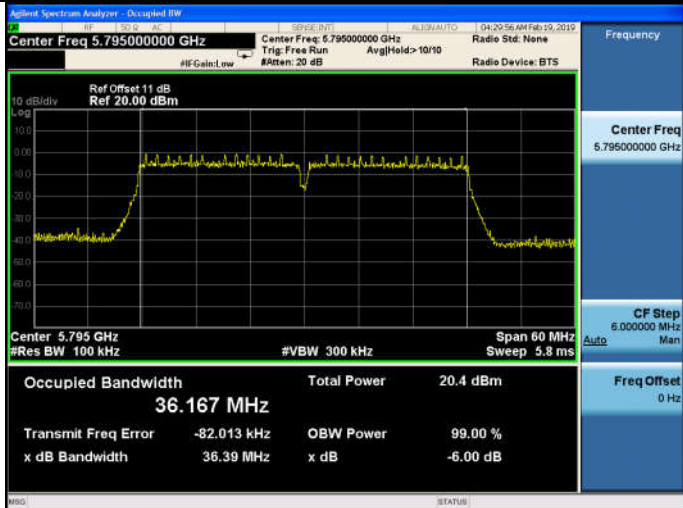
5755MHz



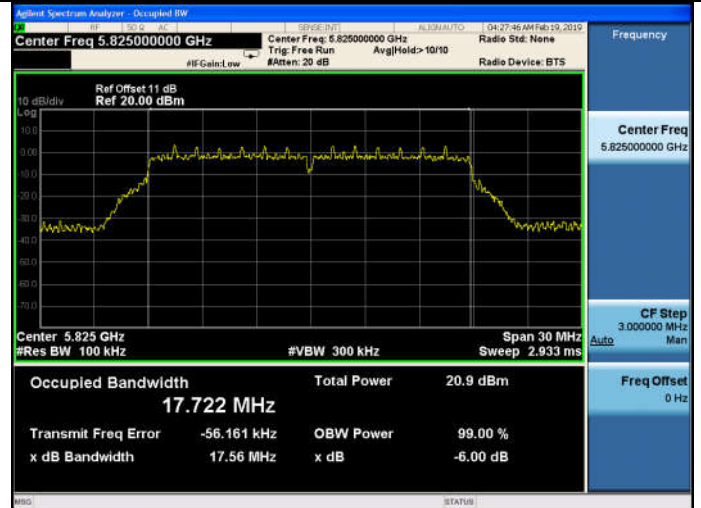
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5795MHz

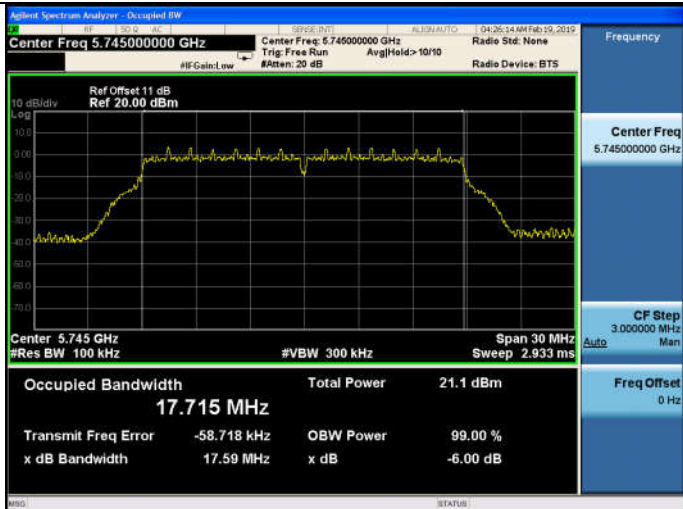


5825MHz



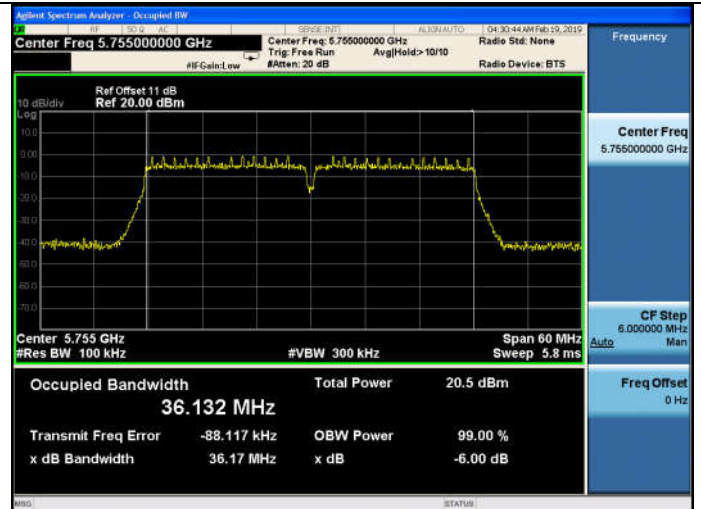
11ac VHT20

5745MHz

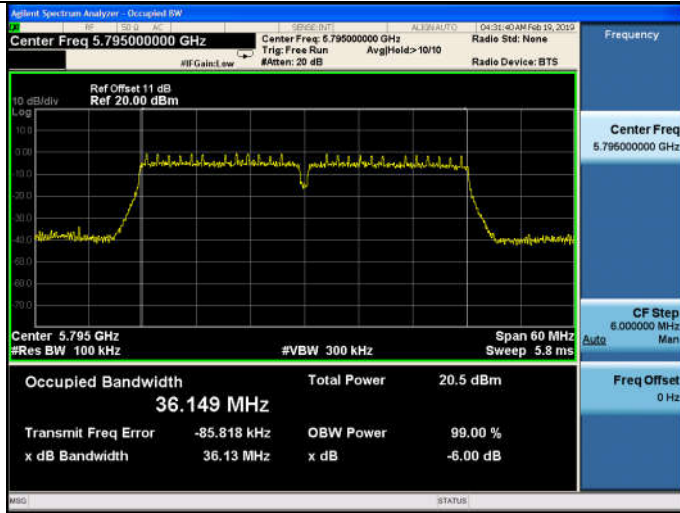


11ac VHT40

5755MHz

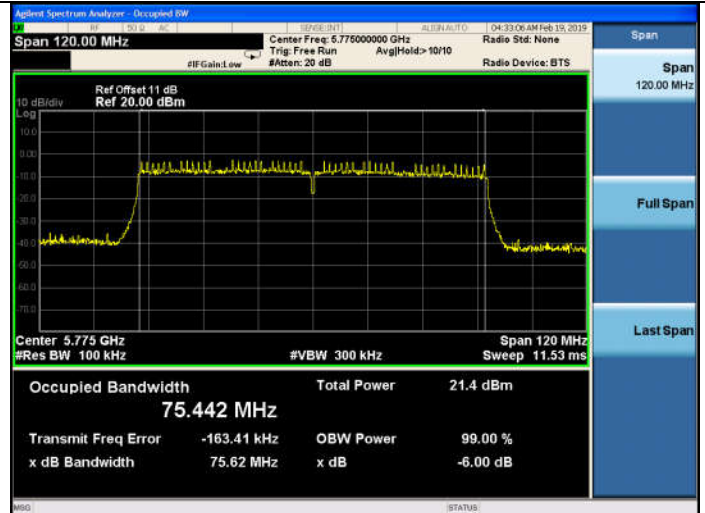


5795MHz



11ac VHT80

5775MHz



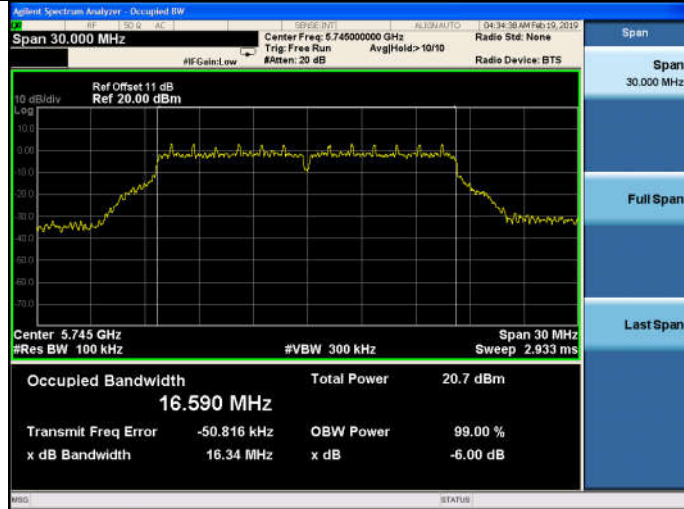
5745-5825MHz Band:

6dB bandwidth

ANT 1

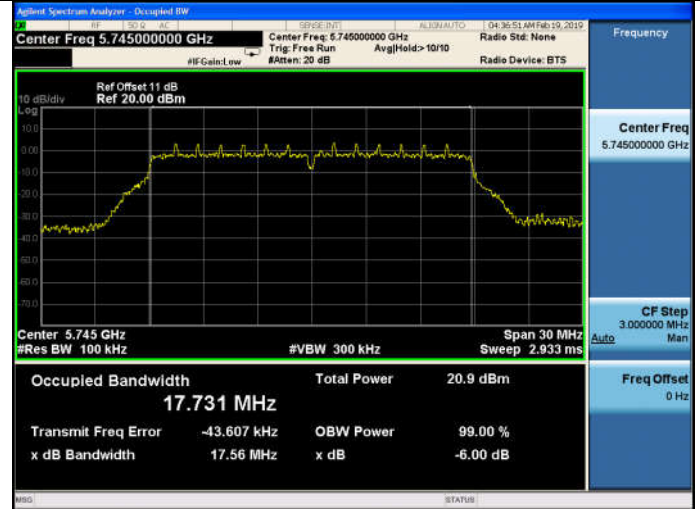
11a

5745MHz

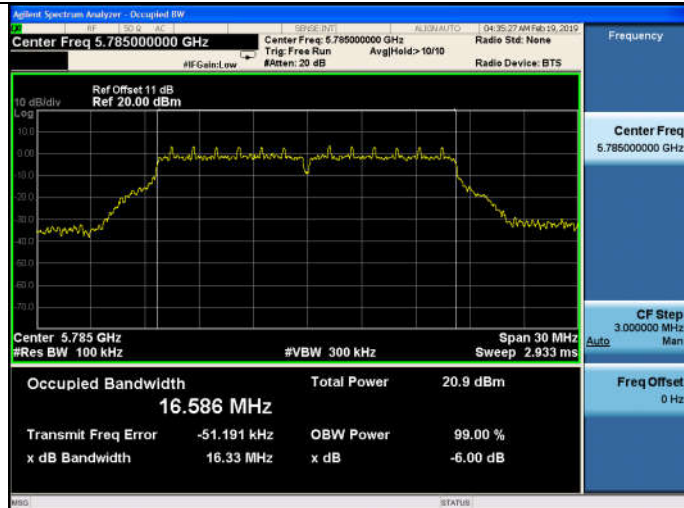


11n HT20

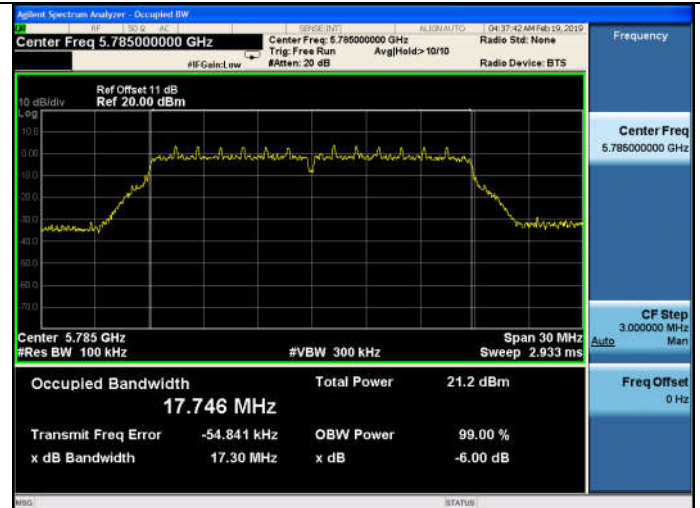
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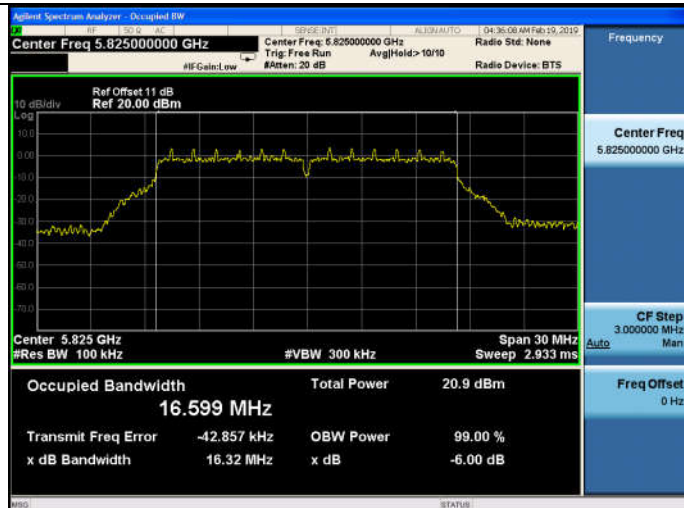
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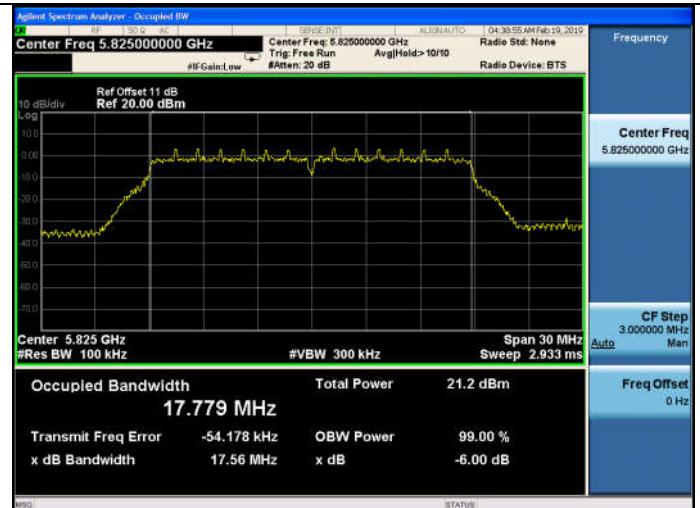
5785MHz



5825MHz

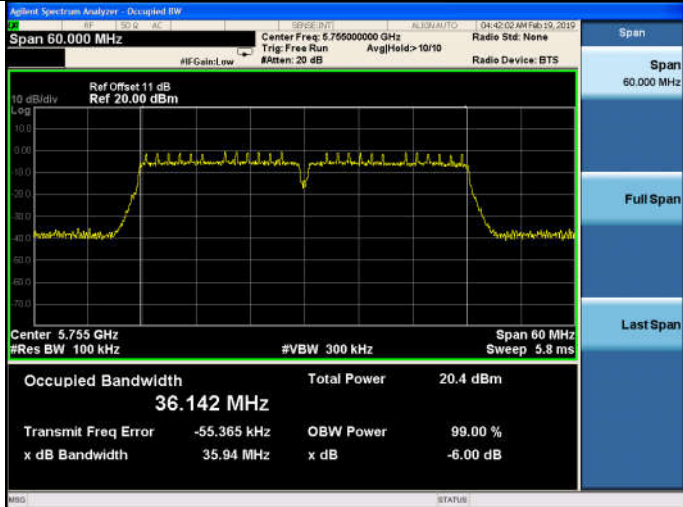


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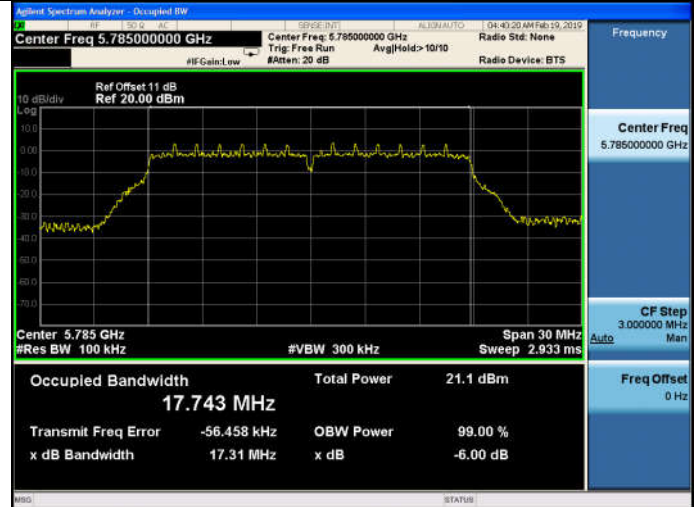


11n HT40

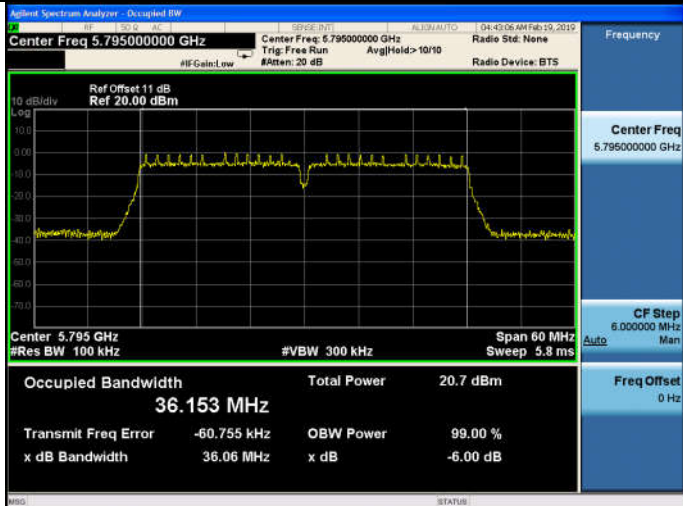
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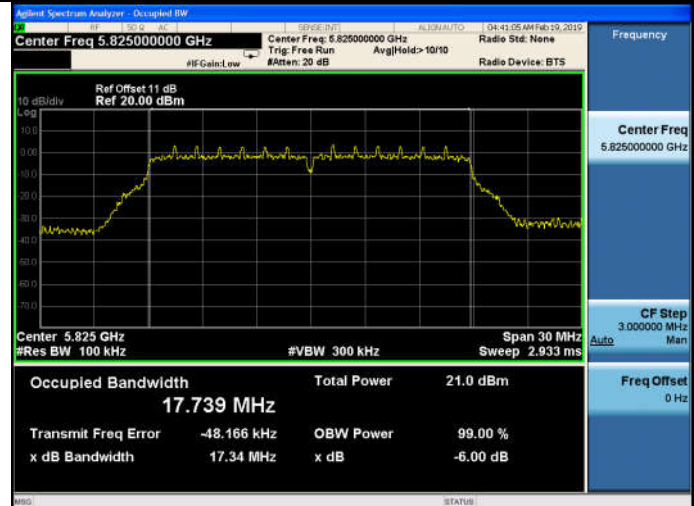
5785MHz



5795MHz

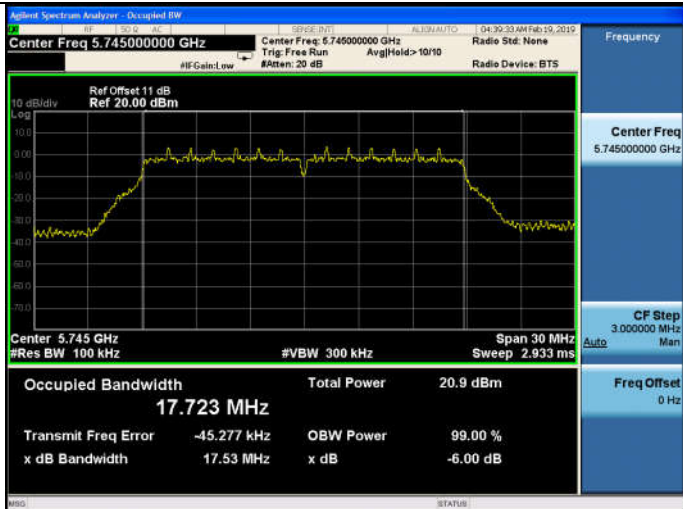


5825MHz



11ac VHT20

5745MHz



11ac VHT40

5755MHz

