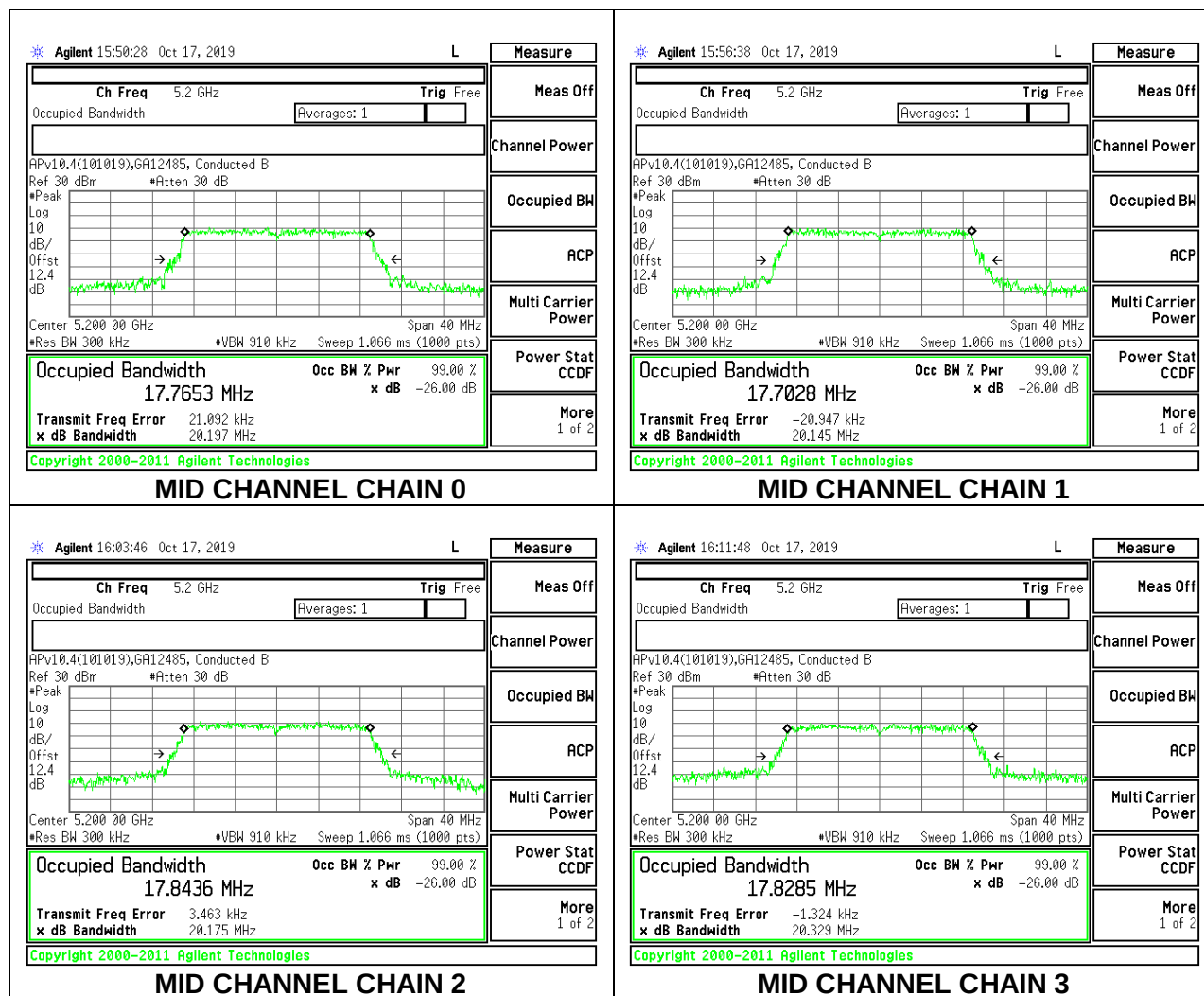
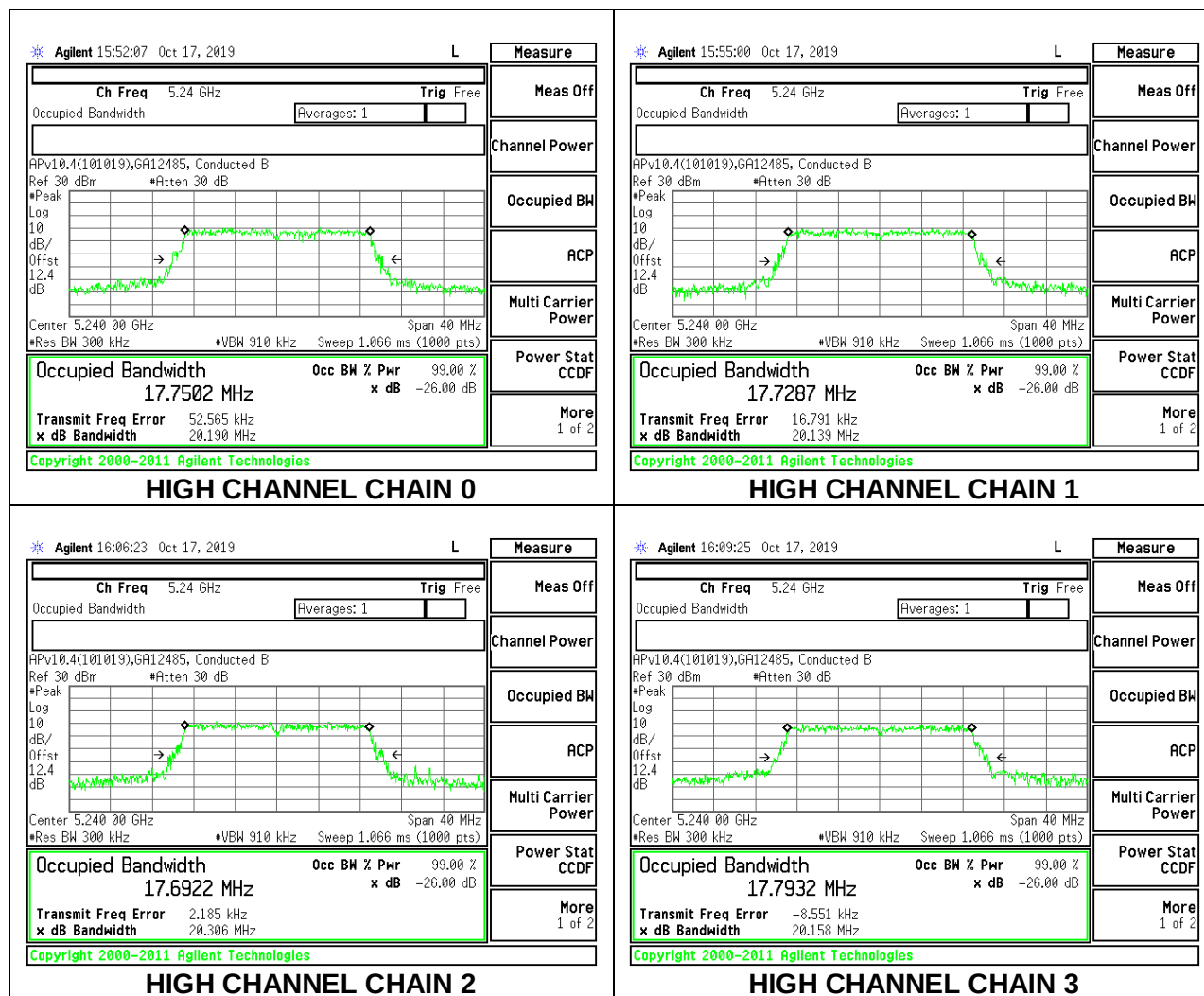


## MID CHANNEL



## HIGH CHANNEL

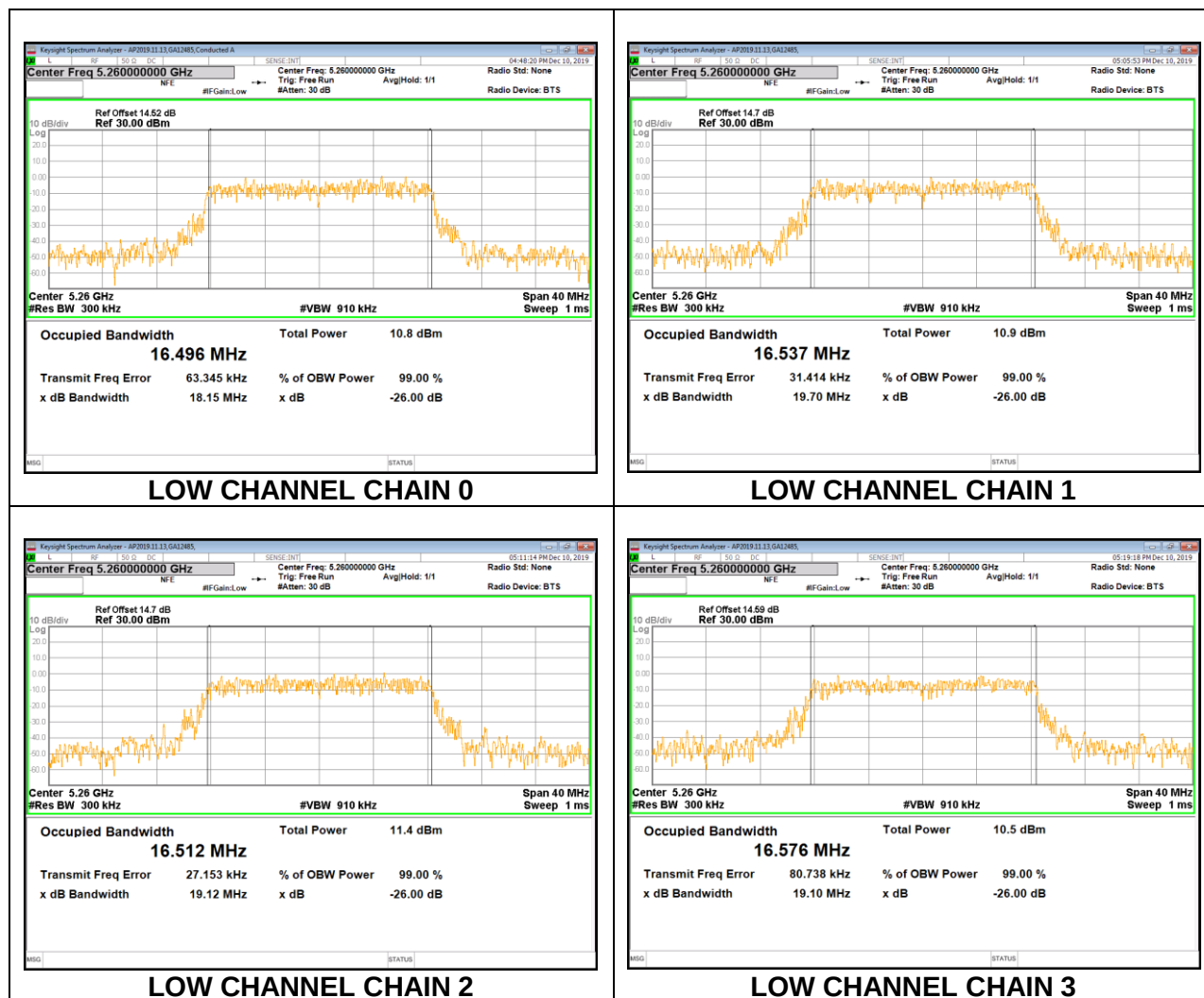


### 8.3.3. 802.11a MODE IN THE 5.3 GHz BAND

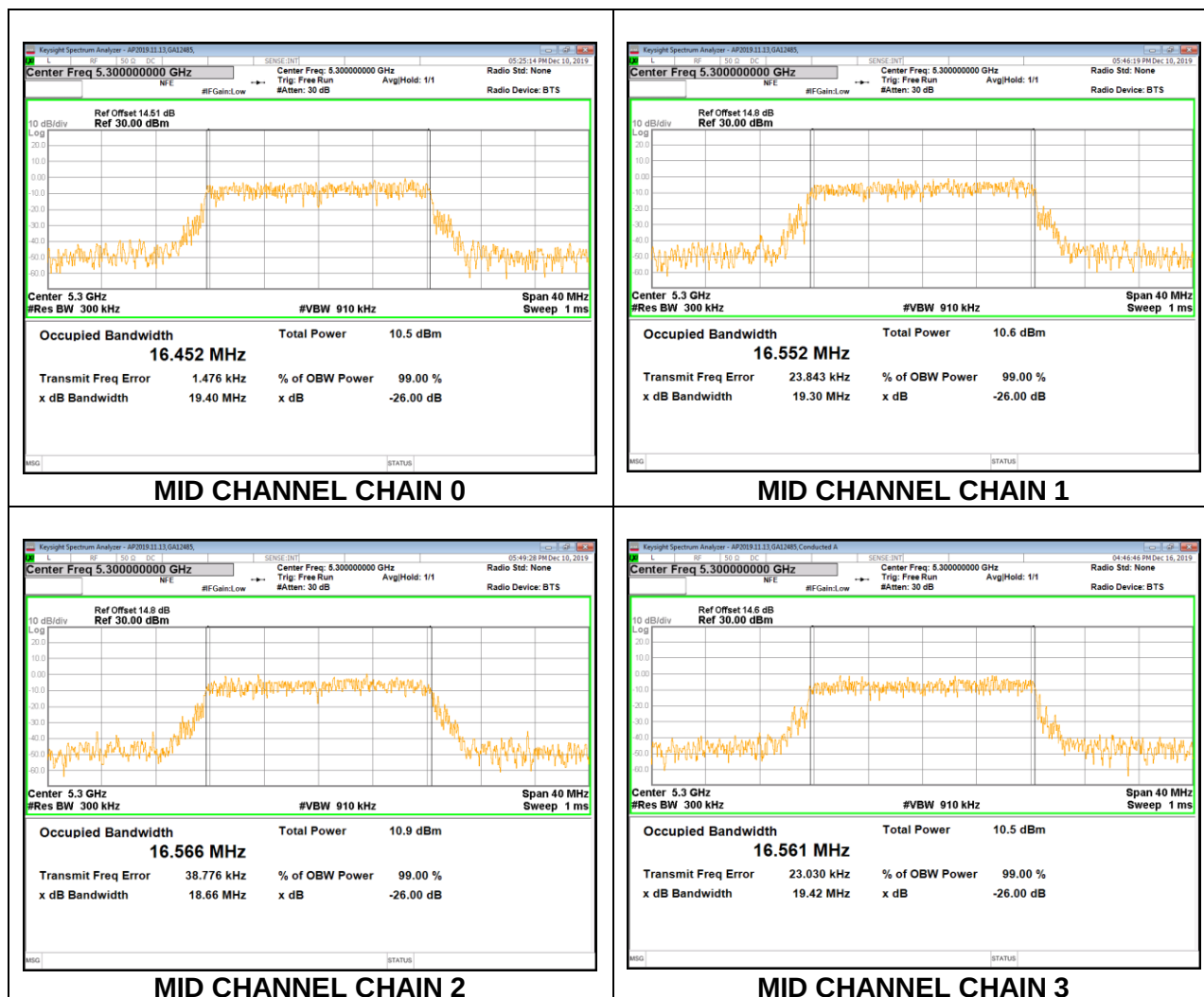
#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>Antenna 0<br>(MHz) | 99% Bandwidth<br>Antenna 1<br>(MHz) | 99% Bandwidth<br>Antenna 2<br>(MHz) | 99% Bandwidth<br>Antenna 3<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Low     | 5260               | 16.496                              | 16.537                              | 16.512                              | 16.576                              |
| Mid     | 5300               | 16.452                              | 16.552                              | 16.566                              | 16.561                              |
| High    | 5320               | 16.606                              | 16.606                              | 16.494                              | 16.564                              |

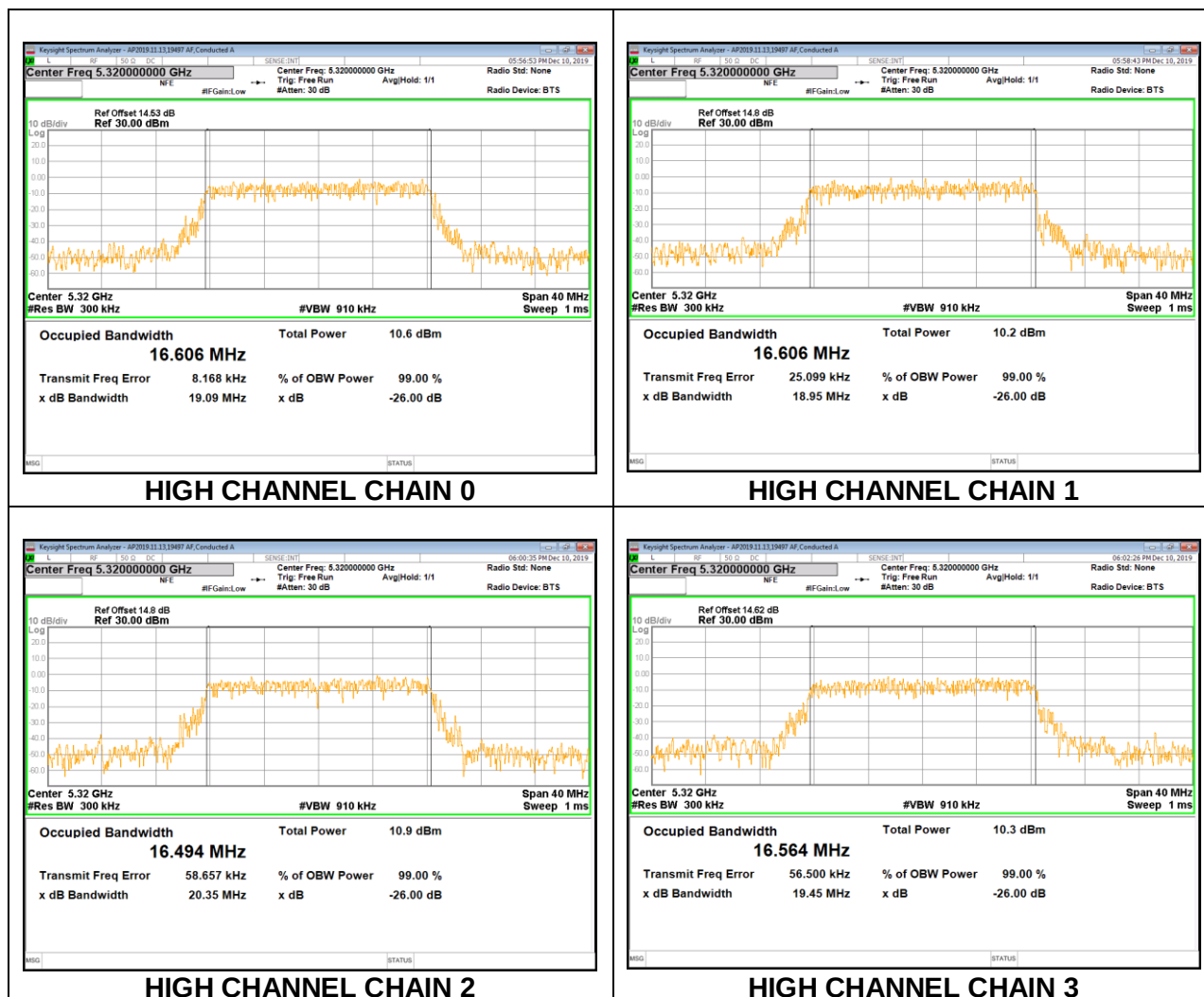
### LOW CHANNEL



## MID CHANNEL



## HIGH CHANNEL

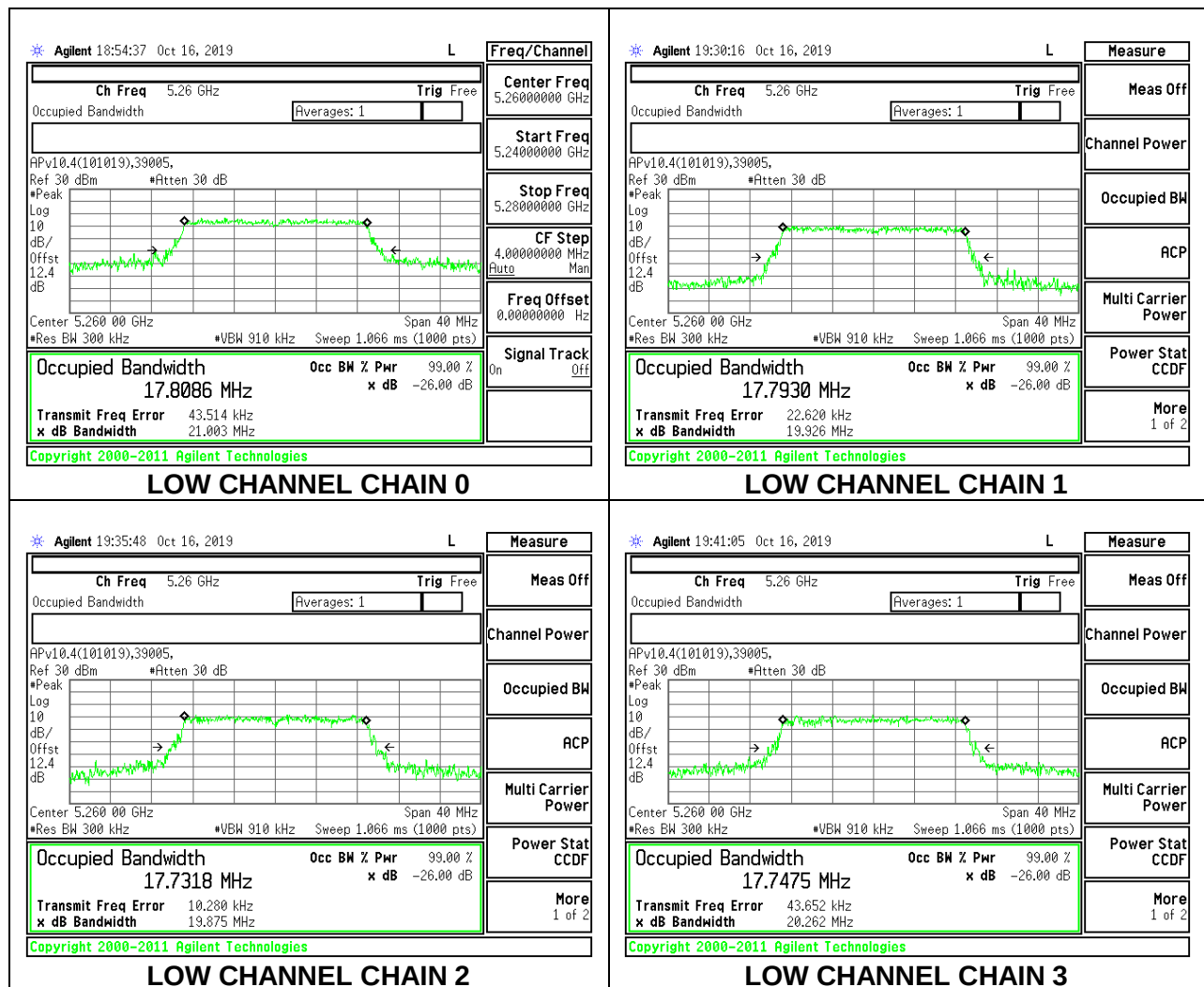


### 8.3.4. 802.11n HT20 MODE IN THE 5.3 GHz BAND

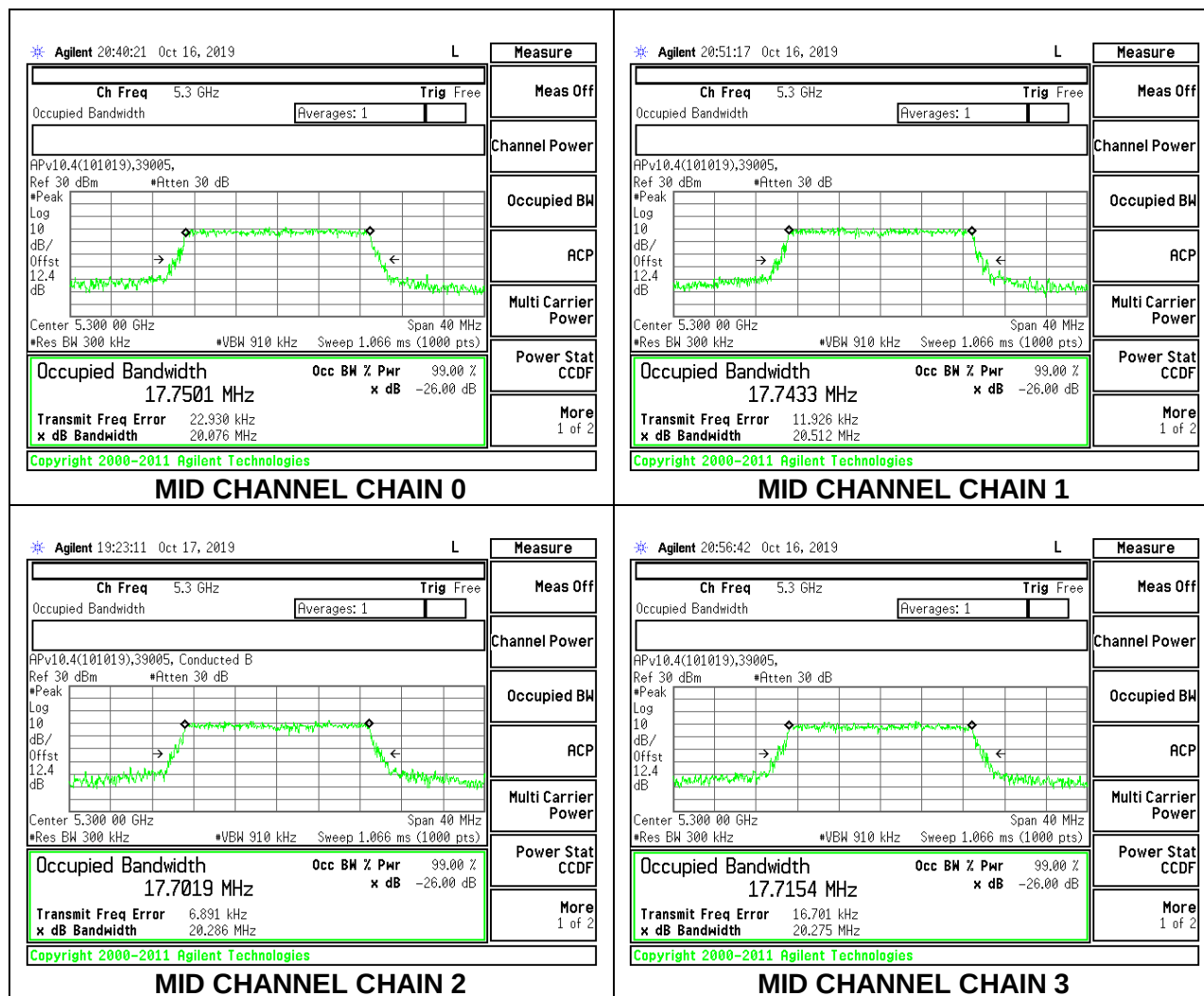
#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>Antenna 0<br>(MHz) | 99% Bandwidth<br>Antenna 1<br>(MHz) | 99% Bandwidth<br>Antenna 2<br>(MHz) | 99% Bandwidth<br>Antenna 3<br>(MHz) |
|---------|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Low     | 5260               | 17.8086                             | 17.7930                             | 17.7318                             | 17.7475                             |
| Mid     | 5300               | 17.7501                             | 17.7433                             | 17.7019                             | 17.7154                             |
| High    | 5320               | 17.5354                             | 17.5283                             | 17.5293                             | 17.5406                             |

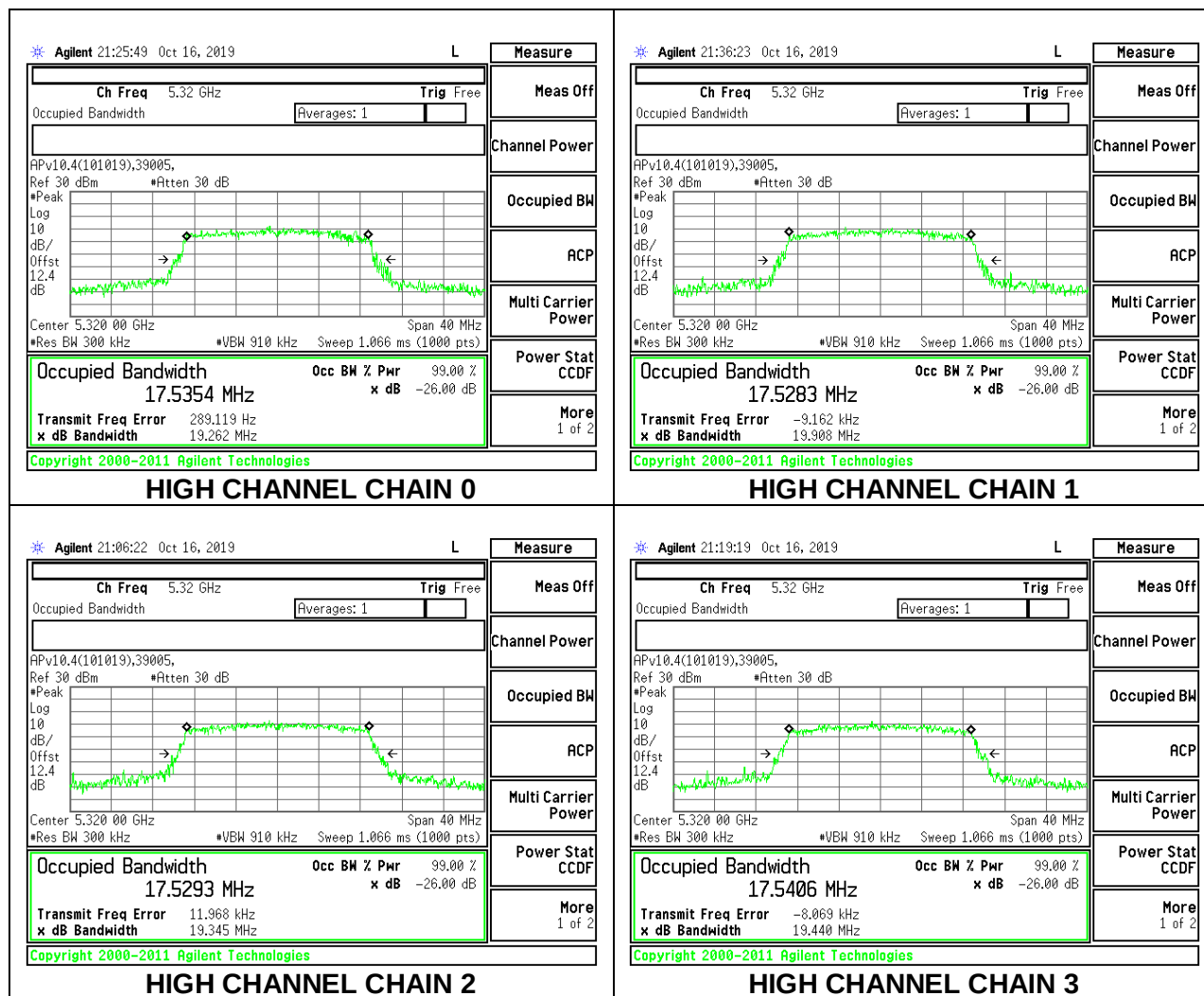
#### LOW CHANNEL



## MID CHANNEL



## HIGH CHANNEL



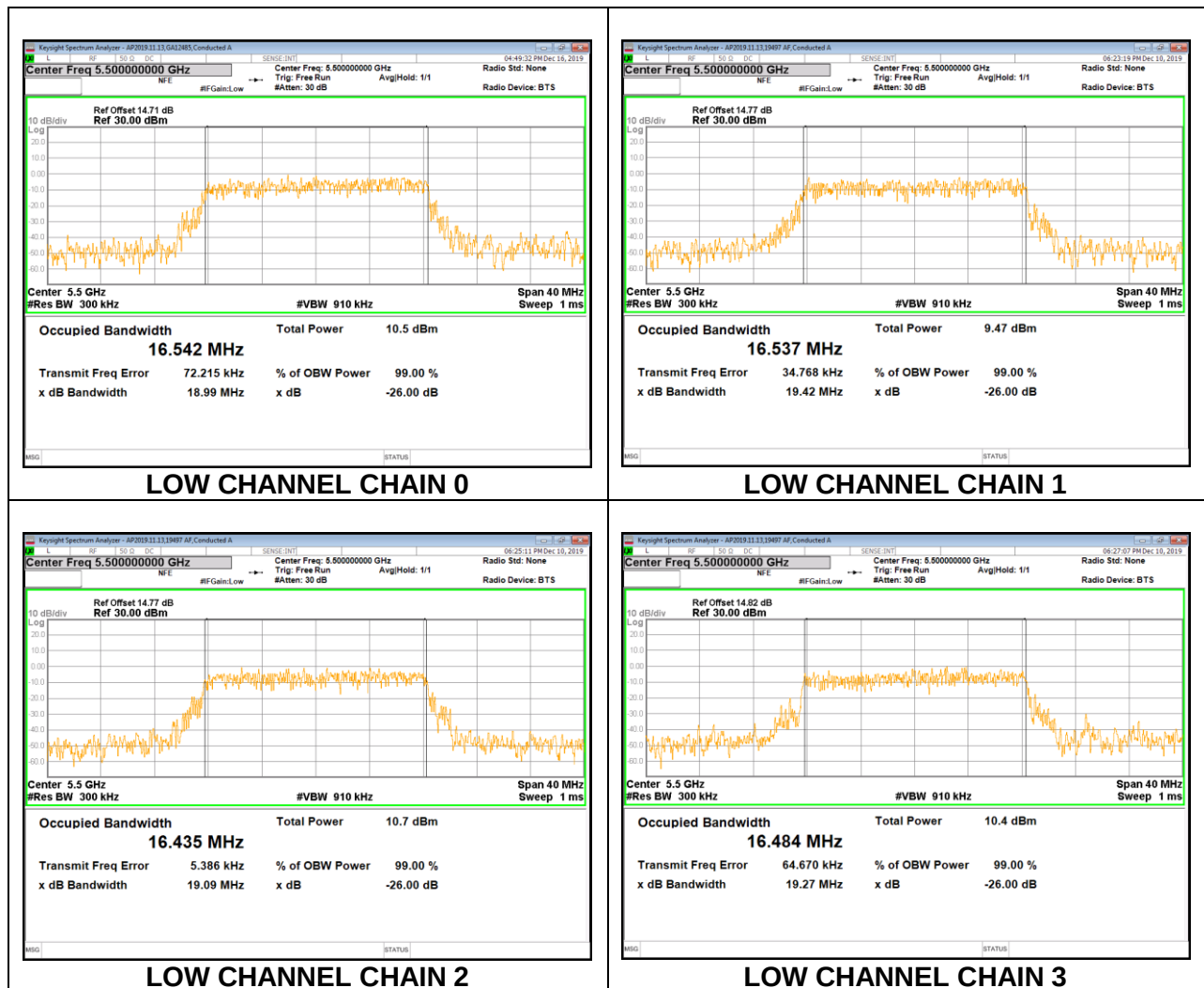


### 8.3.5. 802.11a MODE IN THE 5.6 GHz BAND

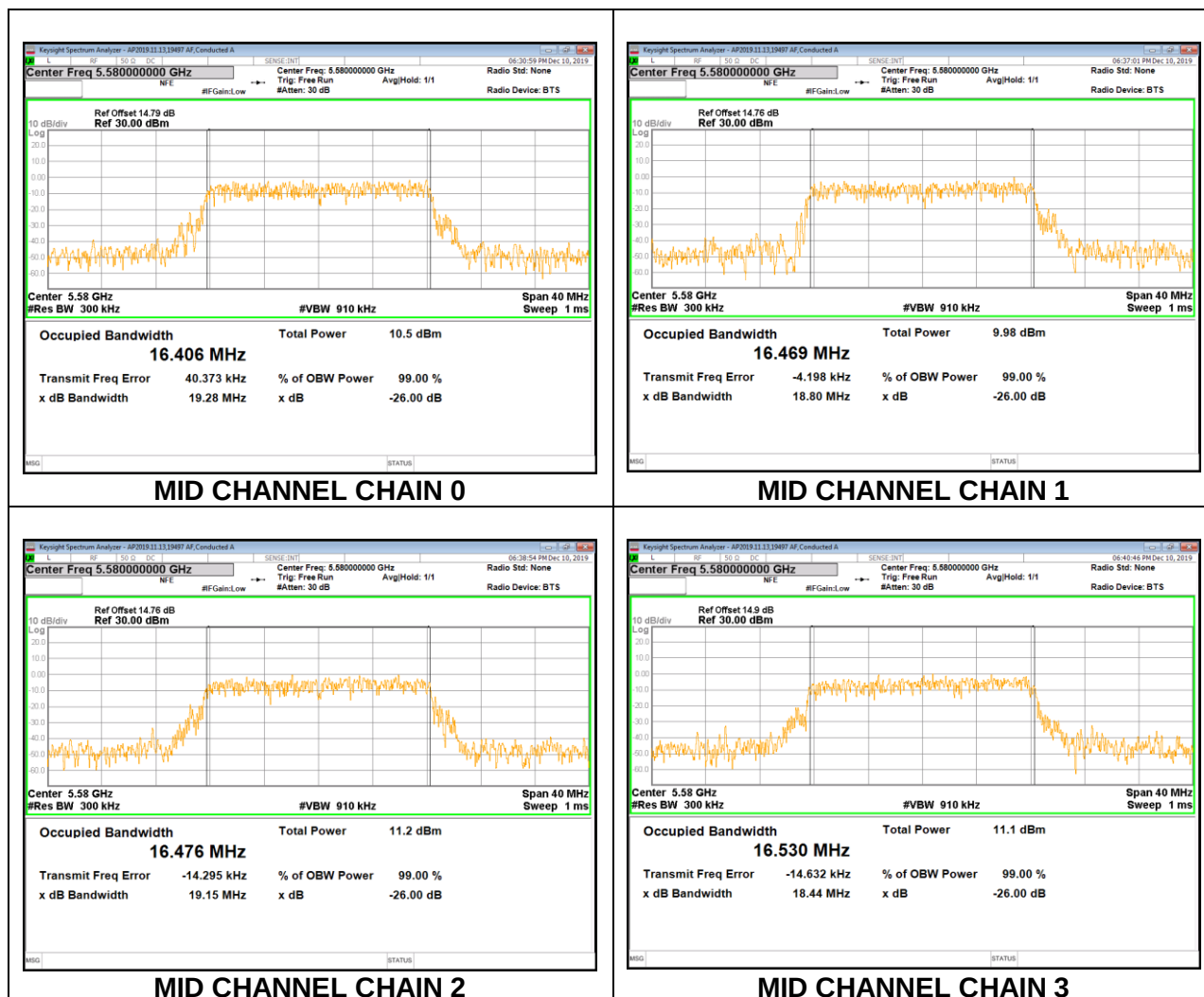
#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Frequency<br>(MHz) | 99% Bandwidth<br>Antenna 0<br>(MHz) | 99% Bandwidth<br>Antenna 1<br>(MHz) | 99% Bandwidth<br>Antenna 2<br>(MHz) | 99% Bandwidth<br>Antenna 3<br>(MHz) |
|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 5500               | 16.542                              | 16.537                              | 16.435                              | 16.484                              |
| 5580               | 16.406                              | 16.469                              | 16.476                              | 16.530                              |
| 5700               | 16.484                              | 16.560                              | 16.545                              | 16.508                              |

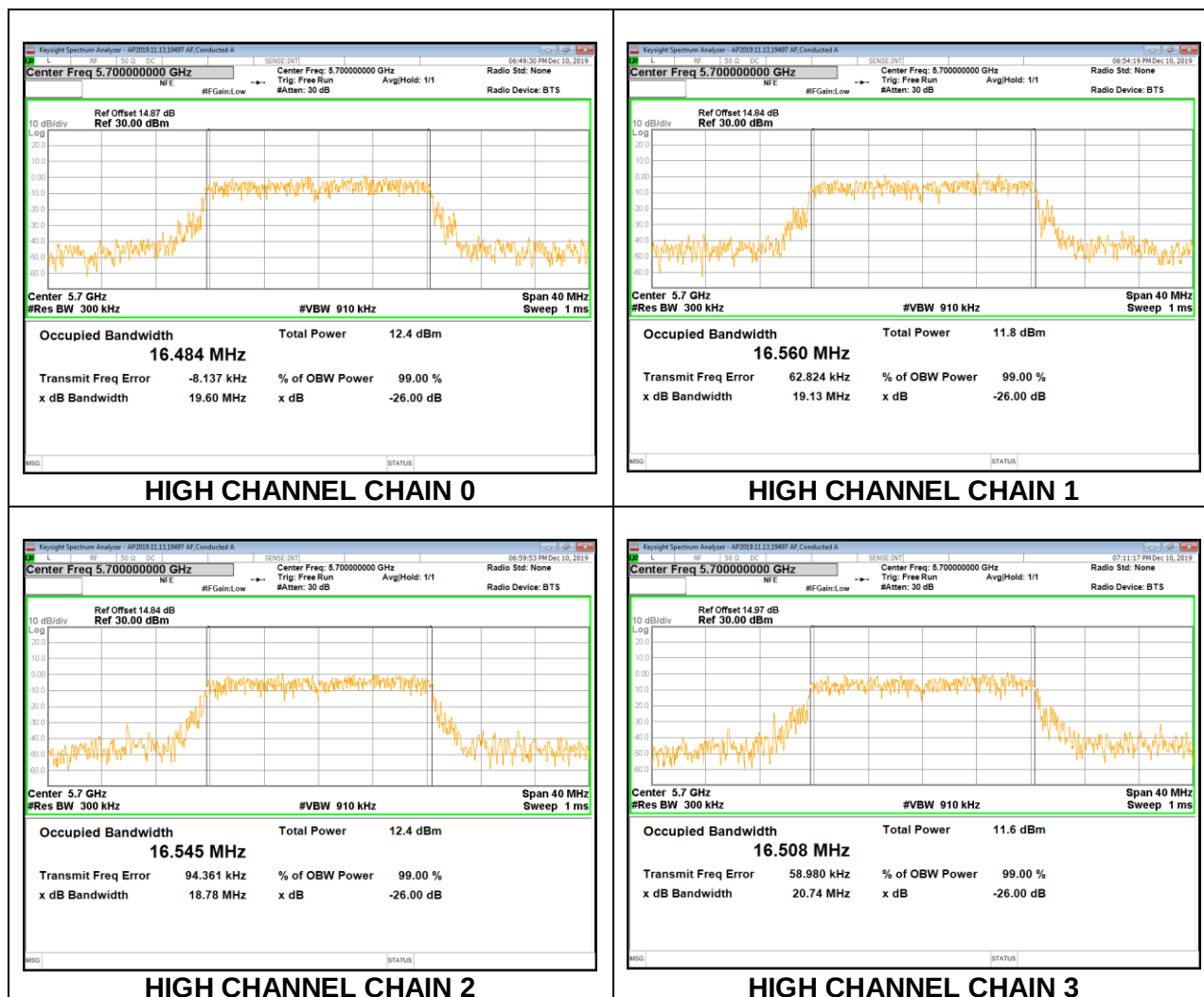
#### LOW CHANNEL



## MID CHANNEL



## HIGH CHANNEL

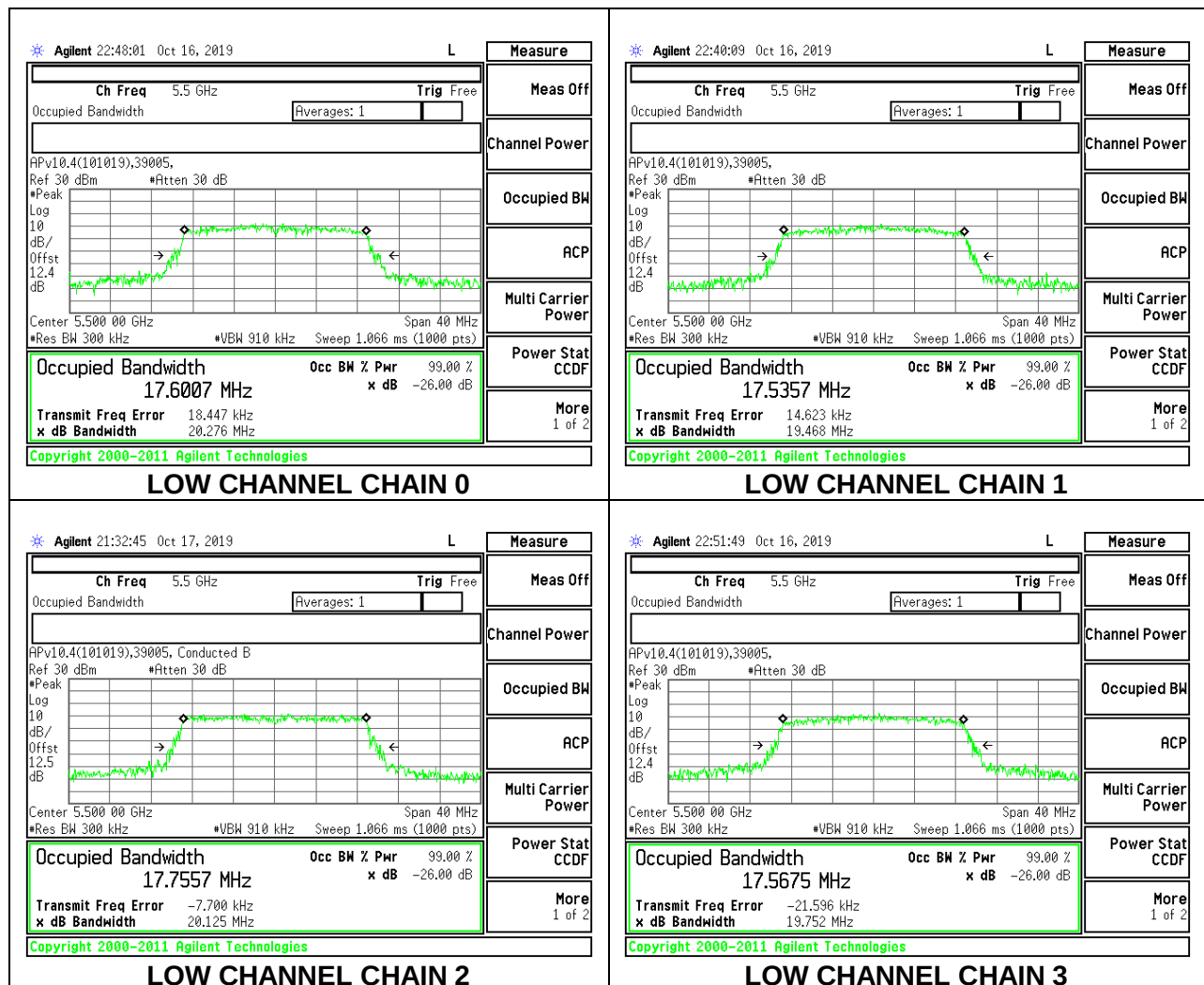


### 8.3.6. 802.11n HT20 MODE IN THE 5.6 GHz BAND

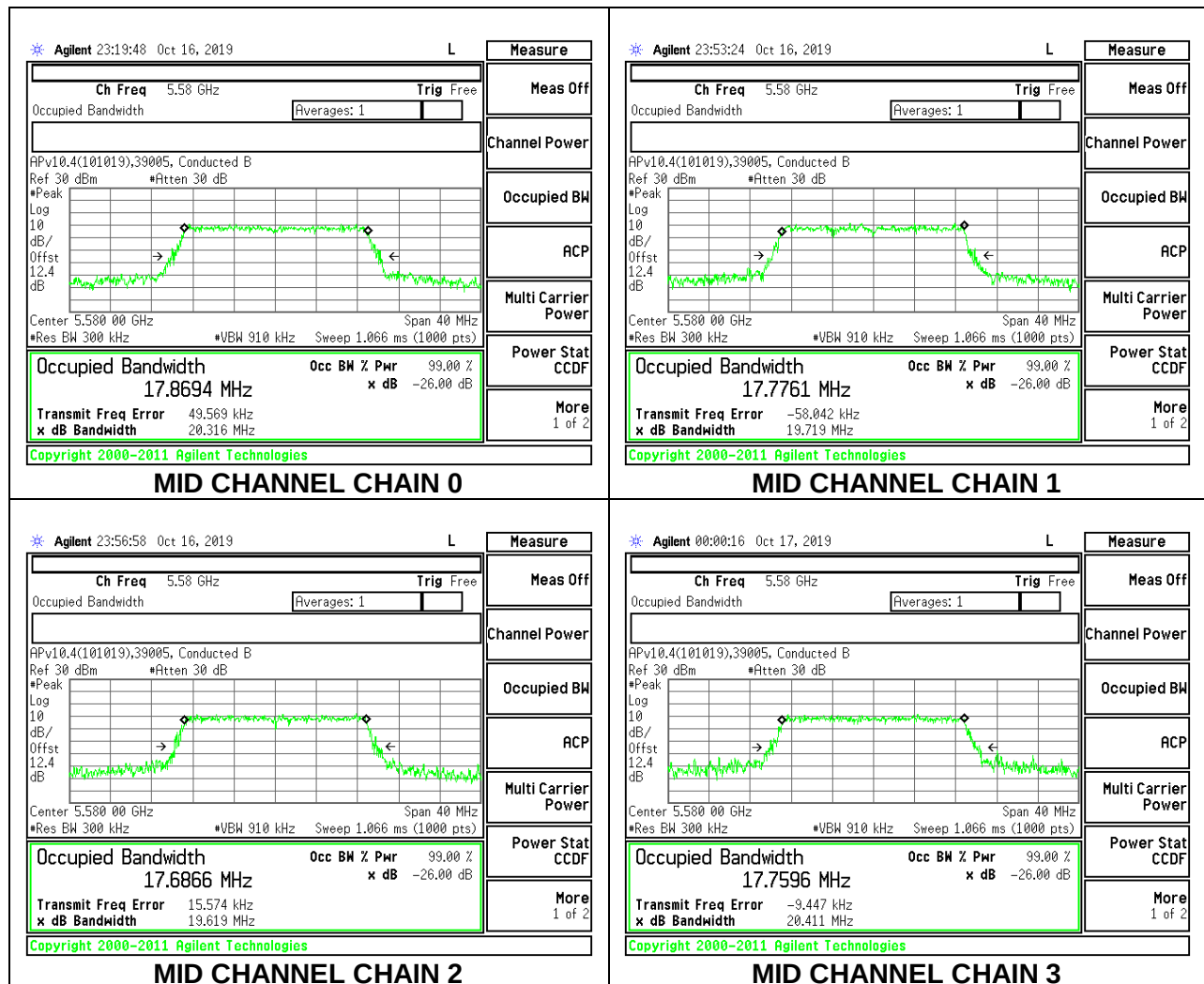
#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Frequency<br>(MHz) | 99% Bandwidth<br>Antenna 0<br>(MHz) | 99% Bandwidth<br>Antenna 1<br>(MHz) | 99% Bandwidth<br>Antenna 2<br>(MHz) | 99% Bandwidth<br>Antenna 3<br>(MHz) |
|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 5500               | 17.6007                             | 17.5357                             | 17.7557                             | 17.5675                             |
| 5580               | 17.8694                             | 17.7761                             | 17.6866                             | 17.7596                             |
| 5700               | 17.4753                             | 17.5056                             | 17.5025                             | 17.5293                             |

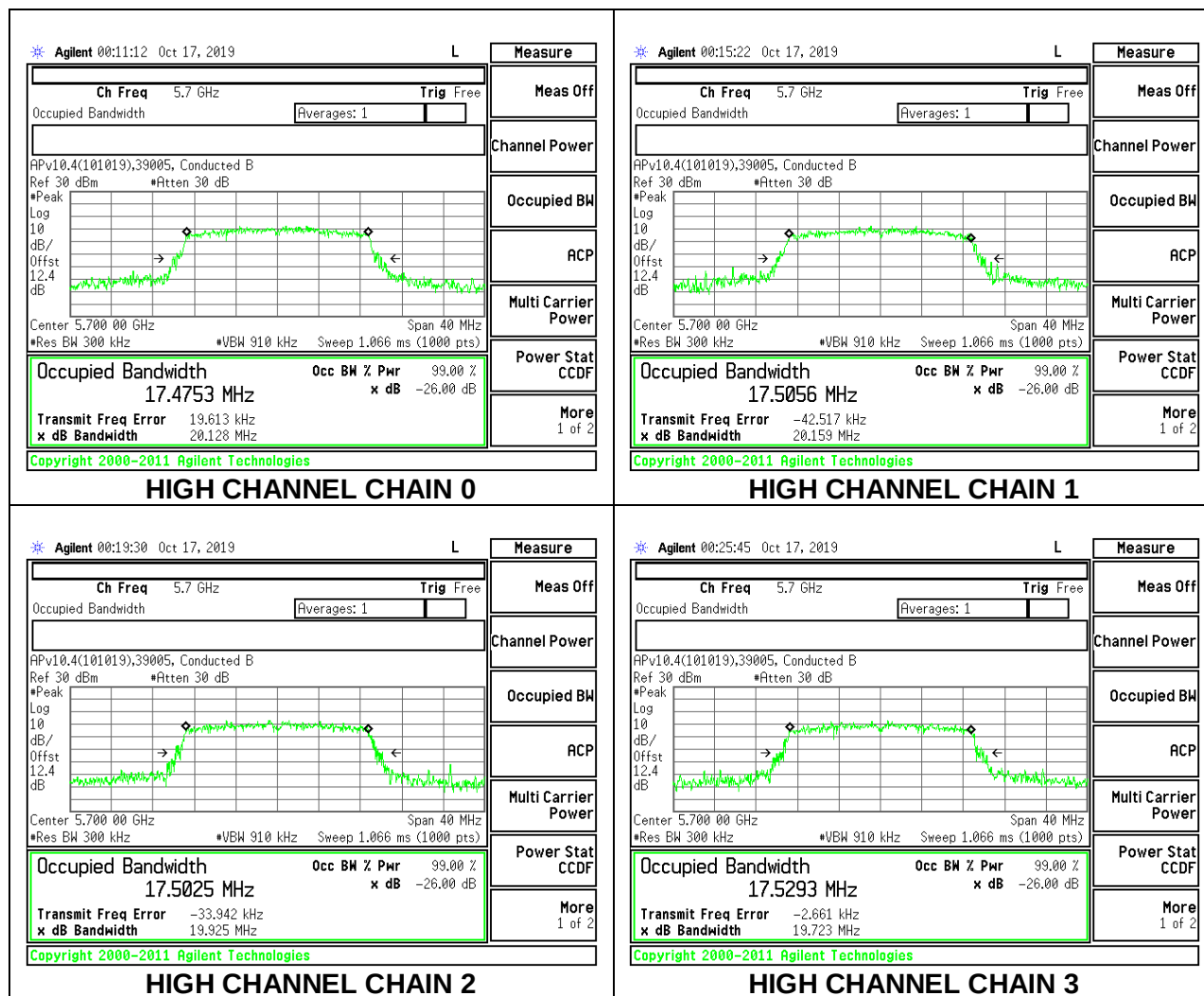
#### LOW CHANNEL



## MID CHANNEL



## HIGH CHANNEL

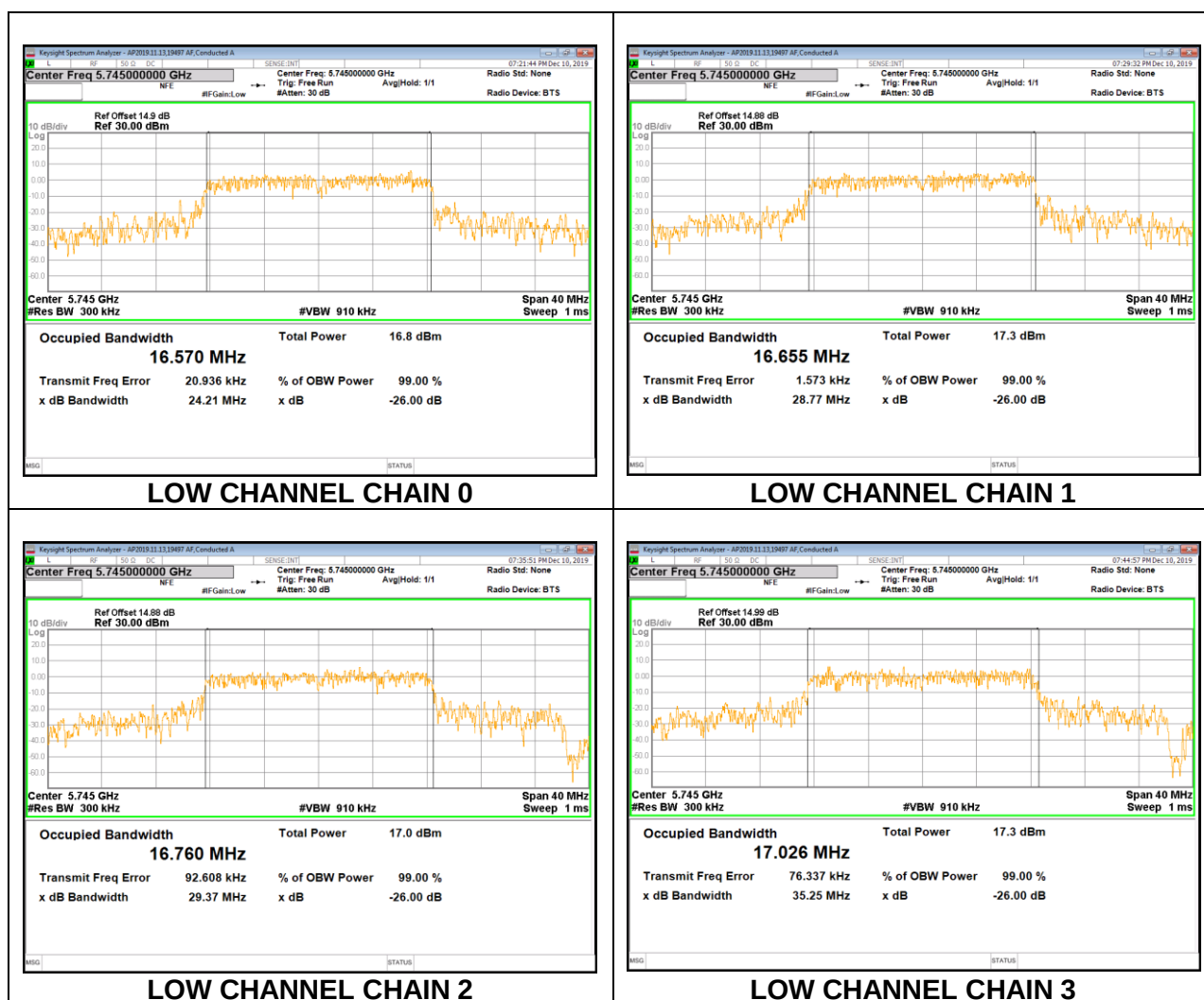


### 8.3.7. 802.11a MODE IN THE 5.8 GHz BAND

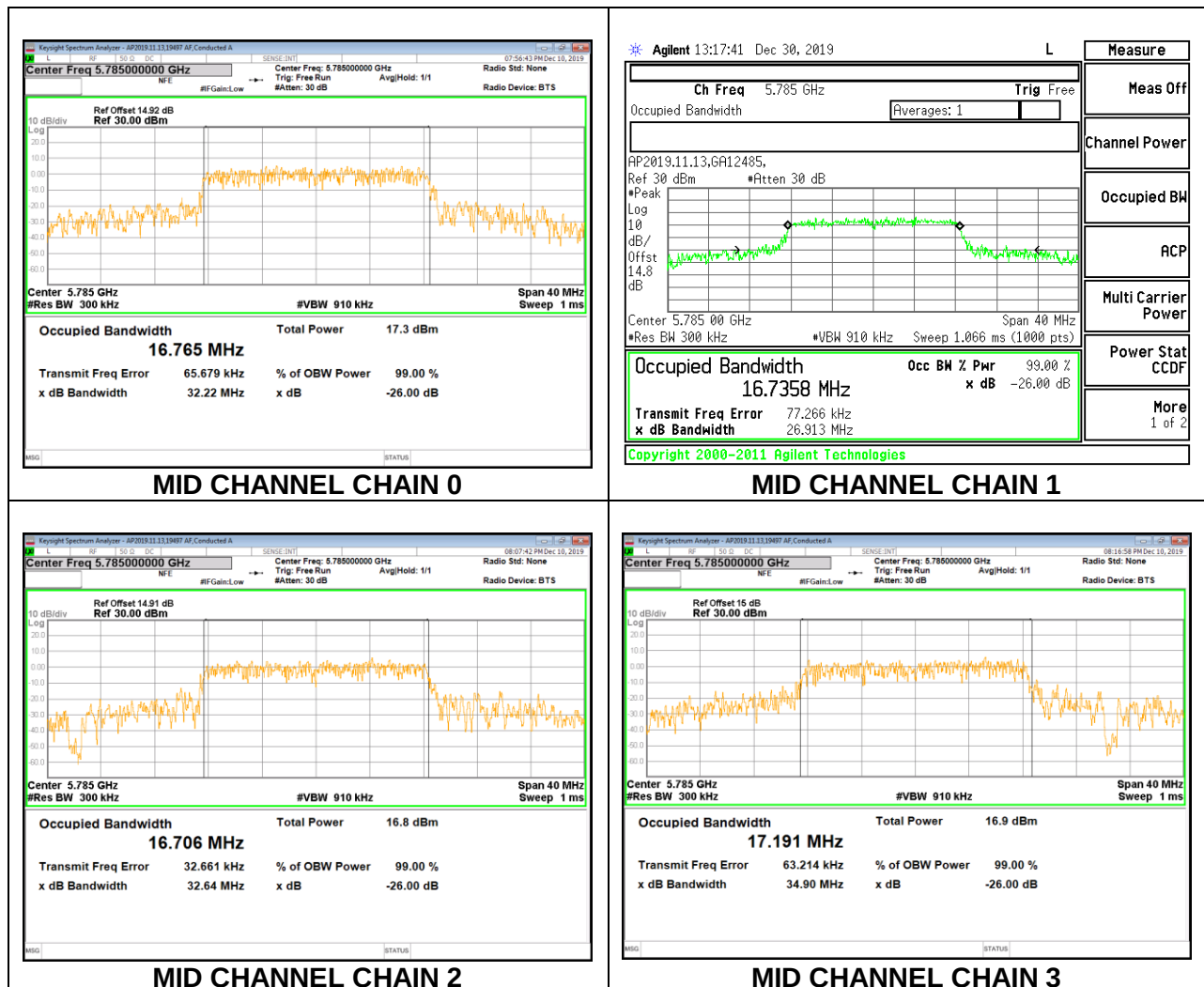
#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Frequency<br>(MHz) | 99% Bandwidth<br>Antenna 0<br>(MHz) | 99% Bandwidth<br>Antenna 1<br>(MHz) | 99% Bandwidth<br>Antenna 2<br>(MHz) | 99% Bandwidth<br>Antenna 3<br>(MHz) |
|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 5745               | 16.570                              | 16.655                              | 16.760                              | 17.026                              |
| 5785               | 16.765                              | 16.736                              | 16.706                              | 17.191                              |
| 5825               | 16.740                              | 17.119                              | 16.740                              | 16.739                              |

### LOW CHANNEL

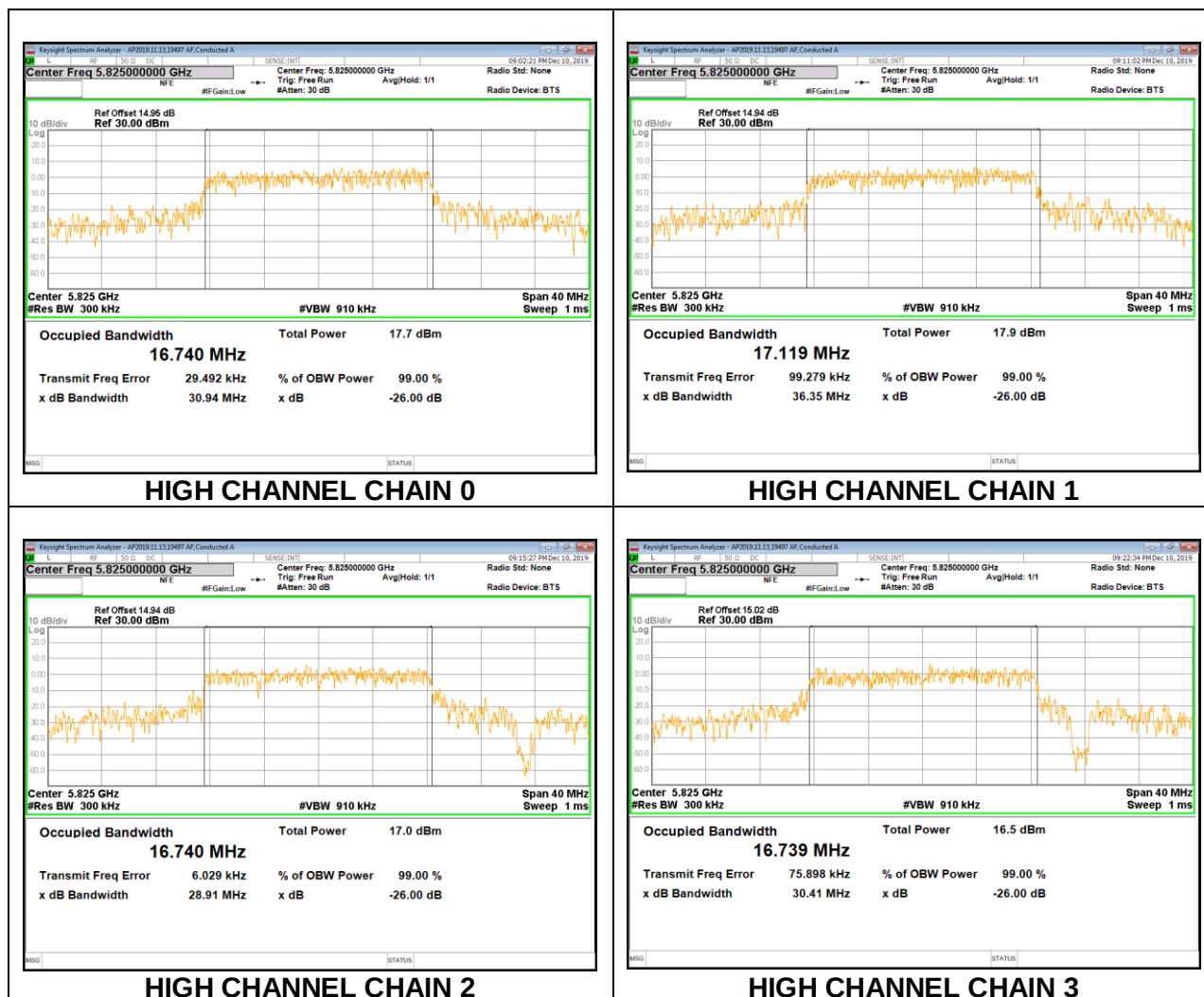


## MID CHANNEL





## HIGH CHANNEL

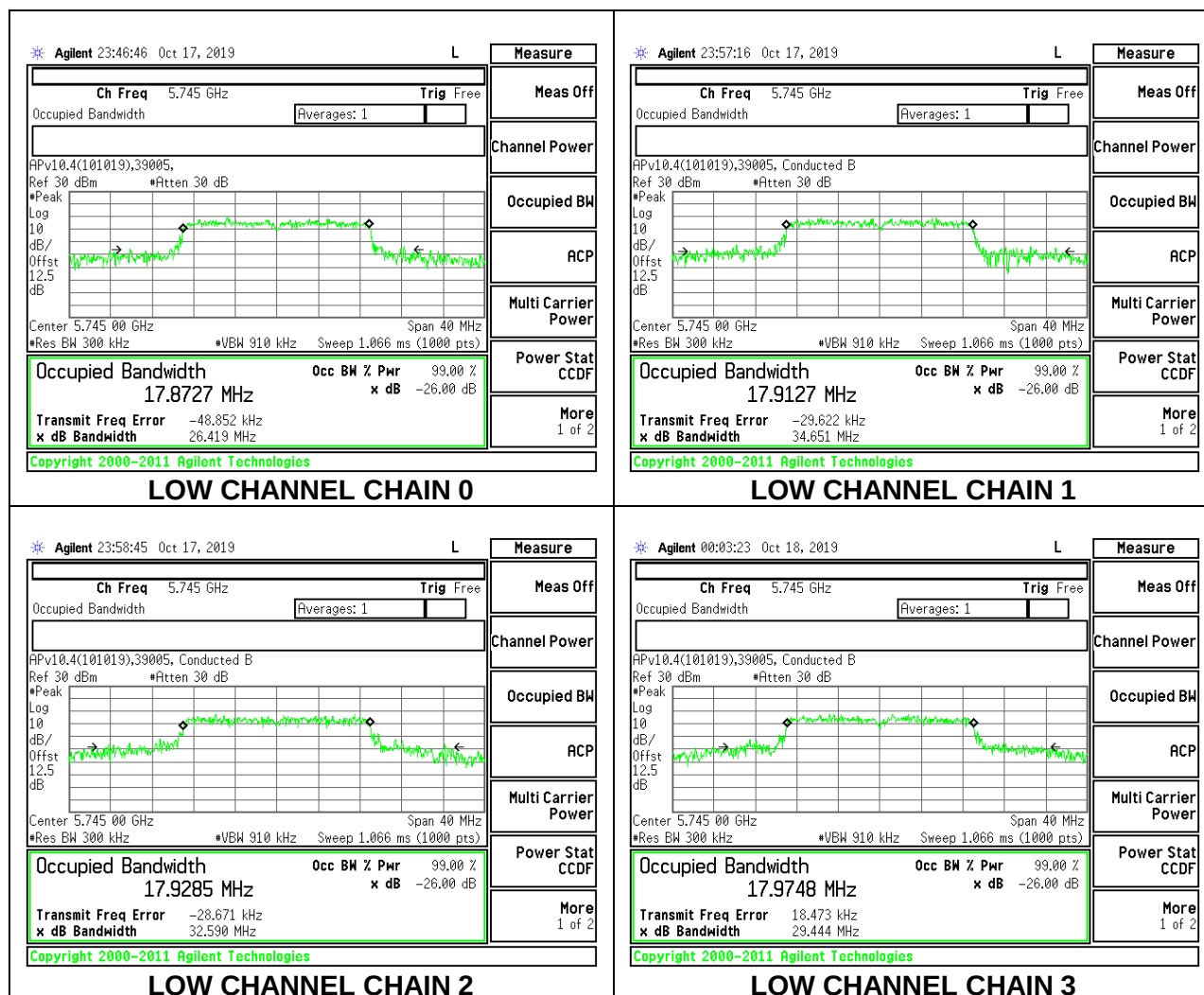


### 8.3.8. 802.11n HT20 MODE IN THE 5.8 GHz BAND

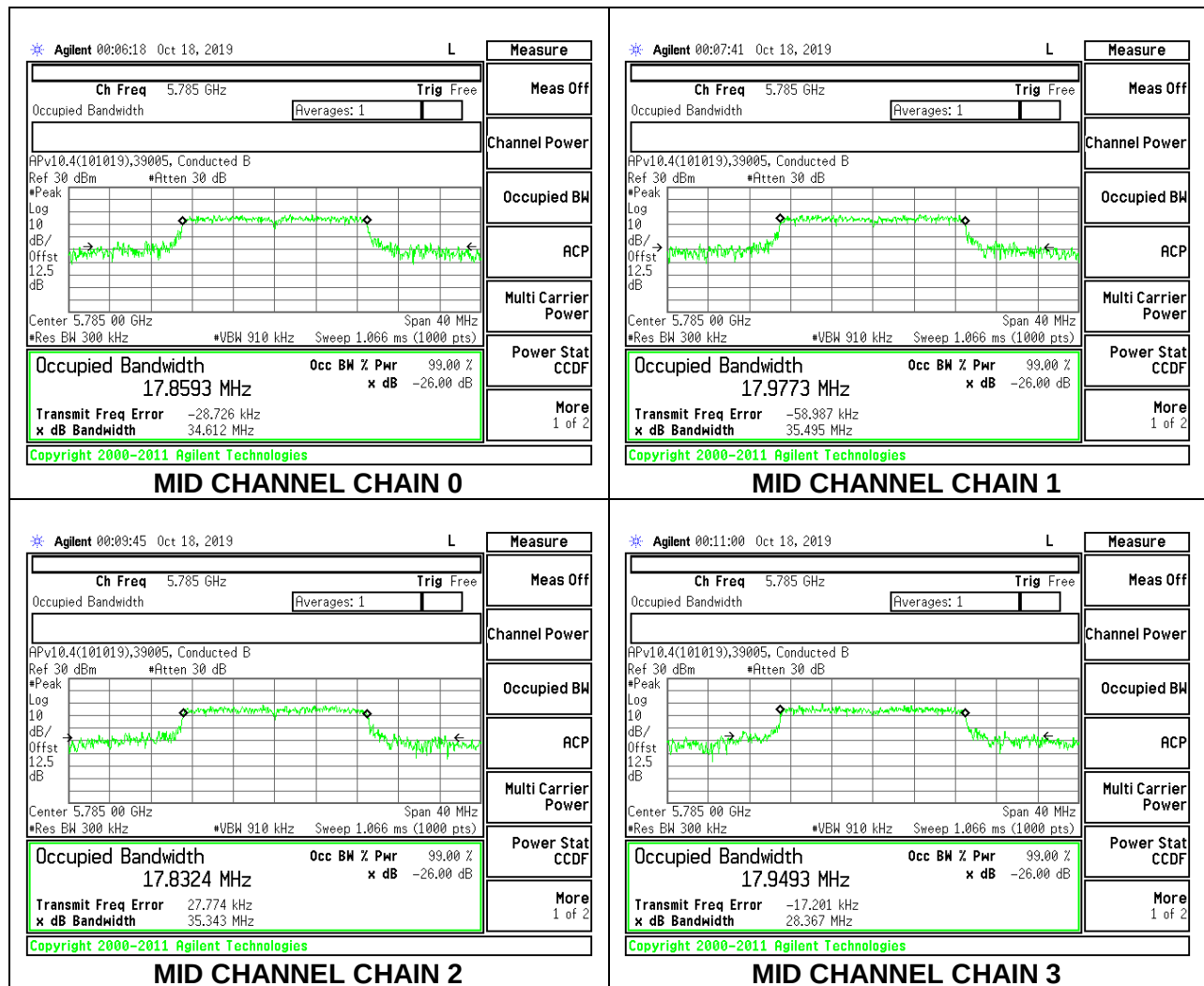
#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Frequency<br>(MHz) | 99% Bandwidth<br>Antenna 0<br>(MHz) | 99% Bandwidth<br>Antenna 1<br>(MHz) | 99% Bandwidth<br>Antenna 2<br>(MHz) | 99% Bandwidth<br>Antenna 3<br>(MHz) |
|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 5745               | 17.8727                             | 17.9127                             | 17.9285                             | 17.9748                             |
| 5785               | 17.8593                             | 17.9773                             | 17.8324                             | 17.9493                             |
| 5825               | 18.0302                             | 18.0717                             | 17.9867                             | 17.9942                             |

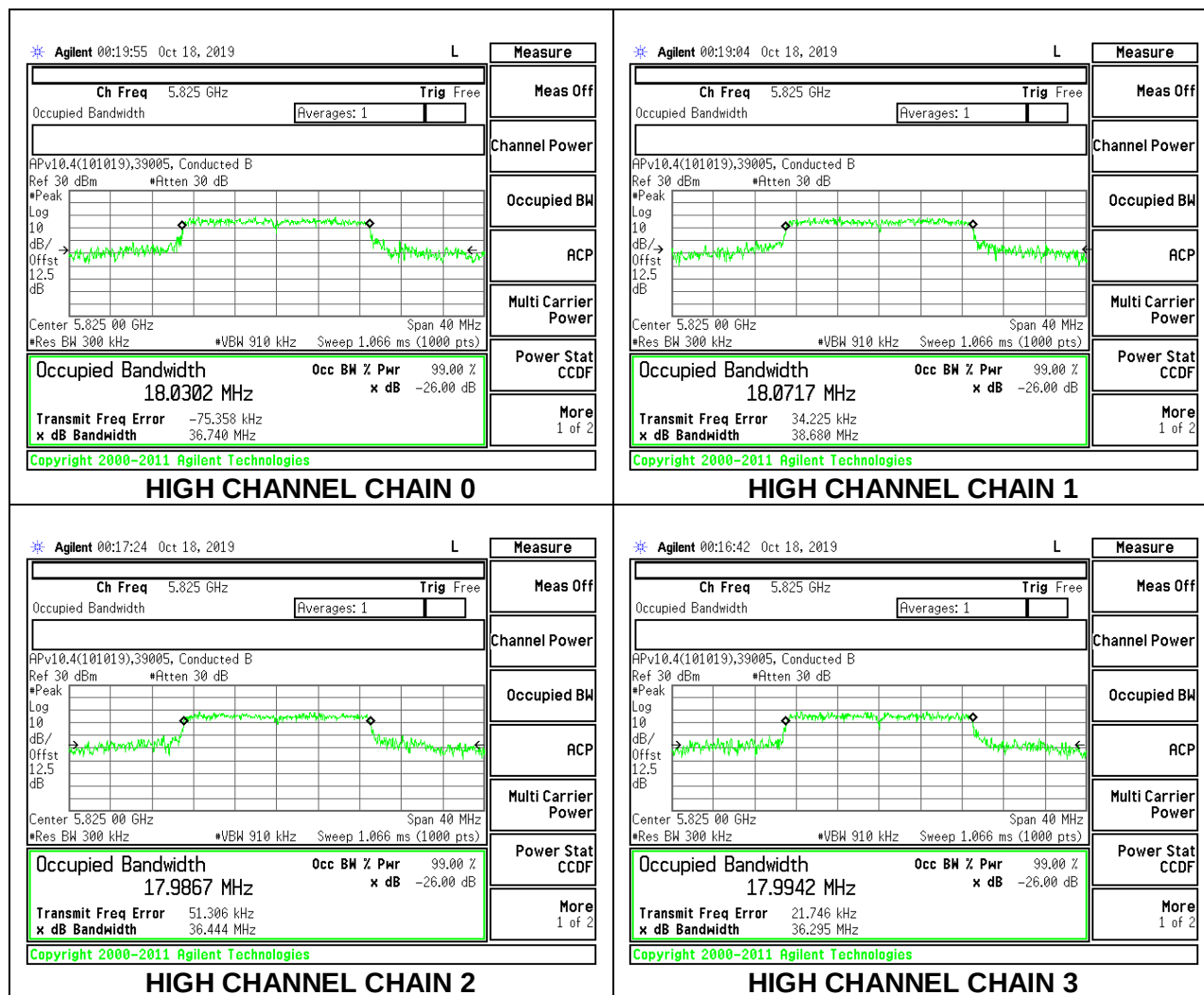
### LOW CHANNEL



## MID CHANNEL



## HIGH CHANNEL



## **8.4. 6 dB BANDWIDTH**

### **LIMITS**

FCC §15.407 (e)

RSS-247 6.2.4.1

The minimum 6 dB bandwidth shall be at least 500 kHz.

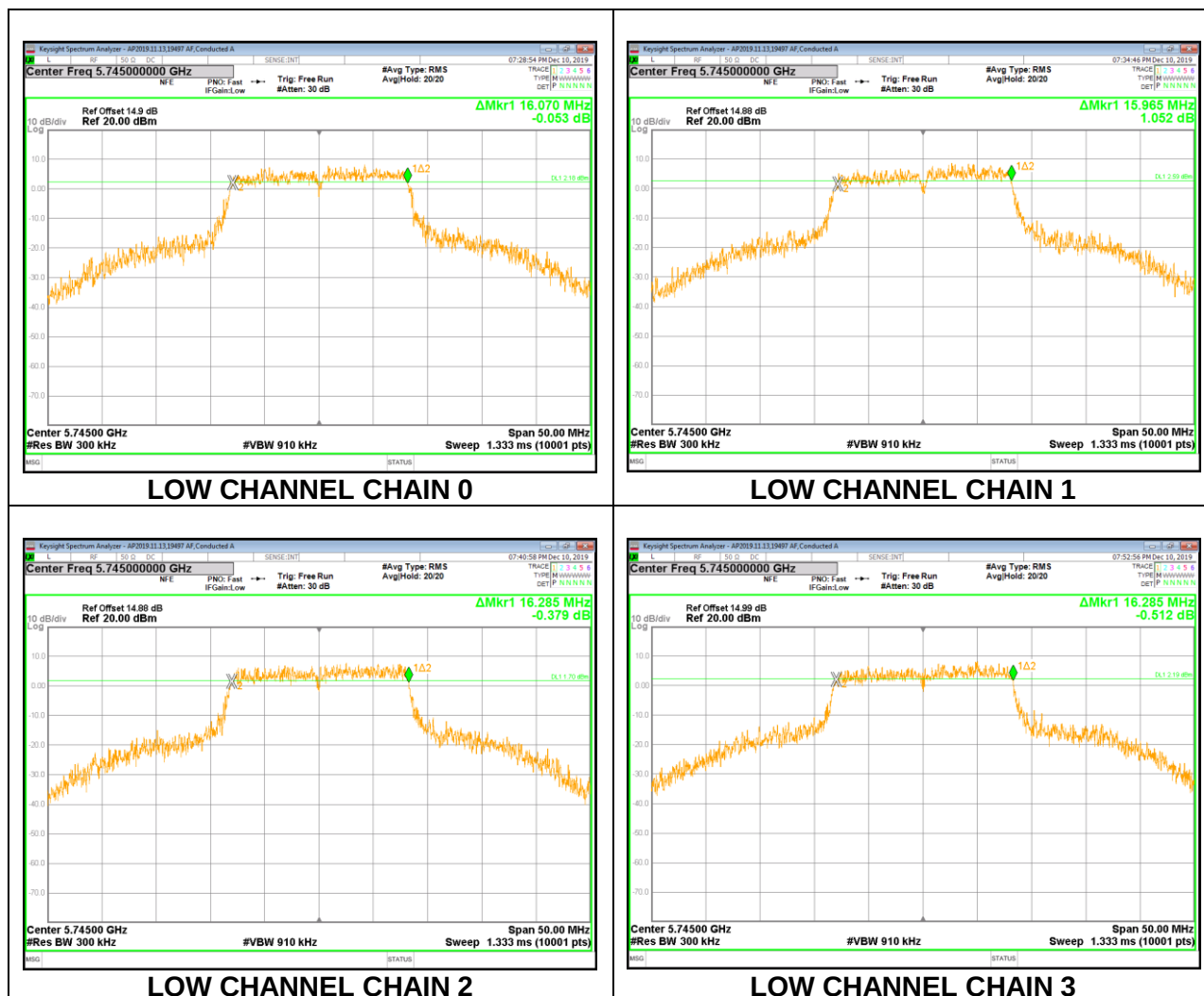
### **RESULTS**

### 8.4.1. 802.11a MODE IN THE 5.8 GHz BAND

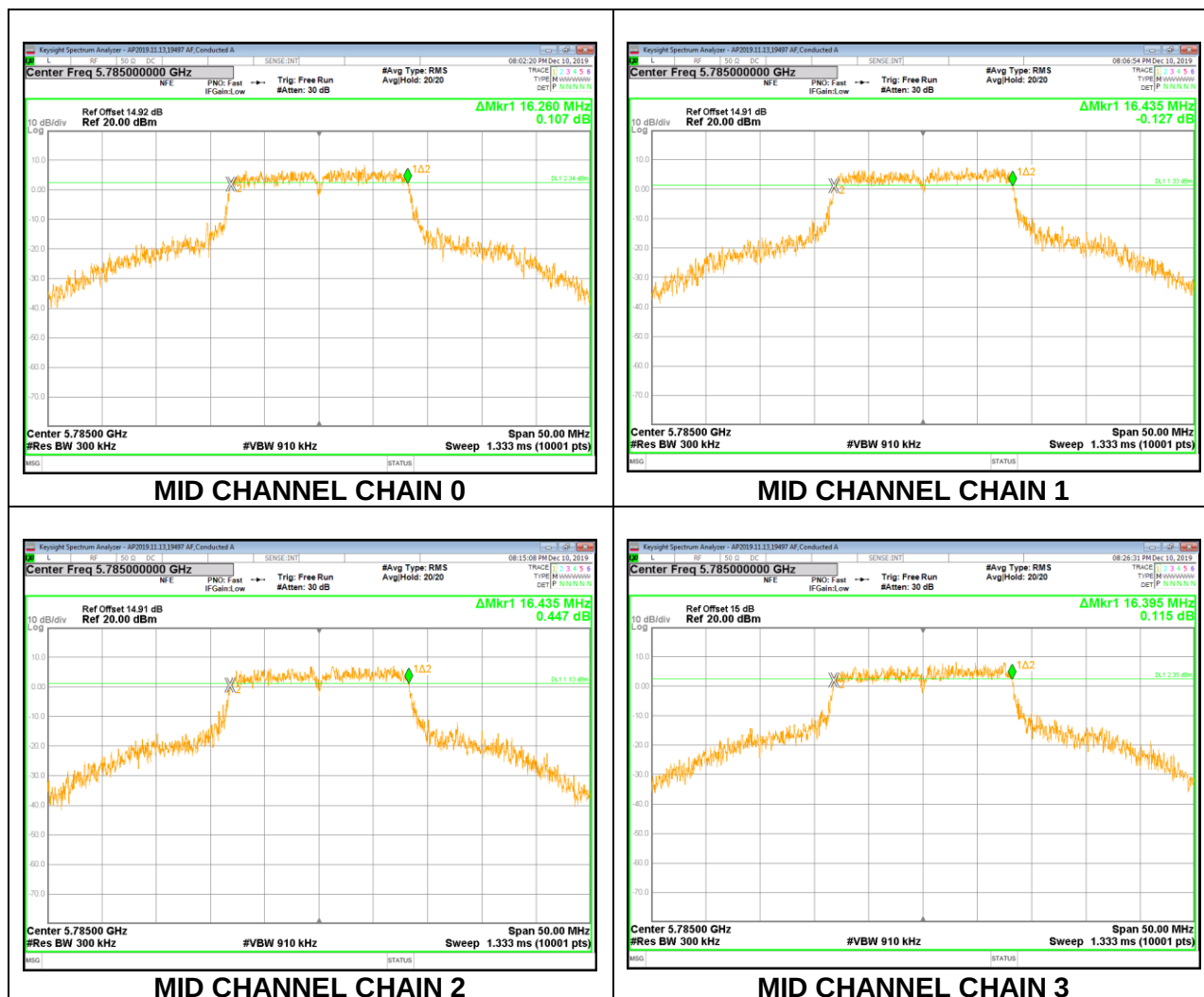
#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Channel | Frequency<br>(MHz) | 6 dB BW<br>Antenna 0<br>(MHz) | 6 dB BW<br>Antenna 1<br>(MHz) | 6 dB BW<br>Antenna 2<br>(MHz) | 6 dB BW<br>Antenna 3<br>(MHz) | Minimum<br>Limit<br>(MHz) |
|---------|--------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|---------------------------|
| Low     | 5745               | 16.070                        | 15.965                        | 16.285                        | 16.285                        | 0.5                       |
| Mid     | 5785               | 16.260                        | 16.435                        | 16.435                        | 16.395                        | 0.5                       |
| High    | 5825               | 16.375                        | 16.145                        | 16.480                        | 16.240                        | 0.5                       |

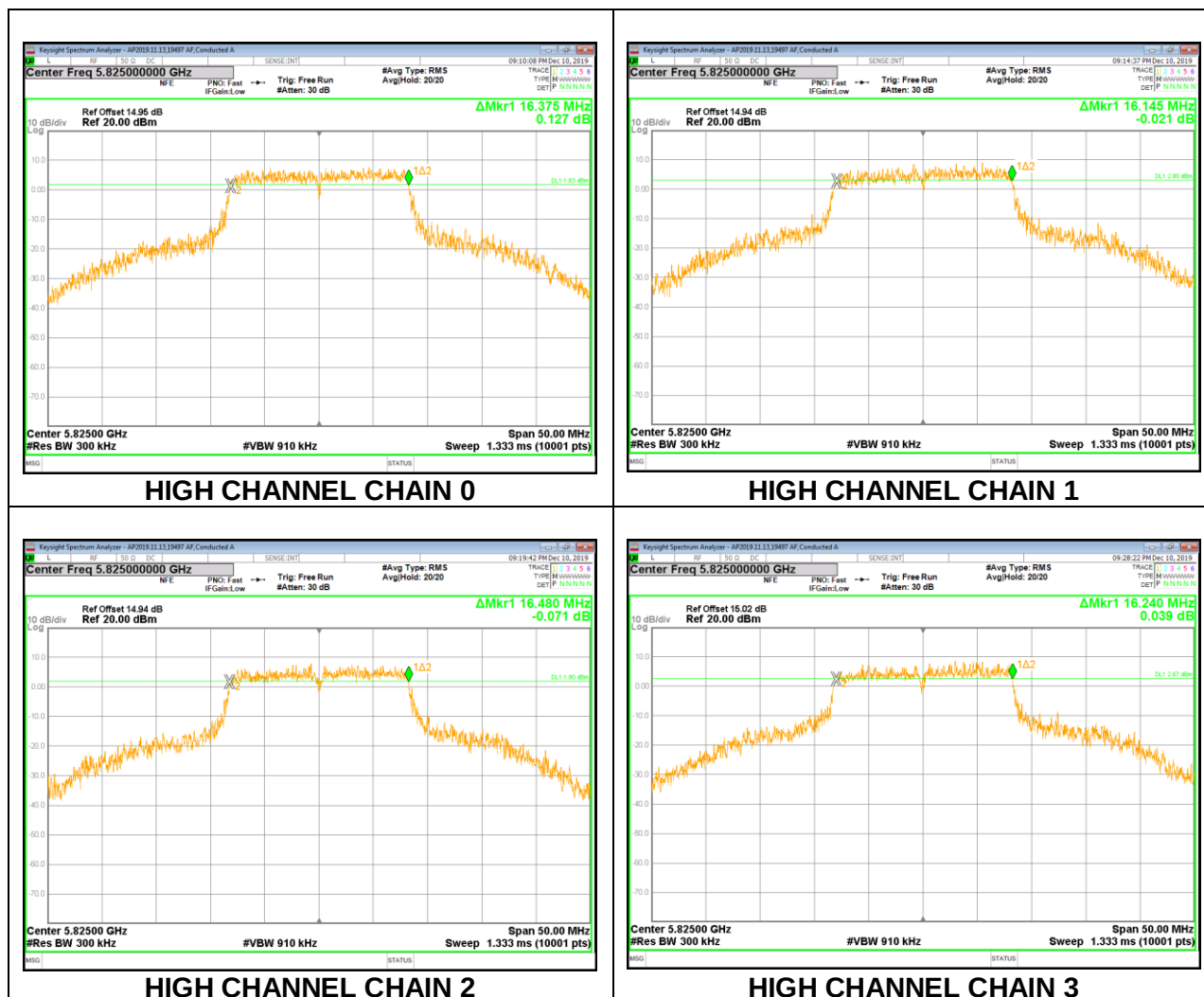
### LOW CHANNEL



## MID CHANNEL



## HIGH CHANNEL



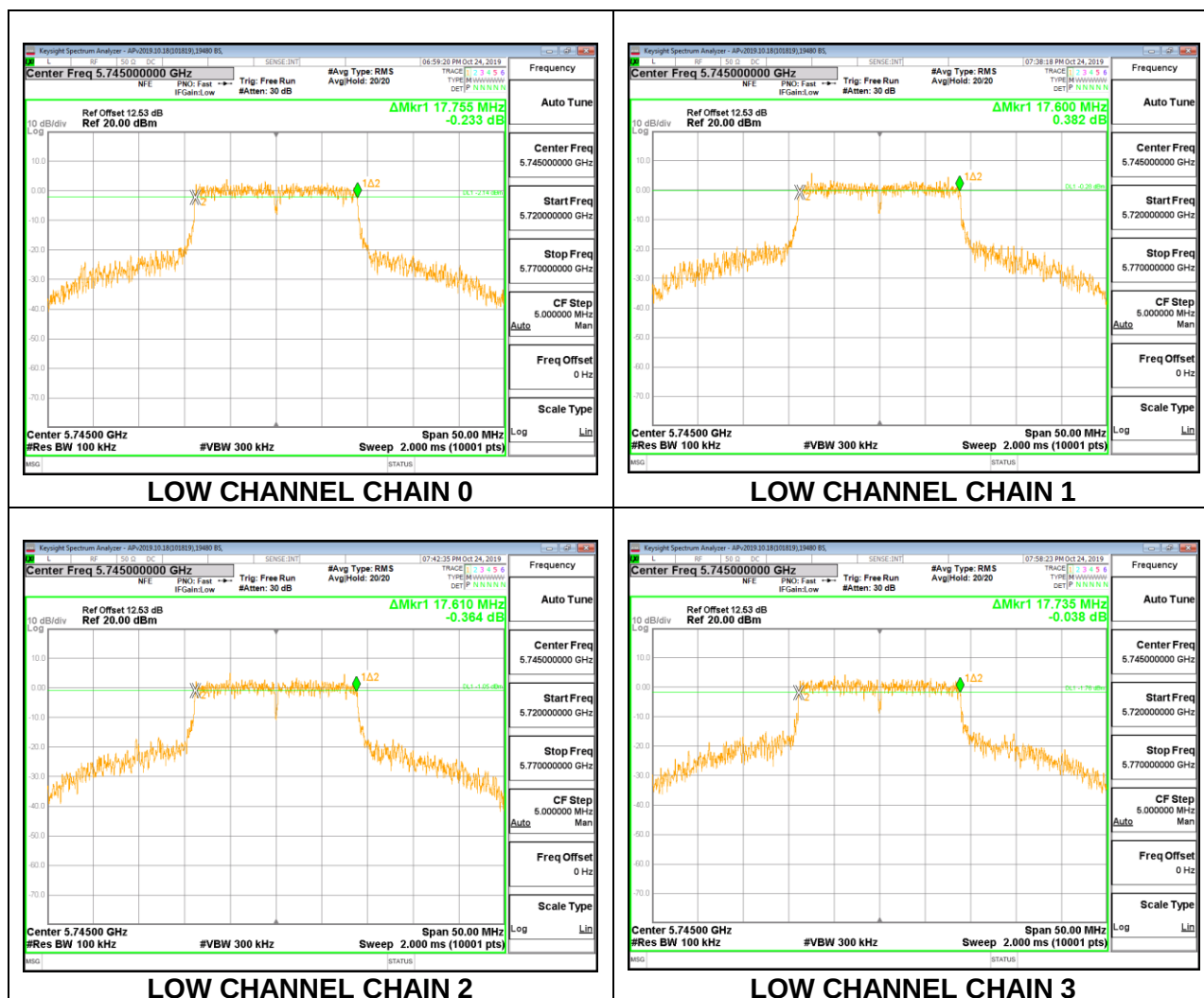


## 8.4.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

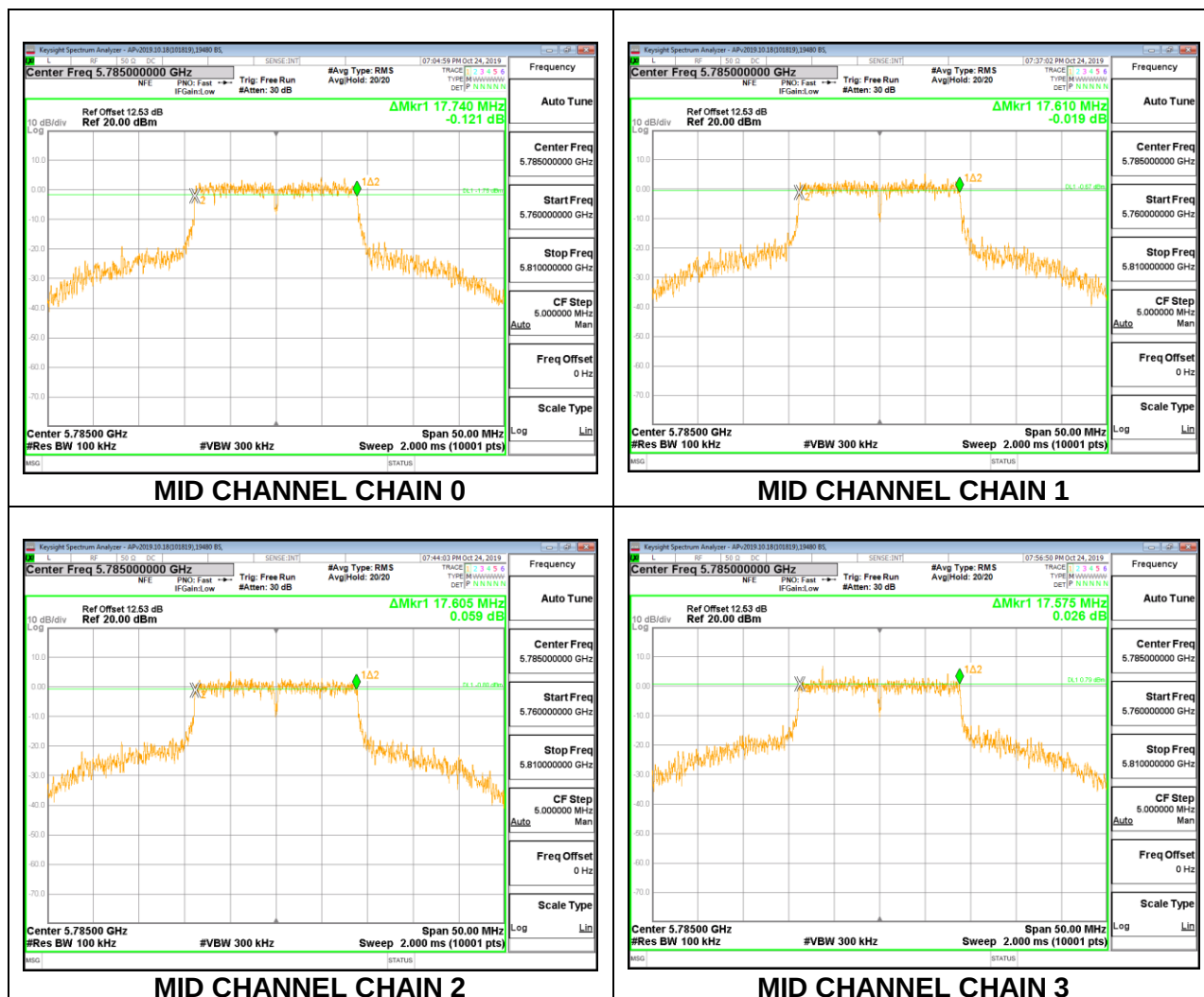
### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

| Channel | Frequency<br>(MHz) | 6 dB BW<br>Antenna 0<br>(MHz) | 6 dB BW<br>Antenna 1<br>(MHz) | 6 dB BW<br>Antenna 2<br>(MHz) | 6 dB BW<br>Antenna 3<br>(MHz) | Minimum<br>Limit<br>(MHz) |
|---------|--------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|---------------------------|
| Low     | 5745               | 17.755                        | 17.600                        | 17.610                        | 17.735                        | 0.5                       |
| Mid     | 5785               | 17.740                        | 17.610                        | 17.605                        | 17.575                        | 0.5                       |
| High    | 5825               | 17.590                        | 17.590                        | 17.610                        | 17.560                        | 0.5                       |

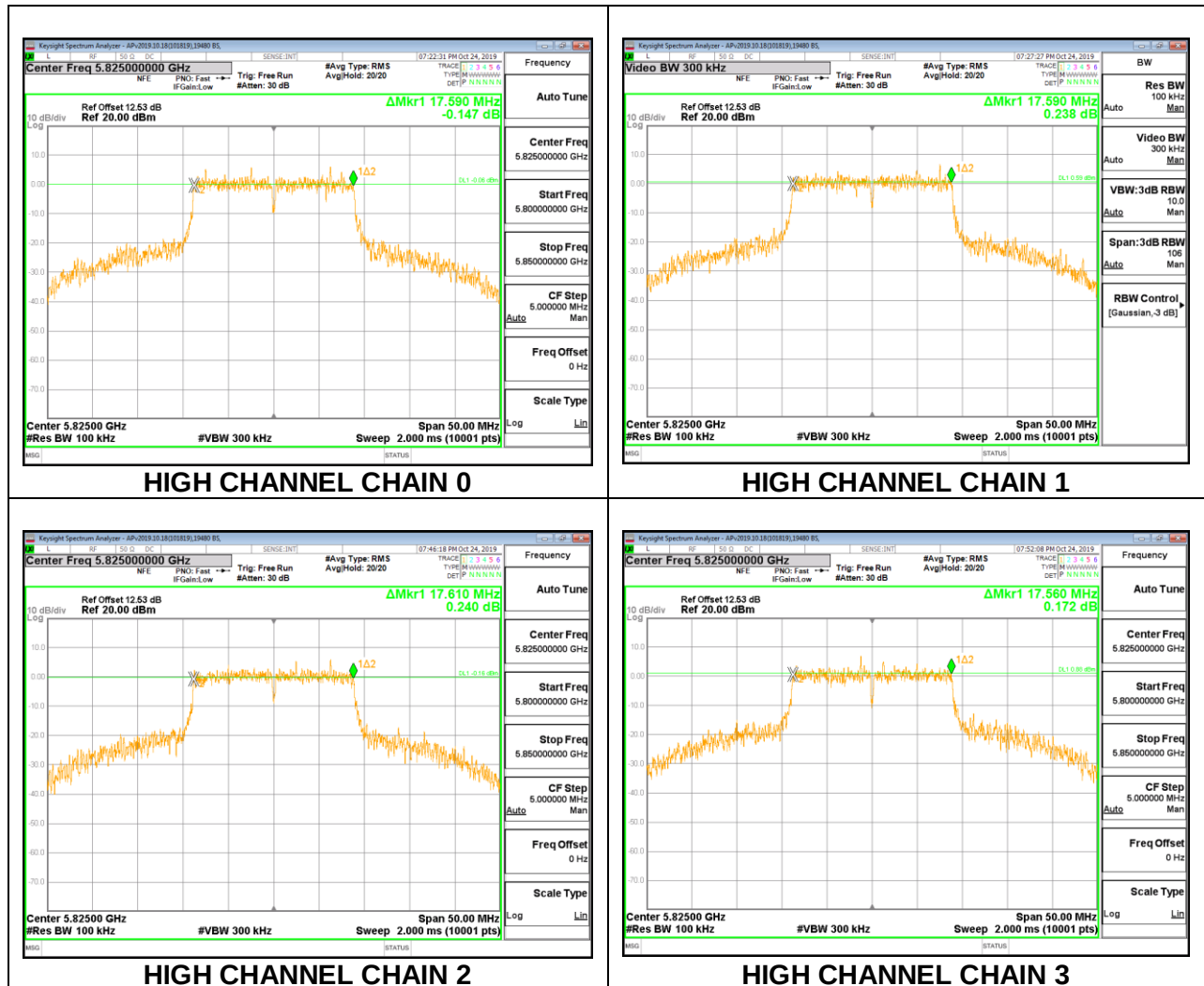
### LOW CHANNEL



## MID CHANNEL



## HIGH CHANNEL



## 8.5. OUTPUT POWER AND PSD

### LIMITS

#### FCC §15.407

##### **Band 5.15–5.25 GHz**

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### **Bands 5.25-5.35 GHz and 5.47-5.725 GHz**

The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### **Band 5.725-5.85 GHz**

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

## **RSS-247**

### **Band 5.15-5.25 GHz**

The maximum e.i.r.p. shall not exceed 200 mW or  $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

### **Band 5.25-5.35 GHz**

The maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10} B$ , dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

### **Bands 5.47-5.6 GHz and 5.65-5.725 GHz**

The maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10} B$ , dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

### **Band 5.725-5.85 GHz**

The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

## **TEST PROCEDURE**

The measurement method used for output power is KDB 789033 D02 v02r01, Section II E.3.b (Method PM-G) and for straddles channels KDB 789033 D02 v02r01, Section E II.2.b (Method SA-1) was used.

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section II F

### **DIRECTIONAL ANTENNA GAIN**

Tx chains are uncorrelated for power and correlated for PSD due to the device supporting CDD in all MIMO modes. The directional gains are as follows:

#### Vertical Polarity (***Worst Case***)

| Band (GHz) | Chain 0 Antenna Gain (dBi) | Chain 1 Antenna Gain (dBi) | Uncorrelated Chains Directional Gain (dBi) | Correlated Chains Directional Gain (dBi) |
|------------|----------------------------|----------------------------|--------------------------------------------|------------------------------------------|
| 5.2        | 7.40                       | 5.13                       | 6.41                                       | 9.35                                     |
| 5.3        | 7.08                       | 6.19                       | 6.66                                       | 9.66                                     |
| 5.6        | 6.57                       | 5.30                       | 5.98                                       | 8.97                                     |
| 5.8        | 5.41                       | 4.69                       | 5.06                                       | 8.07                                     |

#### Horizontal Polarity

| Band (GHz) | Chain 2 Antenna Gain (dBi) | Chain 3 Antenna Gain (dBi) | Uncorrelated Chains Directional Gain (dBi) | Correlated Chains Directional Gain (dBi) |
|------------|----------------------------|----------------------------|--------------------------------------------|------------------------------------------|
| 5.2        | 3.79                       | 1.61                       | 2.84                                       | 5.78                                     |
| 5.3        | 3.49                       | 1.90                       | 2.77                                       | 5.74                                     |
| 5.6        | 3.38                       | 1.90                       | 2.70                                       | 5.68                                     |
| 5.8        | 2.54                       | 1.04                       | 1.85                                       | 4.83                                     |

## 8.5.1. 802.11a MODE IN THE 5.2 GHz BAND

### FCC

#### 4TX Antenna 1 + Antenna 2 + Antenna 3 + Antenna 4 CDD MODE

##### Antenna Gain and Limits

| Channel | Frequency<br>(MHz) | Directional<br>Gain<br>for Power<br>(dBi) | Directional<br>Gain<br>for PSD<br>(dBi) | Power<br>Limit<br>(dBm) | PSD<br>Limit<br>(dBm/<br>1MHz) |
|---------|--------------------|-------------------------------------------|-----------------------------------------|-------------------------|--------------------------------|
| Low     | 5180               | 6.41                                      | 9.35                                    | 23.59                   | 7.65                           |
| Mid     | 5200               | 6.41                                      | 9.35                                    | 23.59                   | 7.65                           |
| High    | 5240               | 6.41                                      | 9.35                                    | 23.59                   | 7.65                           |

|                    |      |                                        |
|--------------------|------|----------------------------------------|
| Duty Cycle CF (dB) | 0.00 | Included in Calculations of Corr'd PSD |
|--------------------|------|----------------------------------------|

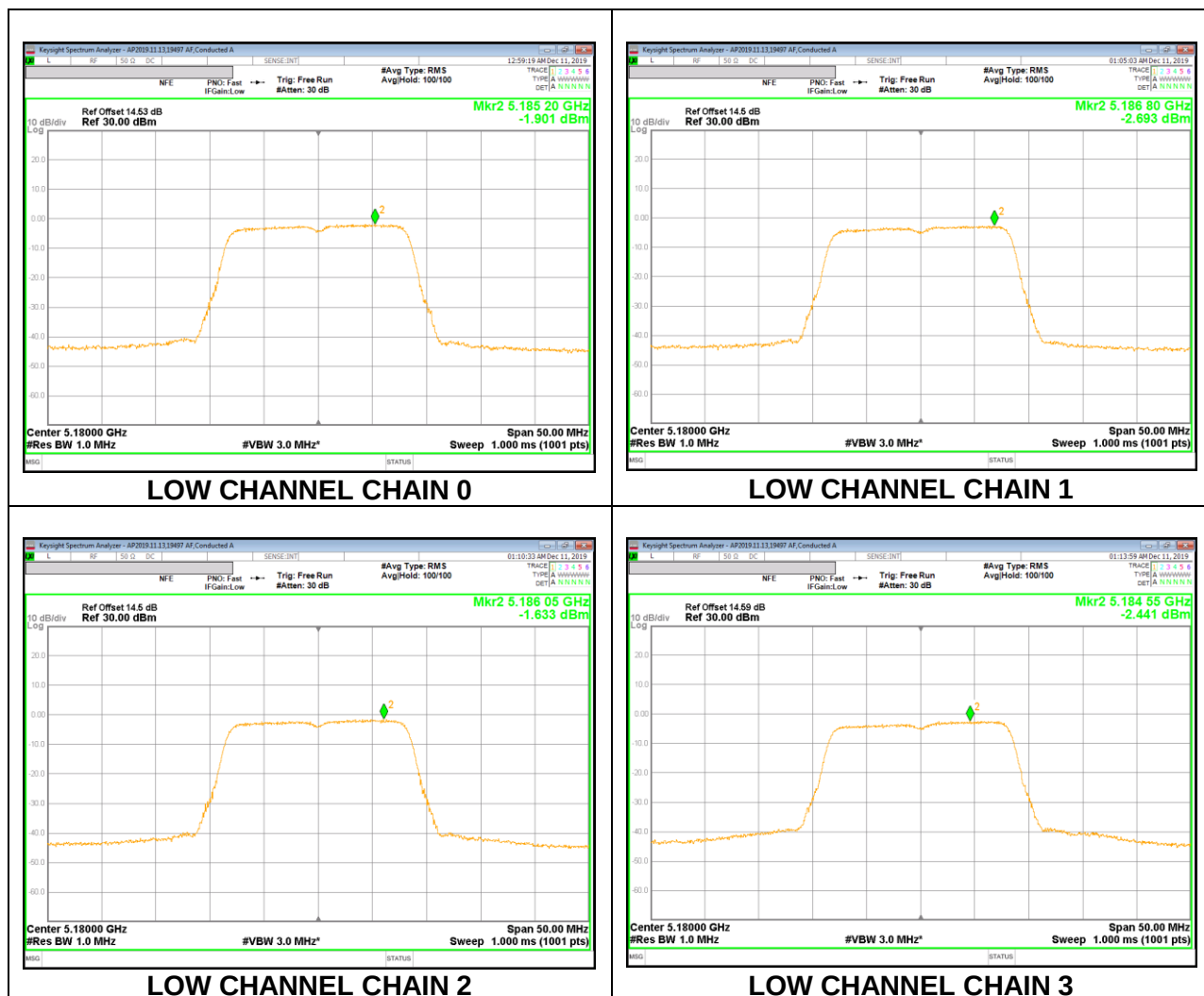
##### Output Power Results

| Channel | Frequency<br>(MHz) | Antenna 0<br>Meas<br>Power<br>(dBm) | Antenna 1<br>Meas<br>Power<br>(dBm) | Antenna 2<br>Meas<br>Power<br>(dBm) | Antenna 3<br>Meas<br>Power<br>(dBm) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5180               | 10.67                               | 9.95                                | 11.14                               | 10.21                               | 16.54                             | 23.59                   | -7.05                   |
| Mid     | 5200               | 11.20                               | 10.53                               | 11.56                               | 10.72                               | 17.04                             | 23.59                   | -6.55                   |
| High    | 5240               | 11.18                               | 10.50                               | 11.39                               | 10.27                               | 16.88                             | 23.59                   | -6.71                   |

##### PSD Results

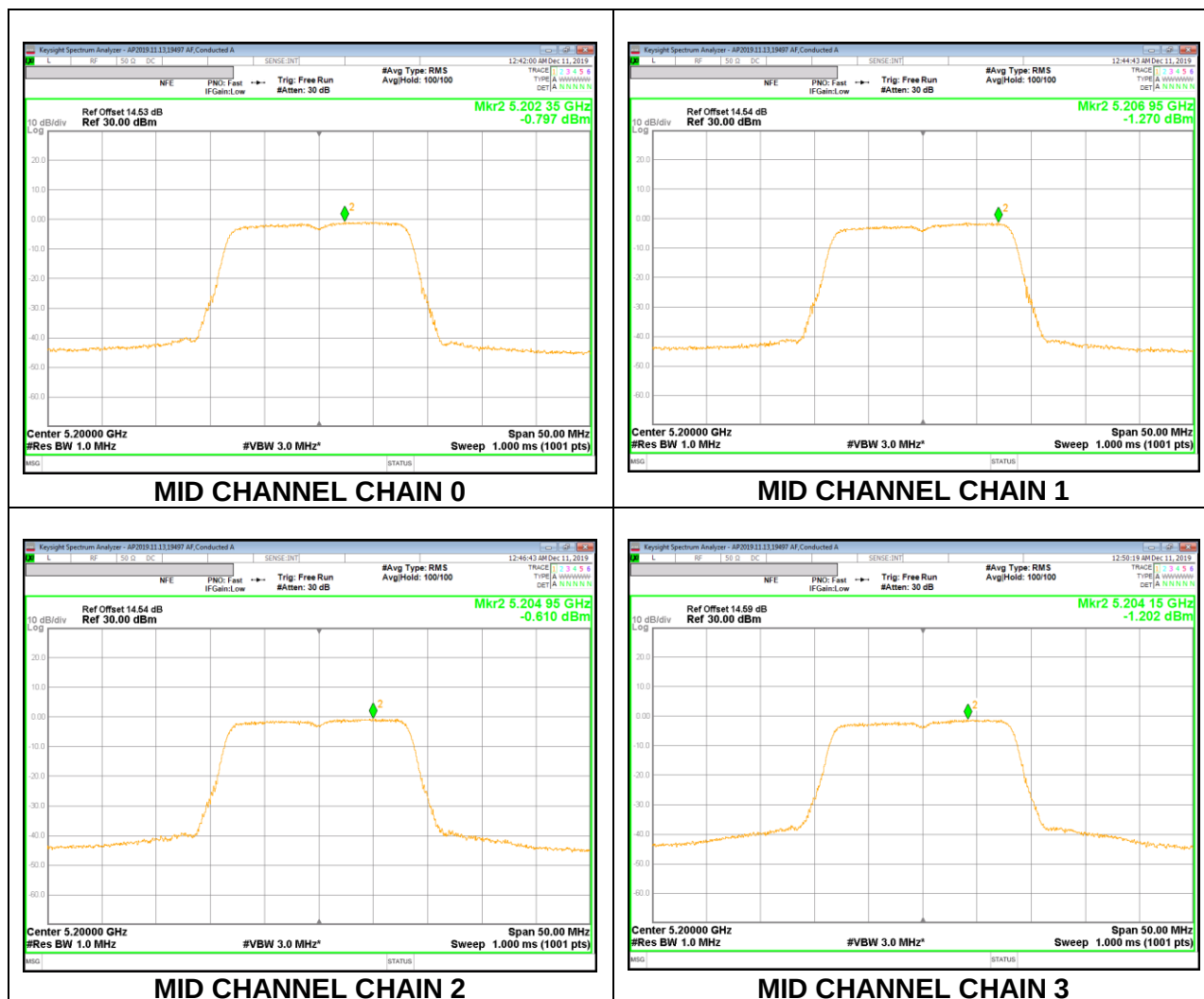
| Channel | Frequency<br>(MHz) | Antenna 0<br>Meas<br>PSD<br>(dBm/<br>1MHz) | Antenna 1<br>Meas<br>PSD<br>(dBm/<br>1MHz) | Antenna 2<br>Meas<br>PSD<br>(dBm/<br>1MHz) | Antenna 3<br>Meas<br>PSD<br>(dBm/<br>1MHz) | Total<br>Corr'd<br>PSD<br>(dBm/<br>1MHz) | PSD<br>Limit<br>(dBm/<br>1MHz) | PSD<br>Margin<br>(dB) |
|---------|--------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|------------------------------------------|--------------------------------|-----------------------|
| Low     | 5180               | -1.901                                     | -2.693                                     | -1.633                                     | -2.441                                     | 3.87                                     | 7.65                           | -3.78                 |
| Mid     | 5200               | -0.797                                     | -1.270                                     | -0.610                                     | -1.202                                     | 5.06                                     | 7.65                           | -2.59                 |
| High    | 5240               | -1.080                                     | -1.273                                     | -0.567                                     | -1.780                                     | 4.87                                     | 7.65                           | -2.78                 |

## LOW CHANNEL

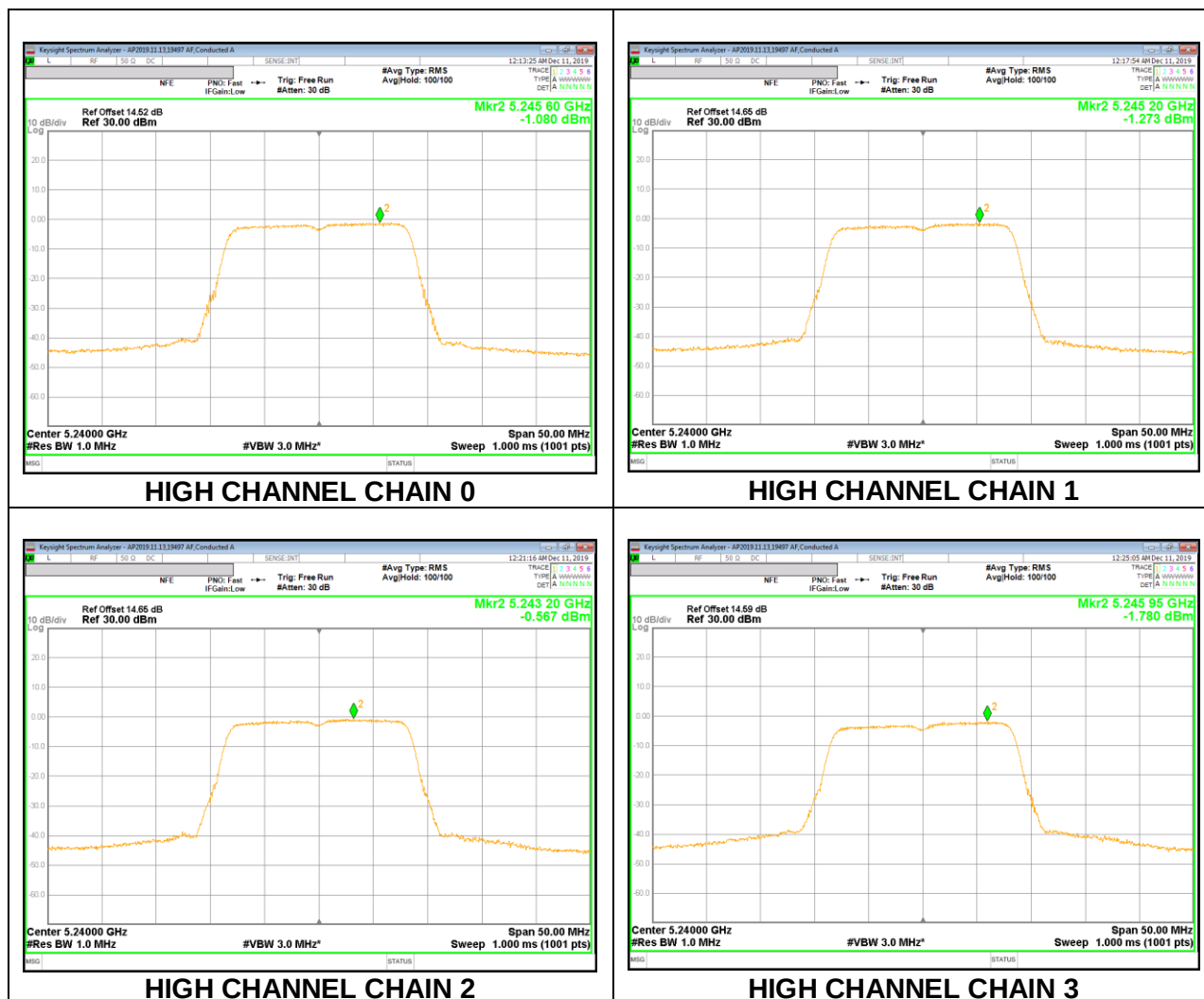




## MID CHANNEL



## HIGH CHANNEL



**IC**

(Note: IC PSD was tested by radiated method)

|                          |          |
|--------------------------|----------|
| <b>Test Engineer ID:</b> | 20756 CW |
|--------------------------|----------|

**Bandwidth and Antenna Gain**

| Channel | Frequency<br>(MHz) | Min<br>99%<br>BW<br>(MHz) |
|---------|--------------------|---------------------------|
| Low     | 5180               | 16.470                    |
| Mid     | 5200               | 16.386                    |
| High    | 5240               | 16.480                    |

**Limits**

| Channel | Frequency<br>(MHz) | ISED<br>EIRP<br>Limit<br>(dBm) | ISED<br>eirp<br>PSD<br>Limit<br>(dBm/<br>1MHz) |
|---------|--------------------|--------------------------------|------------------------------------------------|
| Low     | 5180               | 22.17                          | 10.00                                          |
| Mid     | 5200               | 22.14                          | 10.00                                          |
| High    | 5240               | 22.17                          | 10.00                                          |

|                           |      |                                        |
|---------------------------|------|----------------------------------------|
| <b>Duty Cycle CF (dB)</b> | 0.00 | Included in Calculations of Corr'd PSD |
|---------------------------|------|----------------------------------------|

**Output Power Results**

| Channel | Frequency<br>(MHz) | Total<br>Corr'd<br>Power<br>(dBm) | Power<br>Limit<br>(dBm) | Power<br>Margin<br>(dB) |
|---------|--------------------|-----------------------------------|-------------------------|-------------------------|
| Low     | 5180               | 17.73                             | 22.17                   | -4.44                   |
| Mid     | 5200               | 18.84                             | 22.14                   | -3.30                   |
| High    | 5240               | 17.30                             | 22.17                   | -4.87                   |

**PSD Results**

| Channel | Frequency<br>(MHz) | Total<br>Corr'd<br>PSD<br>(dBm/<br>1MHz) | PSD<br>Limit<br>(dBm/<br>1MHz) | PSD<br>Margin<br>(dB) |
|---------|--------------------|------------------------------------------|--------------------------------|-----------------------|
| Low     | 5180               | 6.45                                     | 10.00                          | -3.55                 |
| Mid     | 5200               | 7.42                                     | 10.00                          | -2.58                 |
| High    | 5240               | 6.99                                     | 10.00                          | -3.01                 |