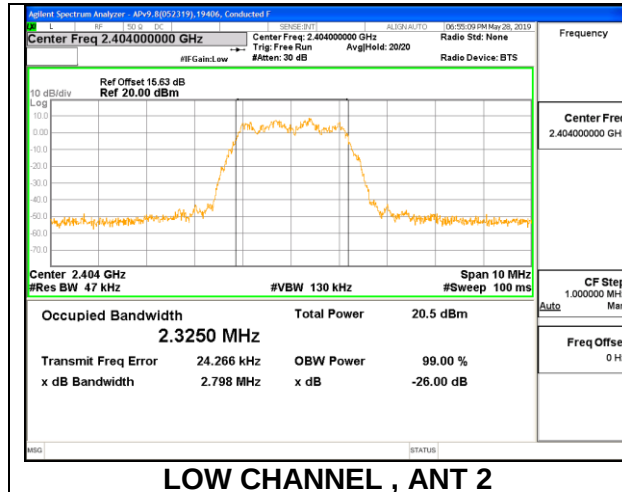


## **8.8. BEAMFORMING, 99% BANDWIDTH**

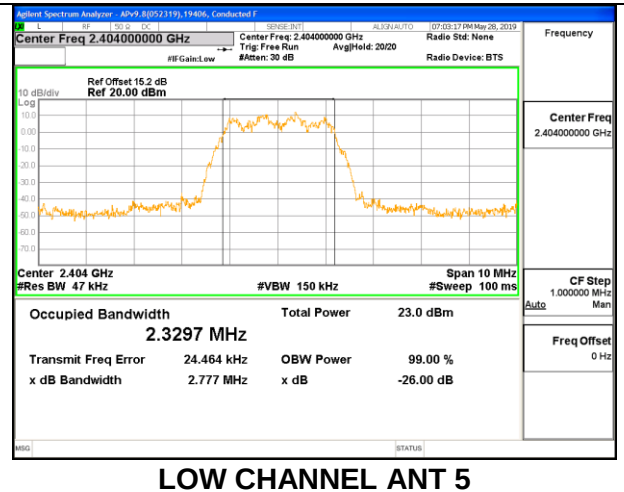
### **8.8.1. HIGH POWER HDR (HDR4)**

| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>ANT 2<br>(MHz) | 99% Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 2.3250                          | 2.3297                          |
| Mid     | 2441               | 2.3257                          | 2.3195                          |
| High    | 2478               | 2.3258                          | 2.3170                          |

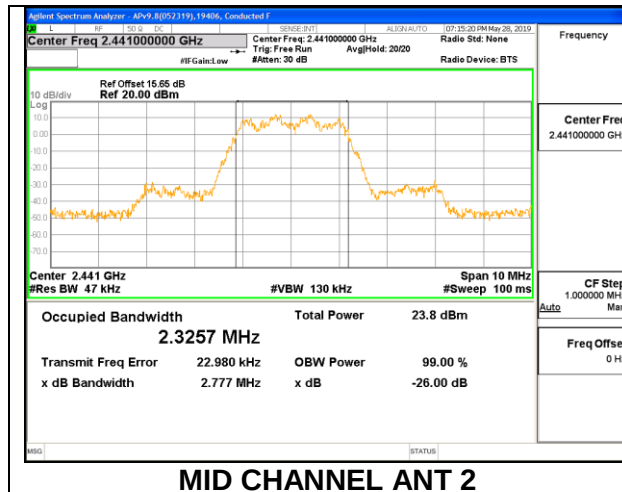
Note: Test procedures and setting on beamforming are same as BT HDR normal modes.



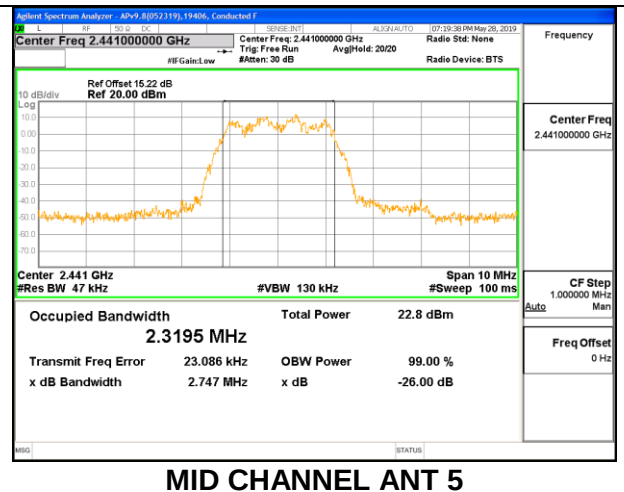
LOW CHANNEL, ANT 2



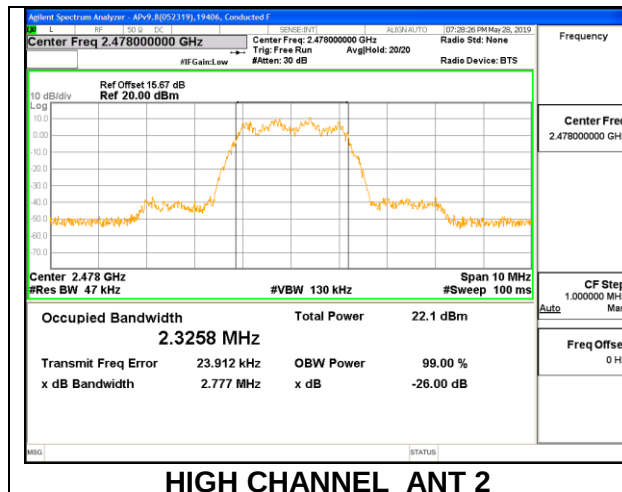
LOW CHANNEL ANT 5



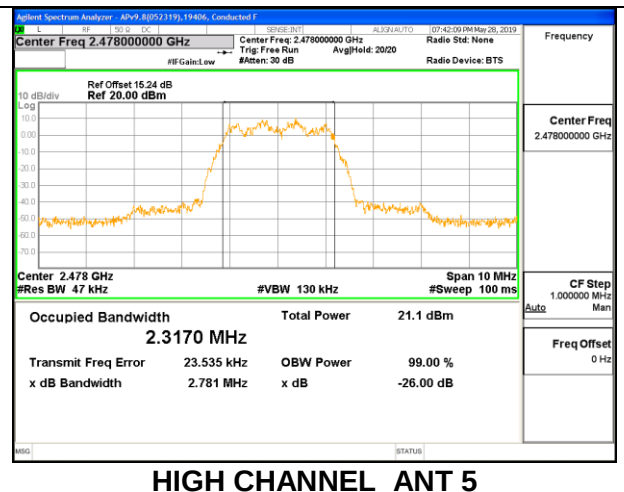
MID CHANNEL ANT 2



MID CHANNEL ANT 5



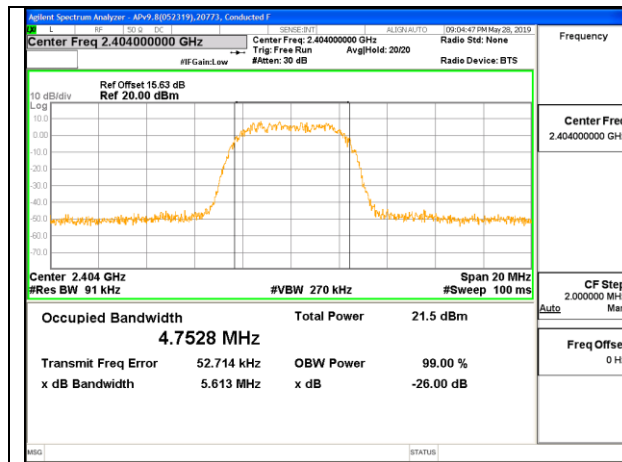
HIGH CHANNEL ANT 2



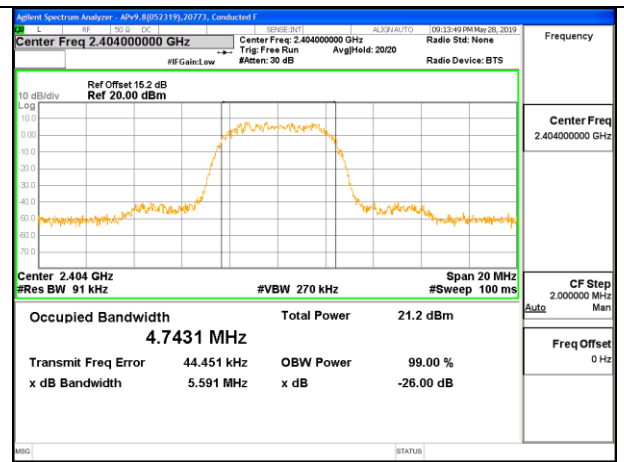
HIGH CHANNEL ANT 5

### 8.8.2. HIGH POWER HDR (HDR8)

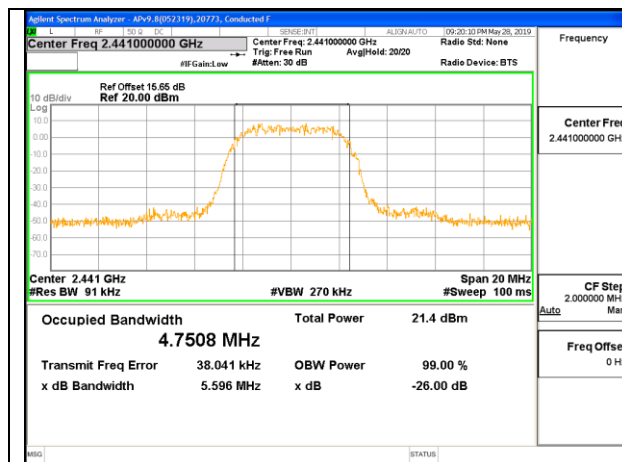
| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>ANT 2<br>(MHz) | 99% Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 4.7528                          | 4.7431                          |
| Mid     | 2441               | 4.7508                          | 4.7560                          |
| High    | 2478               | 4.7504                          | 4.7497                          |



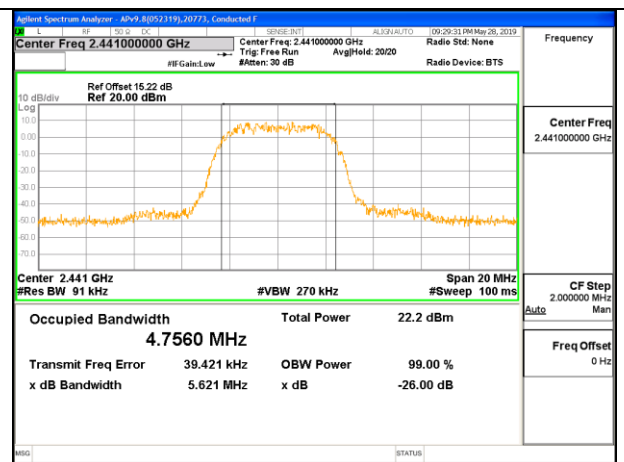
LOW CHANNEL , ANT 2



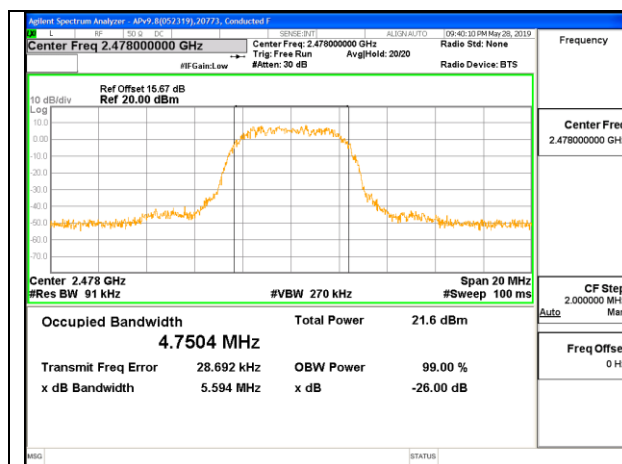
LOW CHANNEL ANT 5



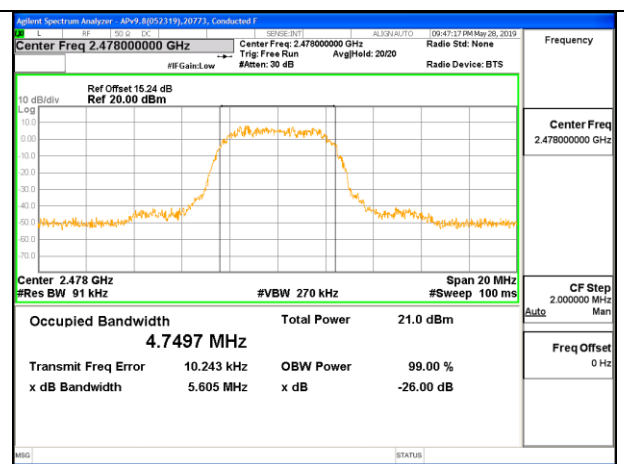
MID CHANNEL ANT 2



MID CHANNEL ANT 5



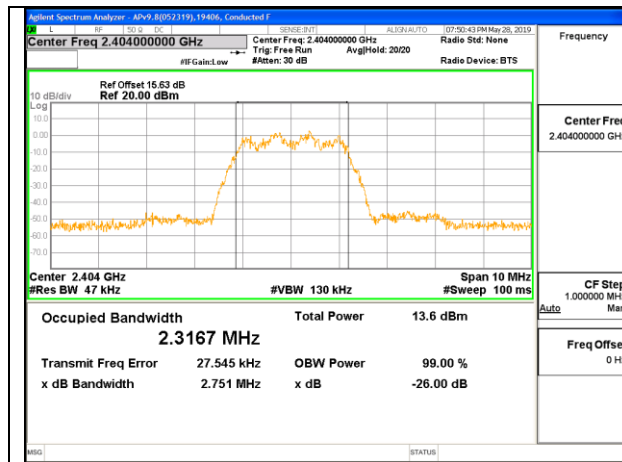
HIGH CHANNEL ANT 2



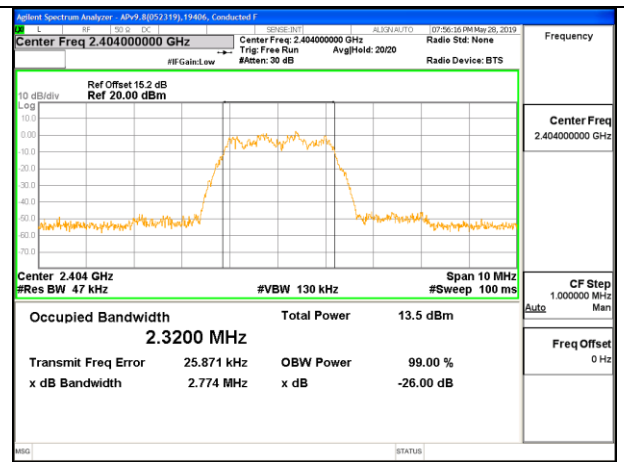
HIGH CHANNEL ANT 5

### 8.8.3. LOW POWER HDR (HDR4)

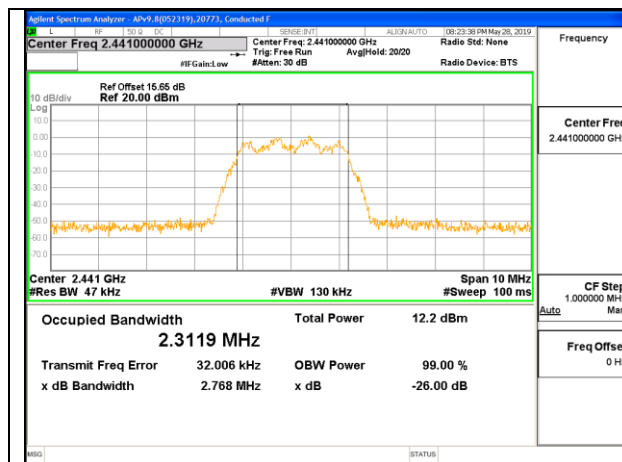
| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>ANT 2<br>(MHz) | 99% Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 2.3167                          | 2.3200                          |
| Mid     | 2441               | 2.3119                          | 2.3166                          |
| High    | 2478               | 2.3225                          | 2.3259                          |



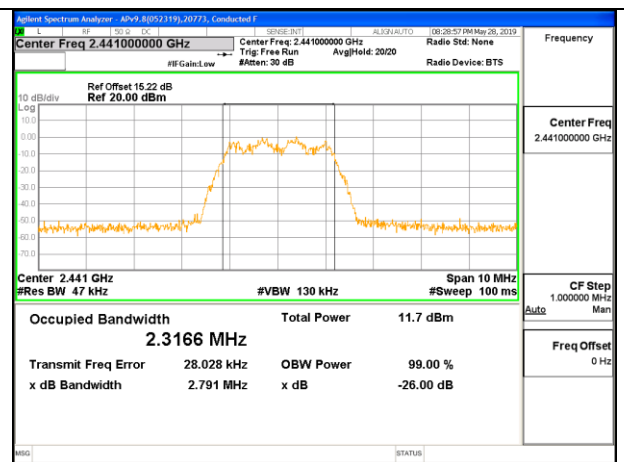
LOW CHANNEL , ANT 2



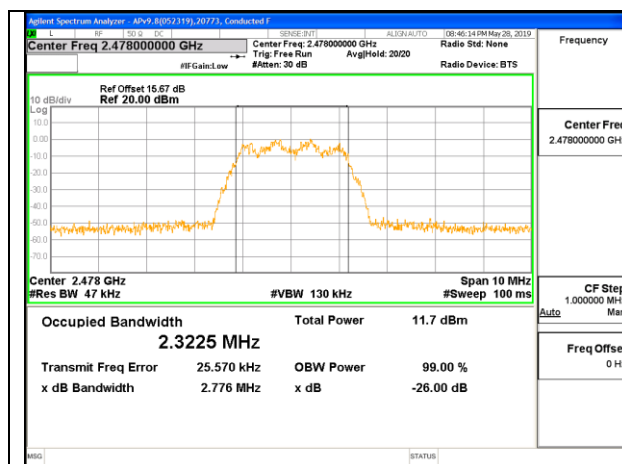
LOW CHANNEL ANT 5



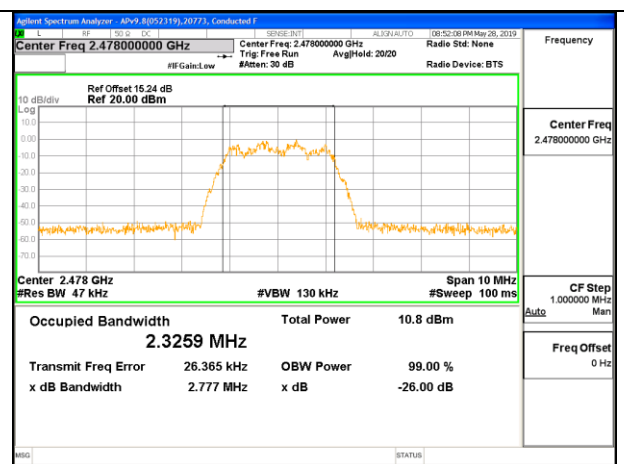
MID CHANNEL ANT 2



MID CHANNEL ANT 5



HIGH CHANNEL ANT 2

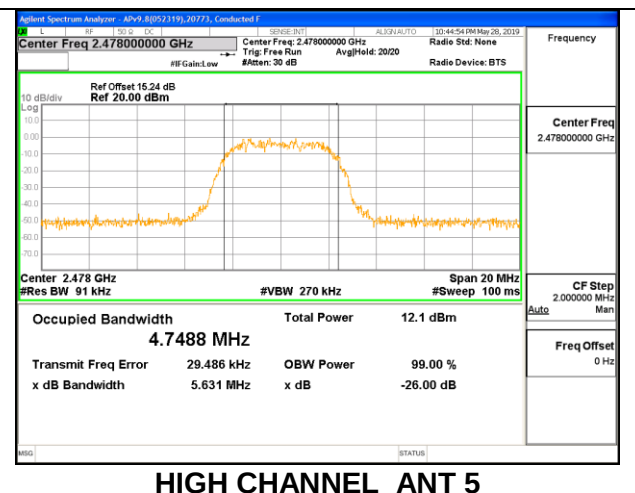
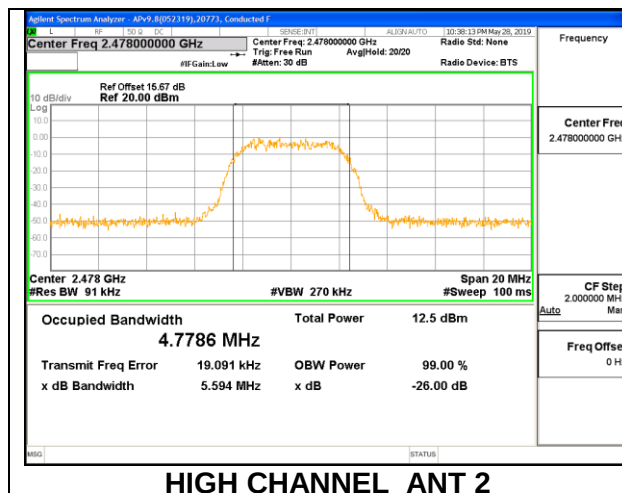
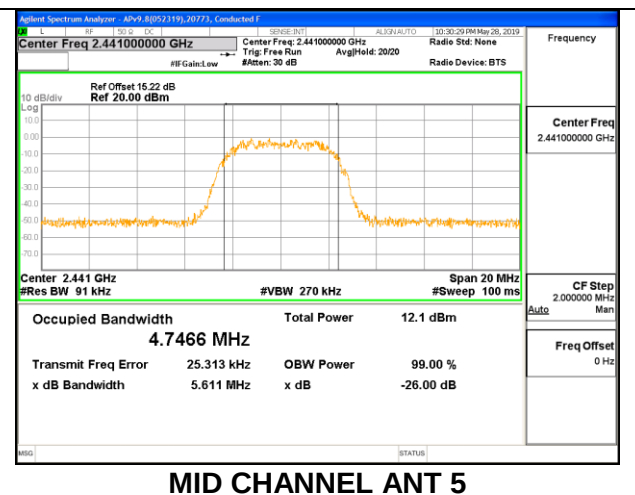
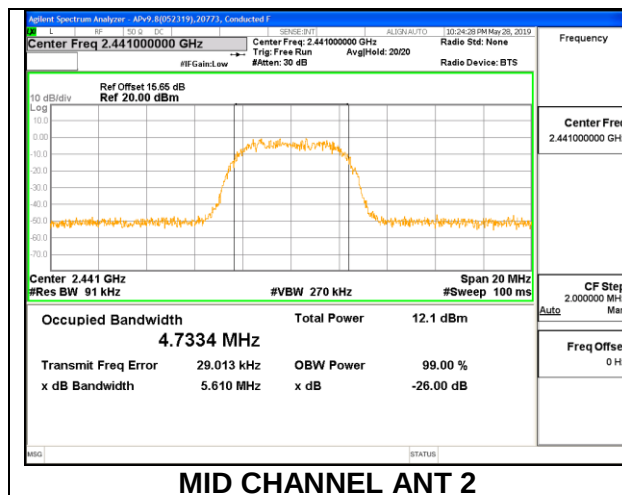
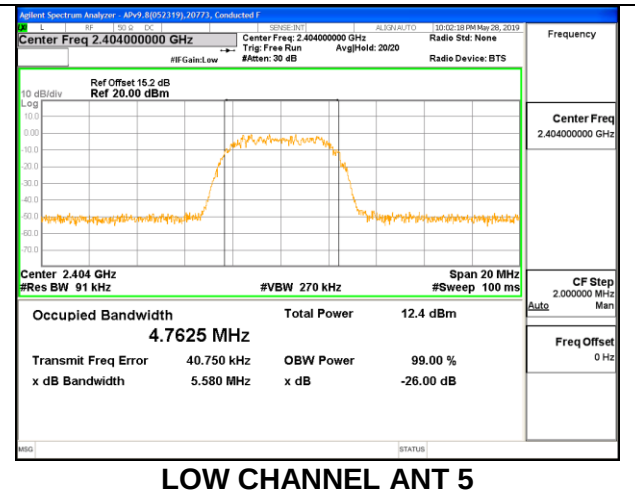
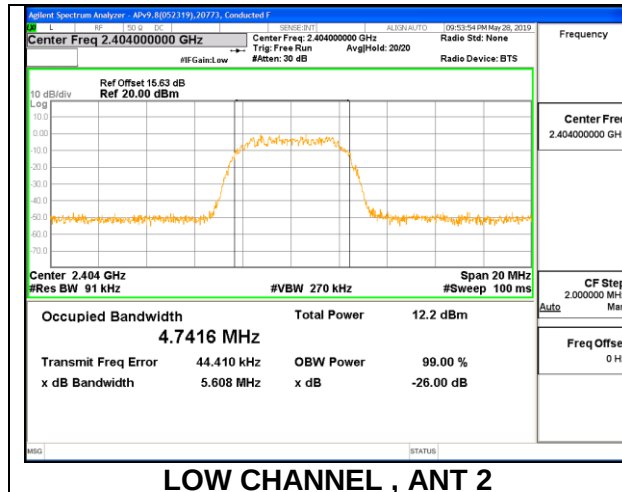


HIGH CHANNEL ANT 5

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**8.8.4. LOW POWER HDR (HDR8)**

| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>ANT 2<br>(MHz) | 99% Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 4.7416                          | 4.7625                          |
| Mid     | 2441               | 4.7334                          | 4.7466                          |
| High    | 2478               | 4.7786                          | 4.7488                          |



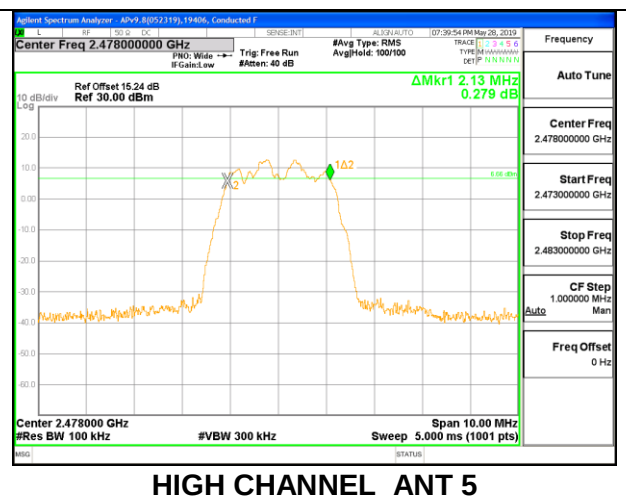
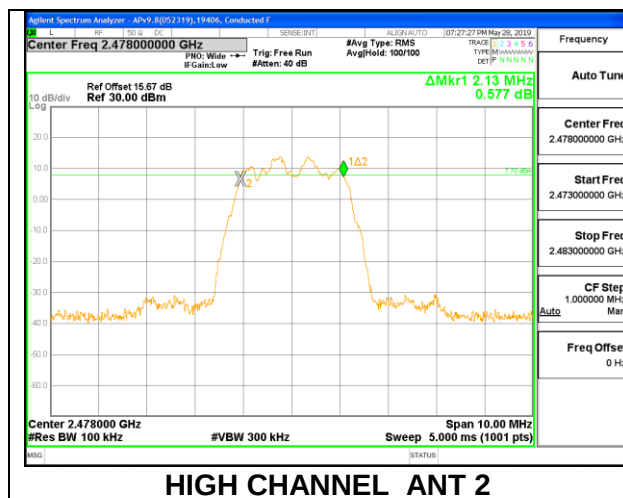
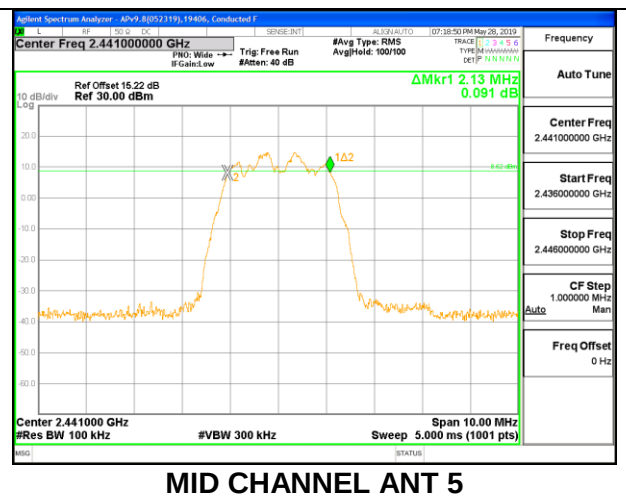
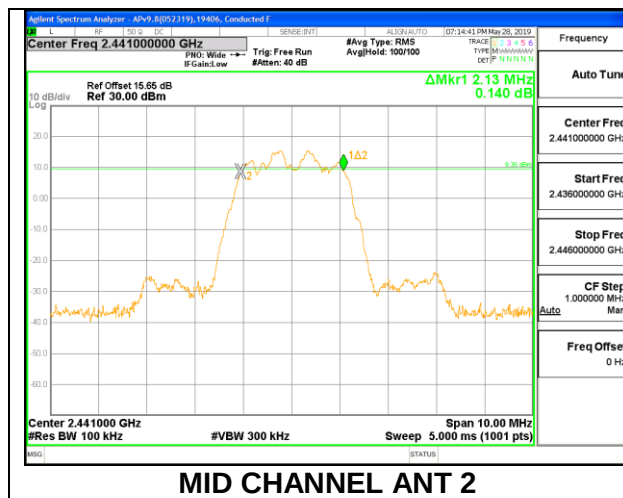
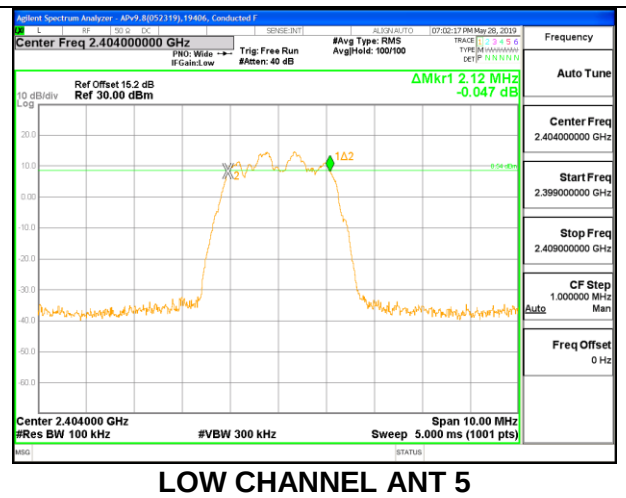
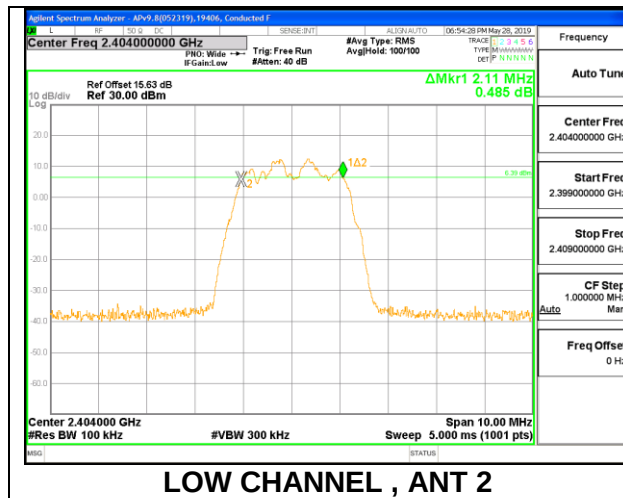


## **8.9. BEAMFORMING, 6dB BANDWIDTH**

### **8.9.1. HIGH POWER HDR (HDR4)**

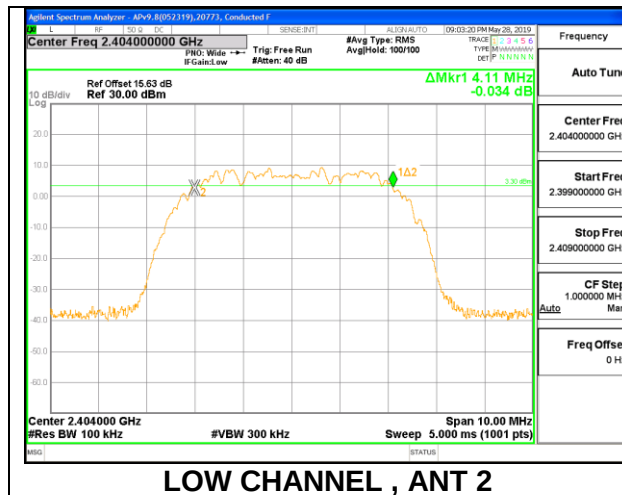
| Channel | Frequency<br>(MHz) | 6dB Bandwidth<br>ANT 2<br>(MHz) | 6dB Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 2.110                           | 2.120                           |
| Mid     | 2441               | 2.130                           | 2.130                           |
| High    | 2478               | 2.130                           | 2.130                           |

Note: Test procedures and setting on beamforming are same as BT HDR normal modes.

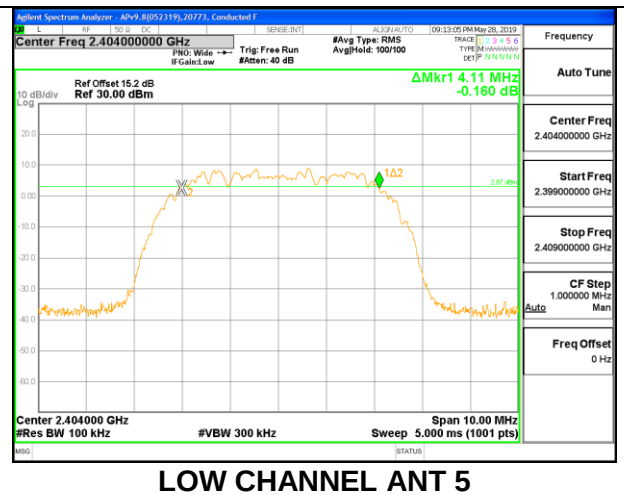


### 8.9.2. HIGH POWER HDR (HDR8)

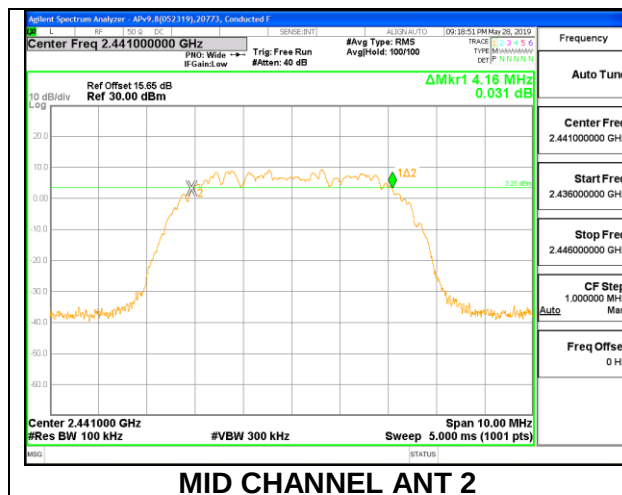
| Channel | Frequency<br>(MHz) | 6dB Bandwidth<br>ANT 2<br>(MHz) | 6dB Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 4.110                           | 4.110                           |
| Mid     | 2441               | 4.160                           | 4.110                           |
| High    | 2478               | 4.160                           | 4.160                           |



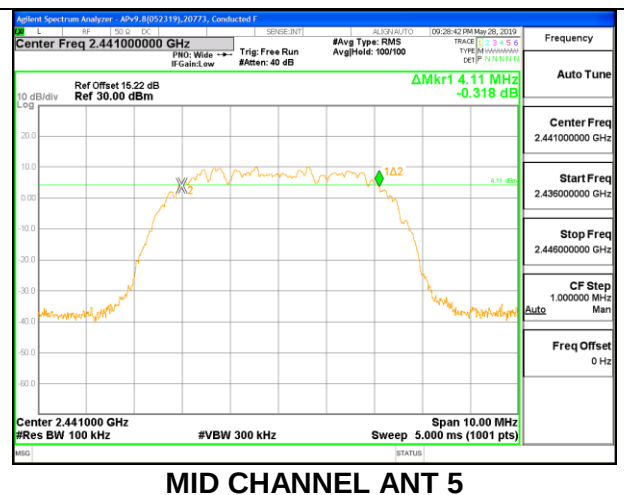
LOW CHANNEL, ANT 2



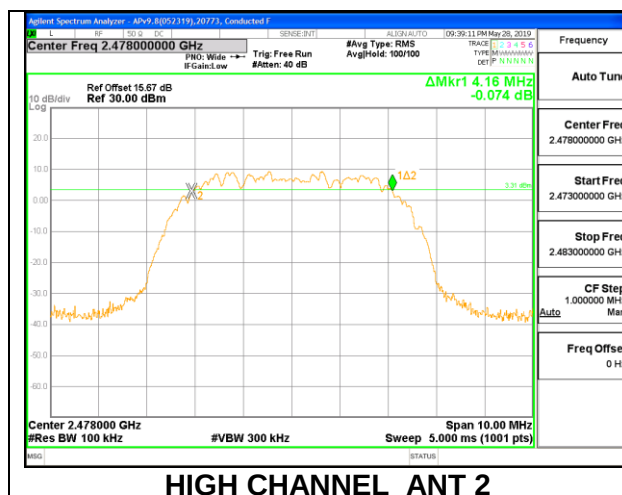
LOW CHANNEL ANT 5



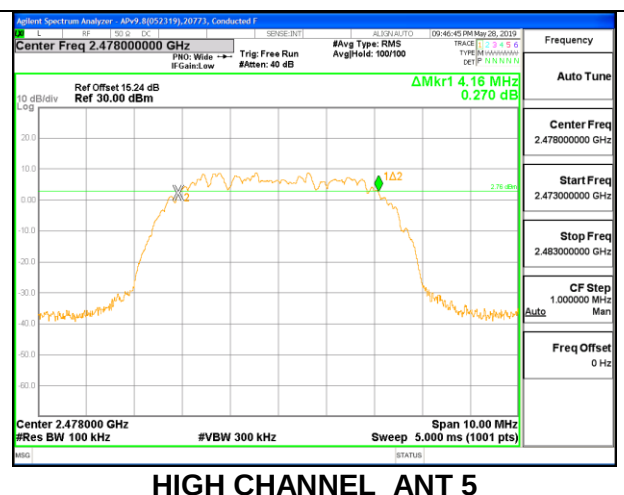
MID CHANNEL ANT 2



MID CHANNEL ANT 5



HIGH CHANNEL ANT 2



HIGH CHANNEL ANT 5

### 8.9.3. LOW POWER HDR (HDR4)

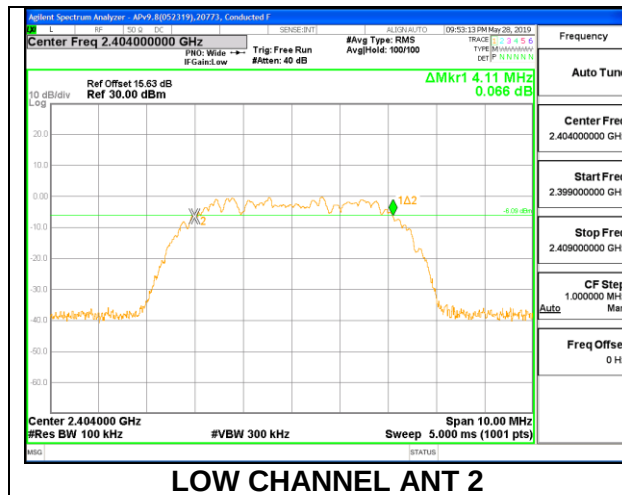
| Channel | Frequency<br>(MHz) | 6dB Bandwidth<br>ANT 2<br>(MHz) | 6dB Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 2.120                           | 2.110                           |
| Mid     | 2441               | 2.120                           | 2.120                           |
| High    | 2478               | 2.120                           | 2.120                           |



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**8.9.4. LOW POWER HDR (HDR8)**

| Channel | Frequency<br>(MHz) | 6dB Bandwidth<br>ANT 2<br>(MHz) | 6dB Bandwidth<br>ANT 5<br>(MHz) |
|---------|--------------------|---------------------------------|---------------------------------|
| Low     | 2404               | 4.110                           | 4.120                           |
| Mid     | 2441               | 4.170                           | 4.150                           |
| High    | 2478               | 4.170                           | 4.170                           |





## 8.10. BEAMFORMING OUTPUT POWER

### 8.10.1. HIGH POWER HDR (HDR4)

#### 2TX Antenna 2 + Antenna 5 TxBF Mode

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Output Power<br>Antenna 2<br>(dBm) | Output Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------|--------------------|------------------------------------|------------------------------------|----------------------|----------------|----------------|
| Low     | 2404               | 14.47                              | 14.79                              | 17.64                | 30             | -12.36         |
| Middle  | 2441               | 14.78                              | 14.81                              | 17.81                | 30             | -12.19         |
| High    | 2478               | 14.73                              | 14.96                              | 17.86                | 30             | -12.14         |

### 8.10.2. HIGH POWER HDR (HDR8)

#### 2TX Antenna 2 + Antenna 5 TxBF Mode

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Output Power<br>Antenna 2<br>(dBm) | Output Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------|--------------------|------------------------------------|------------------------------------|----------------------|----------------|----------------|
| Low     | 2404               | 14.96                              | 15.02                              | 18.00                | 30             | -12.00         |
| Middle  | 2441               | 15.05                              | 15.06                              | 18.07                | 30             | -11.93         |
| High    | 2478               | 14.86                              | 14.88                              | 17.88                | 30             | -12.12         |

**8.10.3. LOW POWER HDR (HDR4)****2TX Antenna 2 + Antenna 5 TxBF Mode**

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Output Power<br>Antenna 2<br>(dBm) | Output Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------|--------------------|------------------------------------|------------------------------------|----------------------|----------------|----------------|
| Low     | 2404               | 9.04                               | 8.87                               | 11.97                | 30             | -18.03         |
| Middle  | 2441               | 8.81                               | 8.82                               | 11.83                | 30             | -18.17         |
| High    | 2478               | 9.05                               | 8.73                               | 11.90                | 30             | -18.10         |

**8.10.4. LOW POWER HDR (HDR8)****2TX Antenna 2 + Antenna 5 TxBF Mode**

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Output Power<br>Antenna 2<br>(dBm) | Output Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------|--------------------|------------------------------------|------------------------------------|----------------------|----------------|----------------|
| Low     | 2404               | 9.62                               | 9.61                               | 12.63                | 30             | -17.37         |
| Middle  | 2441               | 9.77                               | 9.38                               | 12.59                | 30             | -17.41         |
| High    | 2478               | 9.46                               | 9.36                               | 12.42                | 30             | -17.58         |

## 8.11. BEAMFORMING AVERAGE POWER

### 8.11.1. HIGH POWER HDR (HDR4)

#### 2TX Antenna 2 + Antenna 5 TxBF Mode

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Average Power<br>Antenna 2<br>(dBm) | Average Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) |
|---------|--------------------|-------------------------------------|-------------------------------------|----------------------|
| Low     | 2404               | 11.63                               | 11.73                               | 14.69                |
| Middle  | 2441               | 11.72                               | 11.75                               | 14.75                |
| High    | 2478               | 11.74                               | 11.70                               | 14.73                |

### 8.11.2. HIGH POWER HDR (HDR8)

#### 2TX Antenna 2 + Antenna 5 TxBF Mode

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Average Power<br>Antenna 2<br>(dBm) | Average Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) |
|---------|--------------------|-------------------------------------|-------------------------------------|----------------------|
| Low     | 2404               | 11.73                               | 11.74                               | 14.75                |
| Middle  | 2441               | 11.75                               | 11.75                               | 14.76                |
| High    | 2478               | 11.68                               | 11.72                               | 14.71                |

Note: Test procedures and setting on beamforming are same as BT HDR normal modes.

**8.11.3. LOW POWER HDR (HDR4)****2TX Antenna 2 + Antenna 5 TxBF Mode**

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Average Power<br>Antenna 2<br>(dBm) | Average Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) |
|---------|--------------------|-------------------------------------|-------------------------------------|----------------------|
| Low     | 2404               | 6.22                                | 6.22                                | 9.23                 |
| Middle  | 2441               | 6.12                                | 6.21                                | 9.18                 |
| High    | 2478               | 6.24                                | 6.24                                | 9.25                 |

**8.11.4. LOW POWER HDR (HDR8)****2TX Antenna 2 + Antenna 5 TxBF Mode**

|            |           |
|------------|-----------|
| Tested By: | 39316     |
| Date:      | 6/28/2019 |

| Channel | Frequency<br>(MHz) | Average Power<br>Antenna 2<br>(dBm) | Average Power<br>Antenna 5<br>(dBm) | Total Power<br>(dBm) |
|---------|--------------------|-------------------------------------|-------------------------------------|----------------------|
| Low     | 2404               | 6.24                                | 6.23                                | 9.25                 |
| Middle  | 2441               | 6.25                                | 6.03                                | 9.15                 |
| High    | 2478               | 6.17                                | 6.20                                | 9.20                 |

## 8.12. BEAMFORMING, POWER SPECTRAL DENSITY

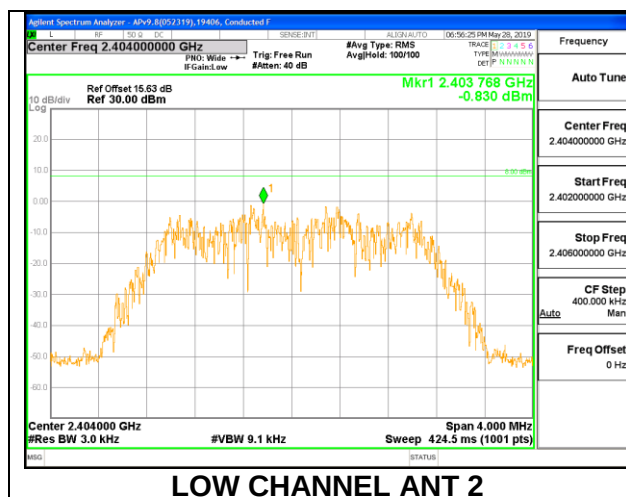
### 8.12.1. HIGH POWER HDR (HDR4)

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

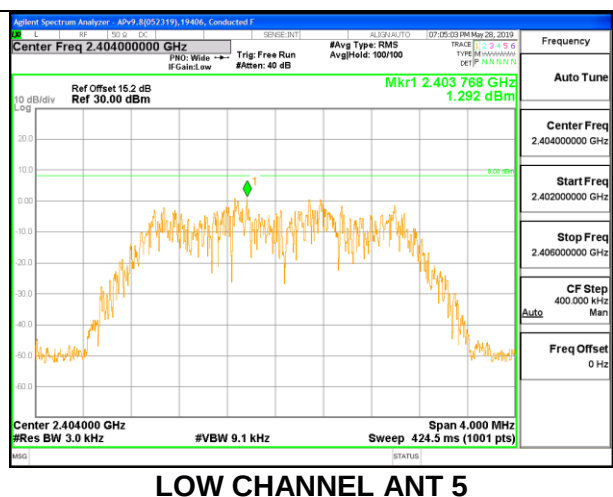
#### PSD Results

| Channel | Frequency<br>(MHz) | ANT 2<br>Meas<br>(dBm/<br>3kHz) | ANT 5<br>Meas<br>(dBm/<br>3kHz) | Total<br>Corr'd<br>PSD<br>(dBm/<br>3kHz) | Limit<br>(dBm/<br>3kHz) | Margin<br>(dB) |
|---------|--------------------|---------------------------------|---------------------------------|------------------------------------------|-------------------------|----------------|
| Low     | 2404               | -0.83                           | 1.29                            | 3.37                                     | 8.0                     | -4.6           |
| Mid     | 2441               | 2.25                            | 1.45                            | 4.88                                     | 8.0                     | -3.1           |
| Hjigh   | 2478               | 0.56                            | -0.32                           | 3.15                                     | 8.0                     | -4.8           |

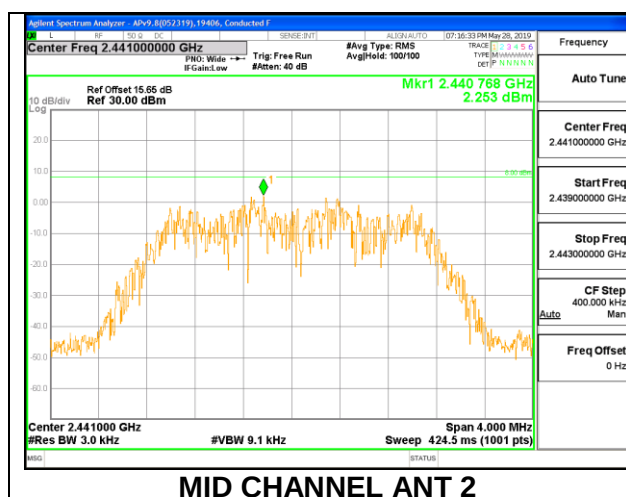
Note: Test procedures and setting on beamforming are same as BT HDR normal modes.



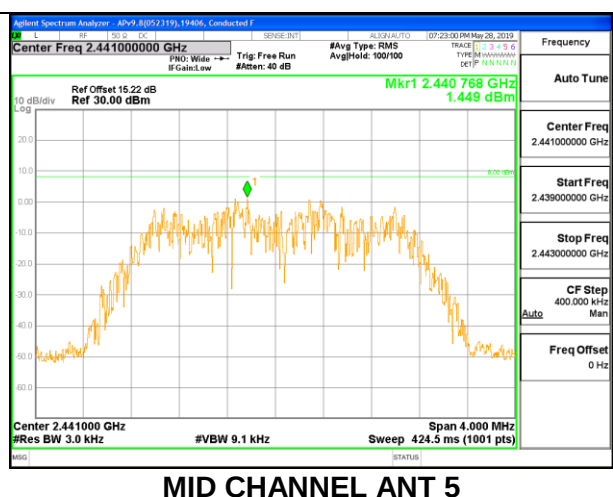
## LOW CHANNEL ANT 2



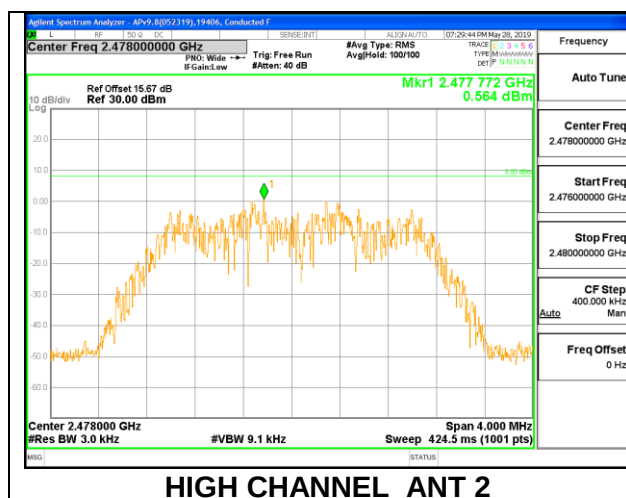
## LOW CHANNEL ANT 5



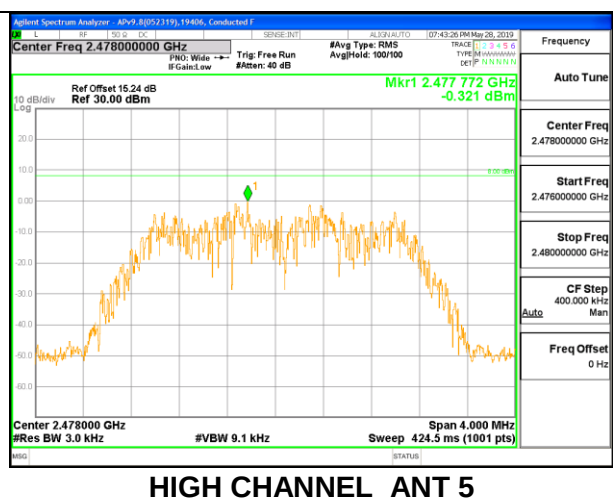
MID CHANNEL ANT 2



MID CHANNEL ANT 5



HIGH CHANNEL ANT 2



HIGH CHANNEL ANT 5