

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Output Power Result

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

| Test Mode | Data Rate |
|----------------|-----------------|
| 802.11a | 6Mbps |
| 802.11n HT20 | MCS0(6.5 Mbps) |
| 802.11n HT40 | MCS0(13.5 Mbps) |
| 802.11ac VHT20 | MCS0(6.5 Mbps) |
| 802.11ac VHT40 | MCS0(13.5 Mbps) |
| 802.11ac VHT80 | MCS0(29.3 Mbps) |

Duty Cycle Result

| Mode | Duty Cycle (%) | Correction Factor(dB) |
|----------------|----------------|-----------------------|
| 802.11a | 98.72 | 0.056 |
| 802.11n HT20 | 97.92 | 0.091 |
| 802.11n HT40 | 95.94 | 0.180 |
| 802.11ac VHT20 | 97.34 | 0.117 |
| 802.11ac VHT40 | 95.87 | 0.183 |
| 802.11ac VHT80 | 92.37 | 0.345 |

Correction factor = $10 * \log(1/\text{duty cycle})$

Output Power

| Band | Test Mode | Frequency (MHz) | Average Power (dBm) | Limit(dBm) |
|----------|----------------|-----------------|---------------------|------------|
| U-NII-1 | 802.11a | 5180 | 11.34 | 24.0 |
| | 802.11a | 5200 | 11.41 | 24.0 |
| | 802.11a | 5240 | 11.42 | 24.0 |
| | 802.11n HT20 | 5180 | 11.25 | 24.0 |
| | 802.11n HT20 | 5200 | 11.21 | 24.0 |
| | 802.11n HT20 | 5240 | 11.26 | 24.0 |
| | 802.11n HT40 | 5190 | 10.53 | 24.0 |
| | 802.11n HT40 | 5230 | 10.55 | 24.0 |
| | 802.11ac VHT20 | 5180 | 11.21 | 24.0 |
| | 802.11ac VHT20 | 5200 | 11.13 | 24.0 |
| | 802.11ac VHT20 | 5240 | 11.22 | 24.0 |
| | 802.11ac VHT40 | 5190 | 10.18 | 24.0 |
| | 802.11ac VHT40 | 5230 | 10.38 | 24.0 |
| | 802.11ac VHT80 | 5210 | 9.38 | 24.0 |
| U-NII-2A | 802.11a | 5260 | 11.67 | 24.0 |
| | 802.11a | 5300 | 11.69 | 24.0 |
| | 802.11a | 5320 | 11.73 | 24.0 |
| | 802.11n HT20 | 5260 | 11.55 | 24.0 |
| | 802.11n HT20 | 5300 | 11.59 | 24.0 |
| | 802.11n HT20 | 5320 | 11.67 | 24.0 |
| | 802.11n HT40 | 5270 | 10.89 | 24.0 |
| | 802.11n HT40 | 5310 | 10.92 | 24.0 |
| | 802.11ac VHT20 | 5260 | 11.12 | 24.0 |
| | 802.11ac VHT20 | 5300 | 11.17 | 24.0 |
| | 802.11ac VHT20 | 5320 | 11.15 | 24.0 |
| | 802.11ac VHT40 | 5270 | 10.32 | 24.0 |
| | 802.11ac VHT40 | 5310 | 10.25 | 24.0 |
| | 802.11ac VHT80 | 5290 | 9.94 | 24.0 |

| Band | Test Mode | Frequency (MHz) | Average Power (dBm) | Limit(dBm) |
|----------------|----------------|-----------------|---------------------|------------|
| U-NII-2C | 802.11a | 5500 | 11.43 | 24.0 |
| | 802.11a | 5580 | 11.38 | 24.0 |
| | 802.11a | 5700 | 11.42 | 24.0 |
| | 802.11n HT20 | 5500 | 11.33 | 24.0 |
| | 802.11n HT20 | 5580 | 11.37 | 24.0 |
| | 802.11n HT20 | 5700 | 11.34 | 24.0 |
| | 802.11n HT40 | 5510 | 10.88 | 24.0 |
| | 802.11n HT40 | 5670 | 10.84 | 24.0 |
| | 802.11ac VHT20 | 5500 | 10.82 | 24.0 |
| | 802.11ac VHT20 | 5580 | 11.11 | 24.0 |
| | 802.11ac VHT20 | 5720 | 11.10 | 24.0 |
| | 802.11ac VHT40 | 5510 | 10.67 | 24.0 |
| | 802.11ac VHT40 | 5590 | 10.63 | 24.0 |
| | 802.11ac VHT40 | 5710 | 10.63 | 24.0 |
| | 802.11ac VHT80 | 5530 | 10.09 | 24.0 |
| | 802.11ac VHT80 | 5610 | 10.12 | 24.0 |
| 802.11ac VHT80 | 5690 | 10.14 | 24.0 | |
| U-NII-3 | 802.11a | 5745 | 11.43 | 30.0 |
| | 802.11a | 5785 | 11.38 | 30.0 |
| | 802.11a | 5825 | 11.42 | 30.0 |
| | 802.11n HT20 | 5745 | 11.27 | 30.0 |
| | 802.11n HT20 | 5785 | 11.30 | 30.0 |
| | 802.11n HT20 | 5825 | 11.31 | 30.0 |
| | 802.11n HT40 | 5755 | 10.68 | 30.0 |
| | 802.11n HT40 | 5795 | 10.63 | 30.0 |
| | 802.11ac VHT20 | 5720 | 10.67 | 30.0 |
| | 802.11ac VHT20 | 5745 | 11.13 | 30.0 |
| | 802.11ac VHT20 | 5785 | 11.17 | 30.0 |
| | 802.11ac VHT20 | 5825 | 11.14 | 30.0 |
| | 802.11ac VHT40 | 5710 | 10.33 | 30.0 |
| | 802.11ac VHT40 | 5755 | 10.31 | 30.0 |
| | 802.11ac VHT40 | 5795 | 10.28 | 30.0 |
| | 802.11ac VHT80 | 5690 | 9.87 | 30.0 |
| 802.11ac VHT80 | 5775 | 9.91 | 30.0 | |

We chose the Worst-modes are shown as following table:

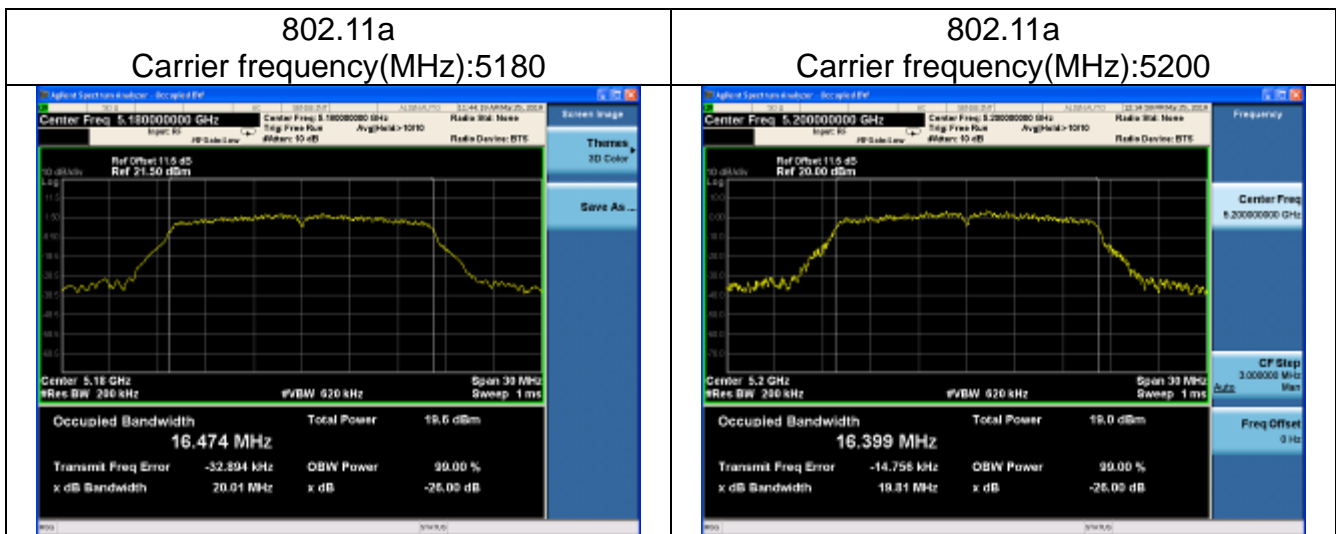
| Test Mode | Note |
|----------------|----------------------|
| 802.11a | --- |
| 802.11n HT20 | Cover 802.11ac VHT20 |
| 802.11n HT40 | Cover 802.11ac VHT40 |
| 802.11ac VHT80 | --- |

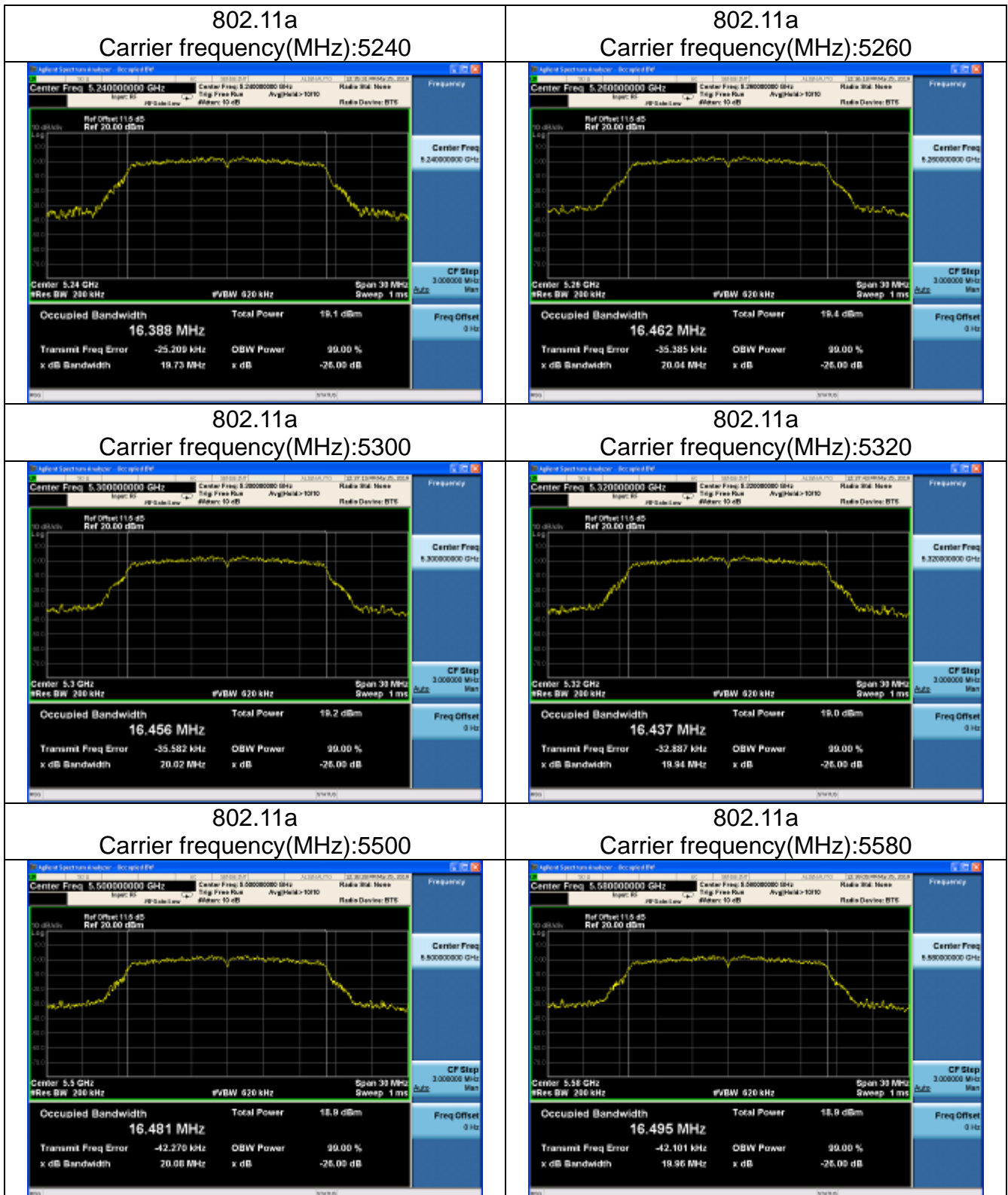
Occupied Bandwidth

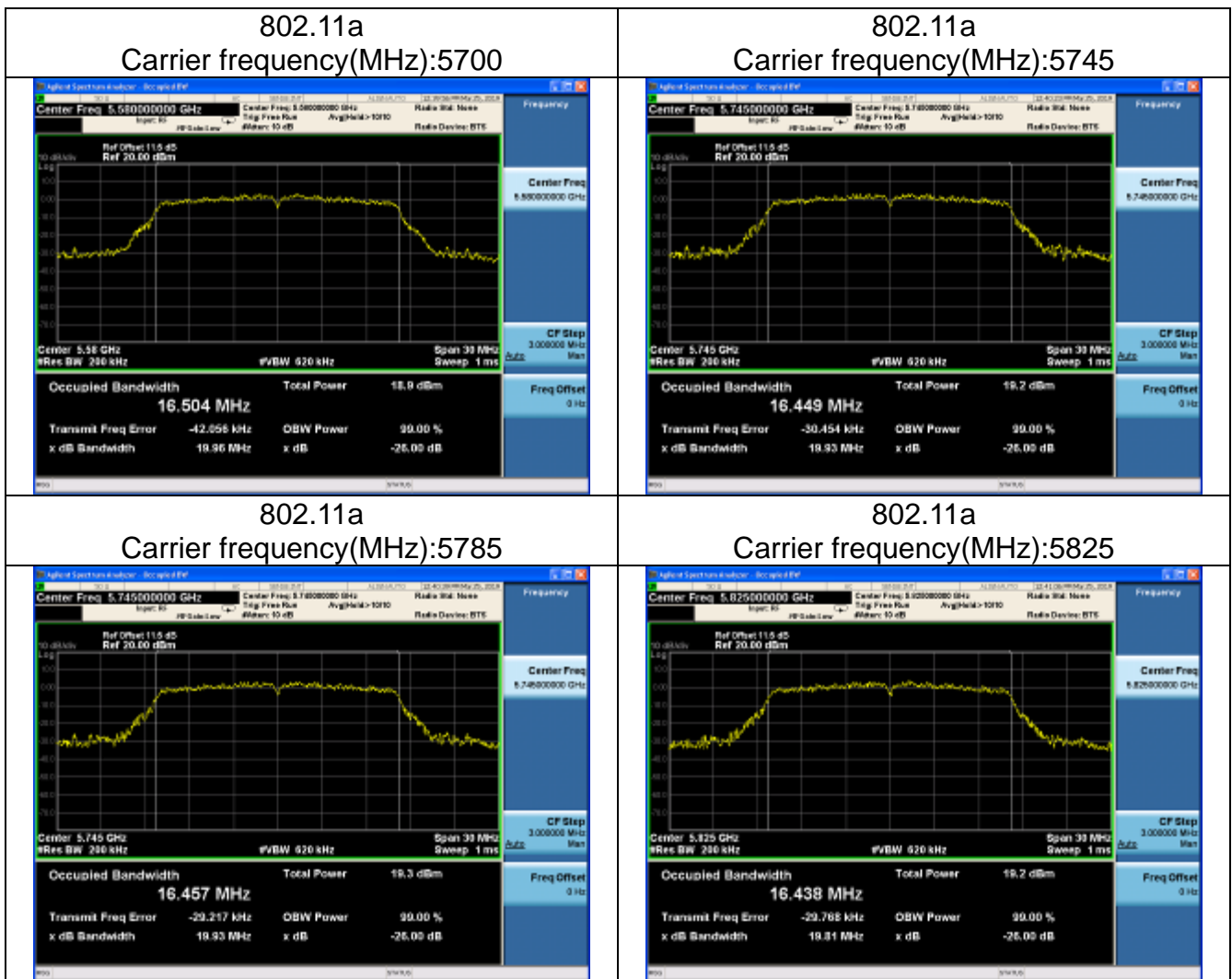
Offset 11.5dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.3dB

Test Mode: 802.11a

| Carrier frequency (MHz) | 99% Bandwidth(MHz) | Minimum 26dB Bandwidth(MHz) | Conclusion |
|-------------------------|--------------------|-----------------------------|------------|
| 5180 | 16.474 | 20.01 | pass |
| 5200 | 16.399 | 19.81 | pass |
| 5240 | 16.388 | 19.73 | pass |
| 5260 | 16.462 | 20.04 | pass |
| 5300 | 16.456 | 20.02 | pass |
| 5320 | 16.437 | 19.94 | pass |
| 5500 | 16.481 | 20.08 | pass |
| 5580 | 16.495 | 19.96 | pass |
| 5700 | 16.504 | 19.96 | pass |
| 5745 | 16.449 | 19.93 | pass |
| 5785 | 16.457 | 19.93 | pass |
| 5825 | 16.438 | 19.81 | pass |

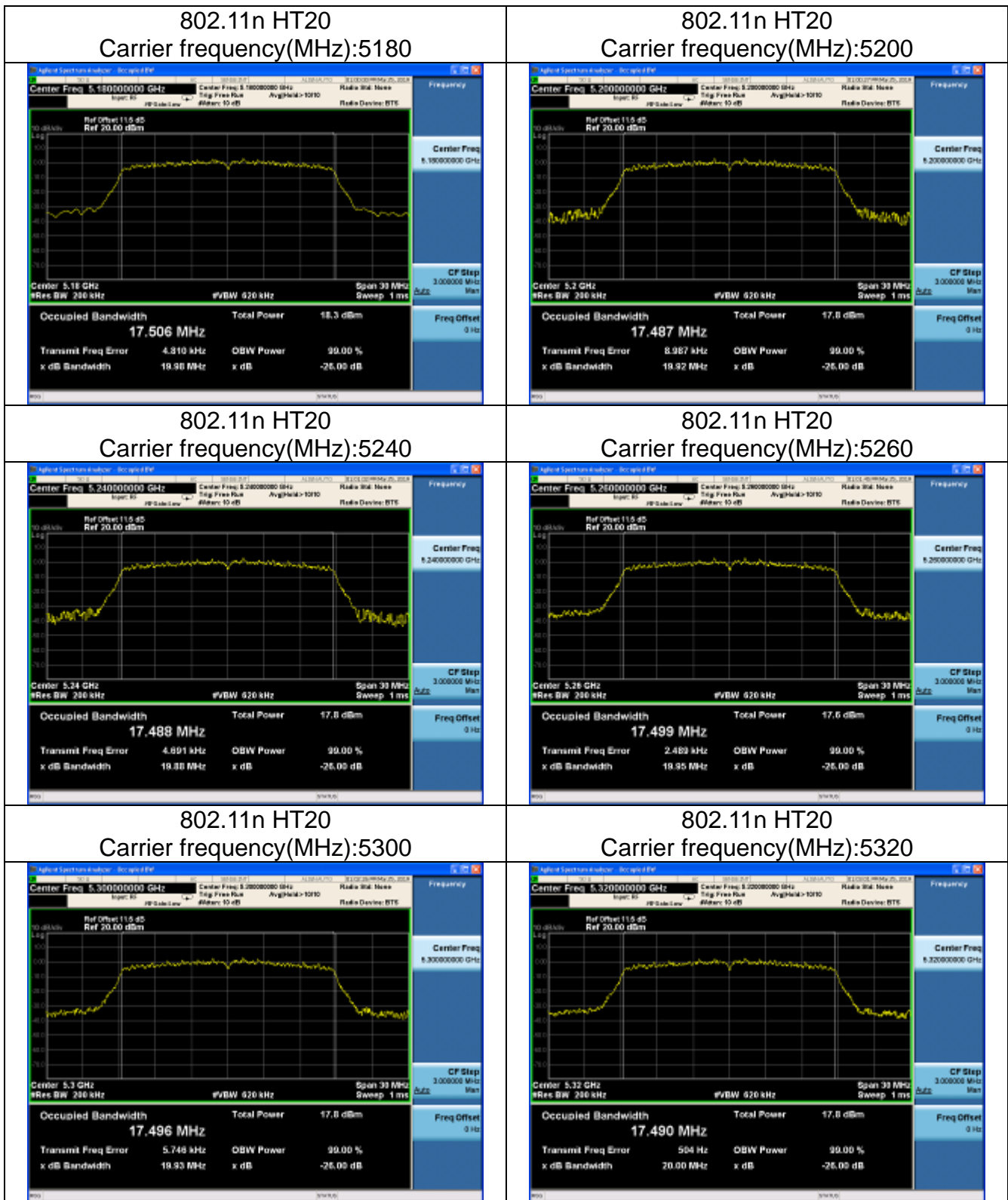


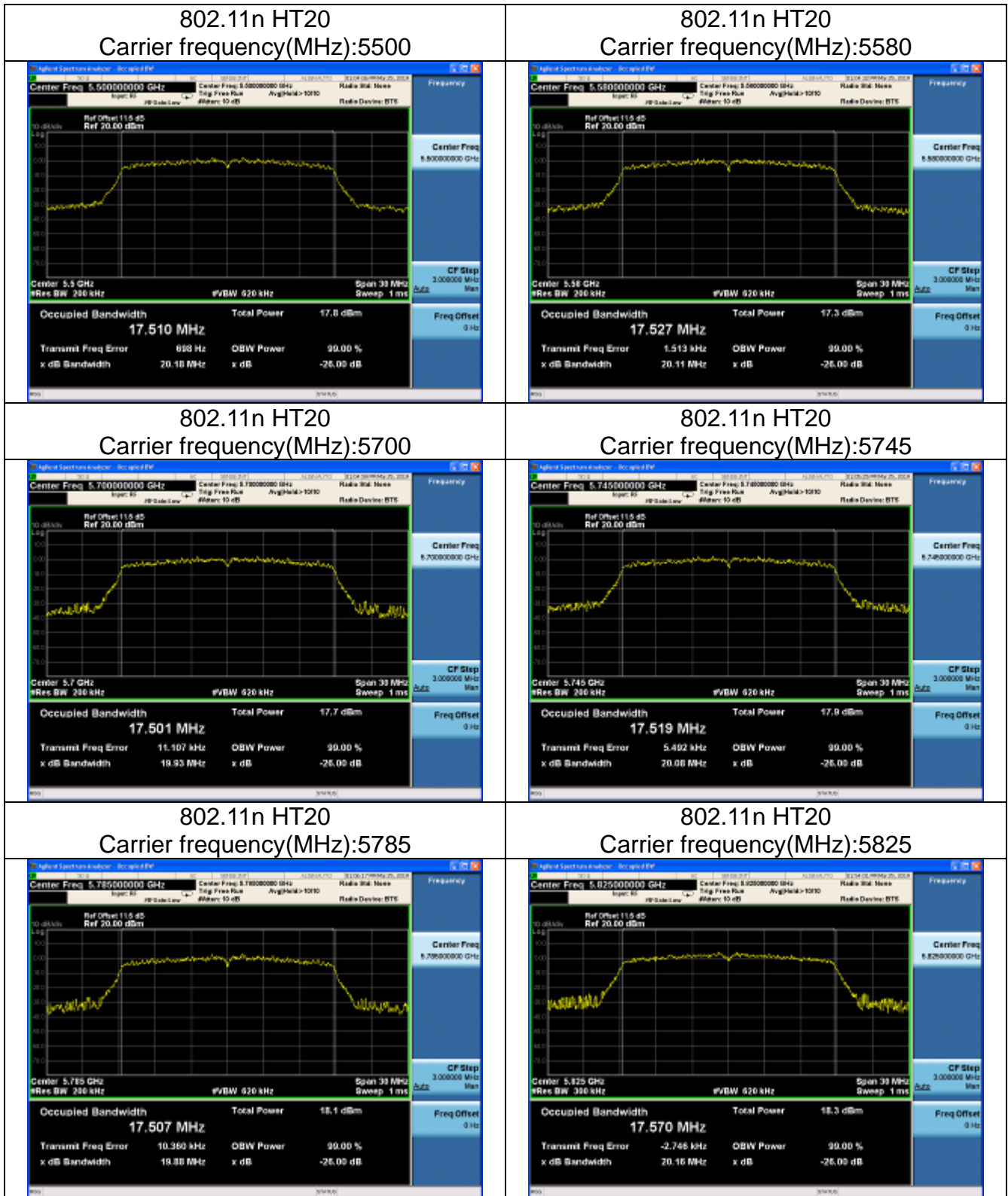




Test Mode: 802.11n HT20

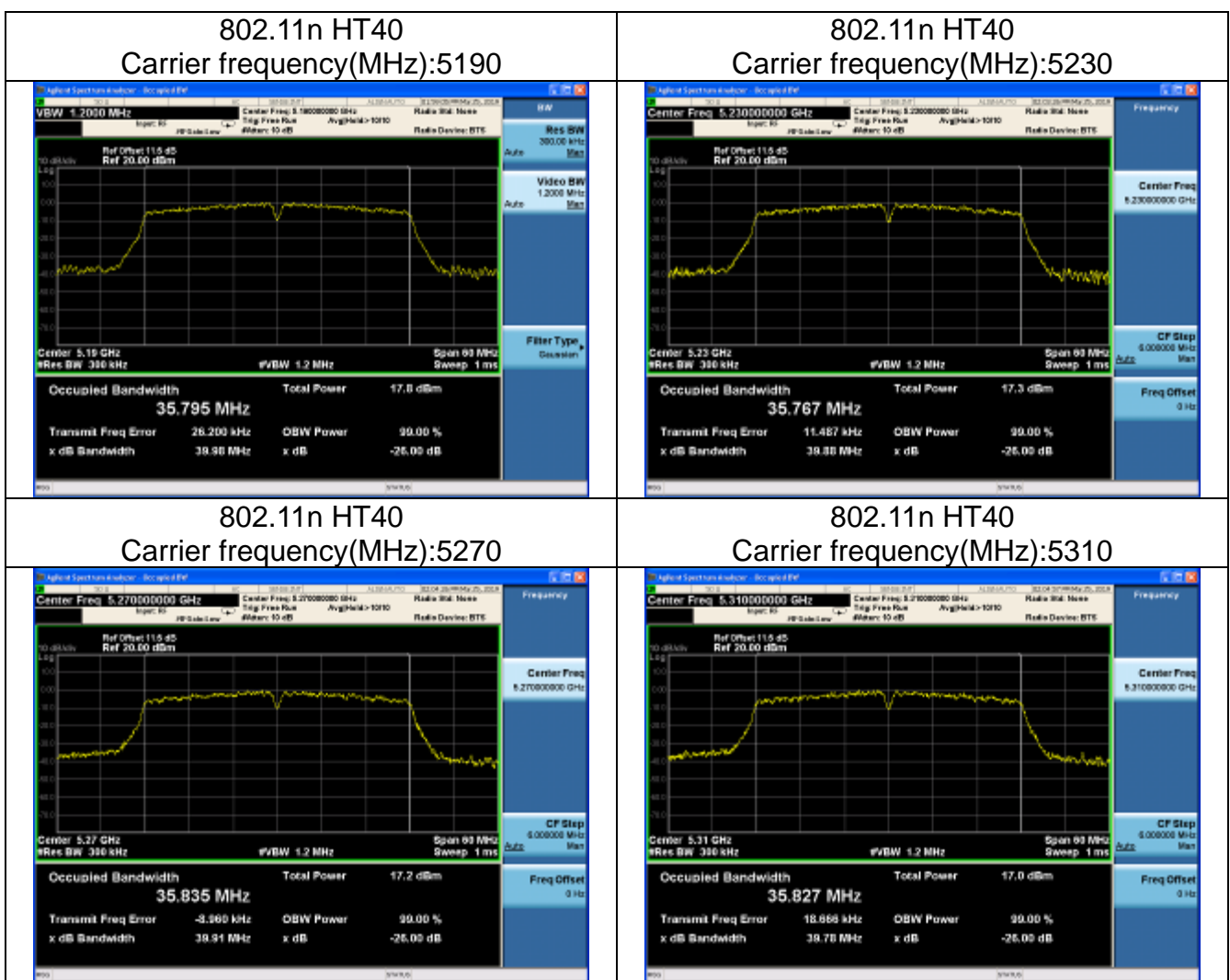
| Carrier frequency (MHz) | 99% Bandwidth(MHz) | Minimum 26dB Bandwidth(MHz) | Conclusion |
|-------------------------|--------------------|-----------------------------|------------|
| 5180 | 17.506 | 19.98 | pass |
| 5200 | 17.487 | 19.92 | pass |
| 5240 | 17.488 | 19.88 | pass |
| 5260 | 17.499 | 19.95 | pass |
| 5300 | 17.496 | 19.93 | pass |
| 5320 | 17.490 | 20.00 | pass |
| 5500 | 17.510 | 20.18 | pass |
| 5580 | 17.527 | 20.11 | pass |
| 5700 | 17.501 | 19.93 | pass |
| 5745 | 17.519 | 20.08 | pass |
| 5785 | 17.507 | 19.88 | pass |
| 5825 | 17.570 | 20.16 | pass |

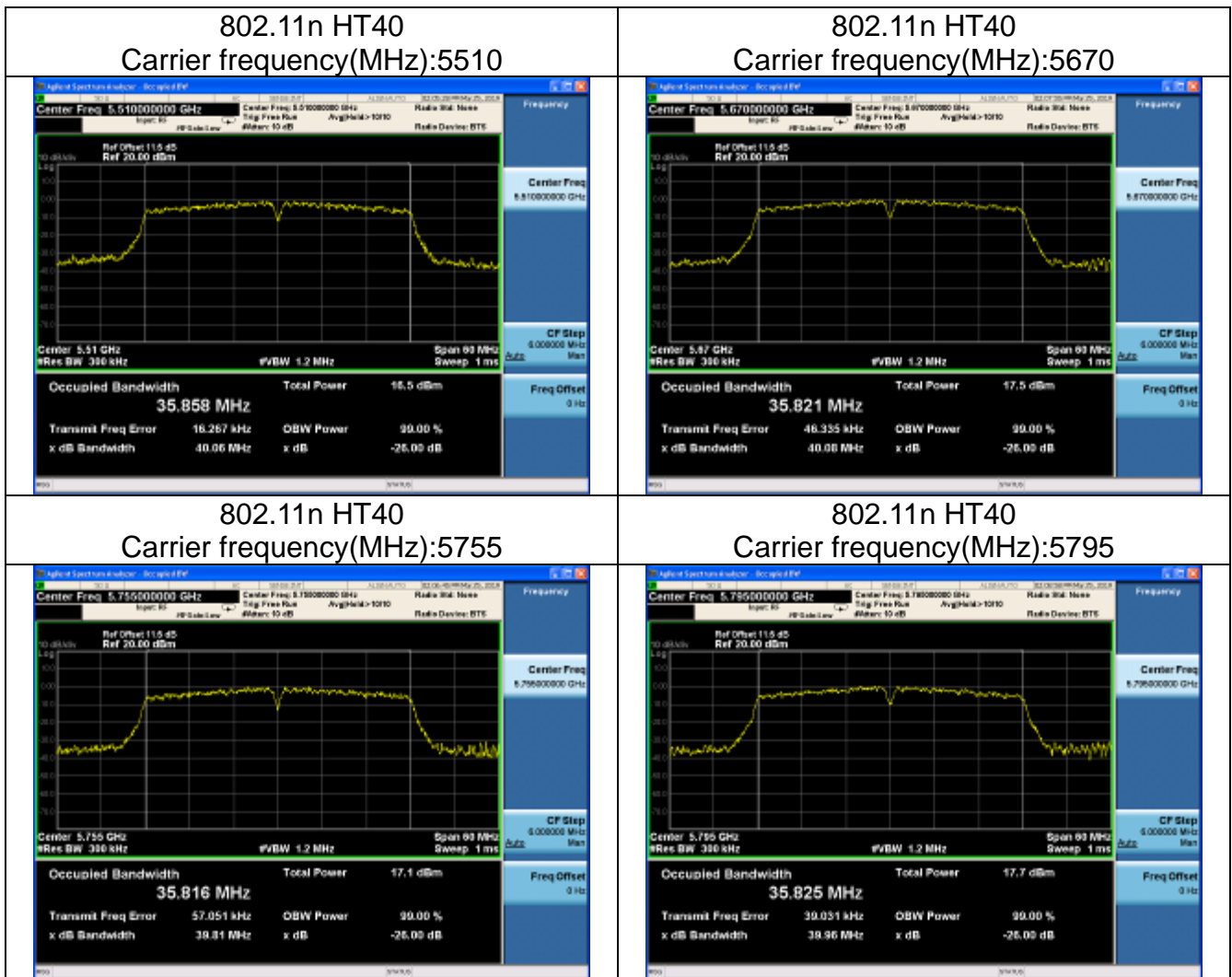




Test Mode: 802.11n HT40

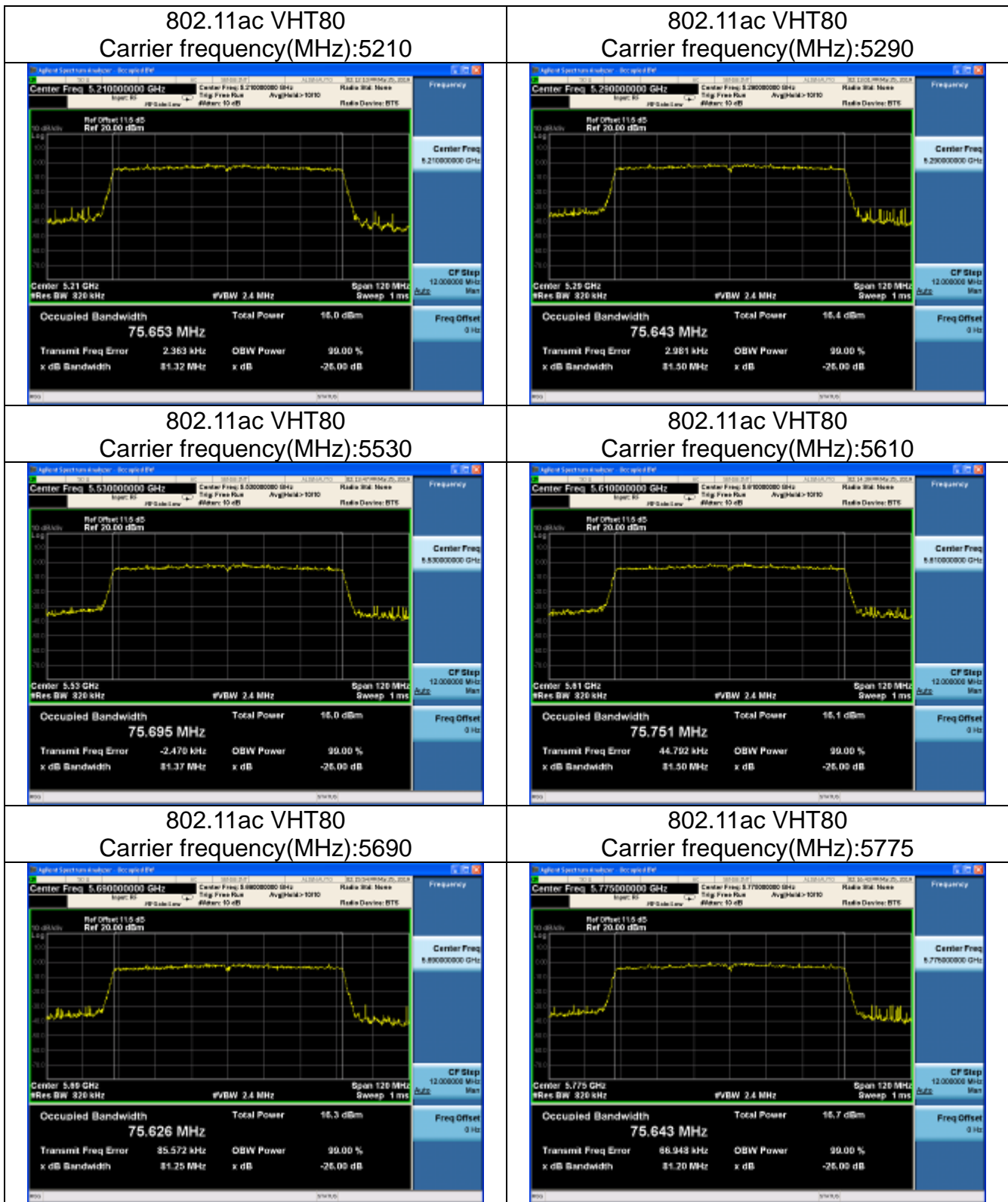
| Carrier frequency (MHz) | 99% Bandwidth(MHz) | Minimum 26dB Bandwidth(MHz) | Conclusion |
|-------------------------|--------------------|-----------------------------|------------|
| 5190 | 35.795 | 39.98 | pass |
| 5230 | 35.765 | 39.88 | pass |
| 5270 | 35.835 | 39.91 | pass |
| 5310 | 35.825 | 19.78 | pass |
| 5510 | 35.858 | 40.06 | pass |
| 5670 | 35.821 | 40.08 | pass |
| 5755 | 35.816 | 39.81 | pass |
| 5795 | 35.825 | 39.96 | pass |





Test Mode: 802.11ac VHT80

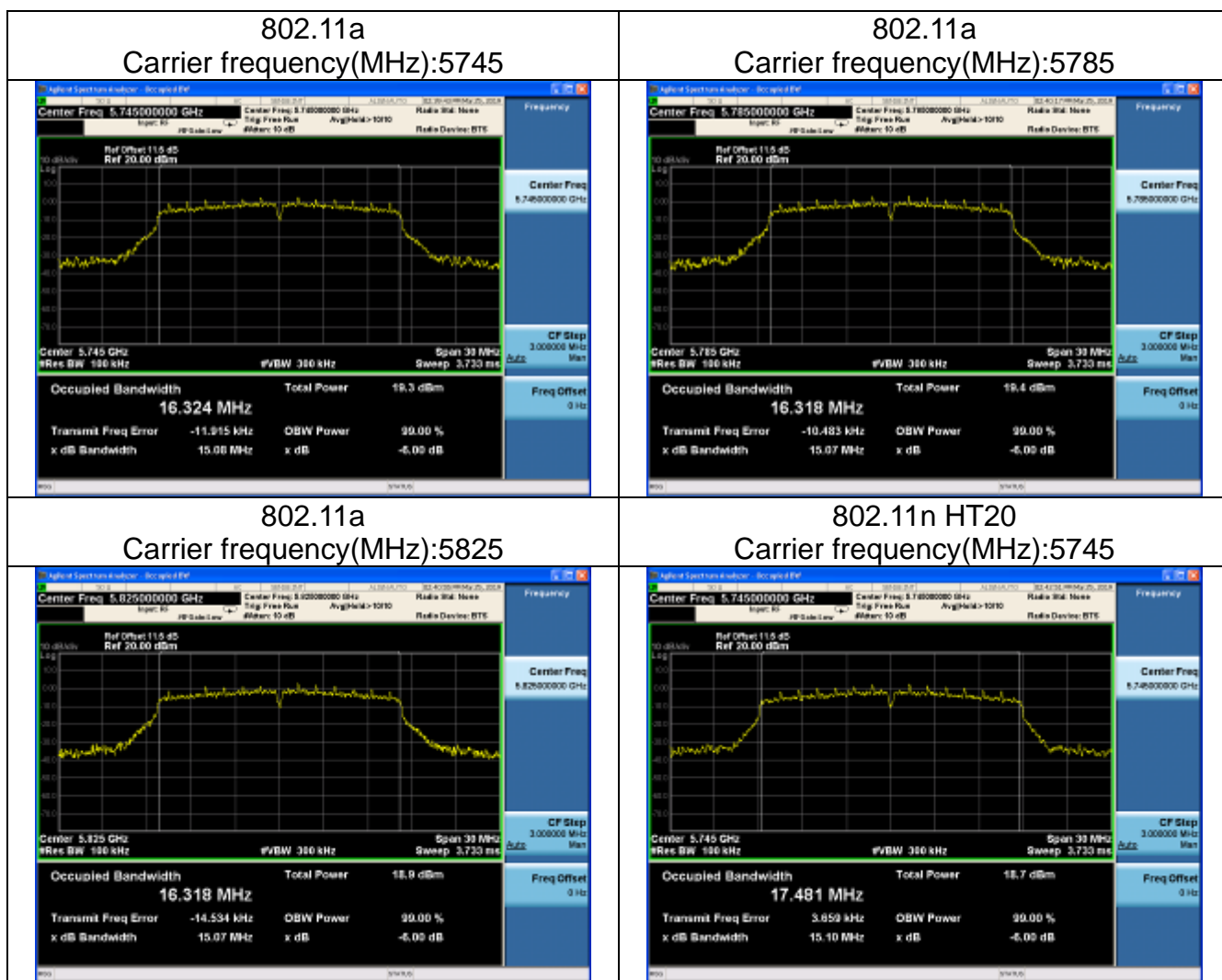
| Carrier frequency (MHz) | 99% Bandwidth(MHz) | Minimum 26dB Bandwidth(MHz) | Conclusion |
|-------------------------|--------------------|-----------------------------|------------|
| 5210 | 75.653 | 81.32 | pass |
| 5290 | 75.643 | 81.50 | pass |
| 5530 | 75.696 | 81.37 | pass |
| 5610 | 75.751 | 81.50 | pass |
| 5690 | 75.626 | 81.25 | pass |
| 5775 | 75.643 | 81.20 | pass |

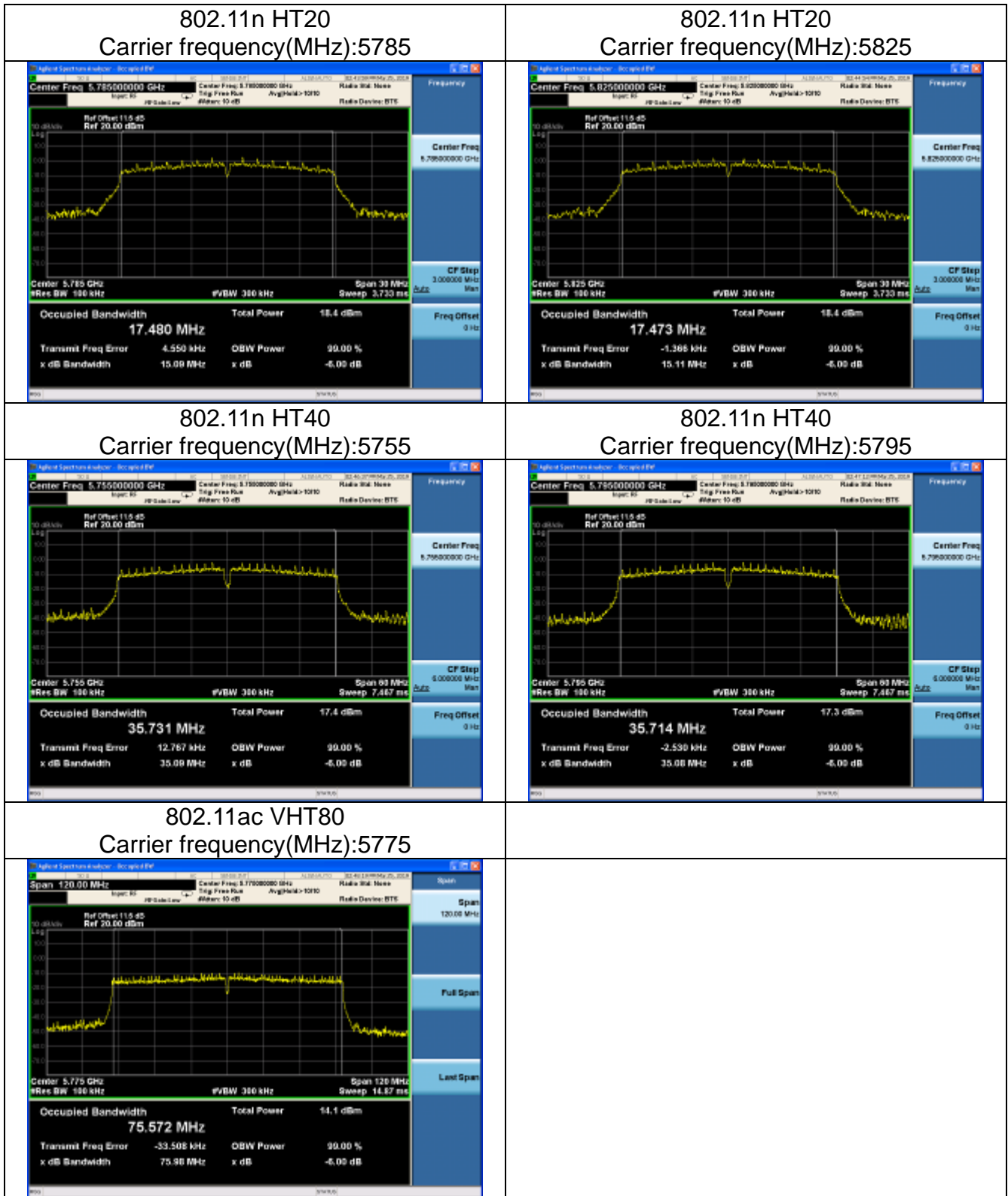


6dB Bandwidth

Test Mode: 802.11a

| Test Mode | Carrier frequency (MHz) | 6dB Bandwidth(MHz) | Minimum Limit (MHz) | Conclusion |
|----------------|-------------------------|--------------------|---------------------|------------|
| 802.11a | 5745 | 15.08 | 0.5 | pass |
| 802.11a | 5785 | 15.07 | 0.5 | pass |
| 802.11a | 5825 | 15.07 | 0.5 | pass |
| 802.11n HT20 | 5745 | 15.10 | 0.5 | pass |
| 802.11n HT20 | 5785 | 15.09 | 0.5 | pass |
| 802.11n HT20 | 5825 | 15.11 | 0.5 | pass |
| 802.11n HT40 | 5755 | 35.09 | 0.5 | pass |
| 802.11n HT40 | 5795 | 35.08 | 0.5 | pass |
| 802.11ac VHT80 | 5775 | 75.98 | 0.5 | pass |



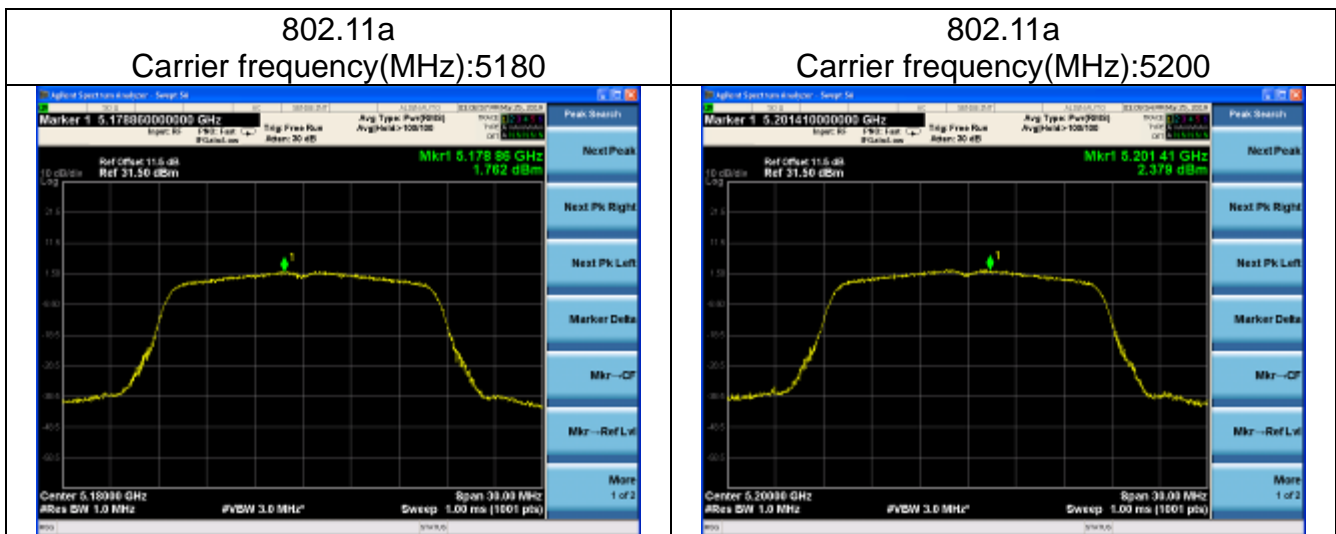


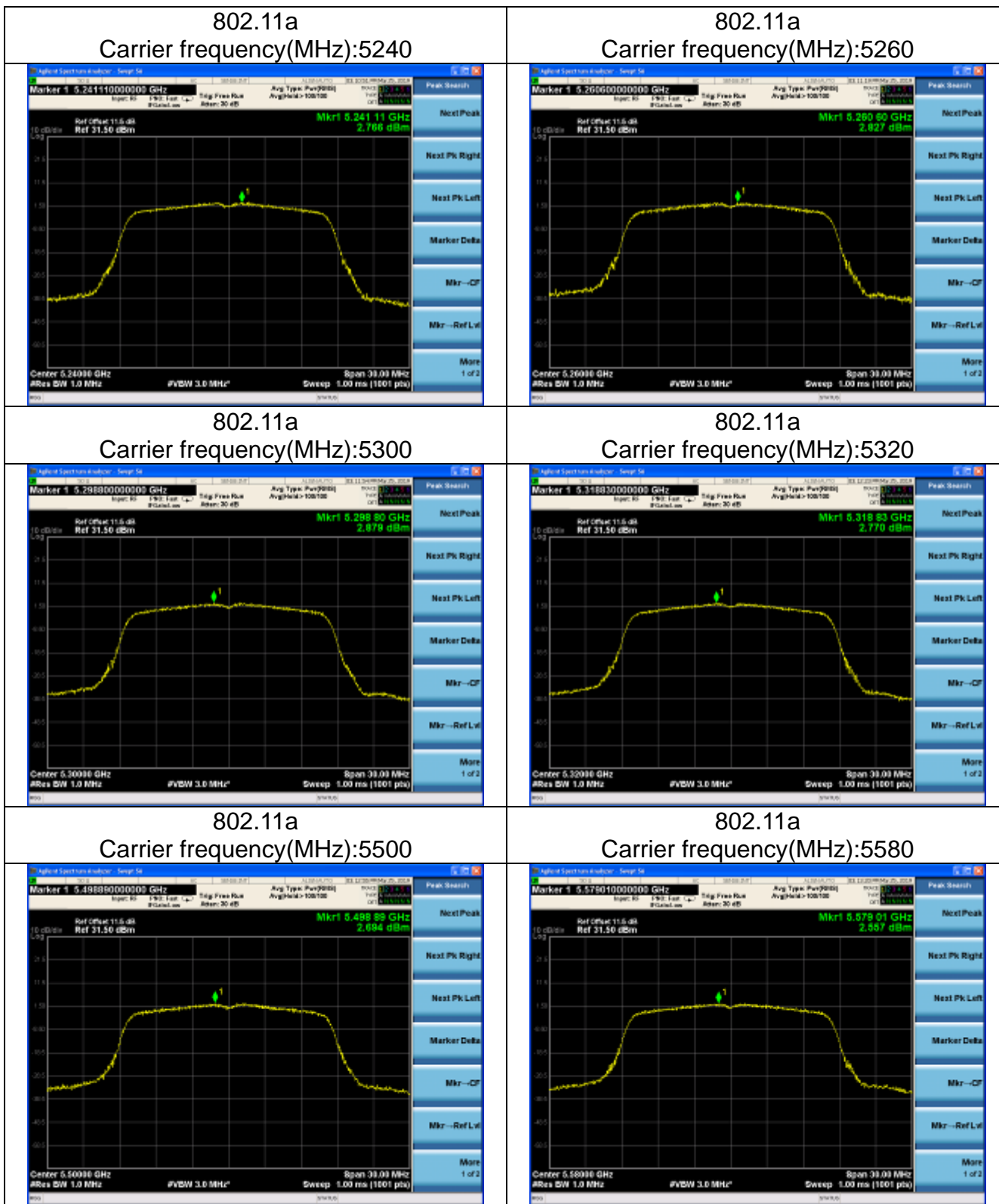
Transmitter Power Spectral Density

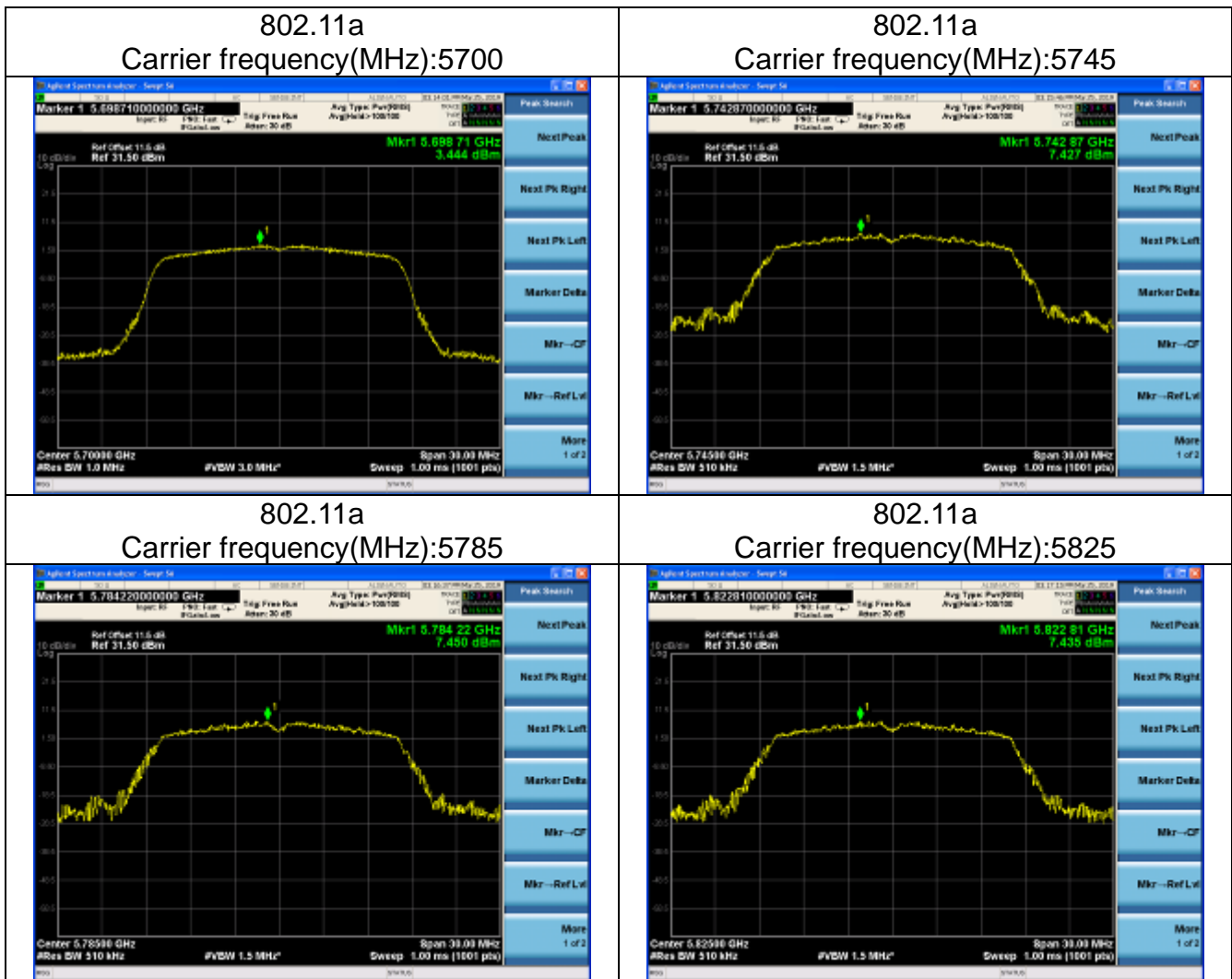
Offset 11.5dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.3dB

Test Mode: 802.11a

| Carrier frequency (MHz) | Duty Cycle Correction Factor(dB) | Power Spectral Density (dBm/MHz) | Limit | Conclusion |
|-------------------------|----------------------------------|----------------------------------|-----------------|------------|
| 5180 | 0.056 | 1.762 | 11.0 dBm/MHz | pass |
| 5200 | 0.055 | 2.379 | 11.0 dBm/MHz | pass |
| 5240 | 0.056 | 2.766 | 11.0 dBm/MHz | pass |
| 5260 | 0.056 | 2.827 | 11.0 dBm/MHz | pass |
| 5300 | 0.054 | 2.879 | 11.0 dBm/MHz | pass |
| 5320 | 0.055 | 2.770 | 11.0 dBm/MHz | pass |
| 5500 | 0.055 | 2.694 | 11.0 dBm/MHz | pass |
| 5580 | 0.055 | 2.557 | 11.0 dBm/MHz | pass |
| 5700 | 0.056 | 3.444 | 11.0 dBm/MHz | pass |
| 5745 | 0.056 | 7.427 | 30.0 dBm/500kHz | pass |
| 5785 | 0.055 | 7.450 | 30.0 dBm/500kHz | pass |
| 5825 | 0.056 | 7.435 | 30.0 dBm/500kHz | pass |



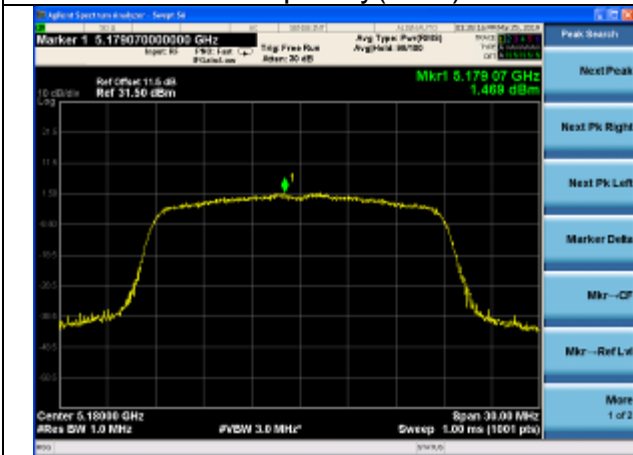




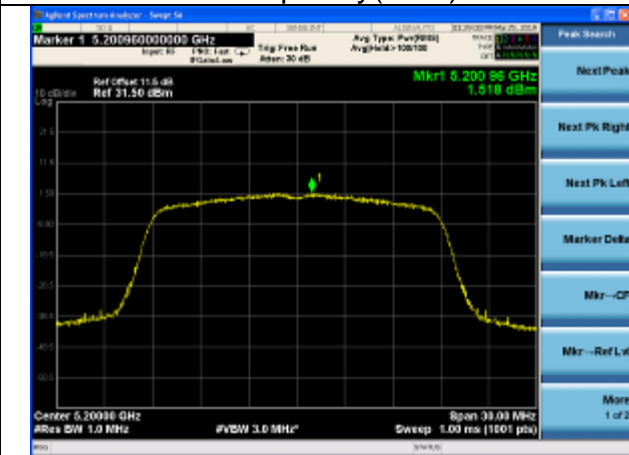
Test Mode: 802.11n HT20

| Carrier frequency (MHz) | Duty Cycle Correction Factor(dB) | Power Spectral Density (dBm/MHz) | Limit | Conclusion |
|-------------------------|----------------------------------|----------------------------------|-----------------|------------|
| 5180 | 0.091 | 1.469 | 11.0 dBm/MHz | pass |
| 5200 | 0.090 | 1.518 | 11.0 dBm/MHz | pass |
| 5240 | 0.091 | 2.202 | 11.0 dBm/MHz | pass |
| 5260 | 0.088 | 2.241 | 11.0 dBm/MHz | pass |
| 5300 | 0.089 | 1.519 | 11.0 dBm/MHz | pass |
| 5320 | 0.089 | 1.280 | 11.0 dBm/MHz | pass |
| 5500 | 0.090 | 1.492 | 11.0 dBm/MHz | pass |
| 5580 | 0.089 | 2.308 | 11.0 dBm/MHz | pass |
| 5700 | 0.091 | 1.415 | 11.0 dBm/MHz | pass |
| 5745 | 0.087 | -0.718 | 30.0 dBm/500kHz | pass |
| 5785 | 0.089 | -0.039 | 30.0 dBm/500kHz | pass |
| 5825 | 0.091 | 0.010 | 30.0 dBm/500kHz | pass |

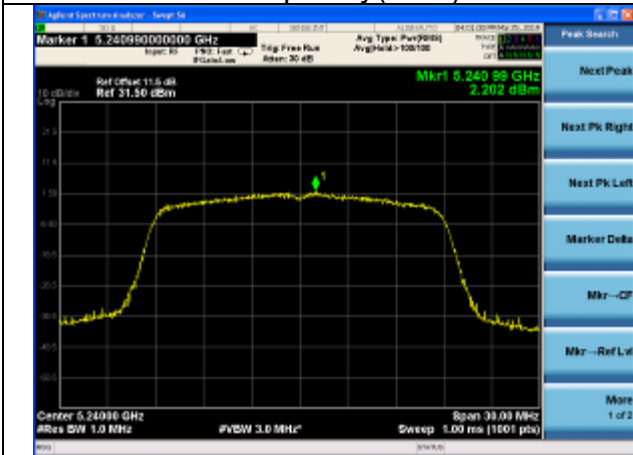
802.11n HT20
Carrier frequency(MHz):5180



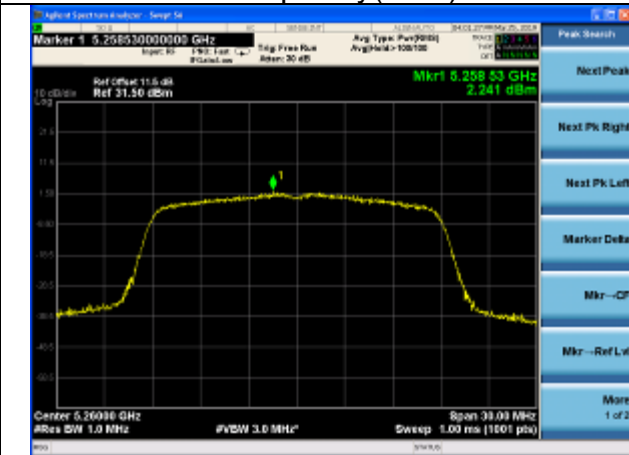
802.11n HT20
Carrier frequency(MHz):5200



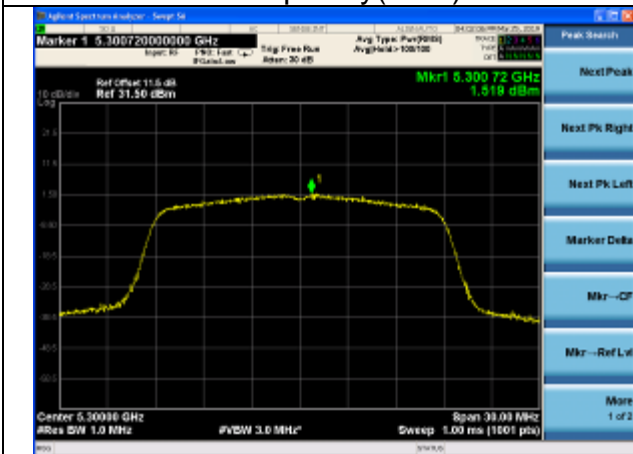
802.11n HT20
Carrier frequency(MHz):5240



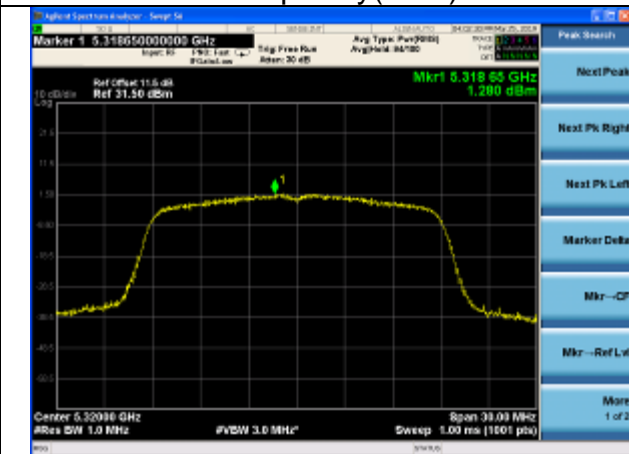
802.11n HT20
Carrier frequency(MHz):5260



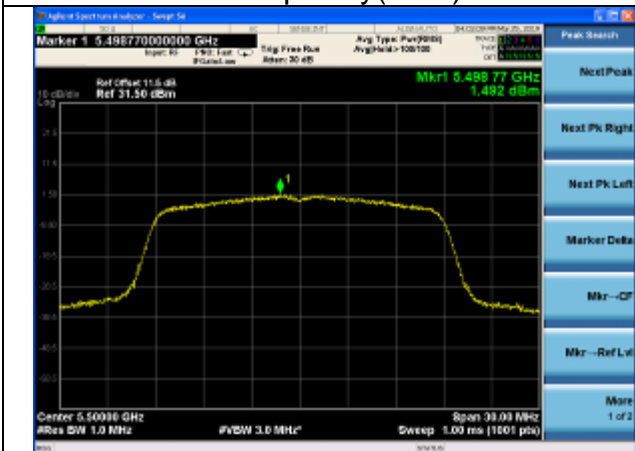
802.11n HT20
Carrier frequency(MHz):5300



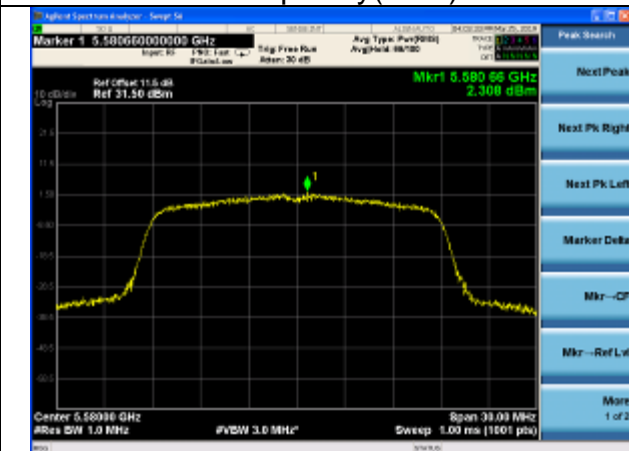
802.11n HT20
Carrier frequency(MHz):5320



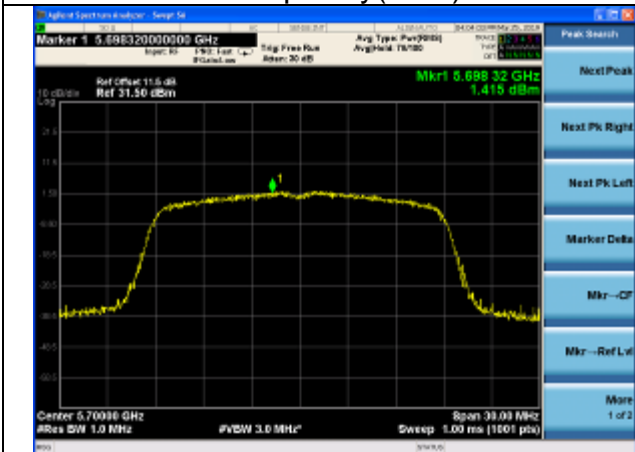
802.11n HT20
Carrier frequency(MHz):5500



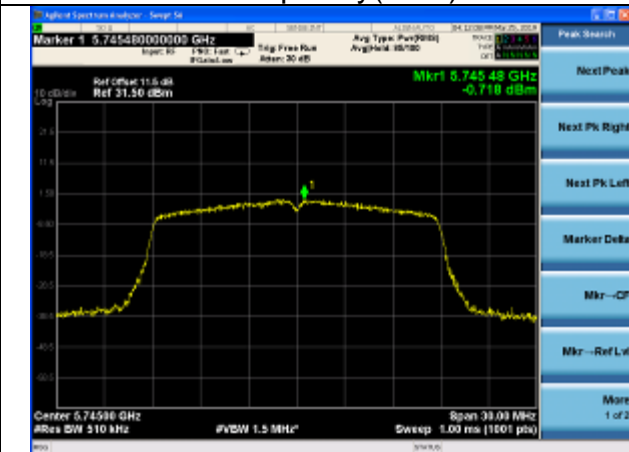
802.11n HT20
Carrier frequency(MHz):5580



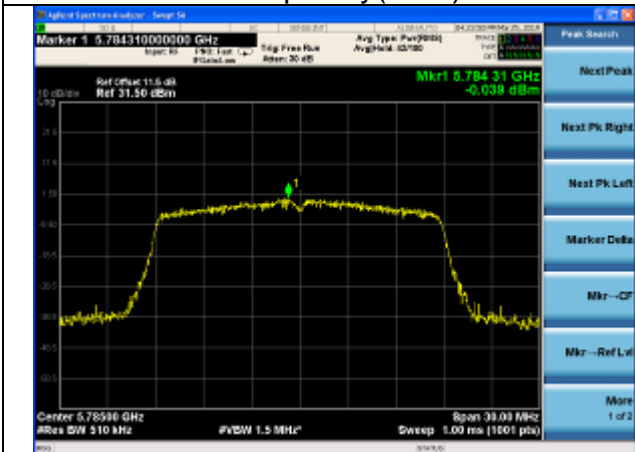
802.11n HT20
Carrier frequency(MHz):5700



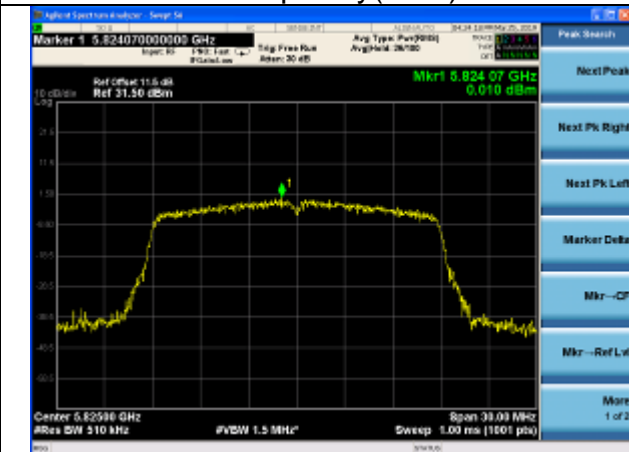
802.11n HT20
Carrier frequency(MHz):5745



802.11n HT20
Carrier frequency(MHz):5785

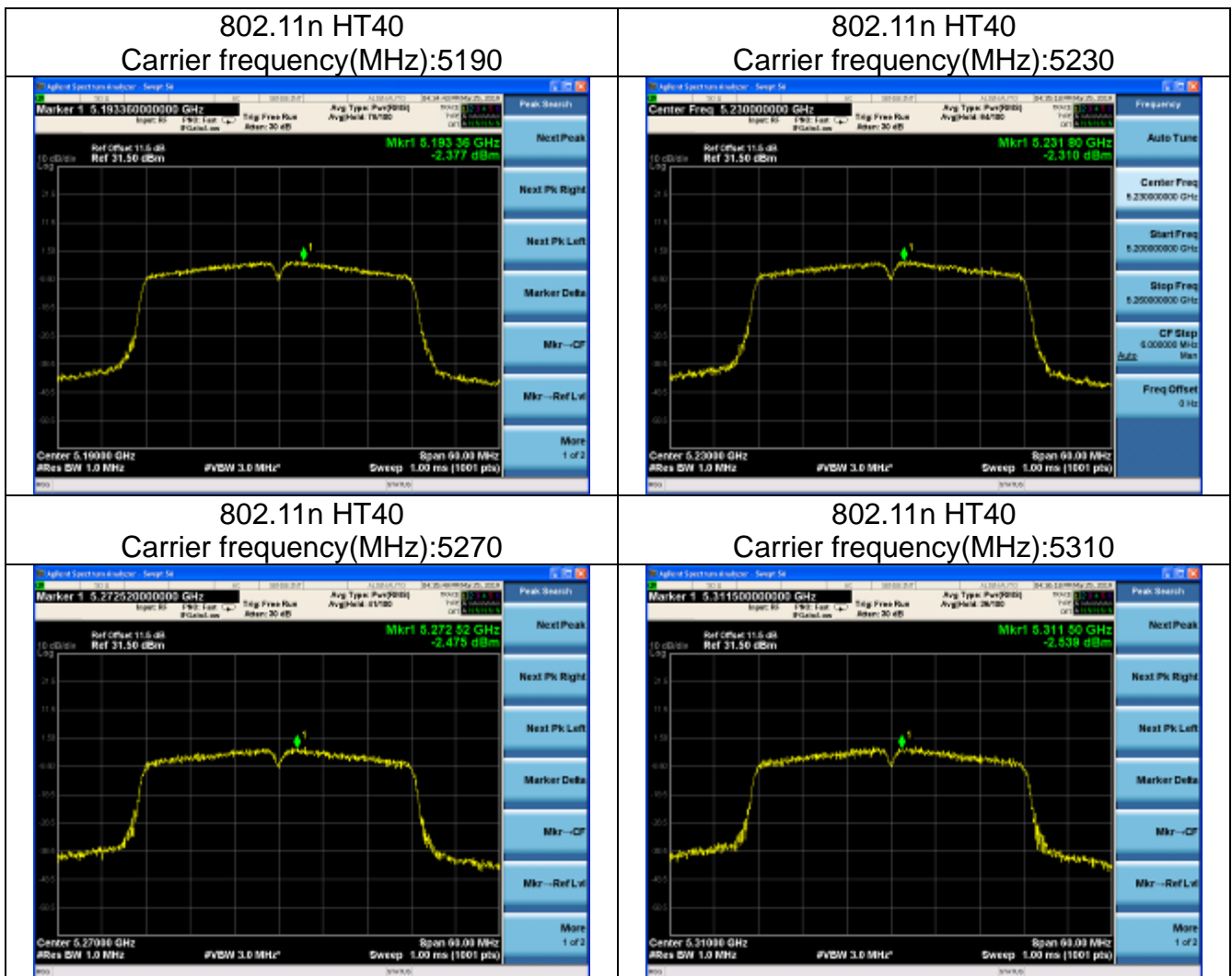


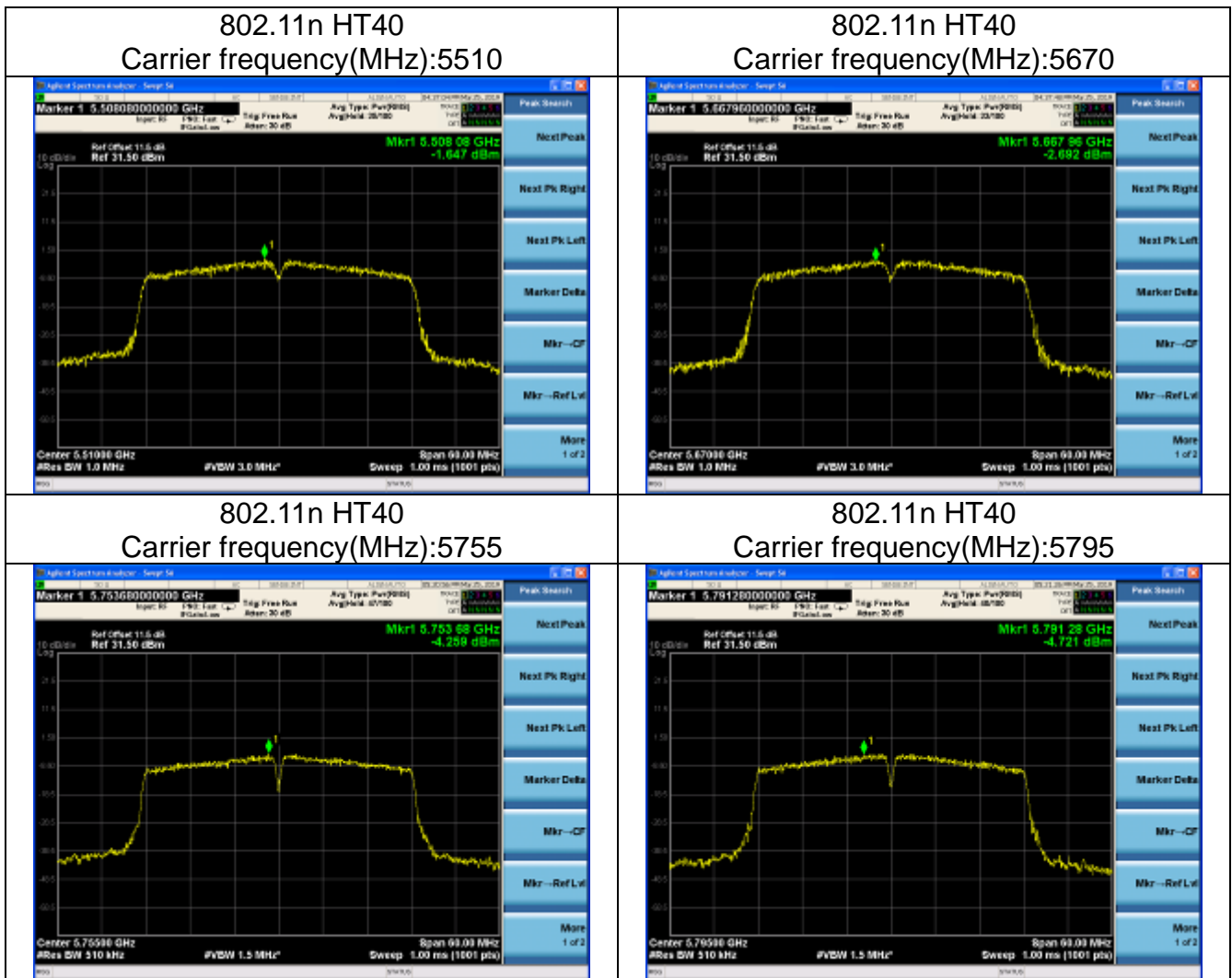
802.11n HT20
Carrier frequency(MHz):5825



Test Mode: 802.11n HT40

| Carrier frequency (MHz) | Duty Cycle Correction Factor(dB) | Power Spectral Density (dBm/MHz) | Limit | Conclusion |
|-------------------------|----------------------------------|----------------------------------|-----------------|------------|
| 5190 | 0.180 | -2.377 | 11.0 dBm/MHz | pass |
| 5230 | 0.177 | -2.310 | 11.0 dBm/MHz | pass |
| 5270 | 0.179 | -2.475 | 11.0 dBm/MHz | pass |
| 5310 | 0.178 | -2.539 | 11.0 dBm/MHz | pass |
| 5510 | 0.180 | -1.647 | 11.0 dBm/MHz | pass |
| 5670 | 0.179 | -2.692 | 11.0 dBm/MHz | pass |
| 5755 | 0.179 | -4.259 | 30.0 dBm/500kHz | pass |
| 5795 | 0.180 | -4.721 | 30.0 dBm/500kHz | pass |

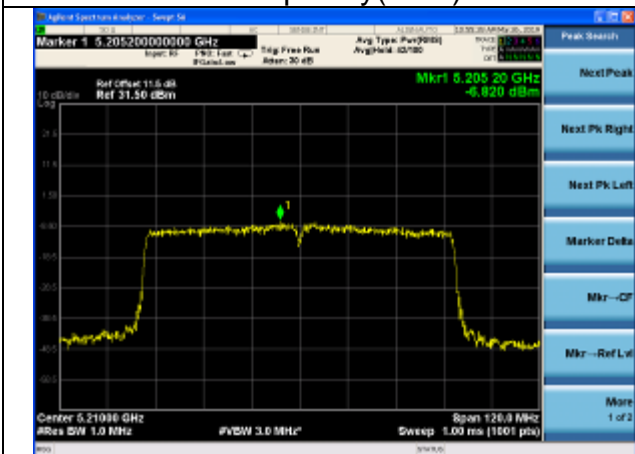




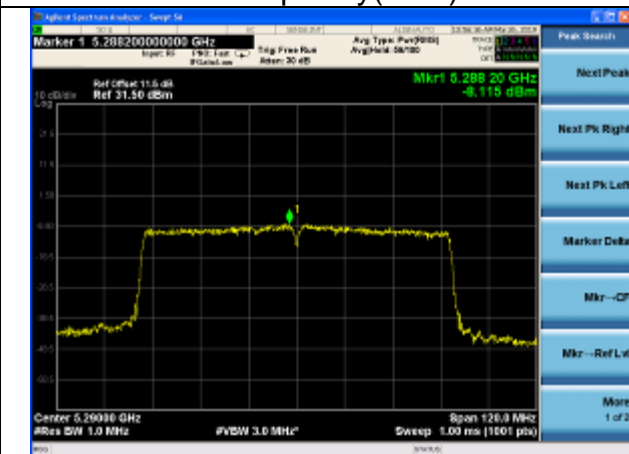
Test Mode: 802.11ac VHT80

| Carrier frequency (MHz) | Duty Cycle Correction Factor(dB) | Power Spectral Density (dBm/MHz) | Limit | Conclusion |
|-------------------------|----------------------------------|----------------------------------|-----------------|------------|
| 5210 | 0.339 | -6.820 | 11.0 dBm/MHz | pass |
| 5290 | 0.343 | -8.115 | 11.0 dBm/MHz | pass |
| 5530 | 0.341 | -8.483 | 11.0 dBm/MHz | pass |
| 5610 | 0.345 | -7.119 | 11.0 dBm/MHz | pass |
| 5690 | 0.339 | -6.829 | 11.0 dBm/MHz | pass |
| 5690 | 0.340 | -10.026 | 30.0 dBm/500kHz | pass |
| 5775 | 0.343 | -10.261 | 30.0 dBm/500kHz | pass |

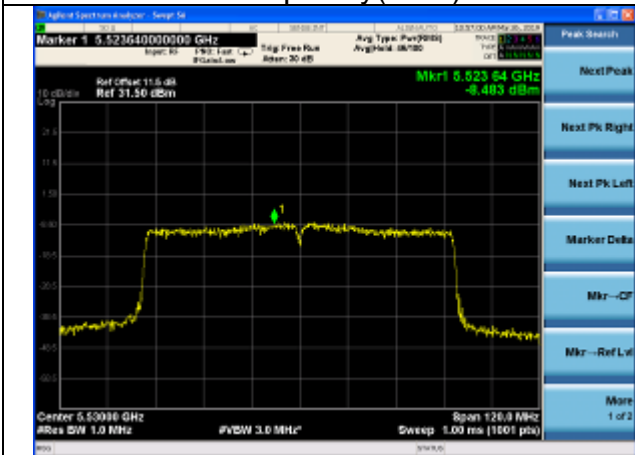
802.11ac HT80
Carrier frequency(MHz):5210



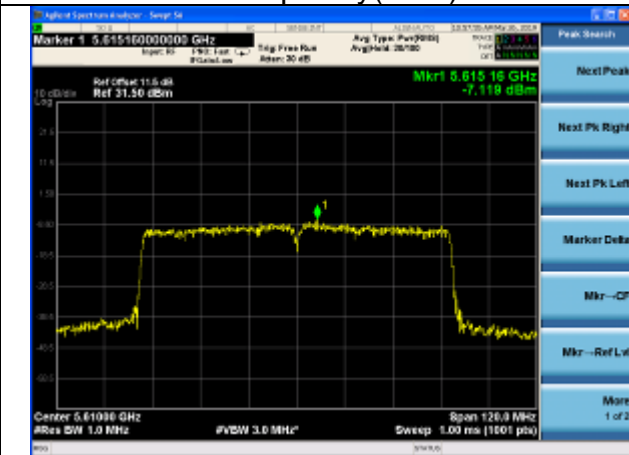
802.11ac HT80
Carrier frequency(MHz):5290



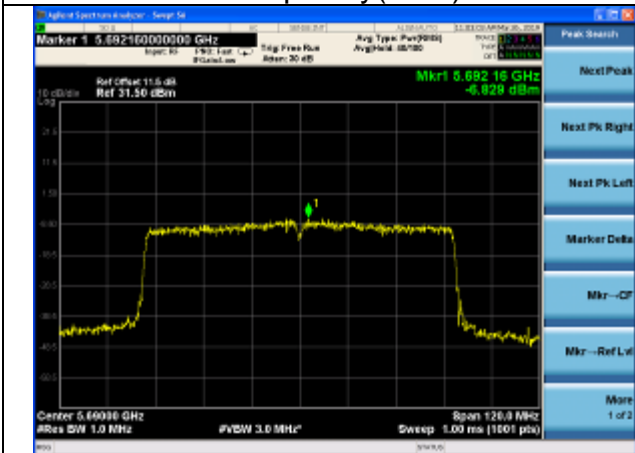
802.11ac HT80
Carrier frequency(MHz):5530

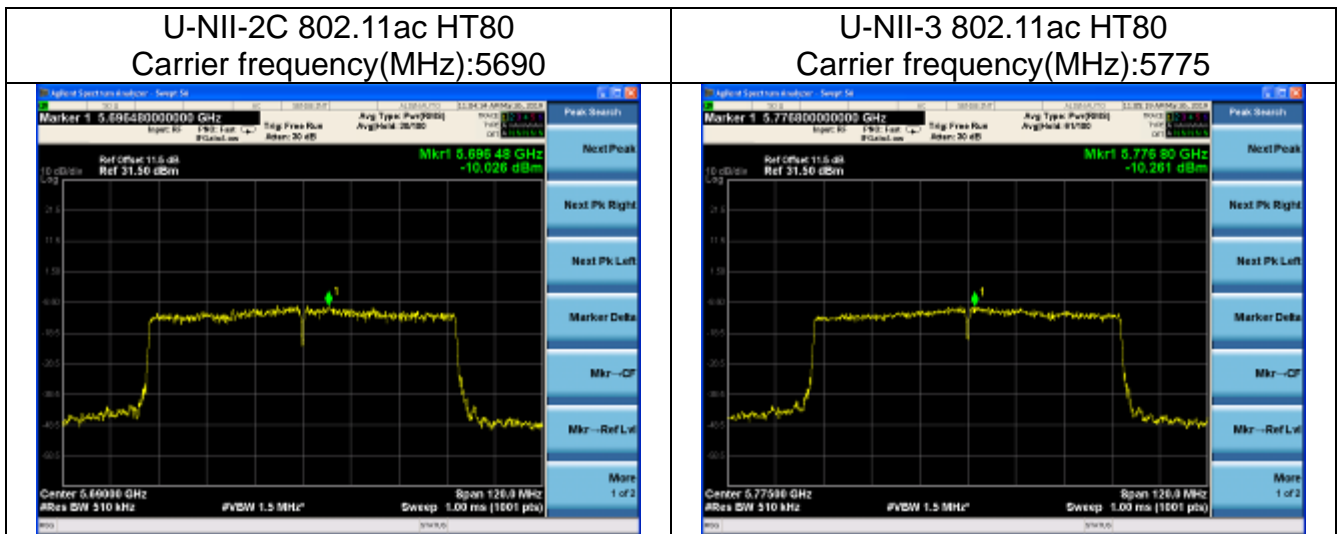


802.11ac HT80
Carrier frequency(MHz):5610



802.11ac HT80
Carrier frequency(MHz):5690

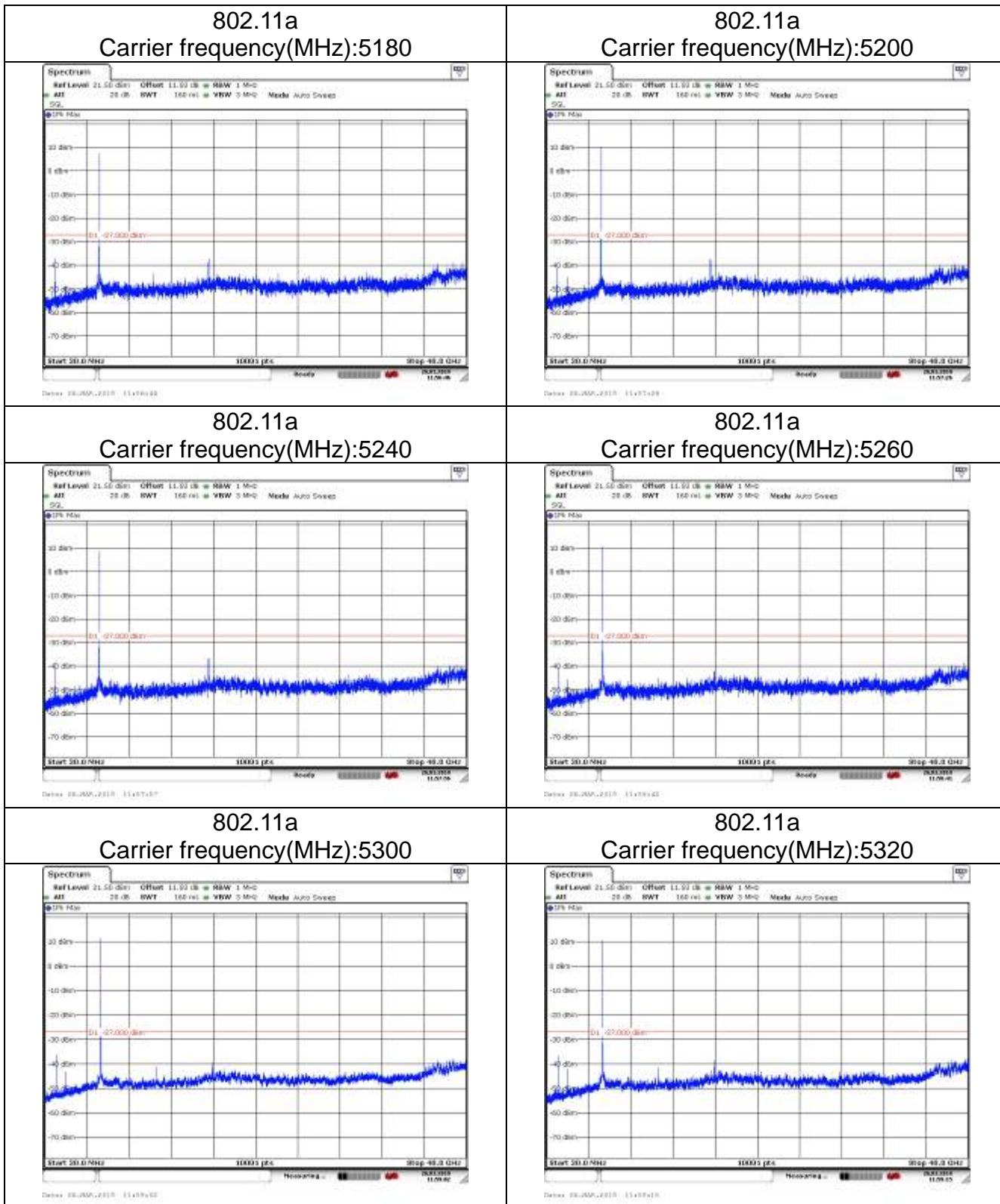


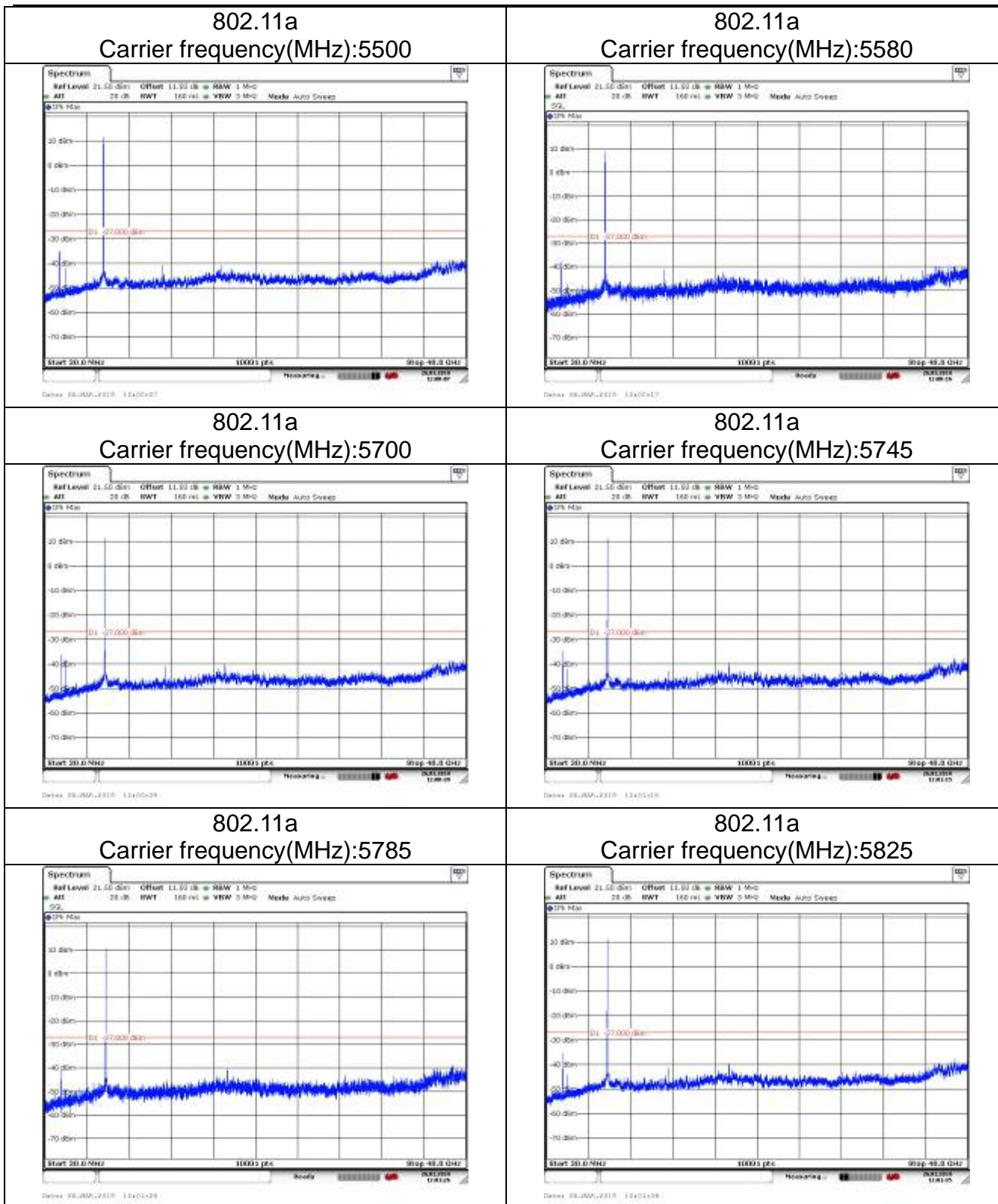


Unwanted Conducted Emission Measurement

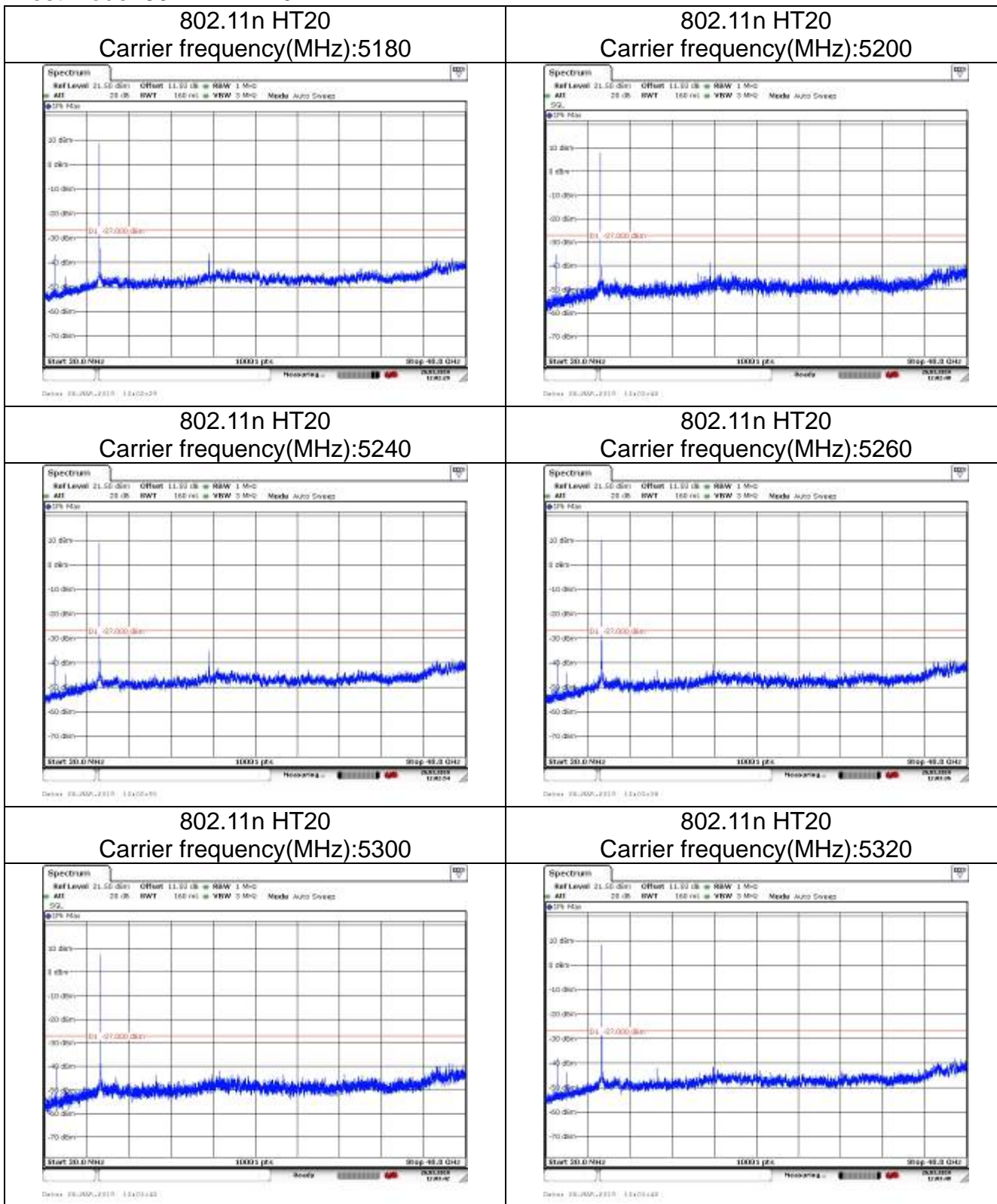
Offset 11.5dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.3dB

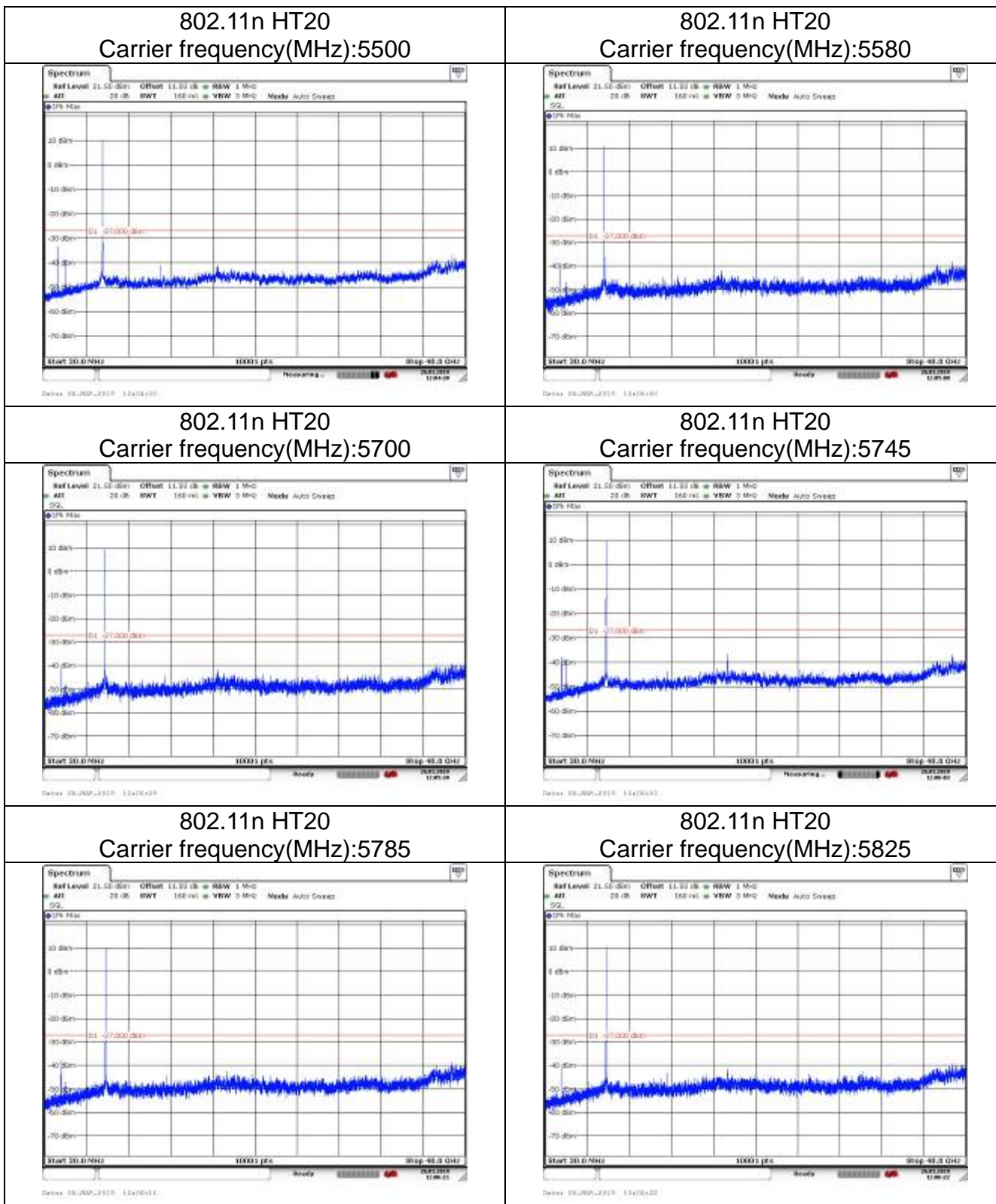
Test Mode: 802.11a



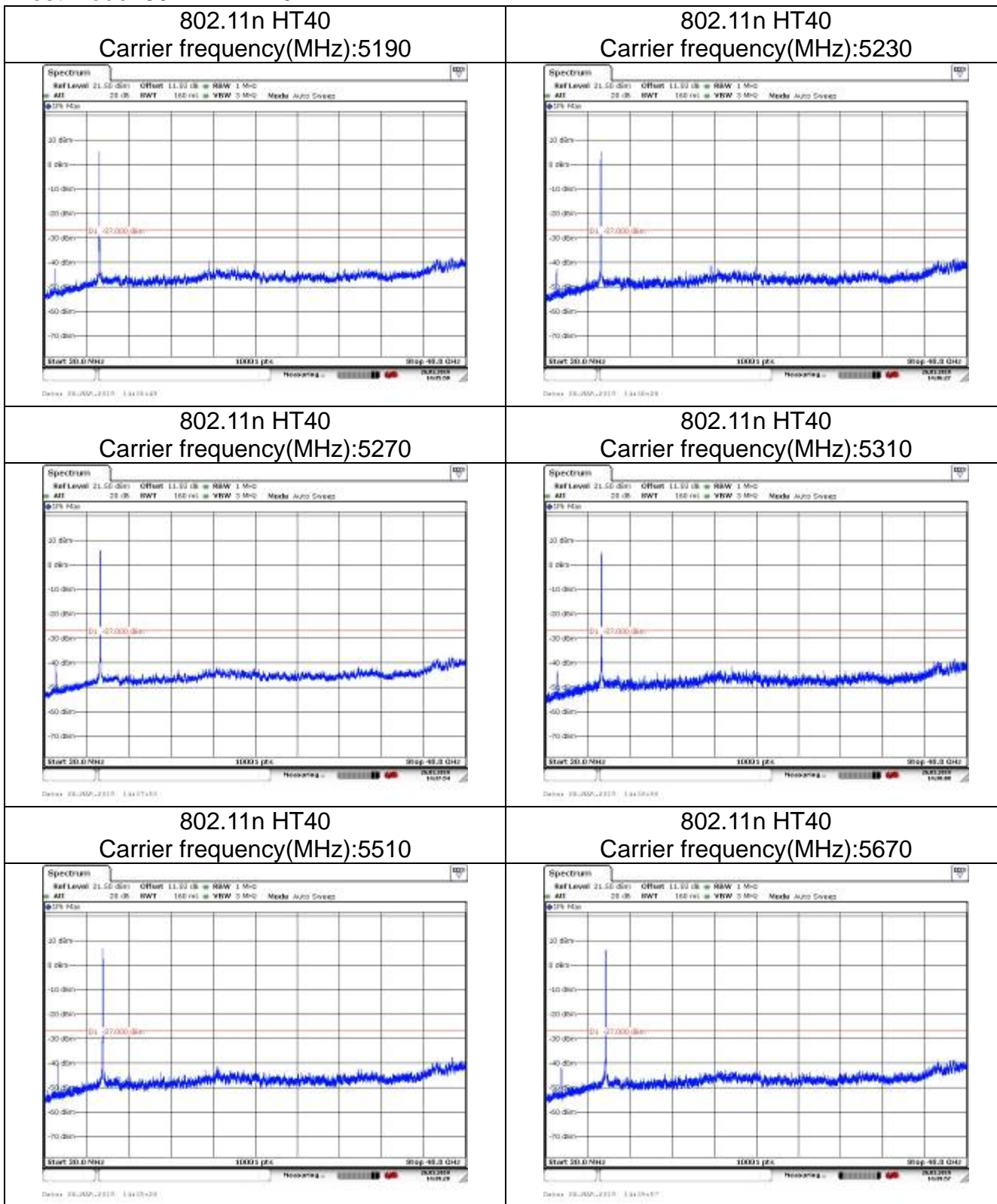


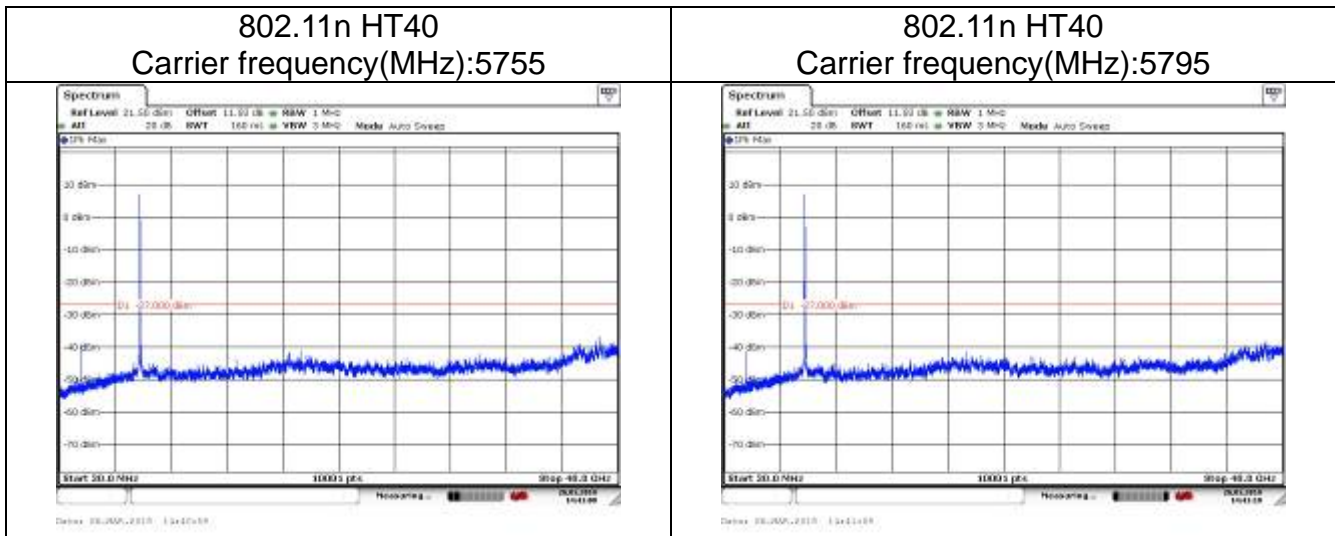
Test Mode: 802.11n HT20



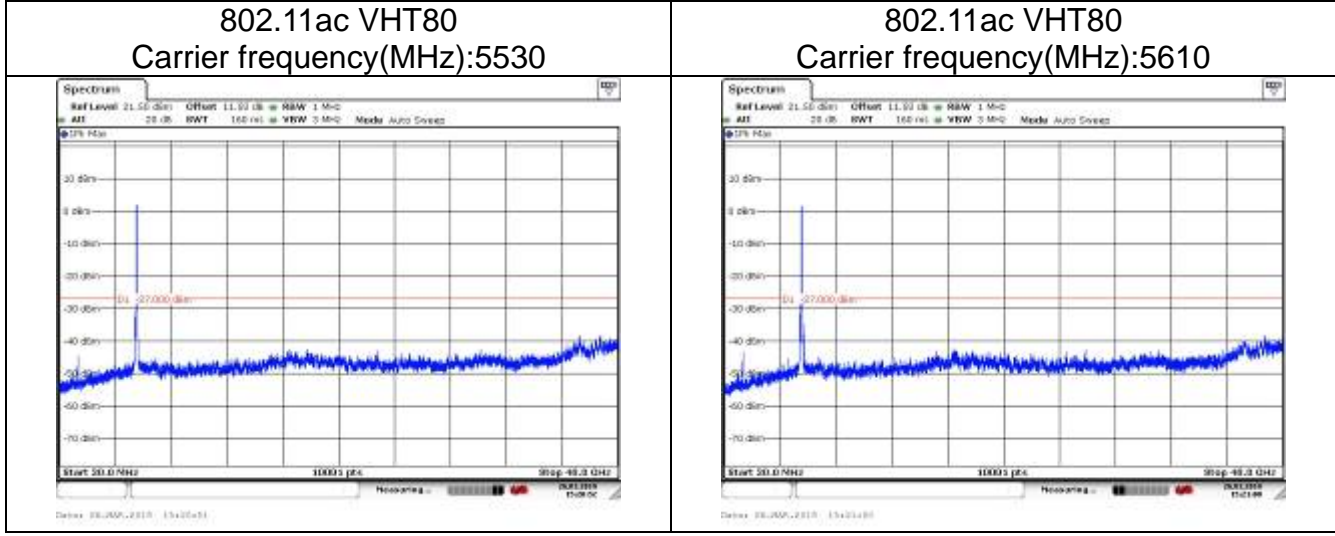
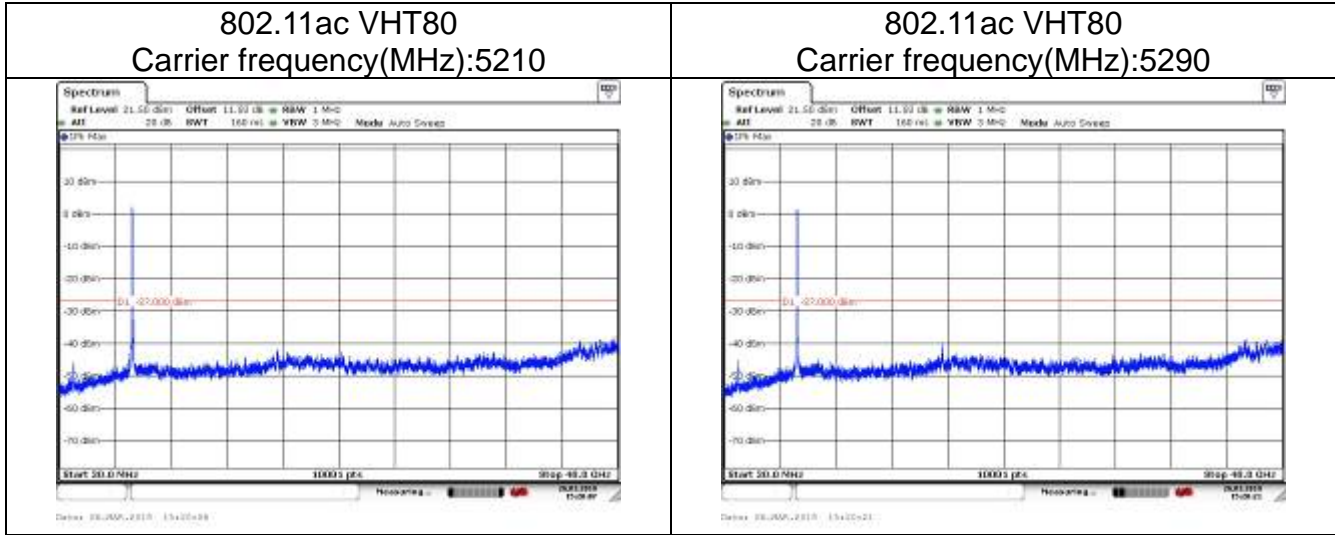


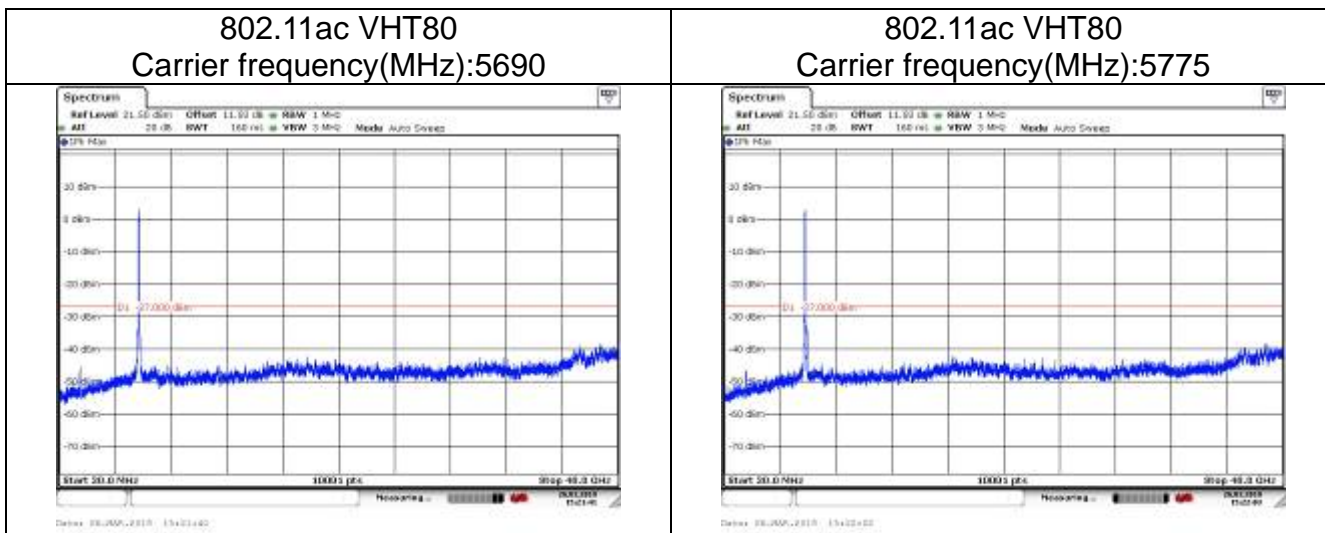
Test Mode: 802.11n HT40





Test Mode: 802.11ac VHT80





Frequency Stability

| Band | Mode | Data Rate | Frequency (MHz) | Frequency Stability(ppm) | Voltage(V) | Temperature(°C) |
|----------|------|-----------|-----------------|--------------------------|------------|-----------------|
| U-NII-1 | 11a | 6Mbps | 5180 | 1.67 | NV | -10 |
| | 11a | 6Mbps | 5180 | 2.22 | NV | 0 |
| | 11a | 6Mbps | 5180 | -2.15 | NV | +10 |
| | 11a | 6Mbps | 5180 | -2.53 | HV | +20 |
| | 11a | 6Mbps | 5180 | 0.41 | LV | +20 |
| | 11a | 6Mbps | 5180 | 1.93 | NV | +20 |
| | 11a | 6Mbps | 5180 | 0.38 | NV | +30 |
| | 11a | 6Mbps | 5180 | -0.08 | NV | +40 |
| | 11a | 6Mbps | 5180 | -0.76 | NV | +50 |
| | 11a | 6Mbps | 5180 | 1.67 | NV | +55 |
| U-NII-2A | 11a | 6Mbps | 5320 | 0.50 | NV | -10 |
| | 11a | 6Mbps | 5320 | -1.74 | NV | 0 |
| | 11a | 6Mbps | 5320 | -1.66 | NV | +10 |
| | 11a | 6Mbps | 5320 | -0.97 | HV | +20 |
| | 11a | 6Mbps | 5320 | -0.39 | LV | +20 |
| | 11a | 6Mbps | 5320 | -0.76 | NV | +20 |
| | 11a | 6Mbps | 5320 | -0.73 | NV | +30 |
| | 11a | 6Mbps | 5320 | 2.46 | NV | +40 |
| | 11a | 6Mbps | 5320 | -0.73 | NV | +50 |
| | 11a | 6Mbps | 5320 | 0.50 | NV | +55 |
| U-NII-2C | 11a | 6Mbps | 5500 | 1.95 | NV | -10 |
| | 11a | 6Mbps | 5500 | -2.64 | NV | 0 |
| | 11a | 6Mbps | 5500 | 0.31 | NV | +10 |
| | 11a | 6Mbps | 5500 | 1.67 | HV | +20 |
| | 11a | 6Mbps | 5500 | -1.00 | LV | +20 |
| | 11a | 6Mbps | 5500 | -0.79 | NV | +20 |
| | 11a | 6Mbps | 5500 | 2.14 | NV | +30 |
| | 11a | 6Mbps | 5500 | 1.95 | NV | +40 |
| | 11a | 6Mbps | 5500 | 2.76 | NV | +50 |
| | 11a | 6Mbps | 5500 | 1.95 | NV | +55 |
| U-NII-3 | 11a | 6Mbps | 5825 | -0.24 | NV | -10 |
| | 11a | 6Mbps | 5825 | -1.59 | NV | 0 |
| | 11a | 6Mbps | 5825 | -2.66 | NV | +10 |
| | 11a | 6Mbps | 5825 | 2.04 | HV | +20 |
| | 11a | 6Mbps | 5825 | 1.65 | LV | +20 |
| | 11a | 6Mbps | 5825 | 1.93 | NV | +20 |
| | 11a | 6Mbps | 5825 | -1.44 | NV | +30 |
| | 11a | 6Mbps | 5825 | 2.87 | NV | +40 |
| | 11a | 6Mbps | 5825 | -2.02 | NV | +50 |
| | 11a | 6Mbps | 5825 | -0.24 | NV | +55 |

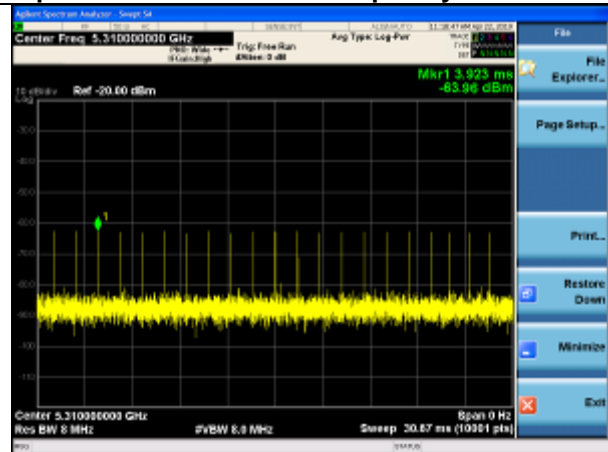
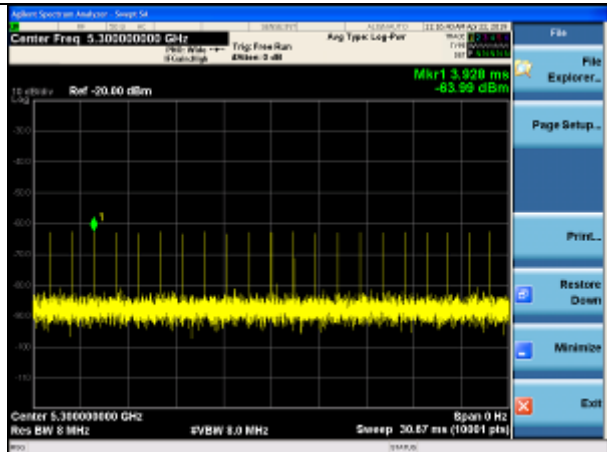
Dynamic Frequency Selection

Radar Waveform Calibration Result

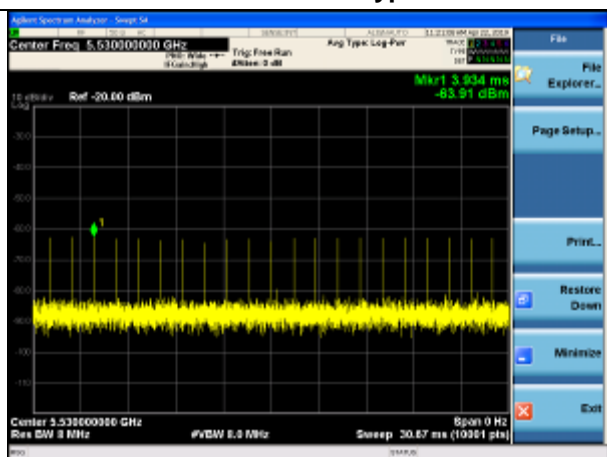
<20MHz / 5300 MHz> Radar Type 0

<40MHz / 5310 MHz> Radar Type 0

Radar / DFS detection threshold level and the burst of pulses on the Channel frequency



<80MHz / 5530 MHz> Radar Type 0



Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period for Client Beacon Test

| BW / Channel | Test Item | Test Result | Limit | Pass/Fail |
|-----------------|-----------------------------------|----------------|----------|-----------|
| 20MHz / 5300MHz | Channel Move Time | 0.5665 s | < 10s | Pass |
| | Channel Closing Transmission Time | 200ms + 0.4 ms | < 260ms | Pass |
| | Non-Occupancy Period | ≥ 30 | ≥ 30 min | Pass |
| 40MHz / 5310MHz | Channel Move Time | 0.5555 s | < 10s | Pass |
| | Channel Closing Transmission Time | 200ms + 0.4 ms | < 260ms | Pass |
| | Non-Occupancy Period | ≥ 30 | ≥ 30 min | Pass |
| 80MHz/5530MHz | Channel Move Time | 0.5635 s | < 10s | Pass |
| | Channel Closing Transmission Time | 200ms + 0.4 ms | < 260ms | Pass |
| | Non-Occupancy Period | ≥ 30 | ≥ 30 min | Pass |

Note: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 seconds period. The aggregate duration of control signals will not count quiet periods in between transmissions.

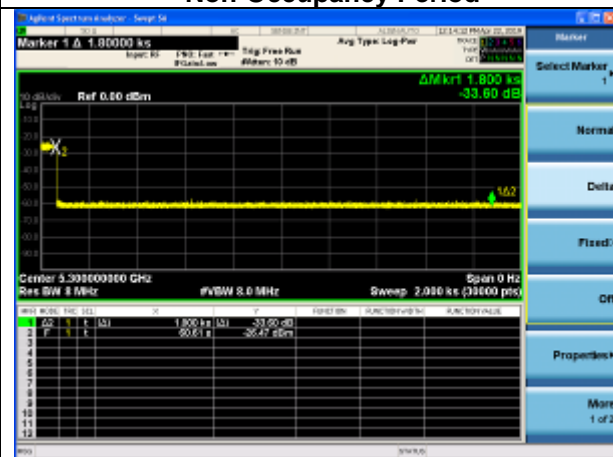
Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period for Client Beacon Test Plots

<20MHz / 5300 MHz>

Channel Move Time & Channel Closing Transmission Time



Non-Occupancy Period



Non-associated test Master was off. (beacon test)



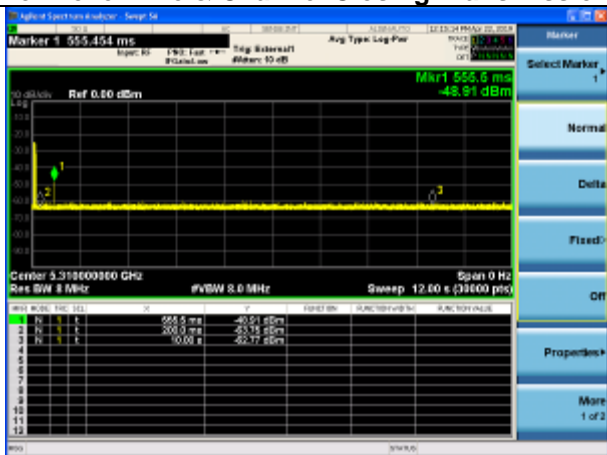
Note:

Dwell (0.4 ms) = Sweep Time (12000 ms) / Sweep Point Bins (30000)

Channel Closing Transmission Time (200 + 0.4 ms) = 200 + Number (1) X Dwell (0.4 ms) < 260ms

<40MHz / 5310 MHz>

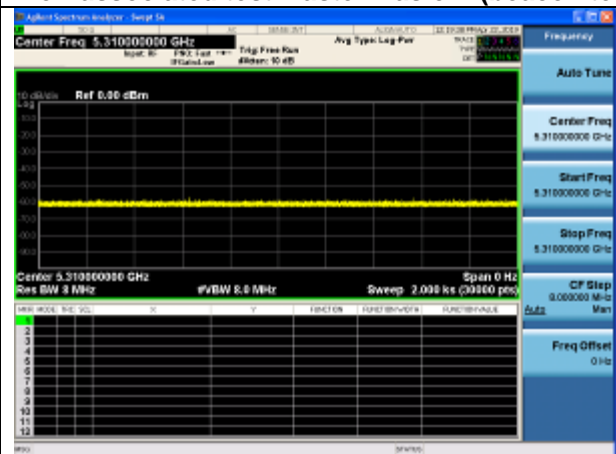
Channel Move Time & Channel Closing Transmission Time



Non-Occupancy Period



Non-associated test Master was off. (beacon test)



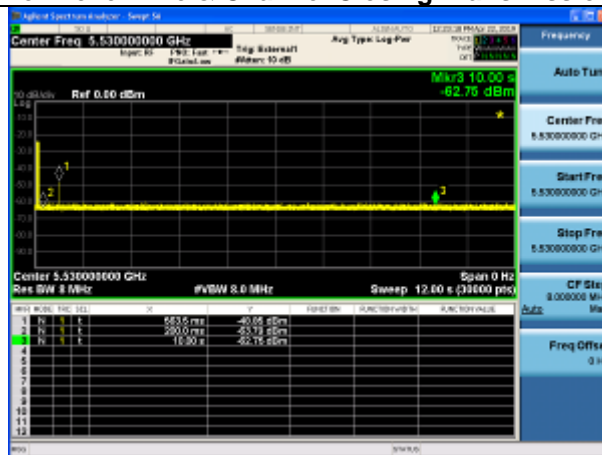
Note:

Dwell (0.4 ms) = Sweep Time (12000 ms) / Sweep Point Bins (30000)

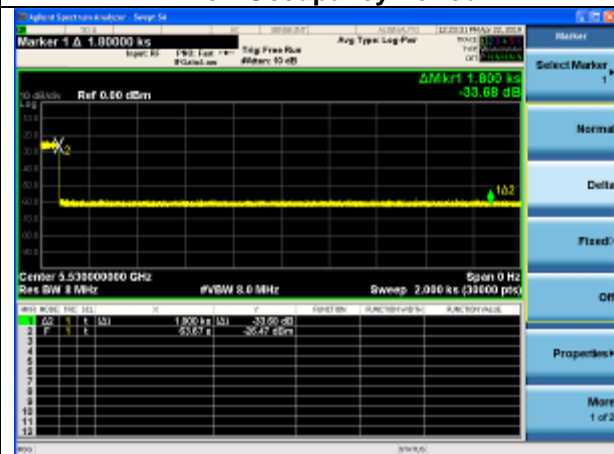
Channel Closing Transmission Time (200 + 0.4 ms) = 200 + Number (1) X Dwell (0.4 ms) < 260ms

<80MHz / 5530 MHz>

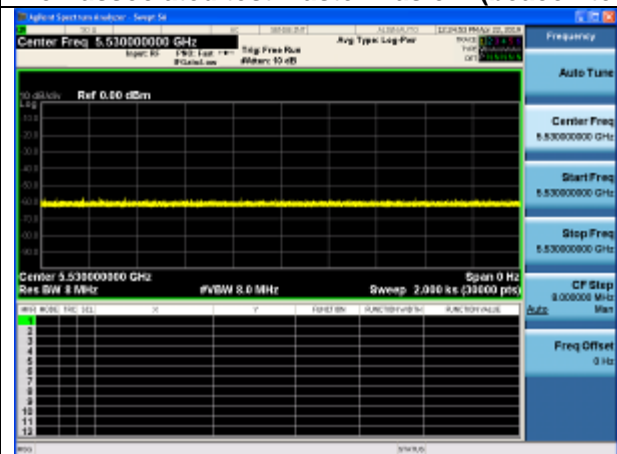
Channel Move Time & Channel Closing Transmission Time



Non-Occupancy Period



Non-associated test Master was off. (beacon test)



Note:

Dwell (0.4 ms) = Sweep Time (12000 ms) / Sweep Point Bins (30000)

Channel Closing Transmission Time (200 + 0.4 ms) = 200 + Number (1) X Dwell (0.4 ms) < 260ms

Data Traffic and Noise Floor Plots

