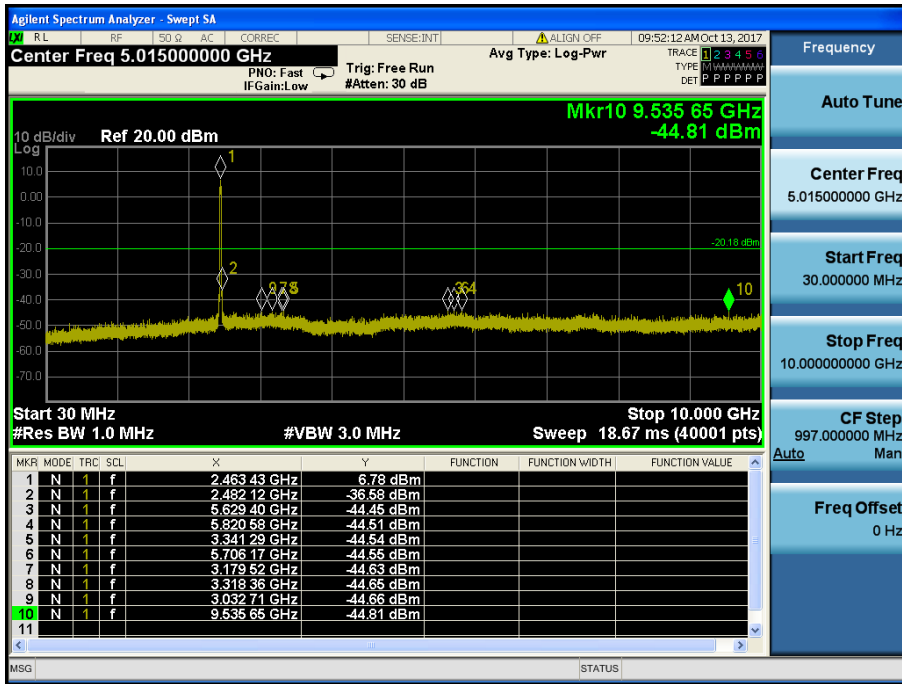
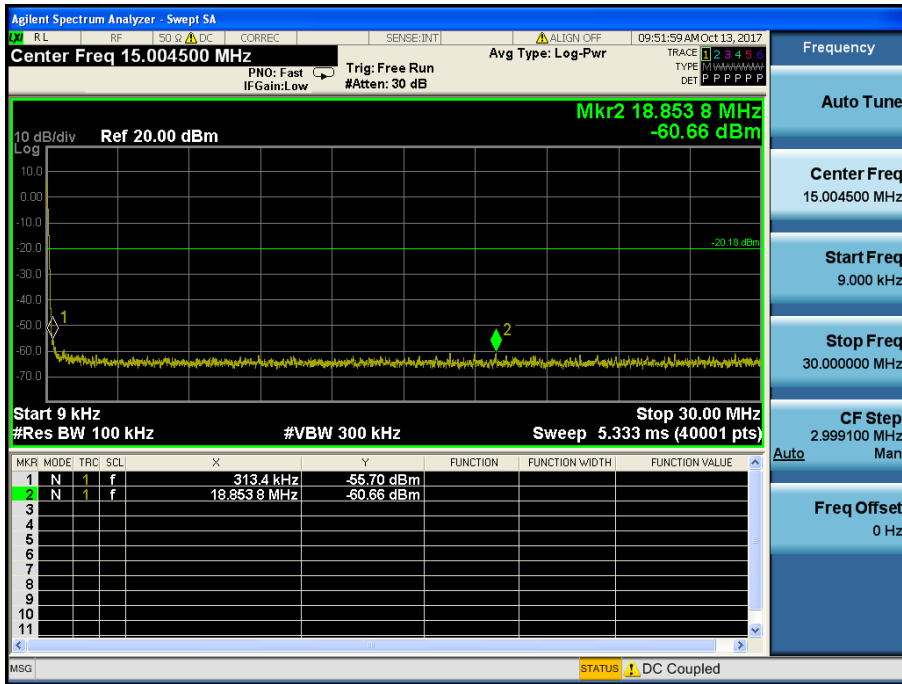
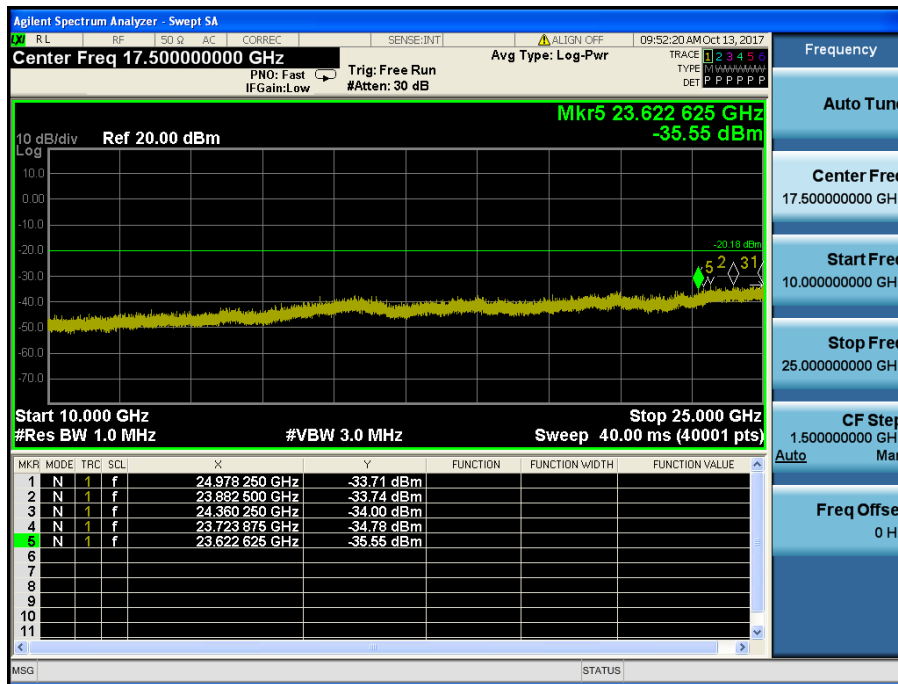


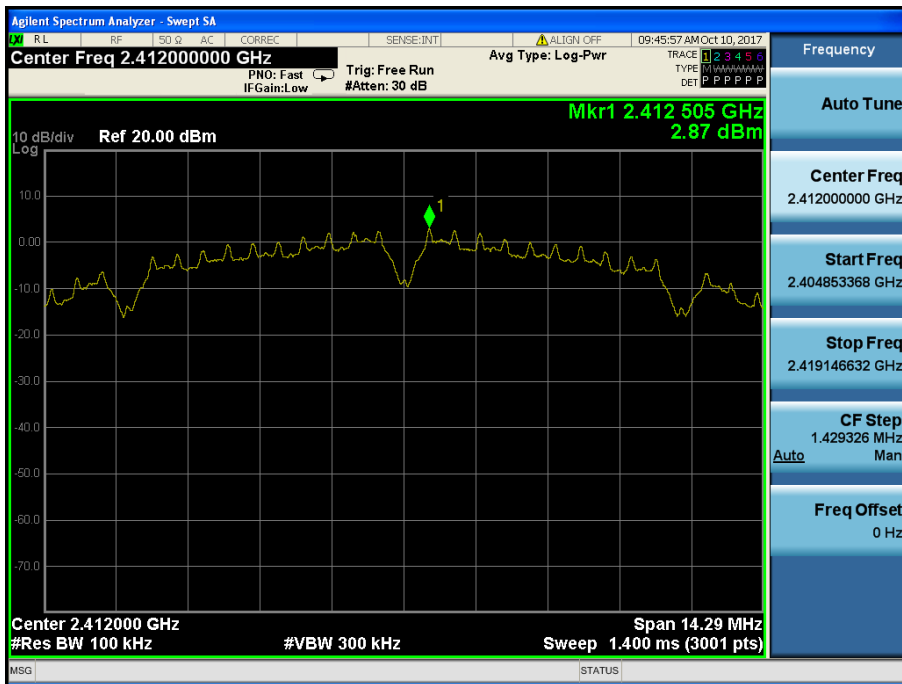
### Conducted Spurious Emissions



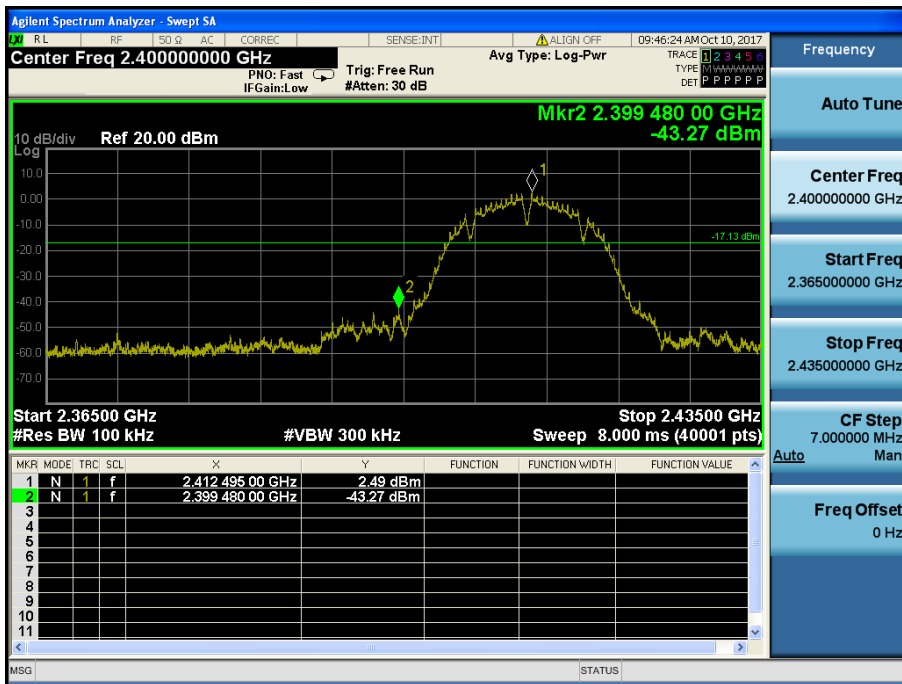
### Conducted Spurious Emissions



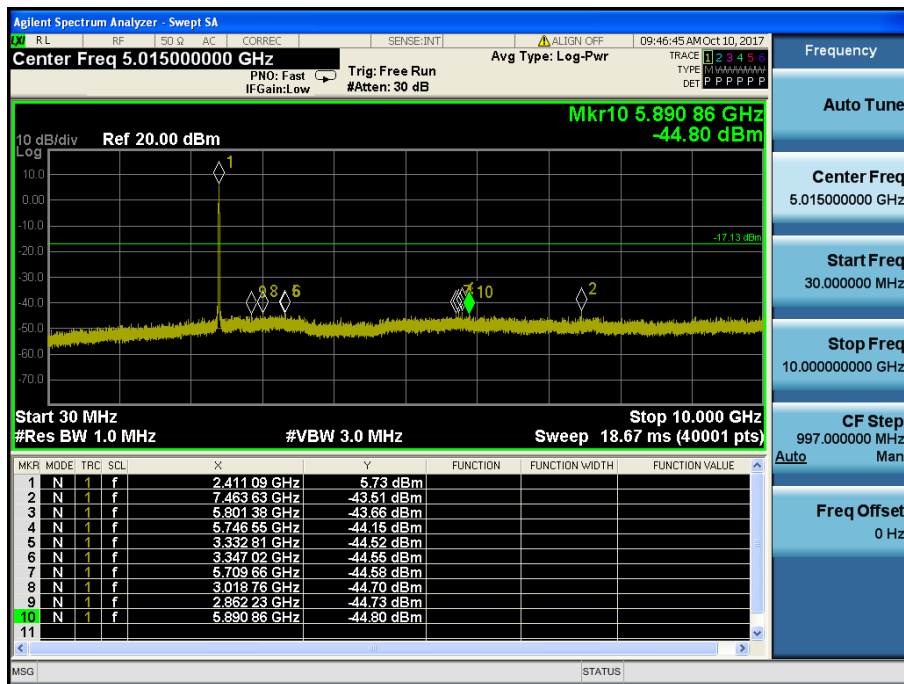
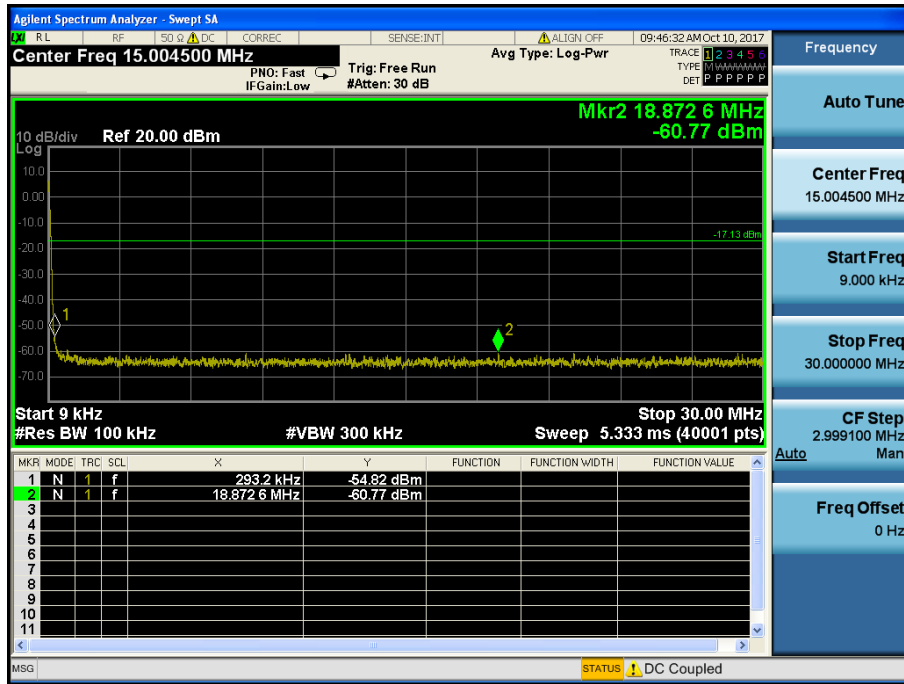
TM 1 & ANT 2 & Lowest  
Reference



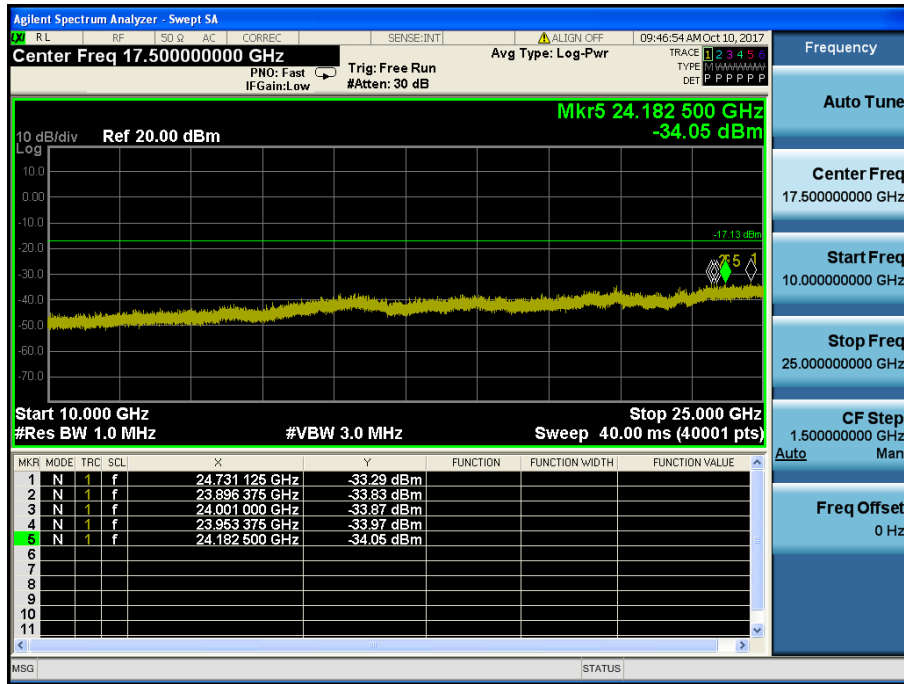
Low Band-edge



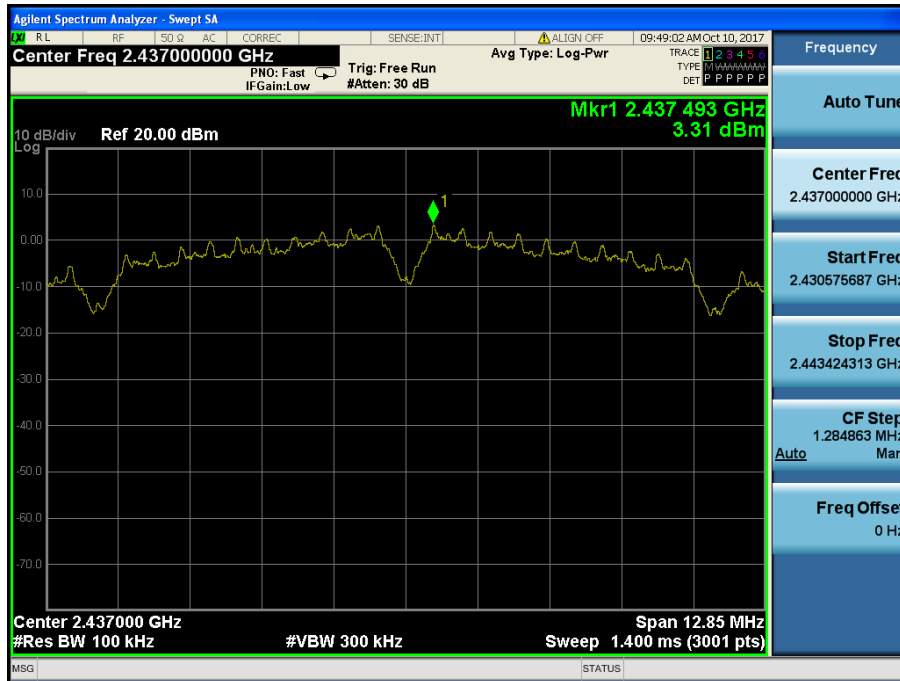
### Conducted Spurious Emissions



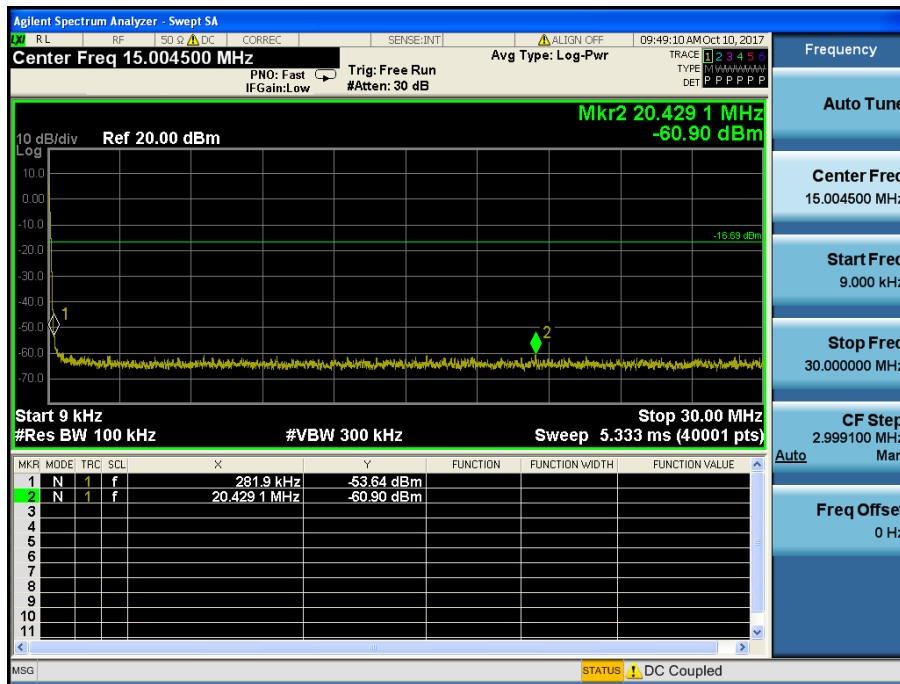
### Conducted Spurious Emissions



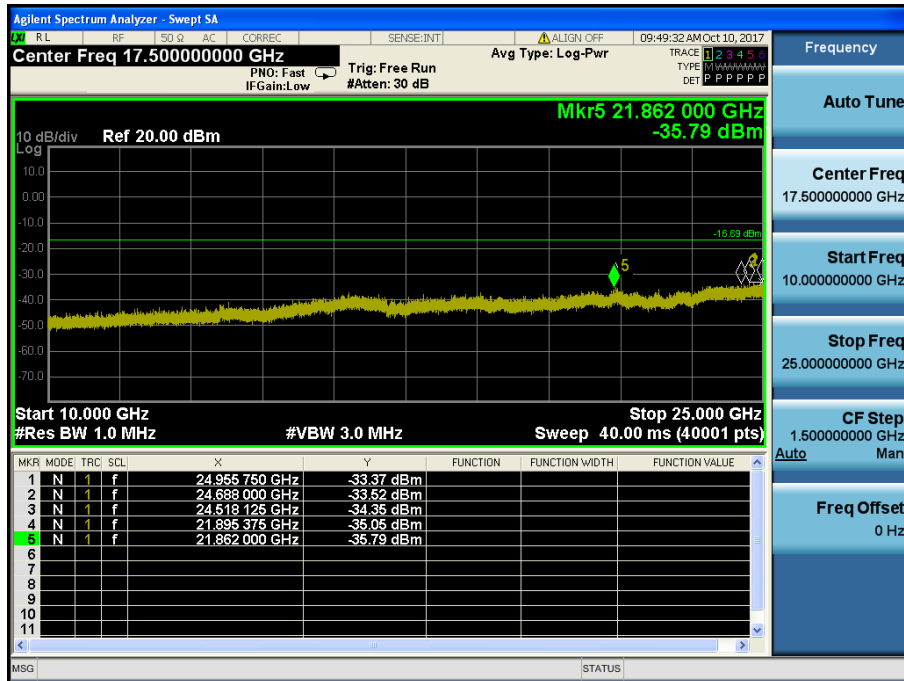
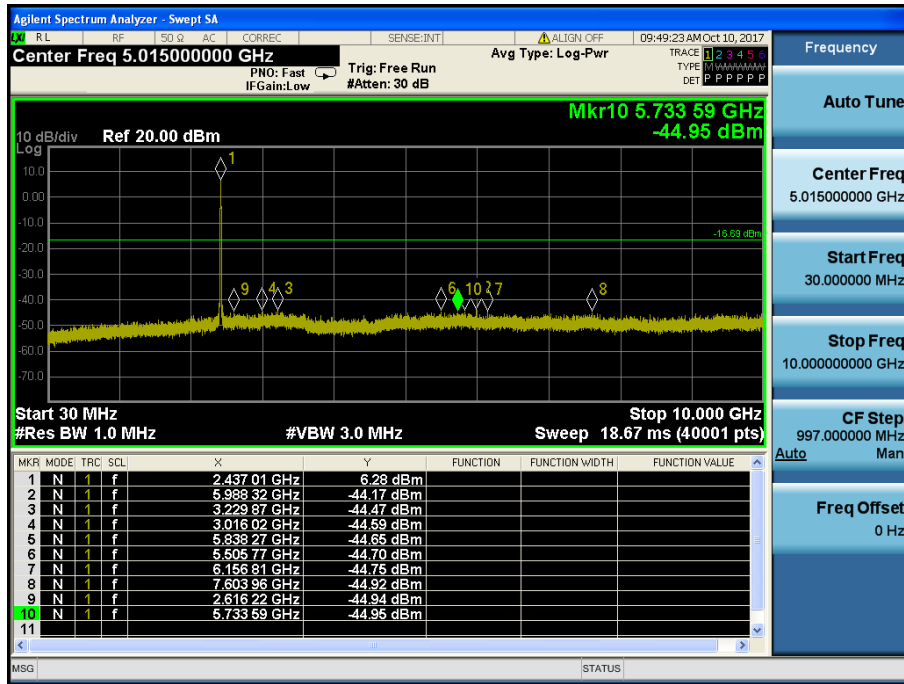
TM 1 & ANT 2 & Middle  
Reference



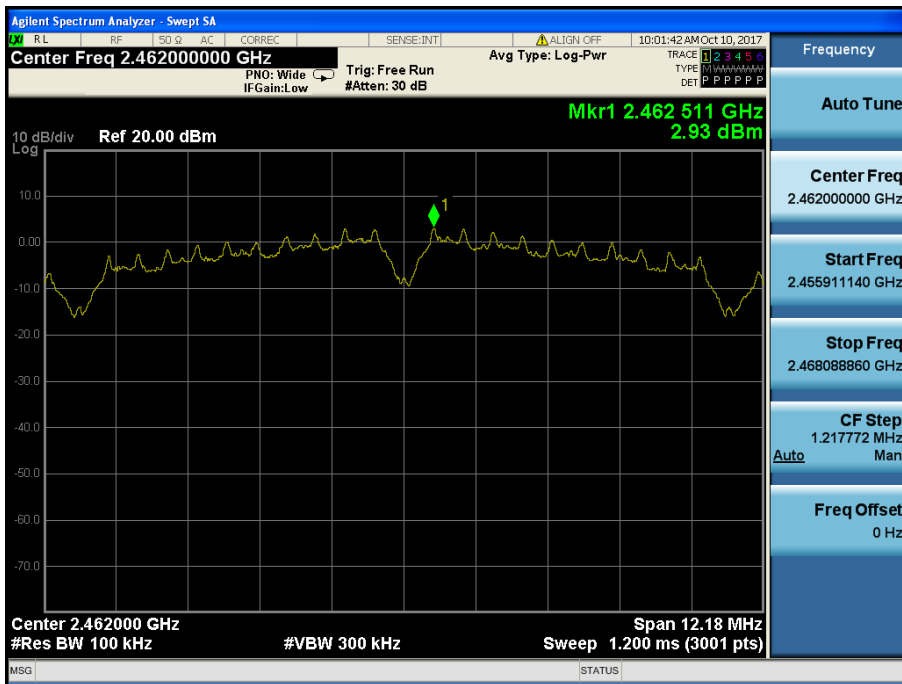
Conducted Spurious Emissions



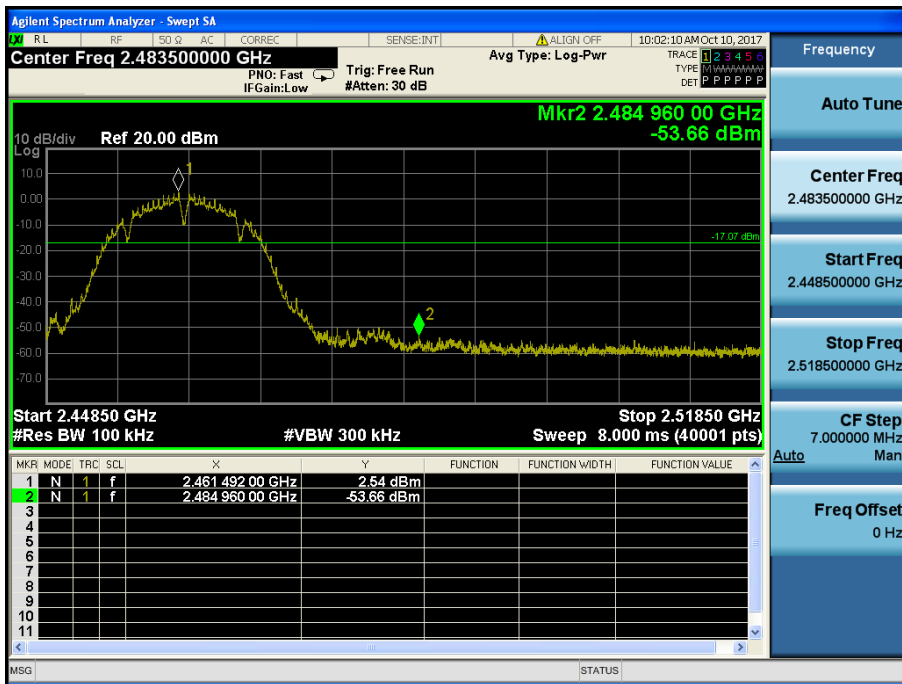
### Conducted Spurious Emissions



TM 1 & ANT 2 & Highest  
Reference

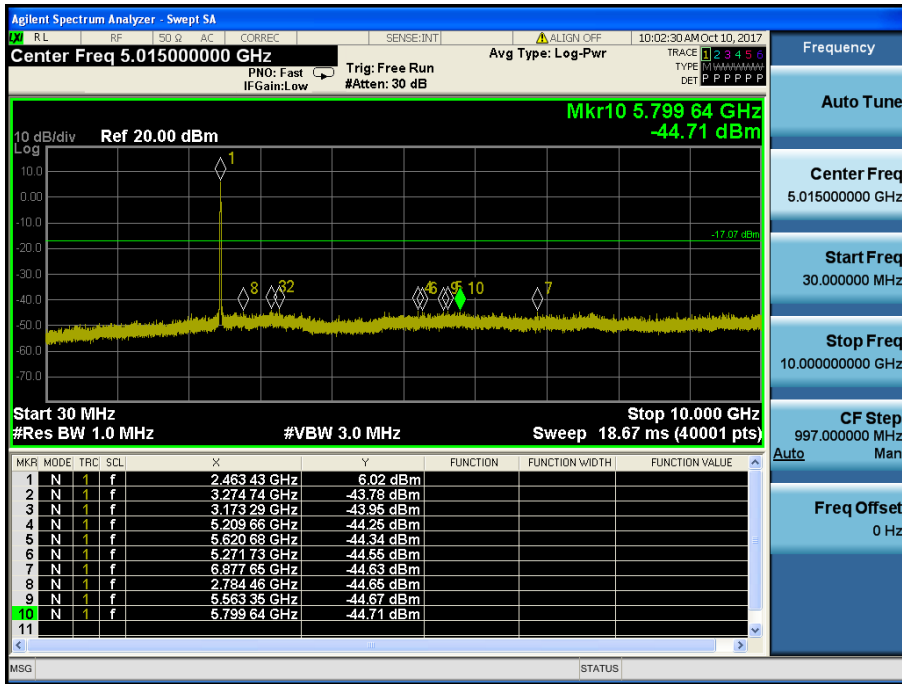
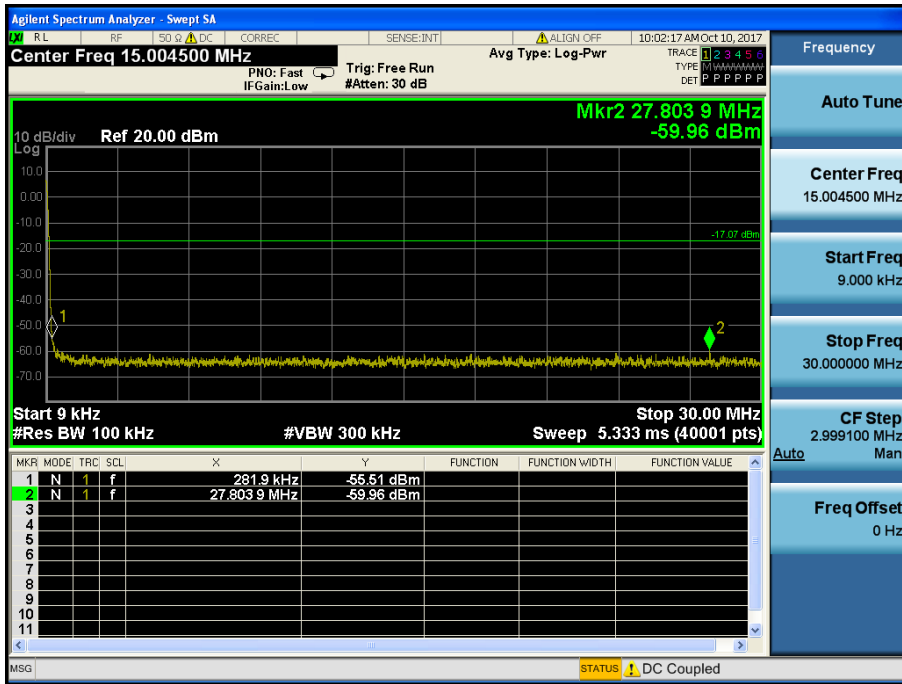


High Band-edge

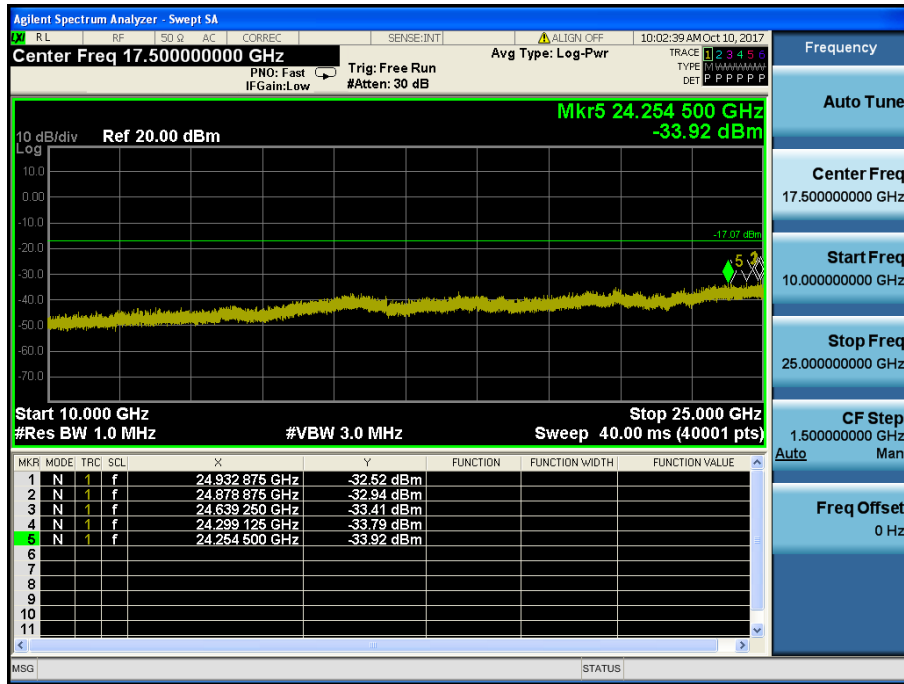




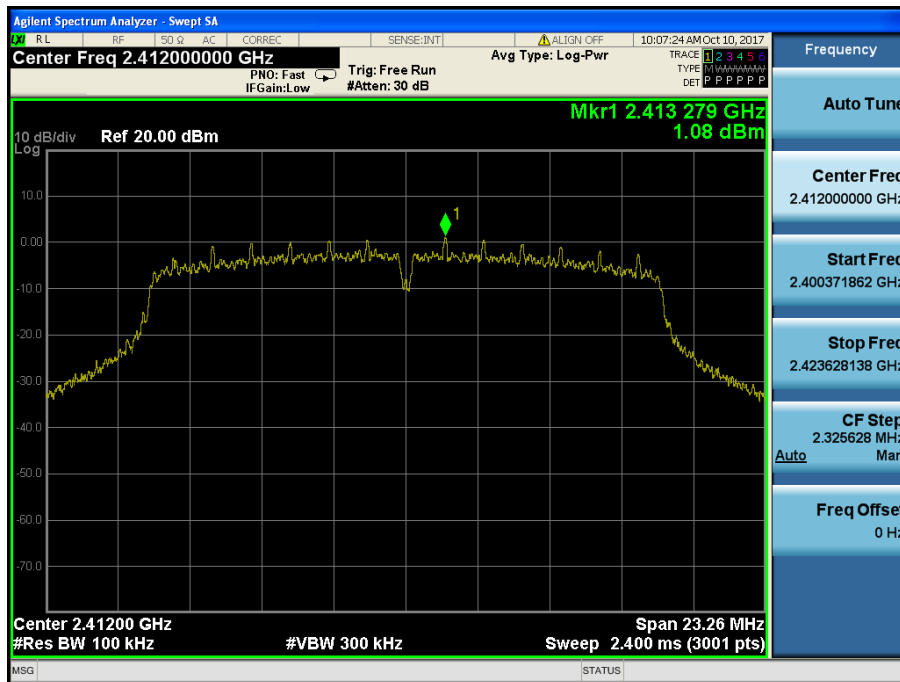
### Conducted Spurious Emissions



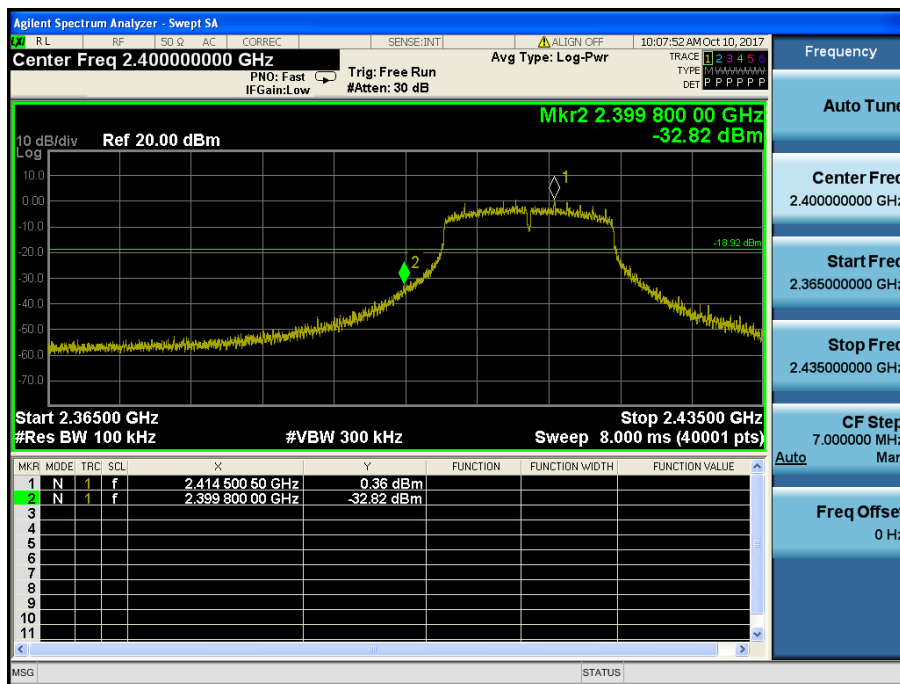
### Conducted Spurious Emissions



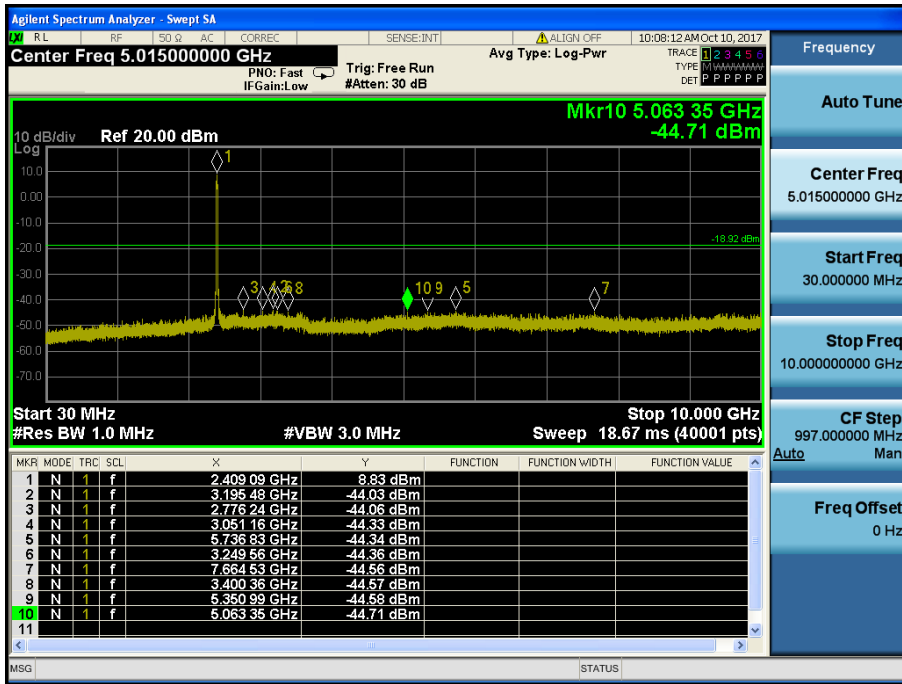
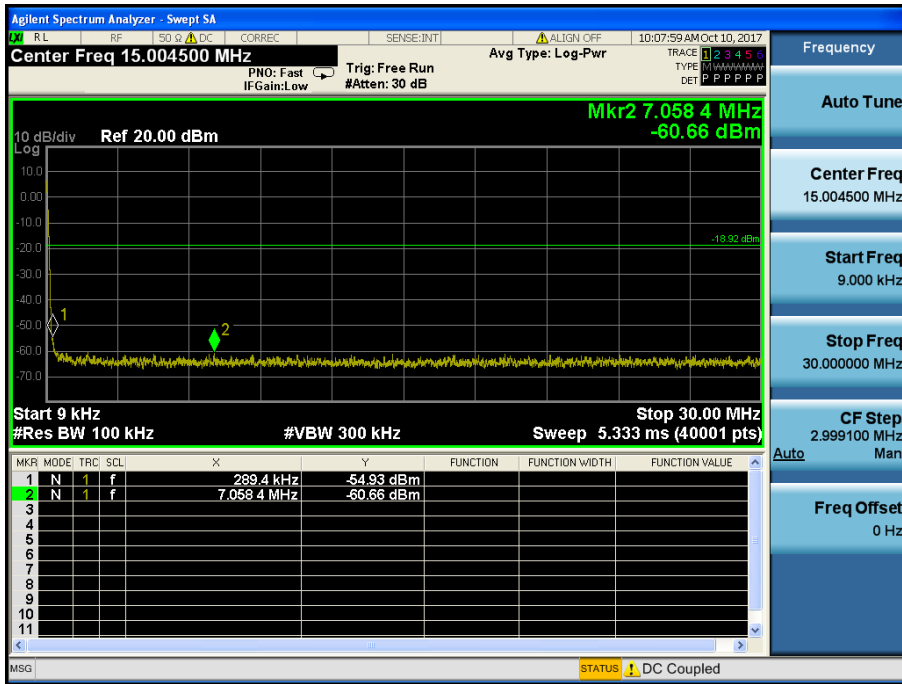
TM 2 & ANT 2 & Lowest  
Reference



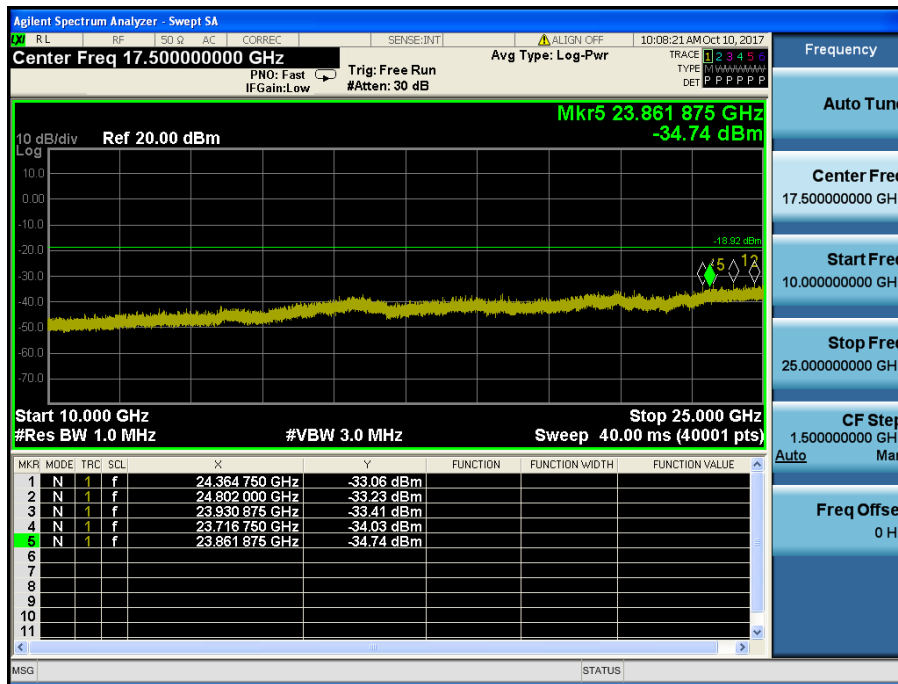
Low Band-edge



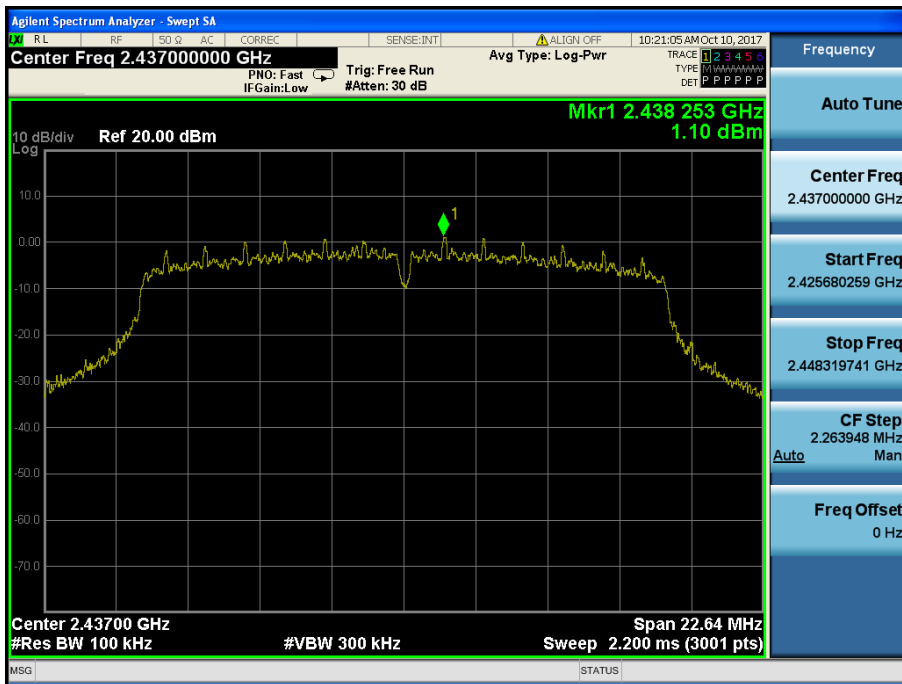
### Conducted Spurious Emissions



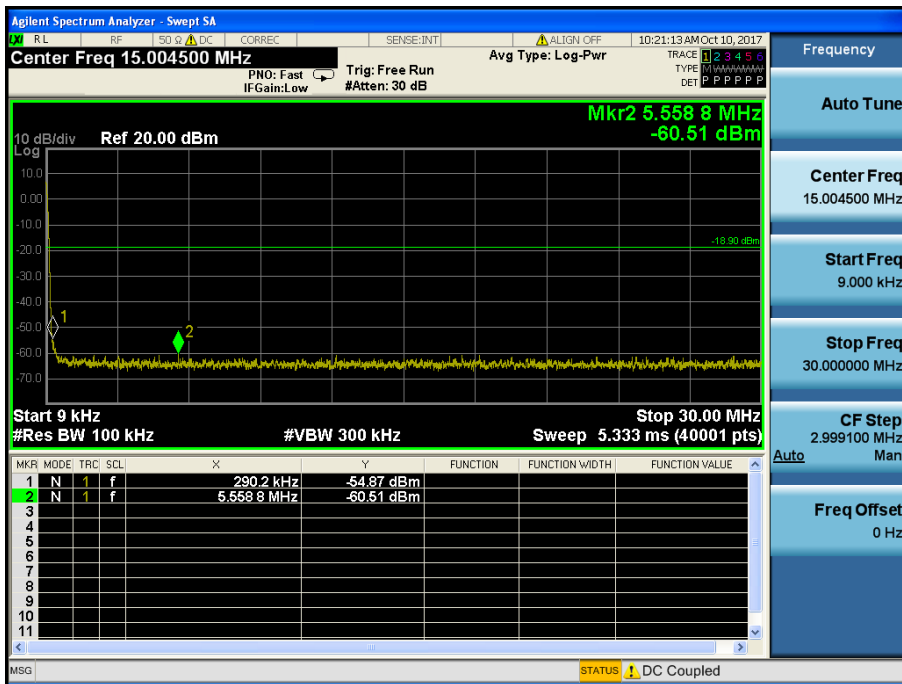
### Conducted Spurious Emissions



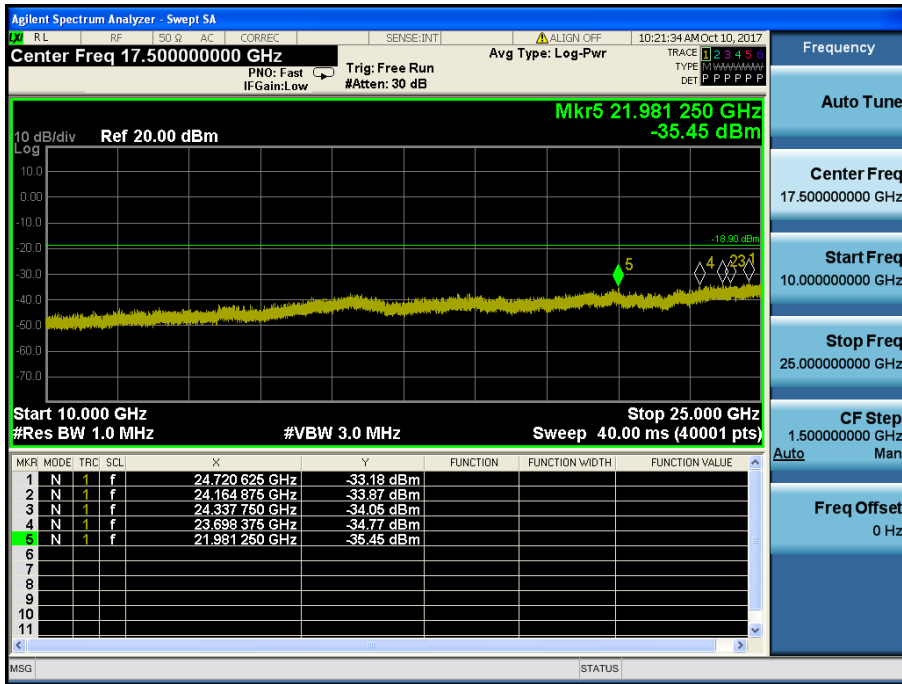
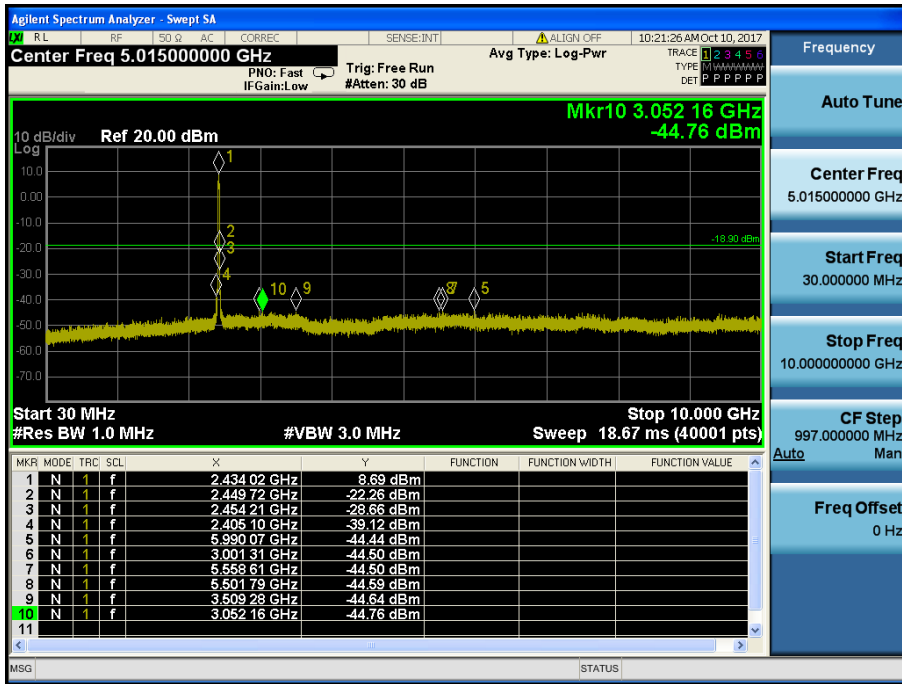
TM 2 & ANT 2 & Middle  
Reference



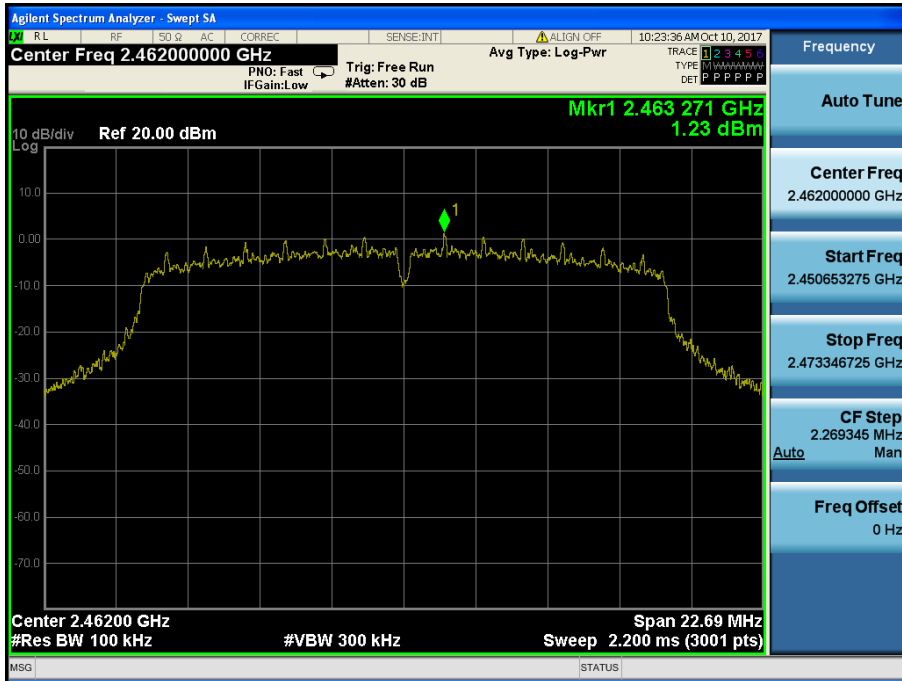
Conducted Spurious Emissions



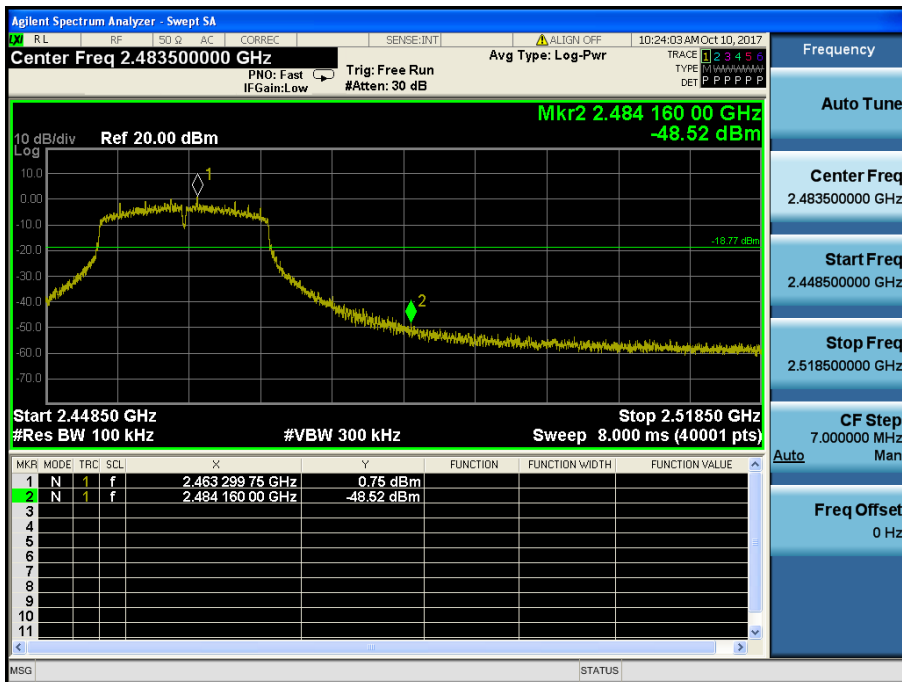
### Conducted Spurious Emissions



TM 2 & ANT 2 & Highest  
Reference

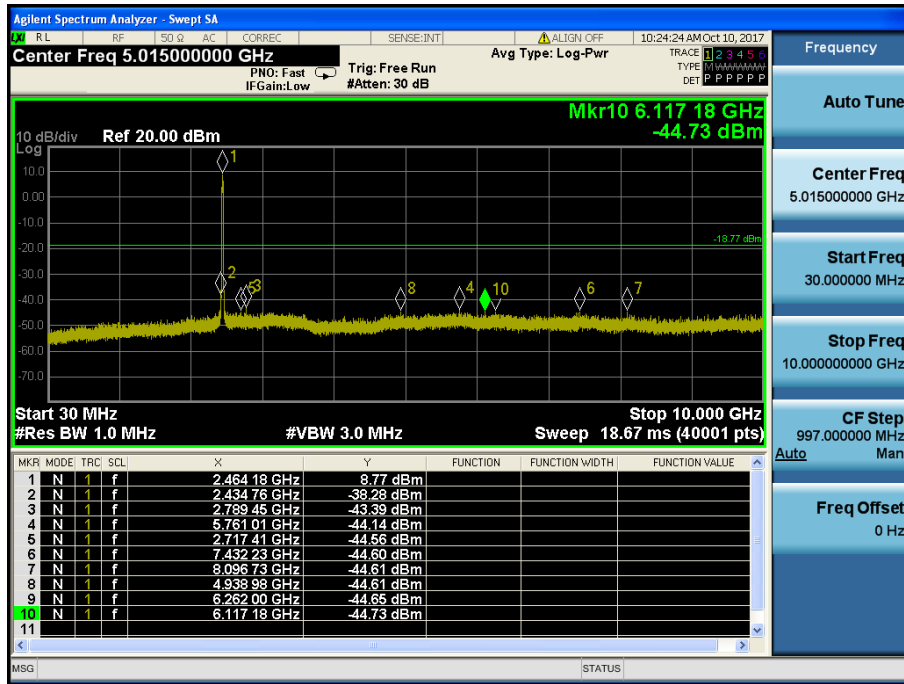
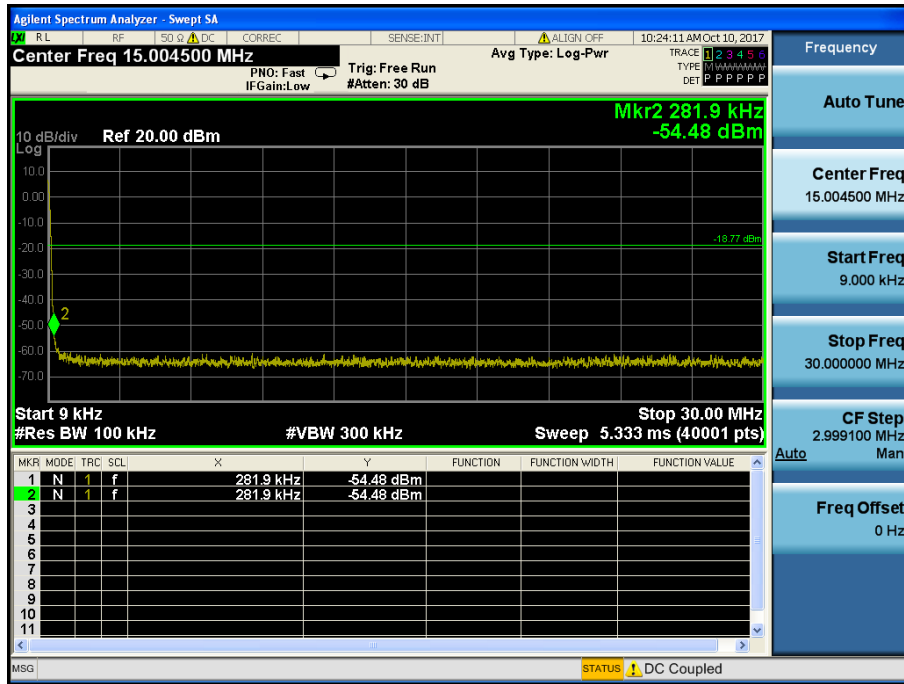


High Band-edge

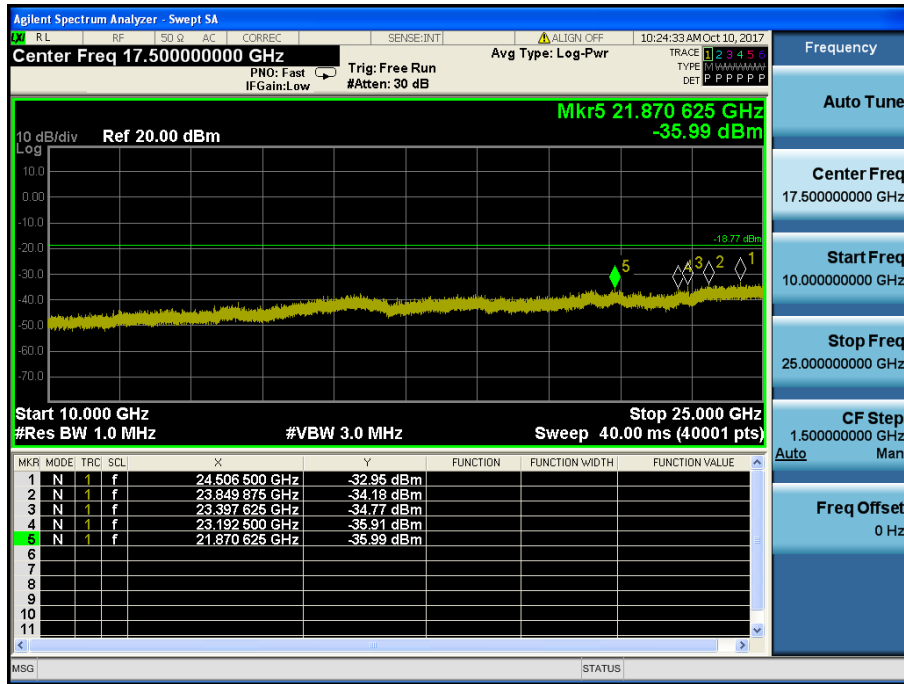




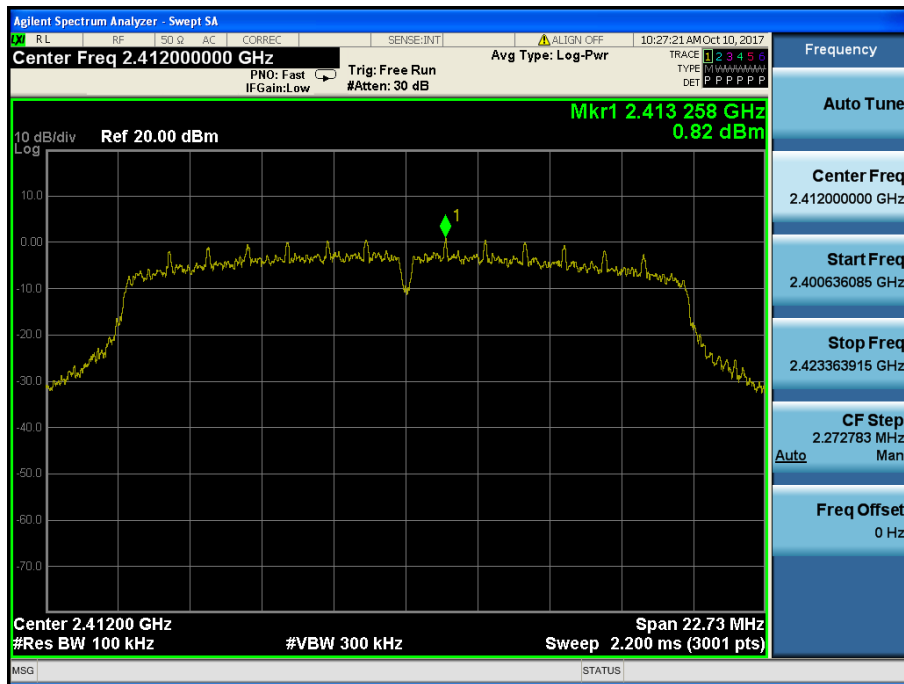
### Conducted Spurious Emissions



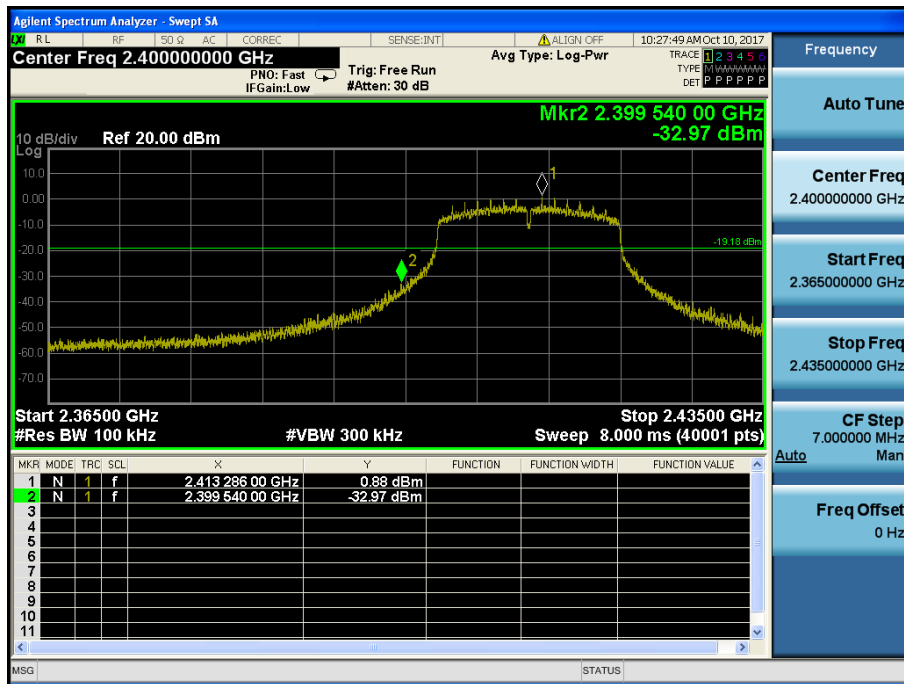
### Conducted Spurious Emissions



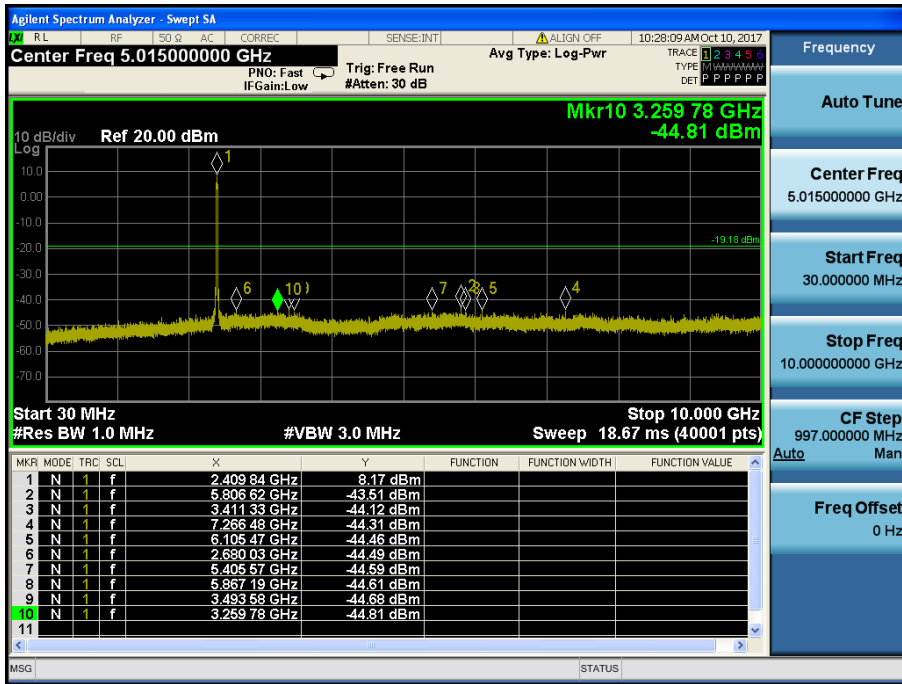
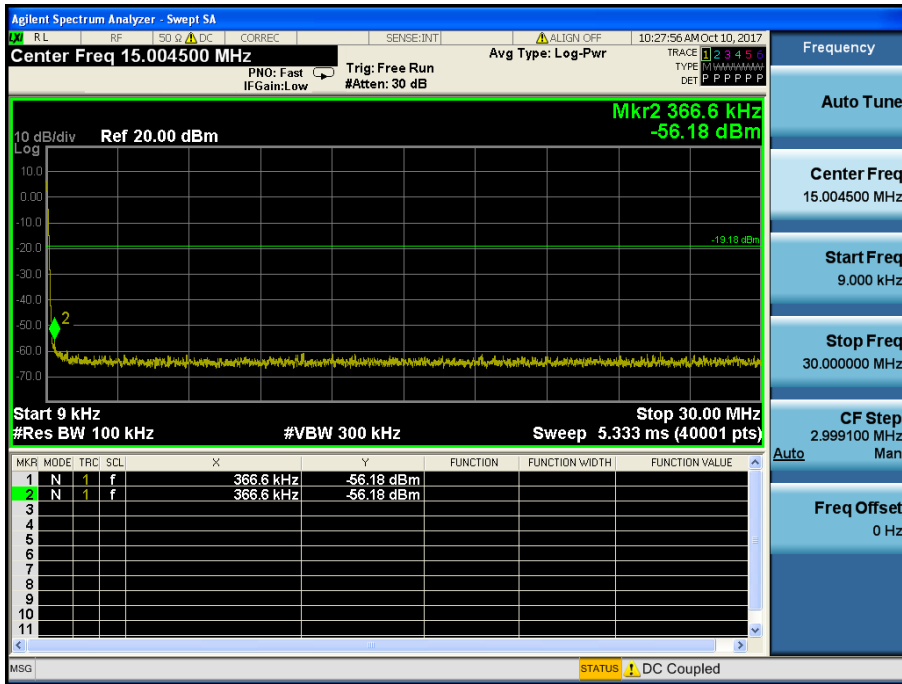
TM 3 & ANT 2 & Lowest  
Reference



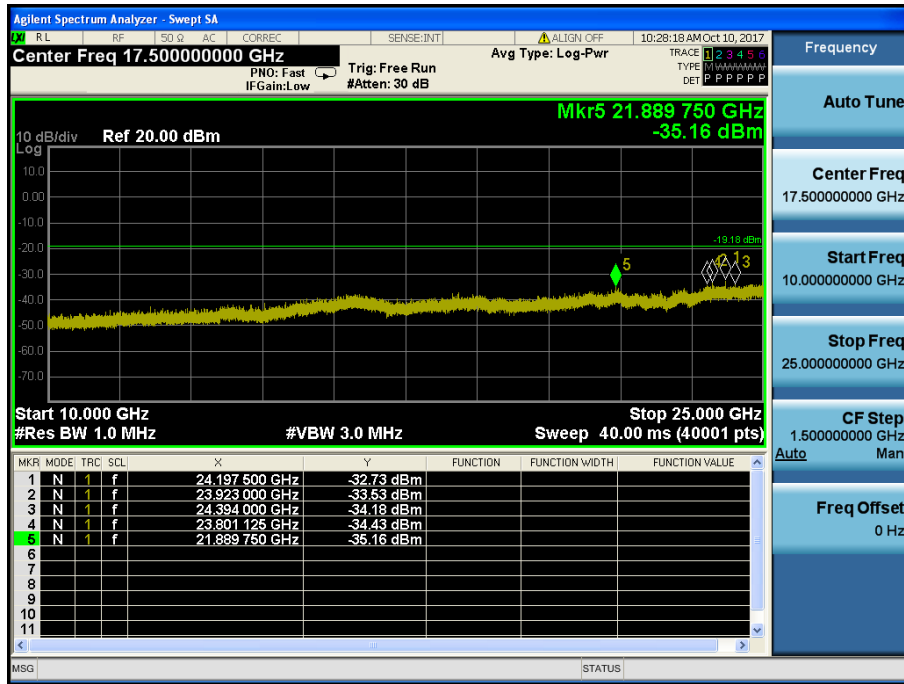
Low Band-edge



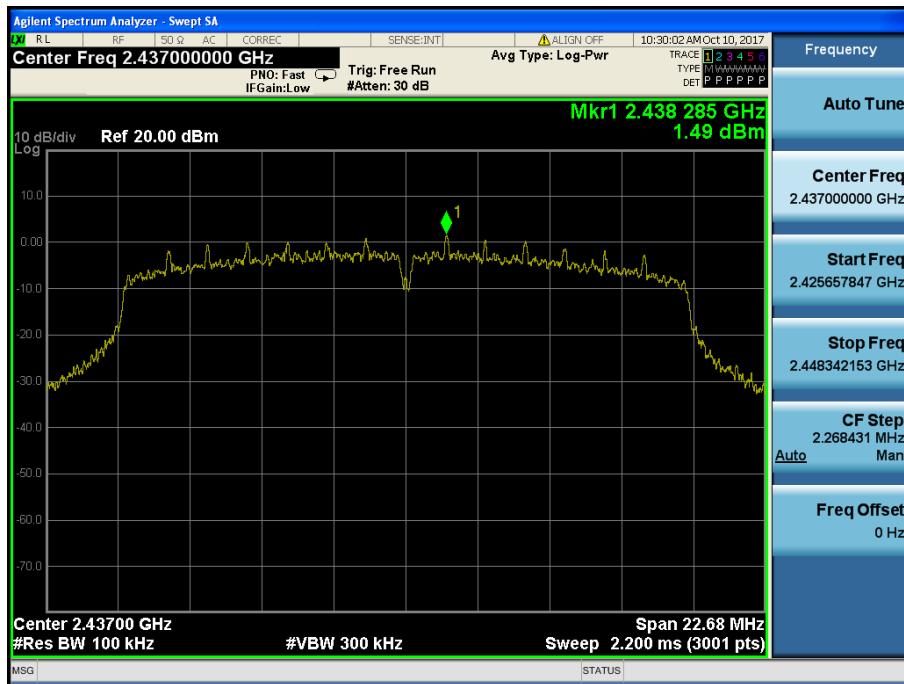
### Conducted Spurious Emissions



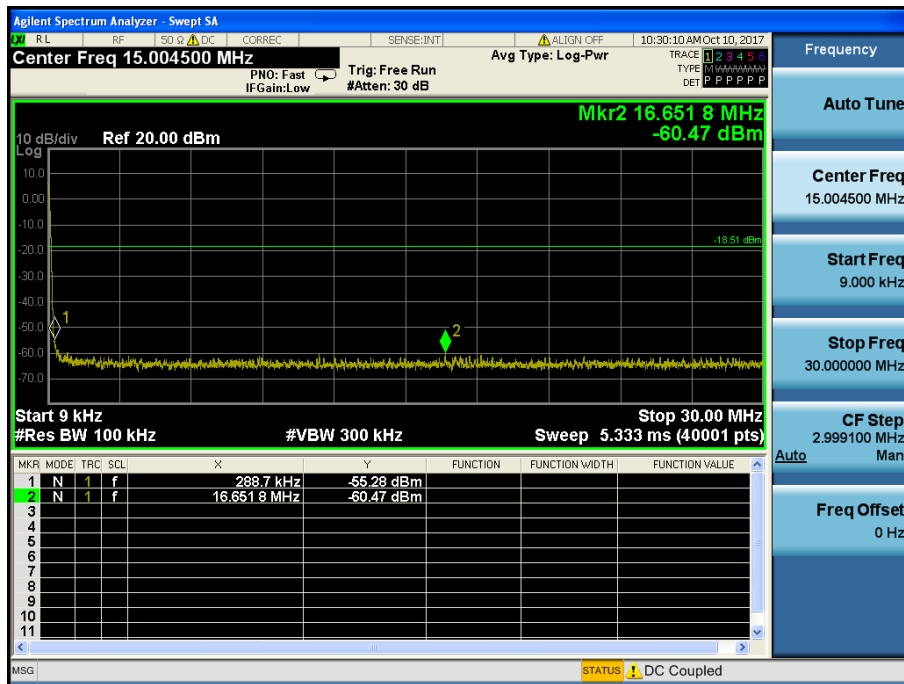
### Conducted Spurious Emissions



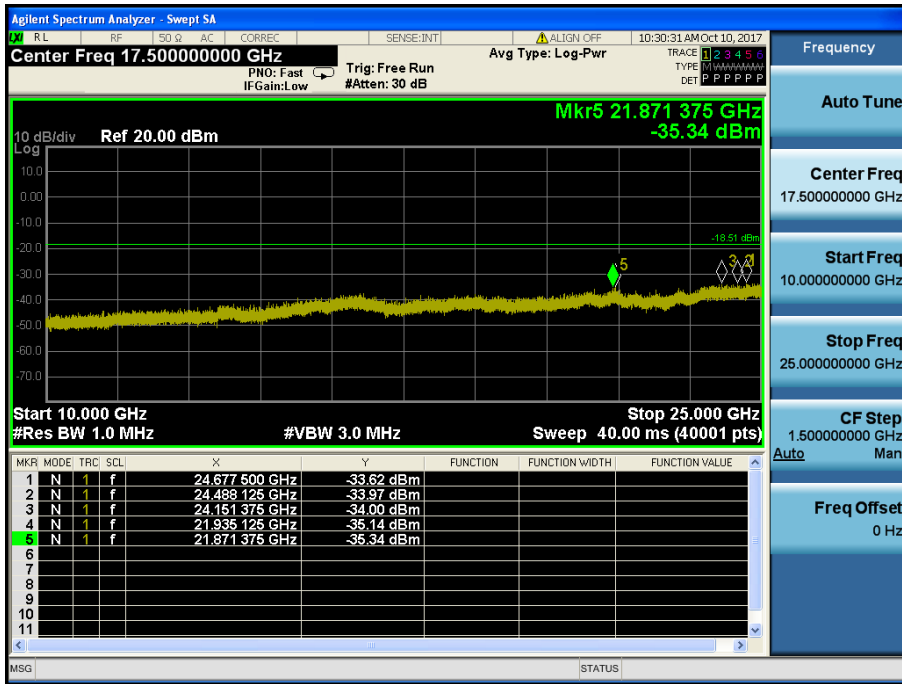
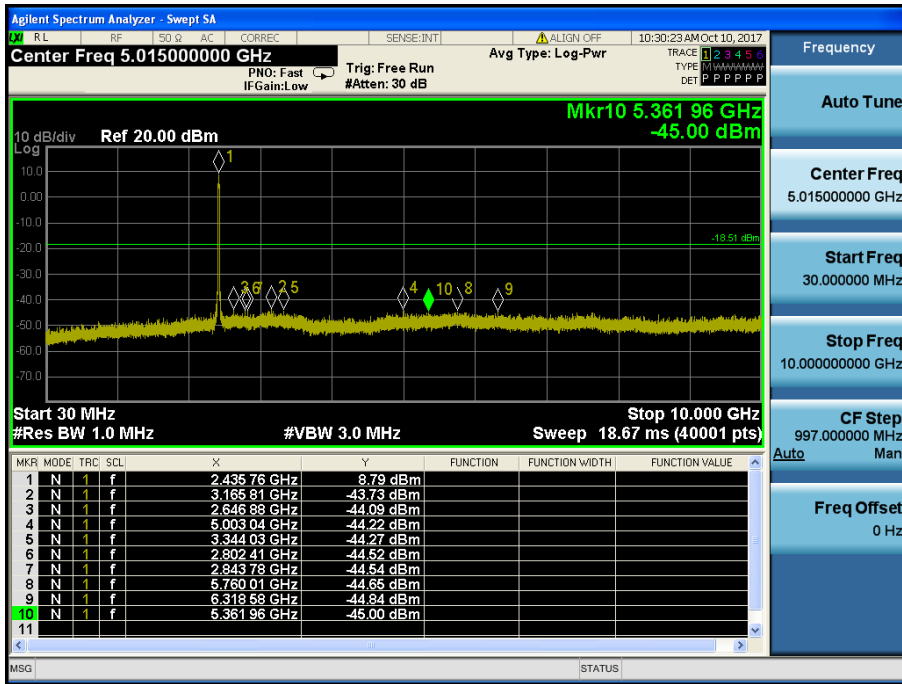
TM 3 & ANT 2 & Middle  
Reference



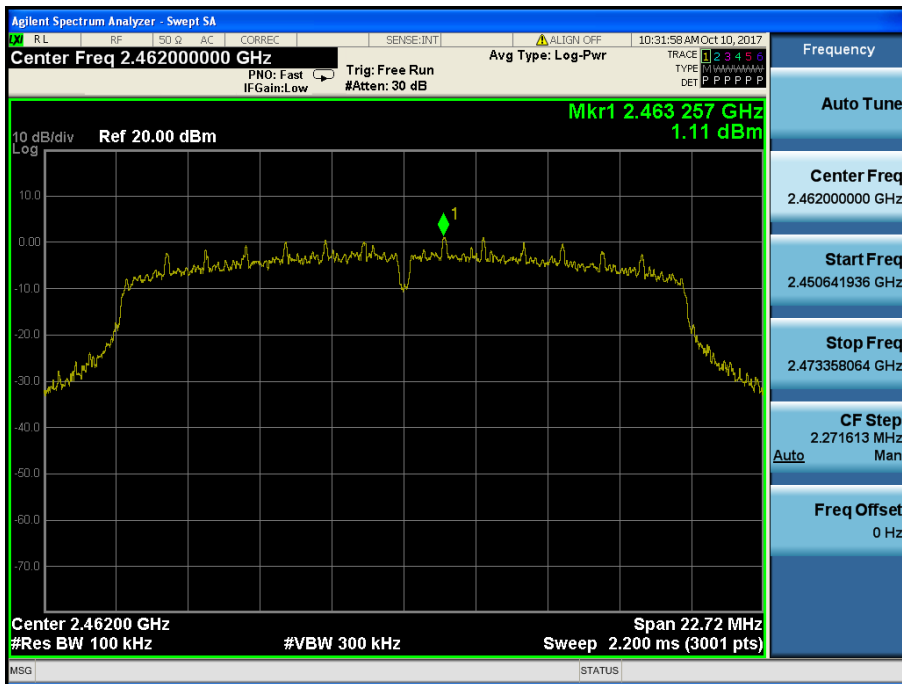
Conducted Spurious Emissions



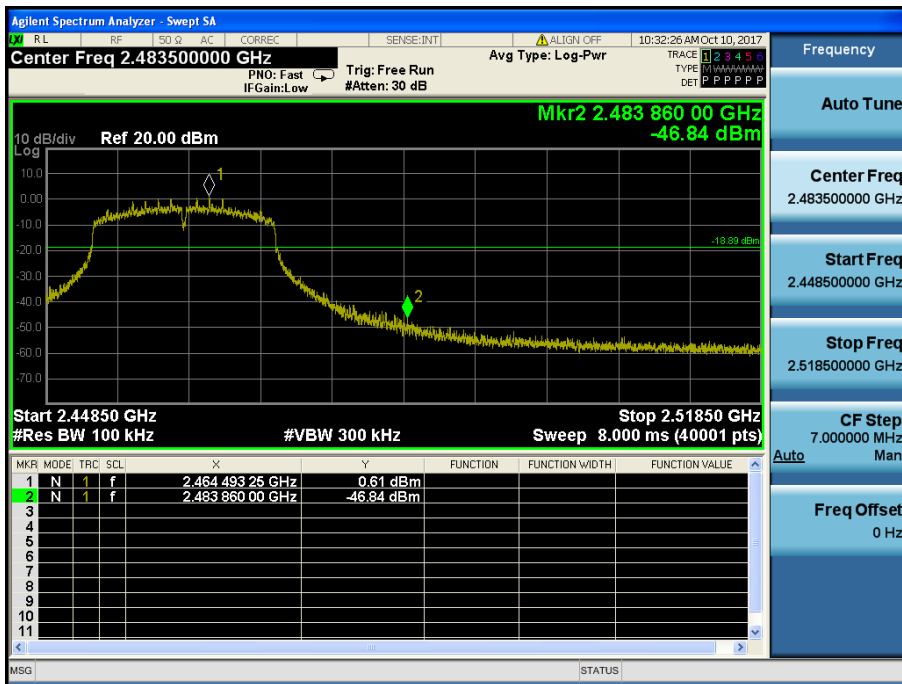
### Conducted Spurious Emissions



TM 3 & ANT 2 & Highest  
Reference

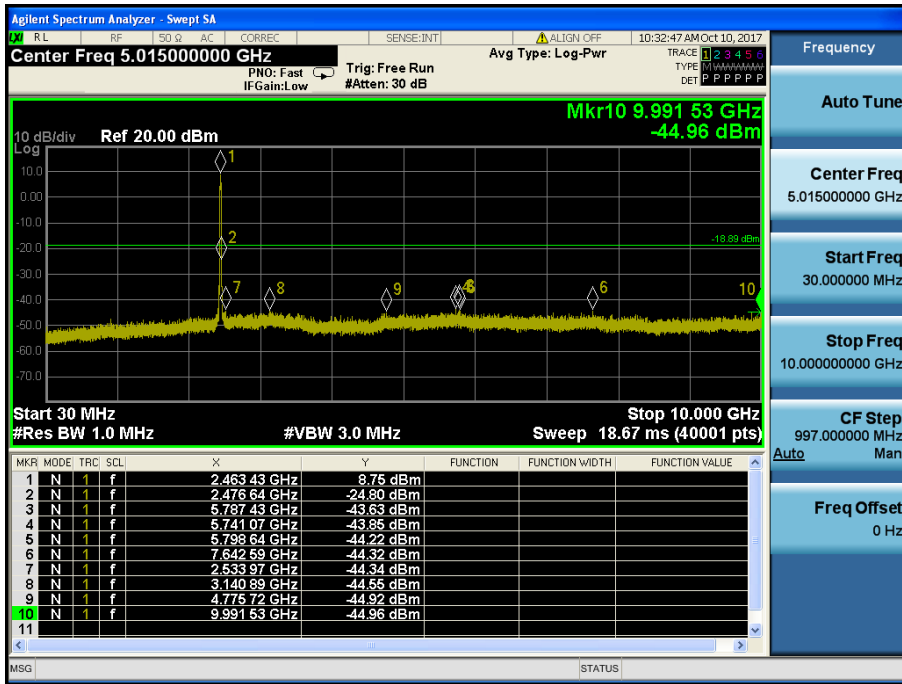
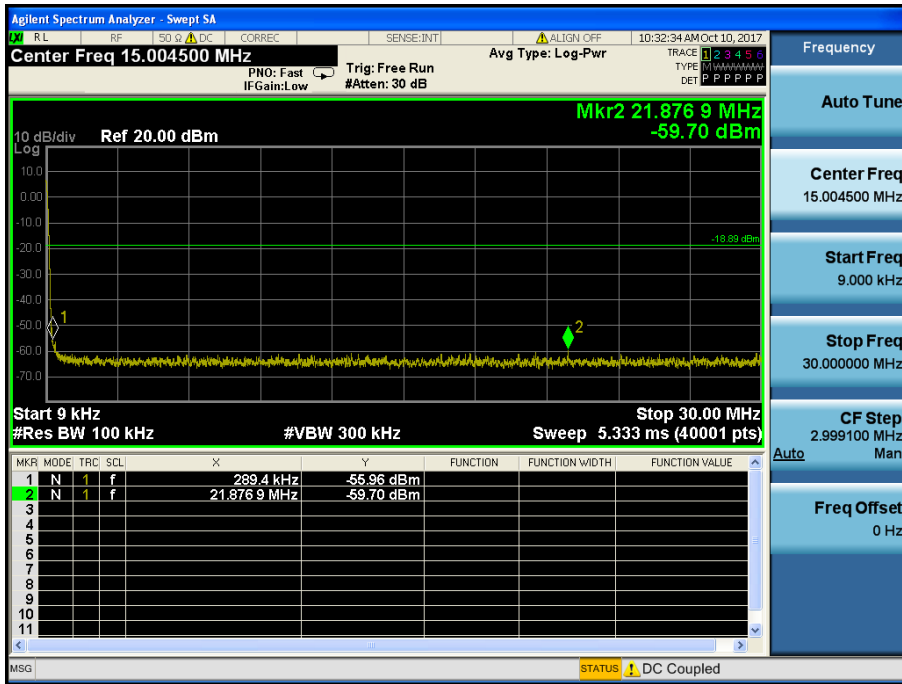


High Band-edge

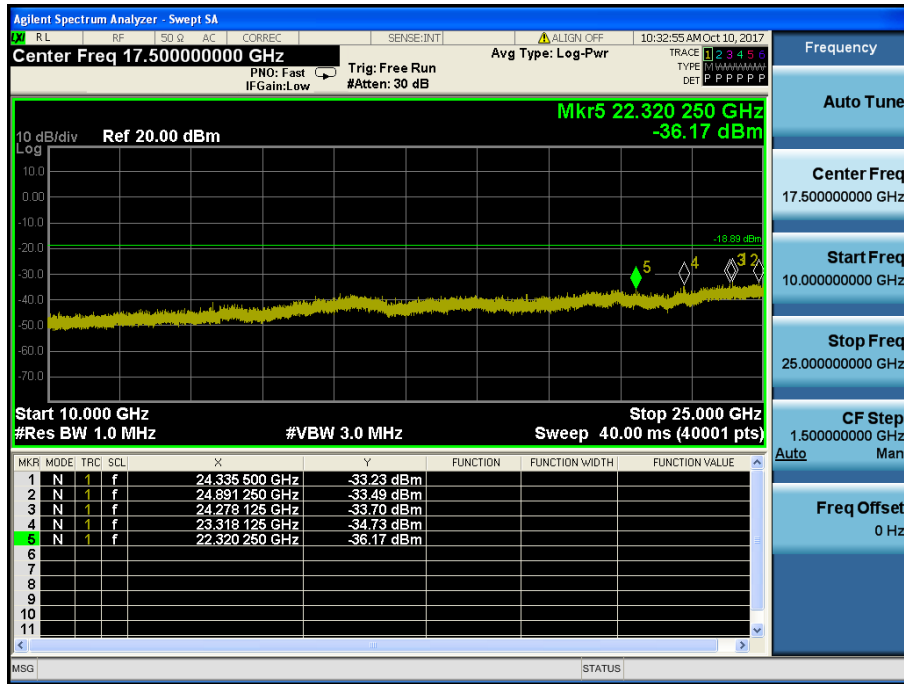




### Conducted Spurious Emissions



### Conducted Spurious Emissions



## 8.5 Radiated Spurious Emissions

### Test Requirements and limit,

#### §15.247(d), §15.205, §15.209

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed

#### • FCC Part 15.209(a) and (b)

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

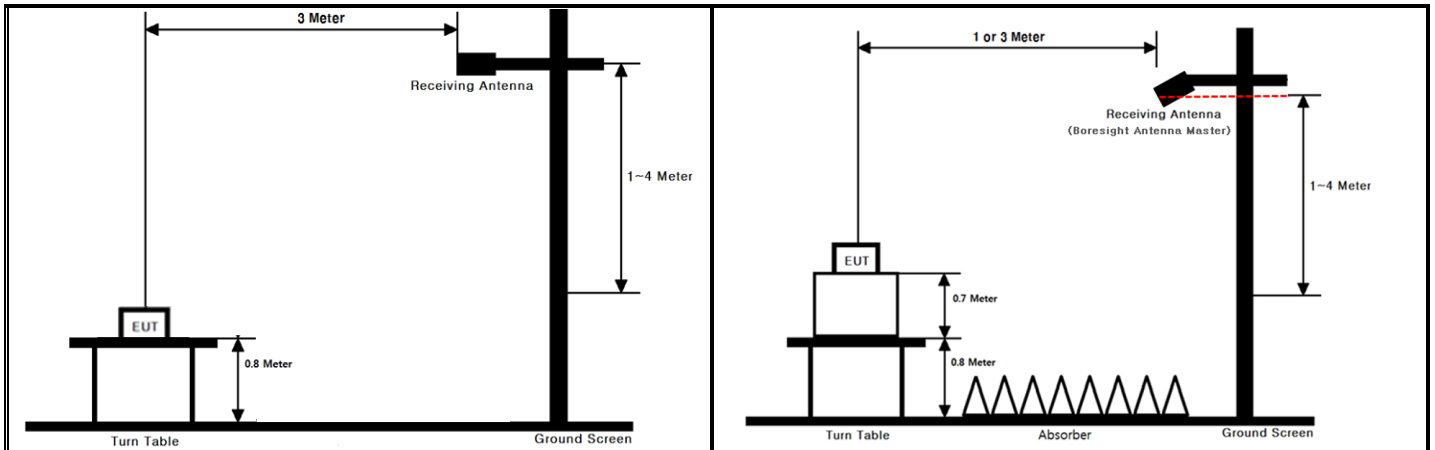
\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 - 72 MHz, 76 - 88 MHz, 174 - 216 MHz or 470 - 806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

| MHz               | MHz               | MHz               | MHz             | GHz          | GHz           |
|-------------------|-------------------|-------------------|-----------------|--------------|---------------|
| 0.009 ~ 0.110     | 8.41425 ~ 8.41475 | 108 ~ 121.94      | 1300 ~ 1427     | 4.5 ~ 5.15   | 14.47 ~ 14.5  |
| 0.495 ~ 0.505     | 12.29 ~ 12.293    | 123 ~ 138         | 1435 ~ 1626.5   | 5.35 ~ 5.46  | 15.35 ~ 16.2  |
| 2.1735 ~ 2.1905   | 12.51975 ~        | 149.9 ~ 150.05    | 1645.5 ~ 1646.5 | 7.25 ~ 7.75  | 17.7 ~ 21.4   |
| 4.125 ~ 4.128     | 12.52025          | 156.52475 ~       | 1660 ~ 1710     | 8.025 ~ 8.5  | 22.01 ~ 23.12 |
| 4.17725 ~ 4.17775 | 12.57675 ~        | 156.52525         | 1718.8 ~ 1722.2 | 9.0 ~ 9.2    | 23.6 ~ 24.0   |
| 4.20725 ~ 4.20775 | 12.57725          | 156.7 ~ 156.9     | 2200 ~ 2300     | 9.3 ~ 9.5    | 31.2 ~ 31.8   |
| 6.215 ~ 6.218     | 13.36 ~ 13.41     | 162.0125 ~ 167.17 | 2310 ~ 2390     | 10.6 ~ 12.7  | 36.43 ~ 36.5  |
| 6.26775 ~ 6.26825 | 16.42 ~ 16.423    | 167.72 ~ 173.2    | 2483.5 ~ 2500   | 13.25 ~ 13.4 | Above 38.6    |
| 6.31175 ~ 6.31225 | 16.69475 ~        | 240 ~ 285         | 2655 ~ 2900     |              |               |
| 8.291 ~ 8.294     | 16.69525          | 322 ~ 335.4       | 3260 ~ 3267     |              |               |
| 8.362 ~ 8.366     | 16.80425 ~        | 399.90 ~ 410      | 3332 ~ 3339     |              |               |
| 8.37625 ~ 8.38675 | 16.80475          | 608 ~ 614         | 3345.8 ~ 3358   |              |               |
|                   | 25.5 ~ 25.67      | 960 ~ 1240        | 3600 ~ 4400     |              |               |
|                   | 37.5 ~ 38.25      |                   |                 |              |               |
|                   | 73 ~ 74.6         |                   |                 |              |               |
|                   | 74.8 ~ 75.2       |                   |                 |              |               |

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

■ **Test Configuration**



■ **Test Procedure**

1. The EUT is placed on a non-conductive table, emission measurements at below 1 GHz, the table height is 80 cm and above 1 GHz, the table height is 1.5 m.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 or 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

## ■ Measurement Instrument Setting for Radiated Emission Measurements.

The radiated emission was tested according to the section 6.3, 6.4, 6.5 and 6.6 of the ANSI C63.10-2013 with following settings.

### Peak Measurement

RBW = As specified in below table, VBW  $\geq 3 \times$  RBW, Sweep = Auto, Detector = Peak, Trace mode = Max Hold until the trace stabilizes.

| Frequency   | RBW         |
|-------------|-------------|
| 9-150 kHz   | 200-300 Hz  |
| 0.15-30 MHz | 9-10 kHz    |
| 30-1000 MHz | 100-120 kHz |
| > 1000 MHz  | 1 MHz       |

### Average Measurement:

1. RBW = 1 MHz (unless otherwise specified).
2. VBW  $\geq 3 \times$  RBW.
3. Detector = RMS (Number of points  $\geq 2 \times$  Span / RBW)
4. Averaging type = power. (i.e., RMS)
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.
7. A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
  - 1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is  $10 \log(1/x)$ , where x is the duty cycle.
  - 2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is  $20 \log(1/x)$ , where x is the duty cycle.
  - 3) If a specific emission is demonstrated to be continuous ( $\geq 98$  percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

### Duty Cycle Correction factor

<ANT 1>

| Test Mode | Date rate | Duty Cycle (%) | Duty Cycle Correction Factor (dB) |
|-----------|-----------|----------------|-----------------------------------|
| TM 1      | 1 Mbps    | 99.53          | 0.02                              |
| TM 2      | 6 Mbps    | 95.52          | 0.20                              |
| TM 3      | MCS 0     | 96.28          | 0.16                              |

<ANT 2>

| Test Mode | Date rate | Duty Cycle (%) | Duty Cycle Correction Factor (dB) |
|-----------|-----------|----------------|-----------------------------------|
| TM 1      | 1 Mbps    | 99.53          | 0.02                              |
| TM 2      | 6 Mbps    | 96.52          | 0.15                              |
| TM 3      | MCS 0     | 95.93          | 0.18                              |

Note: Please refer to the appendix I for duty cycle plots.

## ■ Test Results: **Comply**

Please refer to next page for data table and the appendix II for worst data plots.

9 kHz ~ 1 GHz Data

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | D.C.F (dB) | Distance Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|------------|----------------------|-----------------|----------------|-------------|
| 263.01          | H       | Y                   | QP            | 55.50          | -12.20     | N/A        | N/A                  | 43.30           | 46.00          | 2.70        |
| 408.01          | H       | Y                   | QP            | 50.30          | -7.10      | N/A        | N/A                  | 43.20           | 46.00          | 2.80        |
| 456.01          | H       | Y                   | QP            | 50.70          | -5.70      | N/A        | N/A                  | 45.00           | 46.00          | 1.00        |
| 503.97          | H       | Y                   | QP            | 46.20          | -4.30      | N/A        | N/A                  | 41.90           | 46.00          | 4.10        |
| 792.01          | H       | Y                   | QP            | 41.10          | 1.50       | N/A        | N/A                  | 42.60           | 46.00          | 3.40        |
| 840.05          | H       | Y                   | QP            | 41.80          | 2.90       | N/A        | N/A                  | 44.70           | 46.00          | 1.30        |
| -               | -       | -                   | -             | -              | -          | -          | -                    | -               | -              | -           |

1. Exploratory testing has been performed to determine the emissions characteristic of this device. And low channel of 802.11b & ANT2 mode was selected for final testing and reported.

2. Sample Calculation.

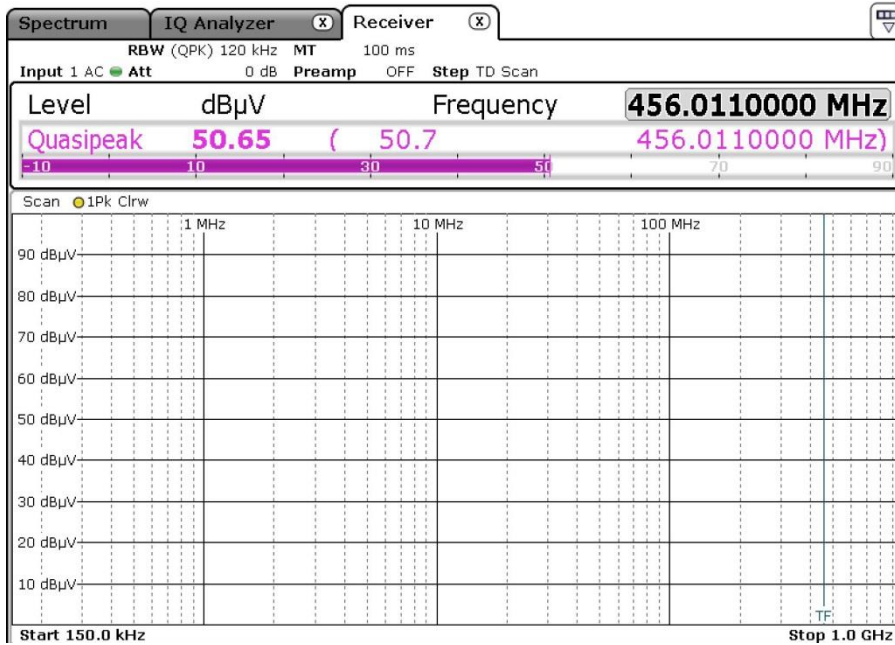
$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} + \text{D.C.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

Worst-case plot

802.11b & Lowest & Y & Hor

Detector Mode : QP



## 1 ~ 25 GHz Data (TM1 & ANT1)

### ▪ 2412 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2389.54         | H       | Y                   | PK            | 52.49          | 0.70       | N/A      | N/A                 | 53.19           | 74.00          | 20.81       |
| 2389.34         | H       | Y                   | AV            | 45.06          | 0.70       | 0.02     | N/A                 | 45.78           | 54.00          | 8.22        |
| 4823.72         | V       | X                   | PK            | 43.72          | 4.85       | N/A      | N/A                 | 48.57           | 74.00          | 25.43       |
| 4823.78         | V       | X                   | AV            | 34.14          | 4.86       | 0.02     | N/A                 | 39.02           | 54.00          | 14.98       |

### ▪ 2437 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 4874.24         | V       | X                   | PK            | 43.94          | 5.07       | N/A      | N/A                 | 49.01           | 74.00          | 24.99       |
| 4874.02         | V       | X                   | AV            | 34.30          | 5.07       | 0.02     | N/A                 | 39.39           | 54.00          | 14.61       |

### ▪ 2462 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2483.71         | H       | Y                   | PK            | 50.70          | 0.94       | N/A      | N/A                 | 51.64           | 74.00          | 22.36       |
| 2483.64         | H       | Y                   | AV            | 39.74          | 0.94       | 0.02     | N/A                 | 40.70           | 54.00          | 13.30       |
| 2488.22         | H       | Y                   | PK            | 50.78          | 0.97       | N/A      | N/A                 | 51.75           | 74.00          | 22.25       |
| 2488.21         | H       | Y                   | AV            | 42.00          | 0.97       | 0.02     | N/A                 | 42.99           | 54.00          | 11.01       |
| 4923.77         | V       | X                   | PK            | 44.27          | 5.23       | N/A      | N/A                 | 49.50           | 74.00          | 24.50       |
| 4923.86         | V       | X                   | AV            | 34.11          | 5.23       | 0.02     | N/A                 | 39.36           | 54.00          | 14.64       |

### Note.

- The radiated emissions were investigated up to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.
- Sample Calculation.  

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor(DCF) : - 9.54 dB =  $20 \cdot \log(1\text{m}/3\text{m})$

## 1 ~ 25 GHz Data (*TM2 & ANT1*)

### ▪ 2412 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2389.89         | H       | Z                   | PK            | 55.54          | 0.70       | N/A      | N/A                 | 56.24           | 74.00          | 17.76       |
| 2389.85         | H       | Z                   | AV            | 46.03          | 0.70       | 0.20     | N/A                 | 46.93           | 54.00          | 7.07        |
| 4822.60         | V       | X                   | PK            | 44.29          | 4.85       | N/A      | N/A                 | 49.14           | 74.00          | 24.86       |
| 4822.60         | V       | X                   | AV            | 32.79          | 4.85       | 0.20     | N/A                 | 37.84           | 54.00          | 16.16       |

### ▪ 2437 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 4872.87         | V       | X                   | PK            | 42.91          | 5.07       | N/A      | N/A                 | 47.98           | 74.00          | 26.02       |
| 4872.88         | V       | X                   | AV            | 32.29          | 5.07       | 0.20     | N/A                 | 37.56           | 54.00          | 16.44       |

### ▪ 2462 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2483.87         | H       | Z                   | PK            | 56.96          | 0.94       | N/A      | N/A                 | 57.90           | 74.00          | 16.10       |
| 2483.71         | H       | Z                   | AV            | 45.45          | 0.94       | 0.20     | N/A                 | 46.59           | 54.00          | 7.41        |
| 4925.26         | V       | X                   | PK            | 43.82          | 5.24       | N/A      | N/A                 | 49.06           | 74.00          | 24.94       |
| 4925.32         | V       | X                   | AV            | 32.62          | 5.24       | 0.20     | N/A                 | 38.06           | 54.00          | 15.94       |

### Note.

- The radiated emissions were investigated up to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.
- Sample Calculation.  

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor(DCF) :  $-9.54 \text{ dB} = 20 \cdot \log(1\text{m}/3\text{m})$



## 1 ~ 25 GHz Data (*TM3 & ANT1*)

### ▪ 2412 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2389.38         | H       | Z                   | PK            | 58.19          | 0.70       | N/A      | N/A                 | 58.89           | 74.00          | 15.11       |
| 2389.41         | H       | Z                   | AV            | 46.52          | 0.70       | 0.16     | N/A                 | 47.38           | 54.00          | 6.62        |
| 4824.65         | V       | X                   | PK            | 43.41          | 4.86       | N/A      | N/A                 | 48.27           | 74.00          | 25.73       |
| 4824.69         | V       | X                   | AV            | 32.21          | 4.86       | 0.16     | N/A                 | 37.23           | 54.00          | 16.77       |

### ▪ 2437 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 4875.32         | V       | X                   | PK            | 43.43          | 5.08       | N/A      | N/A                 | 48.51           | 74.00          | 25.49       |
| 4875.35         | V       | X                   | AV            | 32.45          | 5.08       | 0.16     | N/A                 | 37.69           | 54.00          | 16.31       |

### ▪ 2462 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2483.74         | H       | Z                   | PK            | 63.08          | 0.94       | N/A      | N/A                 | 64.02           | 74.00          | 9.98        |
| 2483.92         | H       | Z                   | AV            | 46.78          | 0.94       | 0.16     | N/A                 | 47.88           | 54.00          | 6.12        |
| 4924.46         | V       | X                   | PK            | 43.47          | 5.23       | N/A      | N/A                 | 48.70           | 74.00          | 25.30       |
| 4924.44         | V       | X                   | AV            | 32.71          | 5.23       | 0.16     | N/A                 | 38.10           | 54.00          | 15.90       |

### Note.

- The radiated emissions were investigated up to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.
- Sample Calculation.  

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor(DCF) : - 9.54 dB =  $20 \cdot \log(1\text{m}/3\text{m})$

## 1 ~ 25 GHz Data (TM 1 & ANT2)

### ▪ 2412 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2389.27         | H       | Y                   | PK            | 49.80          | 0.70       | N/A      | N/A                 | 50.50           | 74.00          | 23.50       |
| 2389.10         | H       | Y                   | AV            | 41.47          | 0.70       | 0.02     | N/A                 | 42.19           | 54.00          | 11.81       |
| 4823.87         | V       | X                   | PK            | 44.45          | 4.86       | N/A      | N/A                 | 49.31           | 74.00          | 24.69       |
| 4823.88         | V       | X                   | AV            | 34.49          | 4.86       | 0.02     | N/A                 | 39.37           | 54.00          | 14.63       |

### ▪ 2437 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 4874.41         | V       | X                   | PK            | 44.61          | 5.07       | N/A      | N/A                 | 49.68           | 74.00          | 24.32       |
| 4874.04         | V       | X                   | AV            | 35.94          | 5.07       | 0.02     | N/A                 | 41.03           | 54.00          | 12.97       |

### ▪ 2462 MHz

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2483.83         | H       | Y                   | PK            | 49.46          | 0.94       | N/A      | N/A                 | 50.40           | 74.00          | 23.60       |
| 2483.84         | H       | Y                   | AV            | 39.88          | 0.94       | 0.02     | N/A                 | 40.84           | 54.00          | 13.16       |
| 2488.65         | H       | Y                   | PK            | 51.64          | 0.98       | N/A      | N/A                 | 52.62           | 74.00          | 21.38       |
| 2488.57         | H       | Y                   | AV            | 43.16          | 0.98       | 0.02     | N/A                 | 44.16           | 54.00          | 9.84        |
| 4923.68         | V       | X                   | PK            | 45.63          | 5.23       | N/A      | N/A                 | 50.86           | 74.00          | 23.14       |
| 4924.10         | V       | X                   | AV            | 37.02          | 5.23       | 0.02     | N/A                 | 42.27           | 54.00          | 11.73       |

### Note.

- The radiated emissions were investigated up to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.
- Sample Calculation.  

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor(DCF) : - 9.54 dB =  $20 \cdot \log(1\text{m}/3\text{m})$

**1 ~ 25 GHz Data (TM 2 & ANT2)**
**▪ 2412 MHz**

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2389.34         | H       | Z                   | PK            | 51.82          | 0.70       | N/A      | N/A                 | 52.52           | 74.00          | 21.48       |
| 2389.49         | H       | Z                   | AV            | 41.68          | 0.70       | 0.15     | N/A                 | 42.53           | 54.00          | 11.47       |
| 4825.40         | V       | X                   | PK            | 44.07          | 4.86       | N/A      | N/A                 | 48.93           | 74.00          | 25.07       |
| 4825.40         | V       | X                   | AV            | 33.35          | 4.86       | 0.15     | N/A                 | 38.36           | 54.00          | 15.64       |

**▪ 2437 MHz**

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 4871.61         | V       | X                   | PK            | 43.79          | 5.06       | N/A      | N/A                 | 48.85           | 74.00          | 25.15       |
| 4871.62         | V       | X                   | AV            | 33.60          | 5.06       | 0.15     | N/A                 | 38.81           | 54.00          | 15.19       |

**▪ 2462 MHz**

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2483.61         | H       | Z                   | PK            | 58.07          | 0.94       | N/A      | N/A                 | 59.01           | 74.00          | 14.99       |
| 2483.53         | H       | Z                   | AV            | 45.61          | 0.94       | 0.15     | N/A                 | 46.70           | 54.00          | 7.30        |
| 4823.50         | V       | X                   | PK            | 44.74          | 5.23       | N/A      | N/A                 | 49.97           | 74.00          | 24.03       |
| 4823.52         | V       | X                   | AV            | 33.40          | 5.23       | 0.15     | N/A                 | 38.78           | 54.00          | 15.22       |

**Note.**

- The radiated emissions were investigated up to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.
- Sample Calculation.  

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} + \text{DCCF} + \text{DCF} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor(DCF) :  $-9.54 \text{ dB} = 20 \cdot \log(1\text{m}/3\text{m})$

**1 ~ 25 GHz Data (TM 3 & ANT2)**
**▪ 2412 MHz**

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2389.47         | H       | Z                   | PK            | 51.43          | 0.70       | N/A      | N/A                 | 52.13           | 74.00          | 21.87       |
| 2389.47         | H       | Z                   | AV            | 40.66          | 0.70       | 0.18     | N/A                 | 41.54           | 54.00          | 12.46       |
| 4820.85         | V       | X                   | PK            | 43.82          | 4.84       | N/A      | N/A                 | 48.66           | 74.00          | 25.34       |
| 4820.88         | V       | X                   | AV            | 33.26          | 4.84       | 0.18     | N/A                 | 38.28           | 54.00          | 15.72       |

**▪ 2437 MHz**

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 4876.00         | H       | Z                   | PK            | 44.50          | 5.08       | N/A      | N/A                 | 49.58           | 74.00          | 24.42       |
| 4875.98         | H       | Z                   | AV            | 32.79          | 5.08       | 0.18     | N/A                 | 38.05           | 54.00          | 15.95       |

**▪ 2462 MHz**

| Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCF (dB) | Distance Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|-----------------|---------|---------------------|---------------|----------------|------------|----------|---------------------|-----------------|----------------|-------------|
| 2484.02         | H       | Z                   | PK            | 60.66          | 0.94       | N/A      | N/A                 | 61.60           | 74.00          | 12.40       |
| 2483.95         | H       | Z                   | AV            | 45.41          | 0.94       | 0.18     | N/A                 | 46.53           | 54.00          | 7.47        |
| 4922.53         | V       | X                   | PK            | 44.71          | 5.23       | N/A      | N/A                 | 49.94           | 74.00          | 24.06       |
| 4922.52         | V       | X                   | AV            | 33.04          | 5.23       | 0.18     | N/A                 | 38.45           | 54.00          | 15.55       |

**Note.**

- The radiated emissions were investigated up to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.
- Sample Calculation.  
 $Margin = Limit - Result$  /  $Result = Reading + T.F + DCCF + DCF$  /  $T.F = AF + CL - AG$   
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
 DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.  
 Therefore Distance Correction Factor(DCF) : - 9.54 dB =  $20 \cdot \log(1m/3m)$

## 8.6 Power-line conducted emissions

### Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network(LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

| Frequency Range (MHz) | Conducted Limit (dBuV) |            |
|-----------------------|------------------------|------------|
|                       | Quasi-Peak             | Average    |
| 0.15 ~ 0.5            | 66 to 56 *             | 56 to 46 * |
| 0.5 ~ 5               | 56                     | 46         |
| 5 ~ 30                | 60                     | 50         |

\* Decreases with the logarithm of the frequency

#### ■ TEST CONFIGURATION

See test photographs for the actual connections between EUT and support equipment.

#### ■ TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to the test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

#### ■ Test Results: **Comply**(Refer to next page.)

The worst data was reported.

RESULT PLOTS

AC Line Conducted Emissions (Graph)

TM 1 & ANT 2 & Lowest

AC Line Conducted Emission

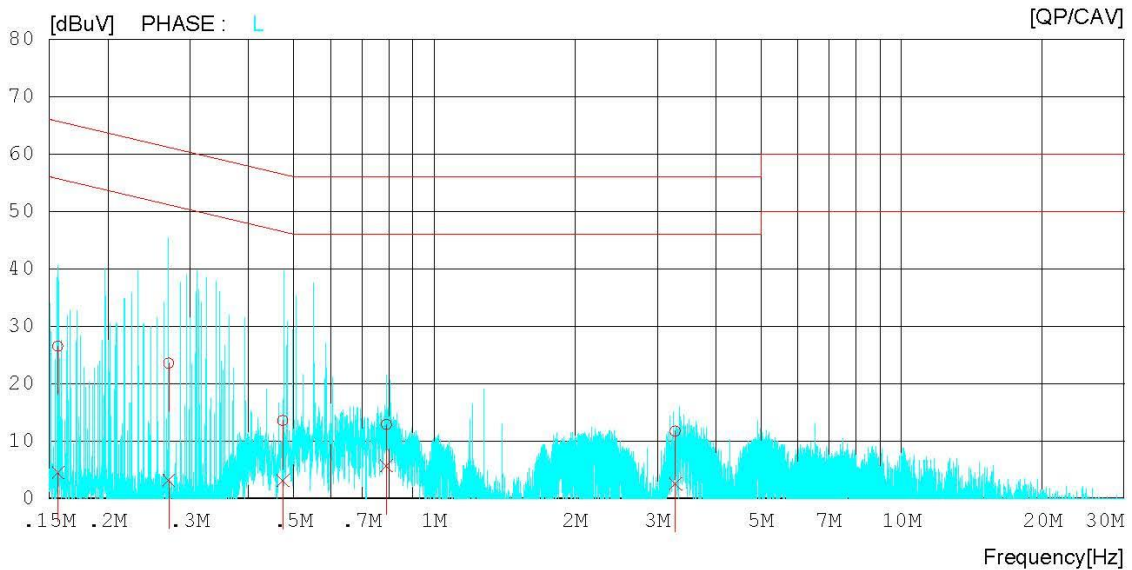
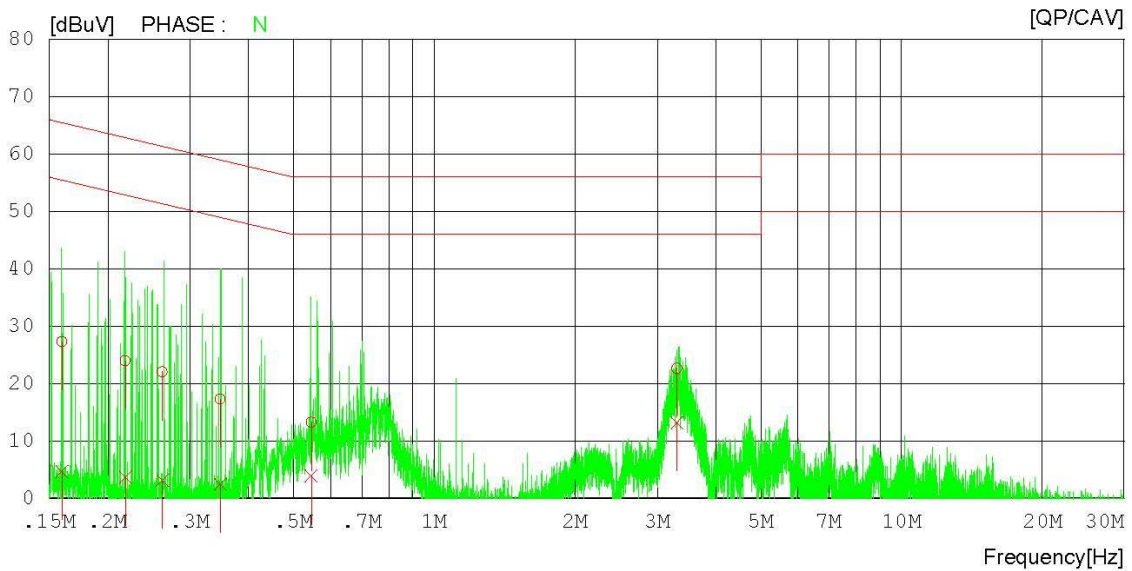
DT&C

Date 2017-10-11

Model AWAIROMN1  
Power Supply 110V/60Hz  
Temp/Humi/Atm 24/46  
Test Condition B

Note

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



**AC Line Conducted Emissions (List)**

TM 1 &amp; ANT 2 &amp; Lowest

## AC Line Conducted Emission

DT&amp;C

Date 2017-10-11

|                |            |
|----------------|------------|
| Model          | AWAIROMNI1 |
| Power Supply   | 110V/60Hz  |
| Temp/Humi/Atm  | 24/46      |
| Test Condition | B          |

Note

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

| NO | FREQ<br>[MHz] | READING      |               | C.FACTOR<br>[dB] | RESULT       |               | LIMIT        |               | MARGIN |       | PHASE |
|----|---------------|--------------|---------------|------------------|--------------|---------------|--------------|---------------|--------|-------|-------|
|    |               | QP<br>[dBuV] | CAV<br>[dBuV] |                  | QP<br>[dBuV] | CAV<br>[dBuV] | QP<br>[dBuV] | CAV<br>[dBuV] |        |       |       |
| 1  | 0.15954       | 27.19        | 4.62          | 0.08             | 27.27        | 4.70          | 65.49        | 55.49         | 38.22  | 50.79 | N     |
| 2  | 0.21820       | 23.87        | 3.59          | 0.08             | 23.95        | 3.67          | 62.89        | 52.89         | 38.94  | 49.22 | N     |
| 3  | 0.26196       | 22.00        | 3.07          | 0.07             | 22.07        | 3.14          | 61.37        | 51.37         | 39.30  | 48.23 | N     |
| 4  | 0.34842       | 17.23        | 2.34          | 0.08             | 17.31        | 2.42          | 59.00        | 49.00         | 41.69  | 46.58 | N     |
| 5  | 0.54527       | 13.14        | 3.79          | 0.08             | 13.22        | 3.87          | 56.00        | 46.00         | 42.78  | 42.13 | N     |
| 6  | 3.30606       | 22.41        | 13.03         | 0.17             | 22.58        | 13.20         | 56.00        | 46.00         | 33.42  | 32.80 | N     |
| 7  | 0.15654       | 26.35        | 4.36          | 0.08             | 26.43        | 4.44          | 65.65        | 55.65         | 39.22  | 51.21 | L     |
| 8  | 0.27026       | 23.46        | 3.06          | 0.07             | 23.53        | 3.13          | 61.11        | 51.11         | 37.58  | 47.98 | L     |
| 9  | 0.47380       | 13.44        | 2.95          | 0.08             | 13.52        | 3.03          | 56.45        | 46.45         | 42.93  | 43.42 | L     |
| 10 | 0.79000       | 12.66        | 5.58          | 0.09             | 12.75        | 5.67          | 56.00        | 46.00         | 43.25  | 40.33 | L     |
| 11 | 3.28097       | 11.50        | 2.39          | 0.16             | 11.66        | 2.55          | 56.00        | 46.00         | 44.34  | 43.45 | L     |

## 8.7 Occupied Bandwidth

### Test Requirements, RSS-Gen [6.6]

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

#### ■ TEST CONFIGURATION

Refer to the APPENDIX I.

#### ■ TEST PROCEDURE

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

#### ■ TEST RESULTS: **NT**



## 7. LIST OF TEST EQUIPMENT

| Type                                | Manufacturer         | Model                       | Cal.Date<br>(yy/mm/dd) | Next.Cal.Date<br>(yy/mm/dd) | S/N                |
|-------------------------------------|----------------------|-----------------------------|------------------------|-----------------------------|--------------------|
| Spectrum Analyzer                   | Agilent Technologies | N9020A                      | 17/01/11               | 18/01/11                    | MY50200828         |
| Spectrum Analyzer                   | Agilent Technologies | N9020A                      | 17/09/05               | 18/09/05                    | MY46471251         |
| Multimeter                          | FLUKE                | 17B                         | 17/04/12               | 18/04/12                    | 26030065WS         |
| DC Power Supply                     | Agilent              | 66332A                      | 17/09/05               | 18/09/05                    | GB42110550         |
| Signal Generator                    | Rohde Schwarz        | SMBV100A                    | 17/01/04               | 18/01/04                    | 255571             |
| Signal Generator                    | Rohde Schwarz        | SMF100A                     | 17/04/21               | 18/04/21                    | 102341             |
| Thermohygrometer                    | BODYCOM              | BJ5478                      | 17/04/11               | 18/04/11                    | 120612-2           |
| 50W 10dB ATT                        | SMAJK                | SMAJK-50-10                 | 17/09/06               | 18/09/06                    | 2-50-10            |
| Loop Antenna                        | Schwarzbeck          | FMZB1513                    | 16/04/22               | 18/04/22                    | 1513-128           |
| BILOG ANTENNA                       | Schwarzbeck          | VULB 9160                   | 16/05/13               | 18/05/13                    | 3358               |
| Horn Antenna                        | ETS-LINDGREN         | 3117                        | 16/05/03               | 18/05/03                    | 00140394           |
| Horn Antenna                        | A.H.Systems Inc.     | SAS-574                     | 17/07/31               | 19/07/31                    | 155                |
| PreAmplifier                        | Agilent              | 8449B                       | 17/01/11               | 18/01/11                    | 3008A00370         |
| PreAmplifier                        | TSJ                  | MLA-010K01-B01-27           | 17/03/06               | 18/03/06                    | 1844539            |
| EMI Test Receiver                   | Rohde Schwarz        | ESR7                        | 17/02/16               | 18/02/16                    | 101061             |
| High-pass filter                    | Wainwright           | WHKX12-2580-3000-18000-80SS | 16/09/09<br>17/09/05   | 18/09/05                    | 3                  |
| High-pass filter                    | Wainwright           | WHNX6-6320-8000-26500-40CC  | 16/09/13<br>17/09/05   | 18/09/05                    | 1                  |
| Power Meter & Wide Bandwidth Sensor | Anritsu              | ML2496A<br>MA2411B          | 17/04/11               | 18/04/11                    | 1338004<br>1306053 |
| EMI Test Receiver                   | R&S                  | ESCI                        | 17/02/26               | 18/02/16                    | 100364             |
| SINGLE-PHASE MASTER                 | NF                   | 4420                        | 17/09/01               | 18/09/01                    | 3049354420023      |
| LISN                                | SCHWARZBECK          | NNLK 8121                   | 17/04/03               | 18/04/03                    | 06182              |

Note: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2006.

## APPENDIX I

### Duty cycle plots

■ TEST PROCEDURE

#### Duty Cycle measured using section 6.0 b) of KDB558074 D01V04

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

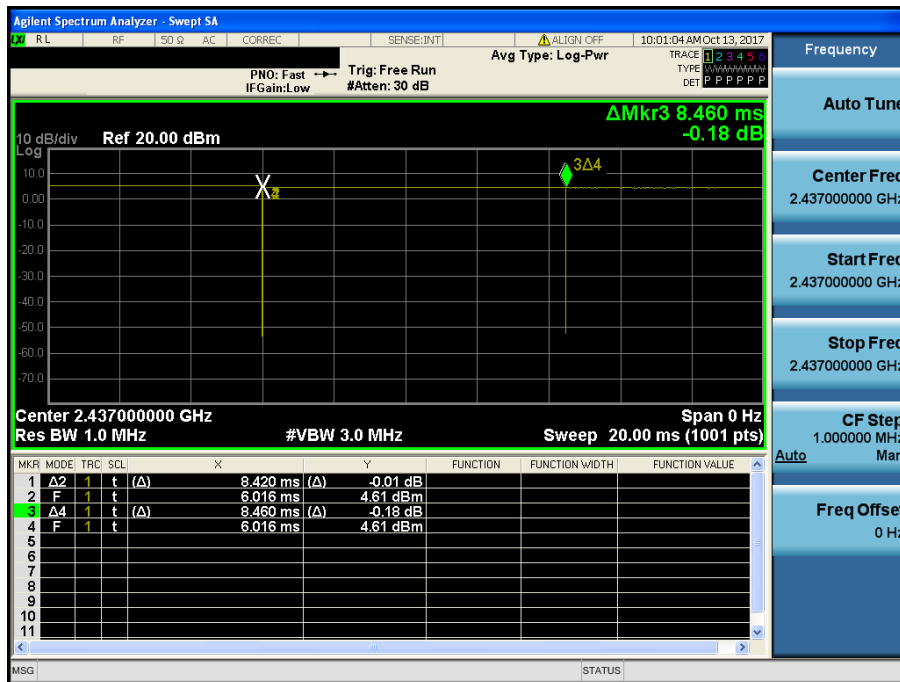
Set the center frequency of the instrument to the center frequency of the transmission. Set  $RBW \geq OBW$  if possible; otherwise, set RBW to the largest available value. Set  $VBW \geq RBW$ . Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are  $> 50/T$  and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if  $T \leq 16.7$  microseconds.)

### Test Plots :

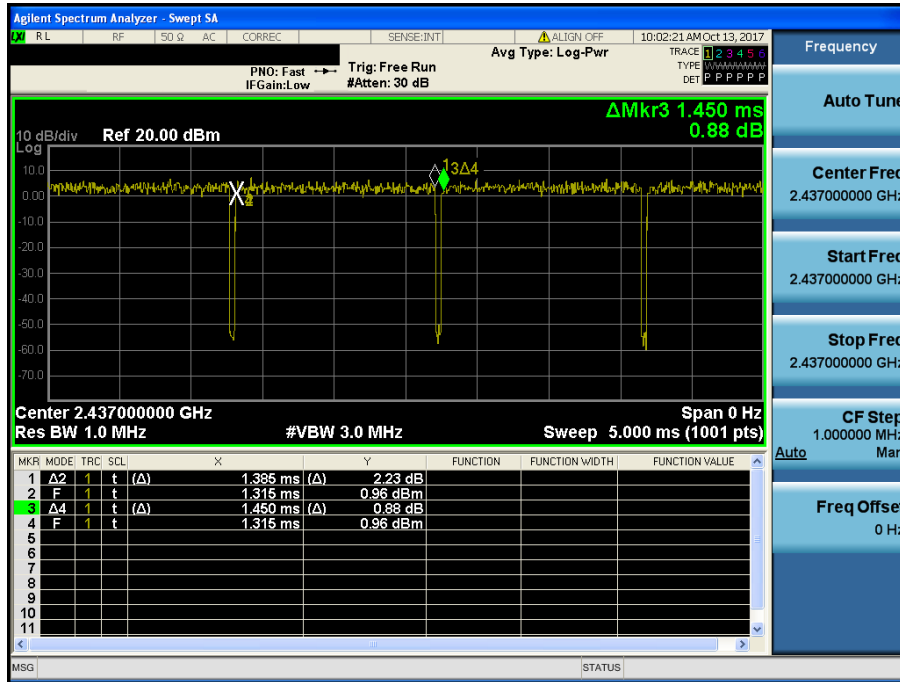
#### Duty Cycle

TM1 & ANT1 & Lowest



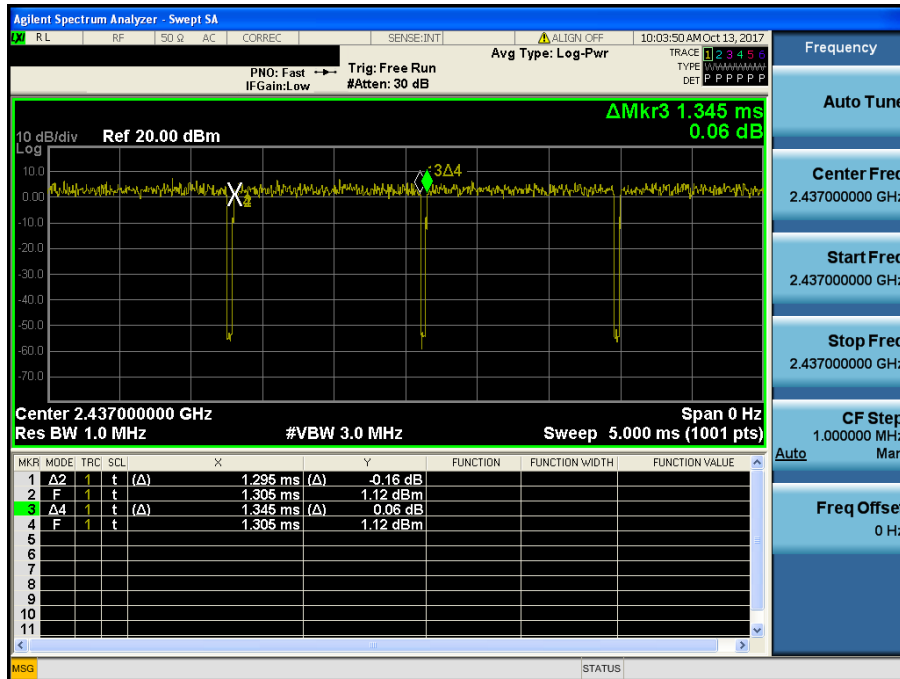
Duty Cycle

TM2 & ANT1 & Middle



Duty Cycle

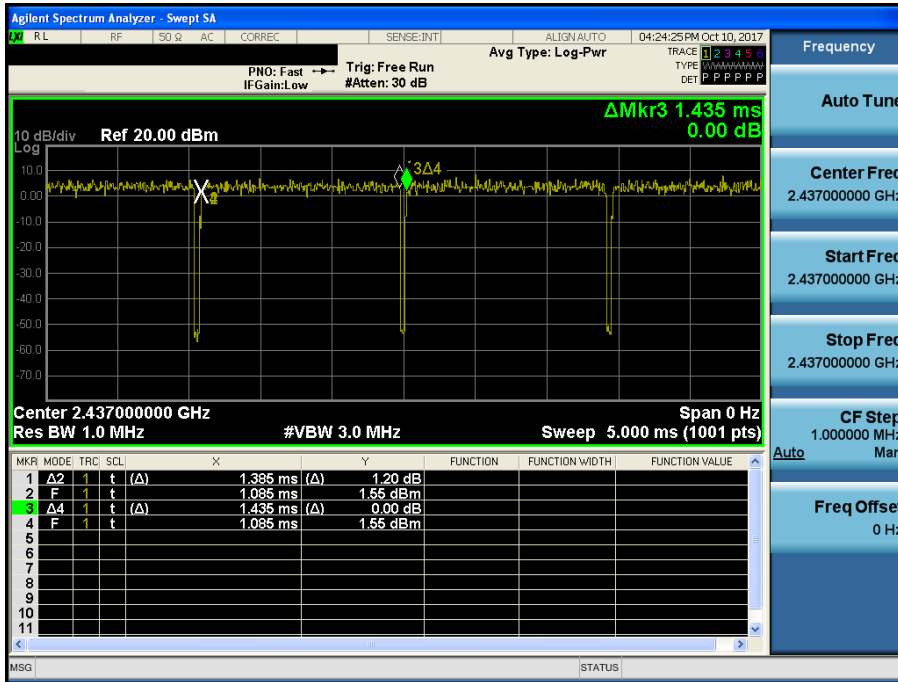
TM3 & ANT1 & Middle





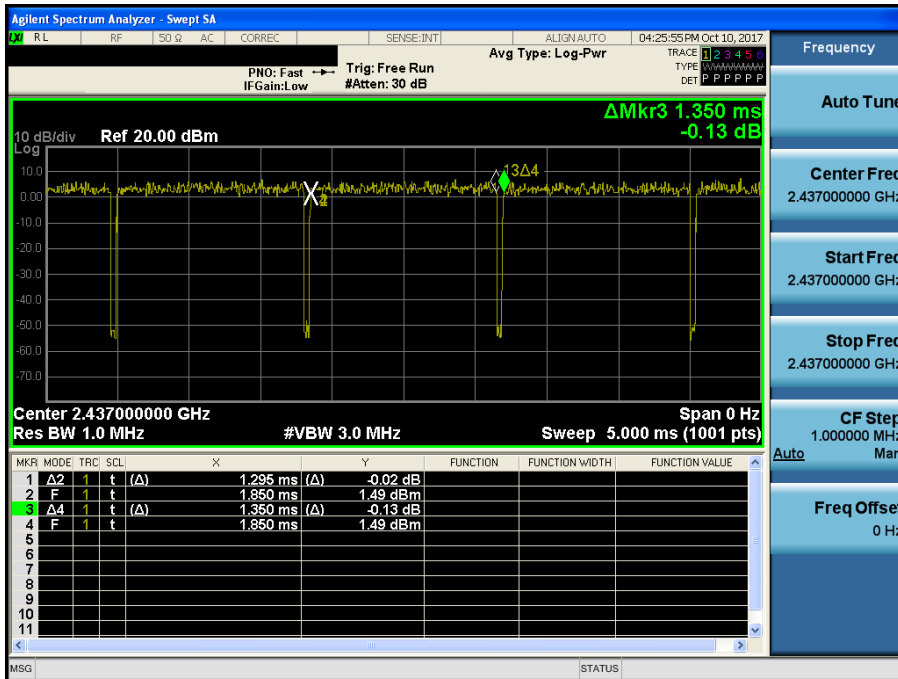
Duty Cycle

TM2 & ANT2 & Middle



Duty Cycle

TM3 & ANT2 & Middle

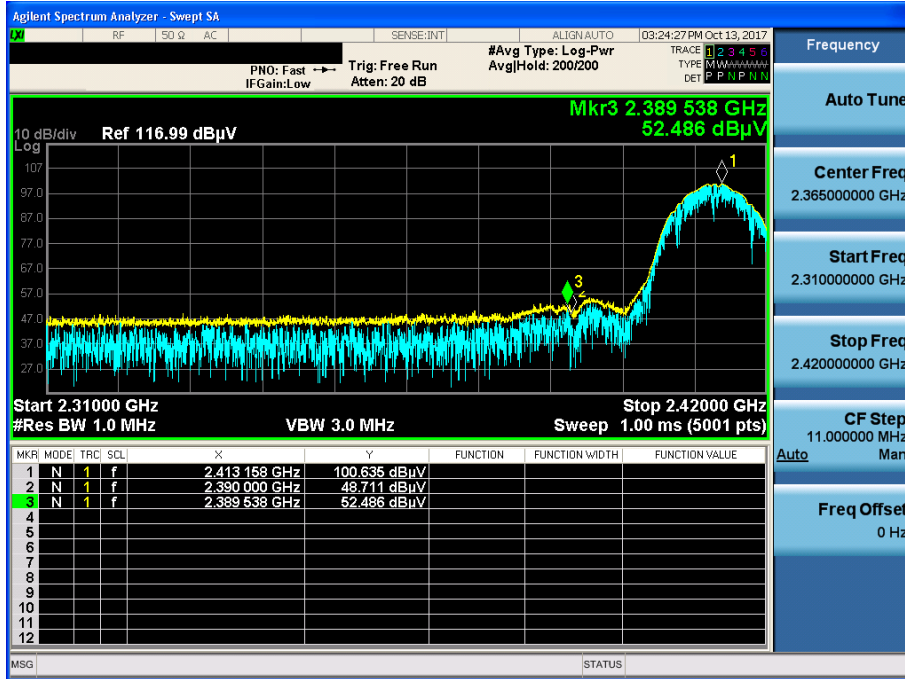


APPENDIX II

Unwanted Emissions (Radiated) Test Plot

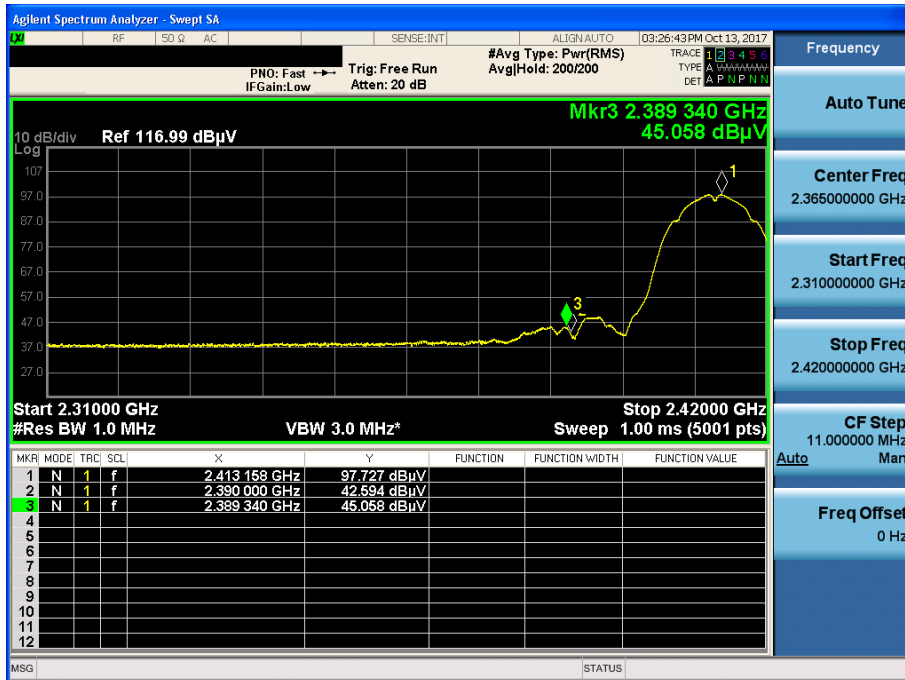
TM1 & ANT1 & Lowest & Y & Hor

Detector Mode : PK



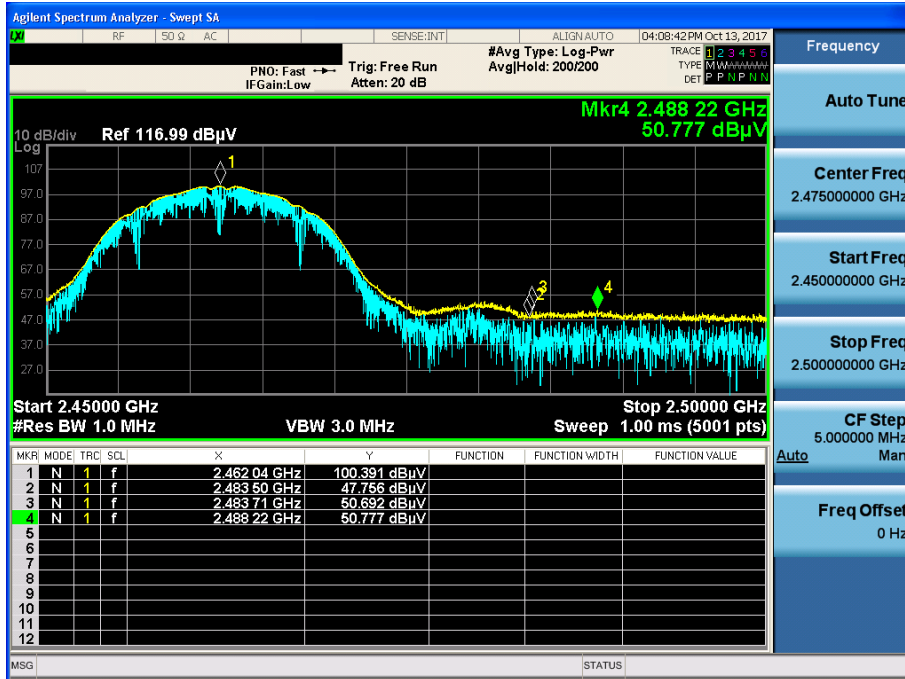
TM1 & ANT1 & Lowest & Y & Hor

Detector Mode : AV



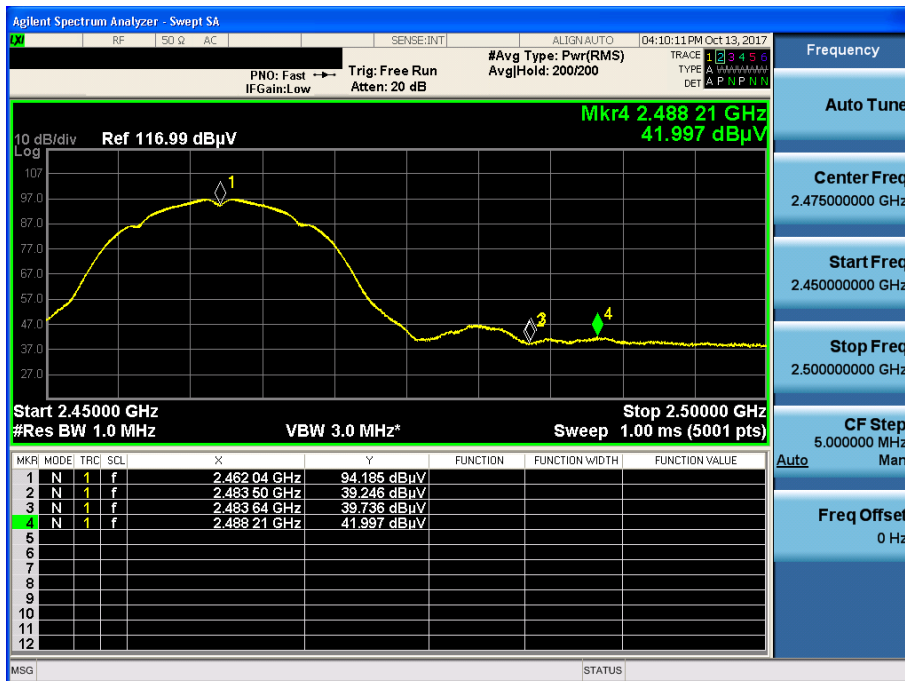
TM1 & ANT1 & Highest & Y & Hor

Detector Mode : PK



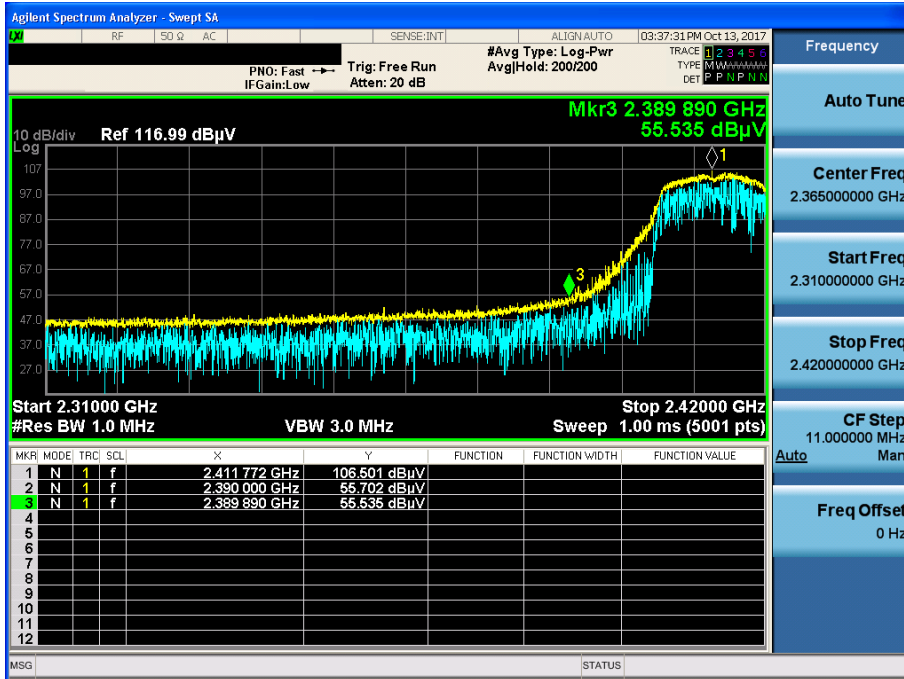
TM1 & ANT1 & Highest & Y & Hor

Detector Mode : AV



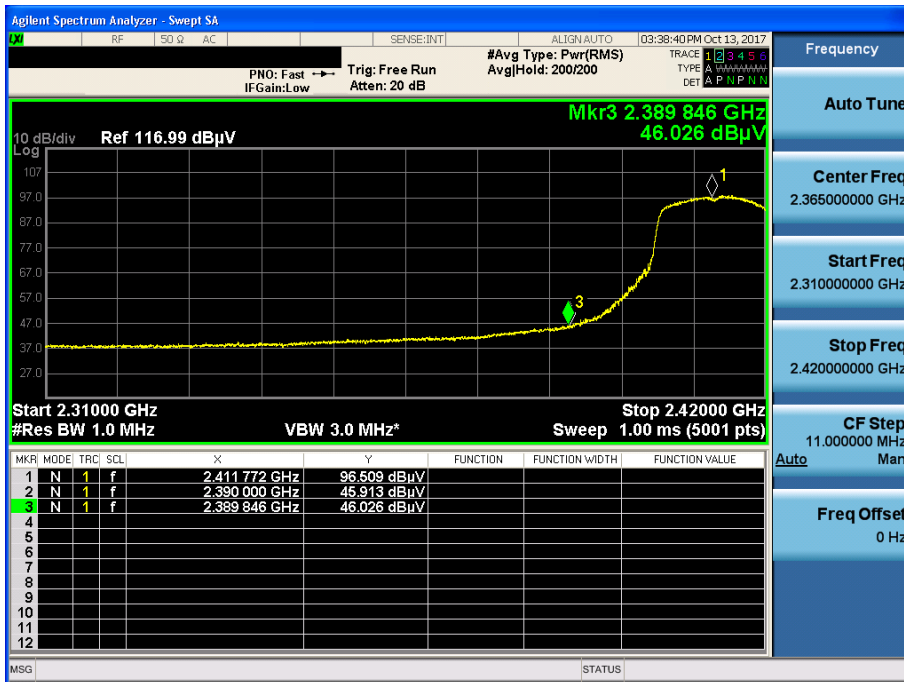
TM2 & ANT1 & Lowest & Z & Hor

Detector Mode : PK



TM2 & ANT1 & Lowest & Z & Hor

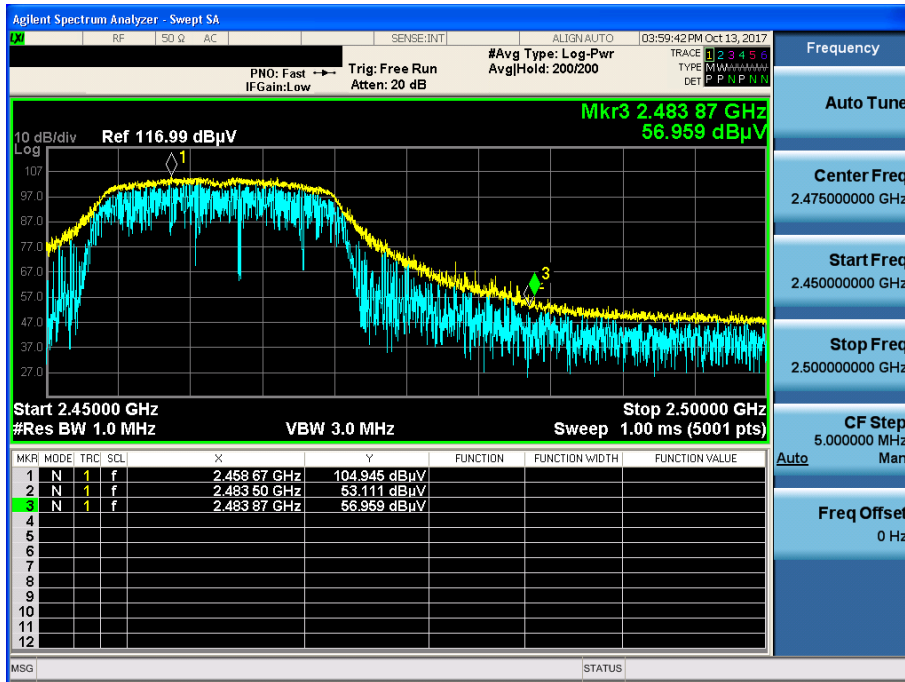
Detector Mode : AV





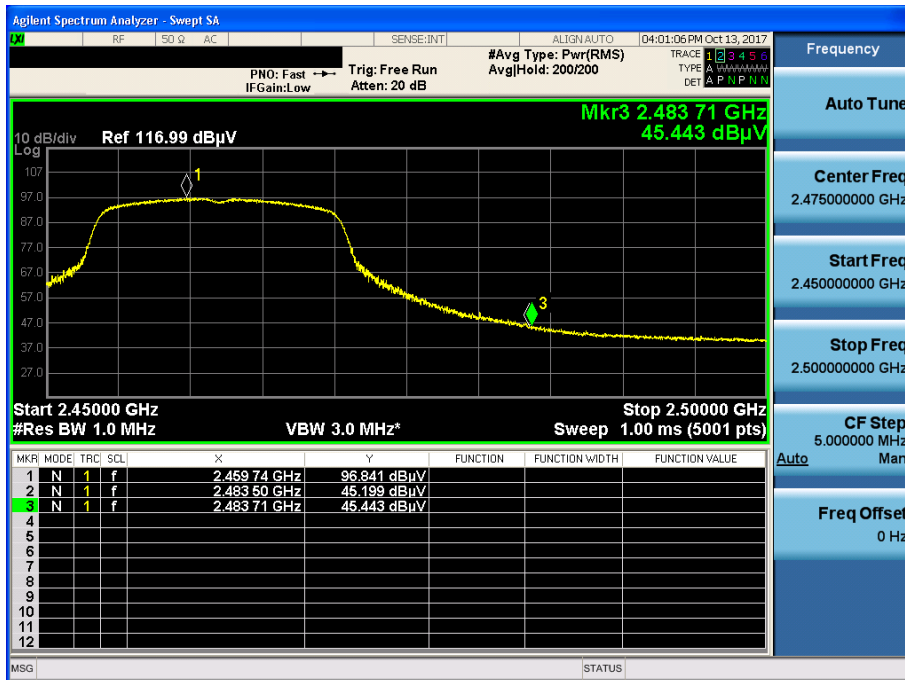
TM2 & ANT1 Highest & Z & Hor

Detector Mode : PK



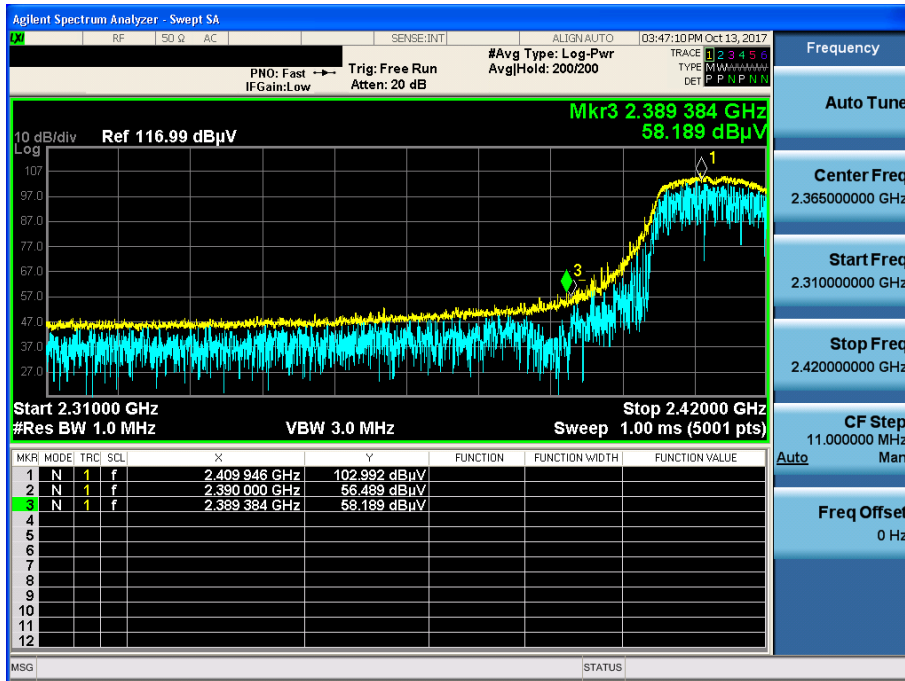
TM2 & ANT1 & Highest & Z & Hor

Detector Mode : AV



TM3 & ANT1 & Lowest & Z & Hor

Detector Mode : PK



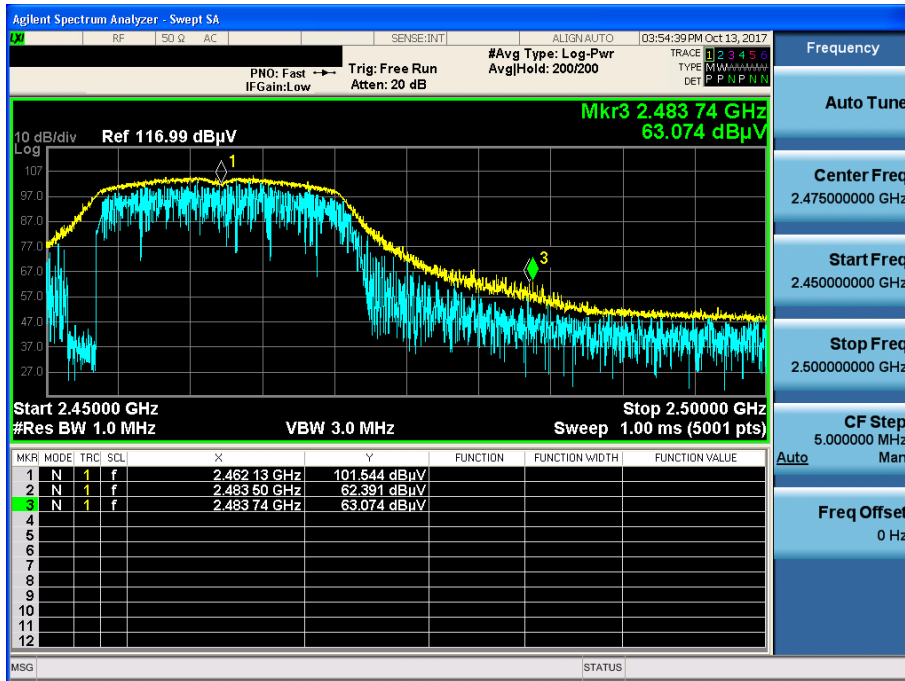
TM3 & ANT1 & Lowest & Z & Hor

Detector Mode : AV



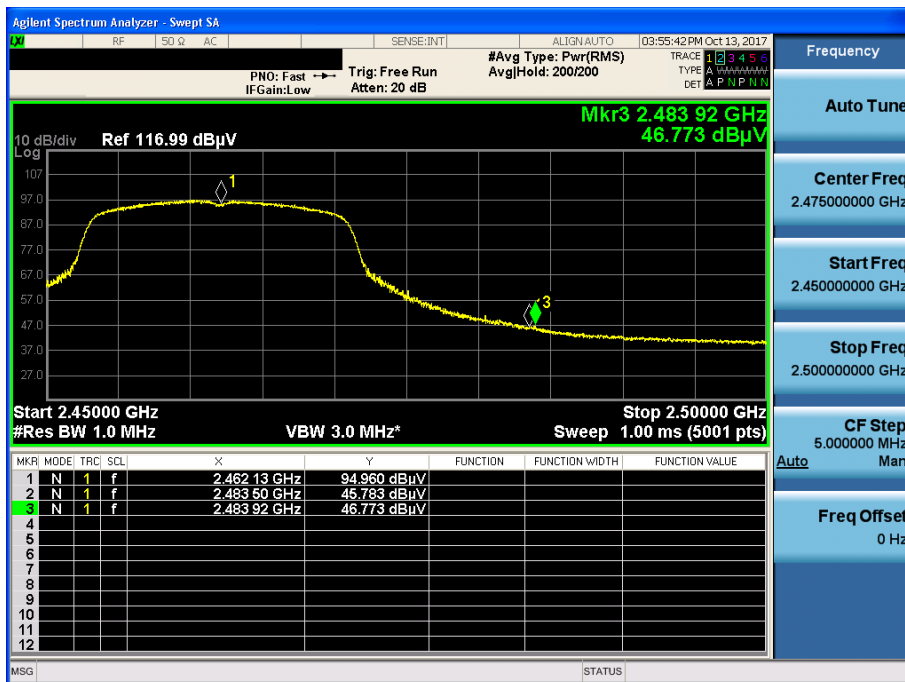
TM3 & ANT1 & Highest & Z & Hor

Detector Mode : PK



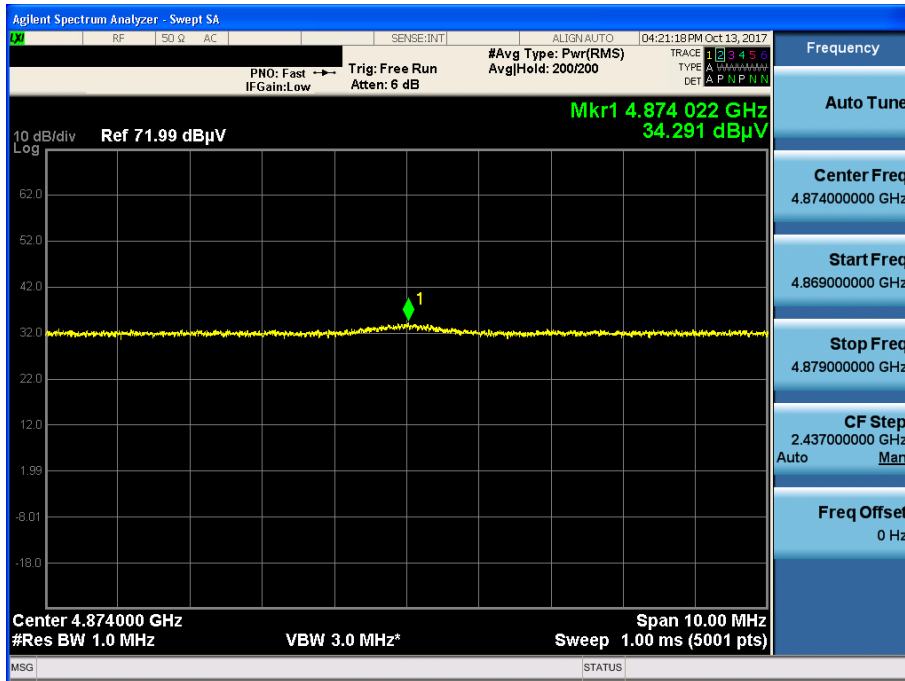
TM3 & ANT1 & Highest & Z & Hor

Detector Mode : AV



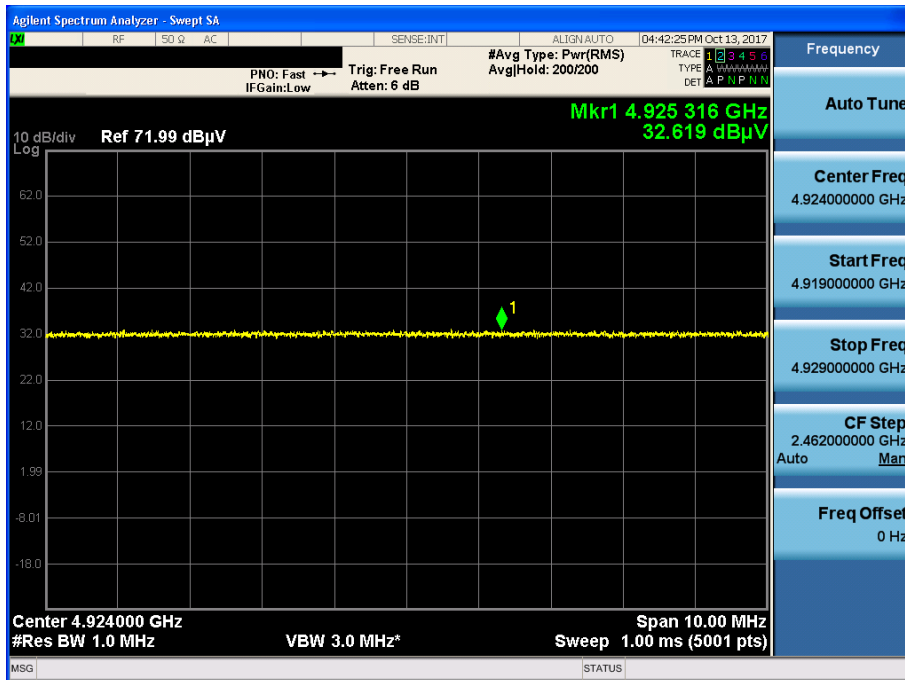
TM1 & ANT1 & Middle & X & Ver

Detector Mode : AV



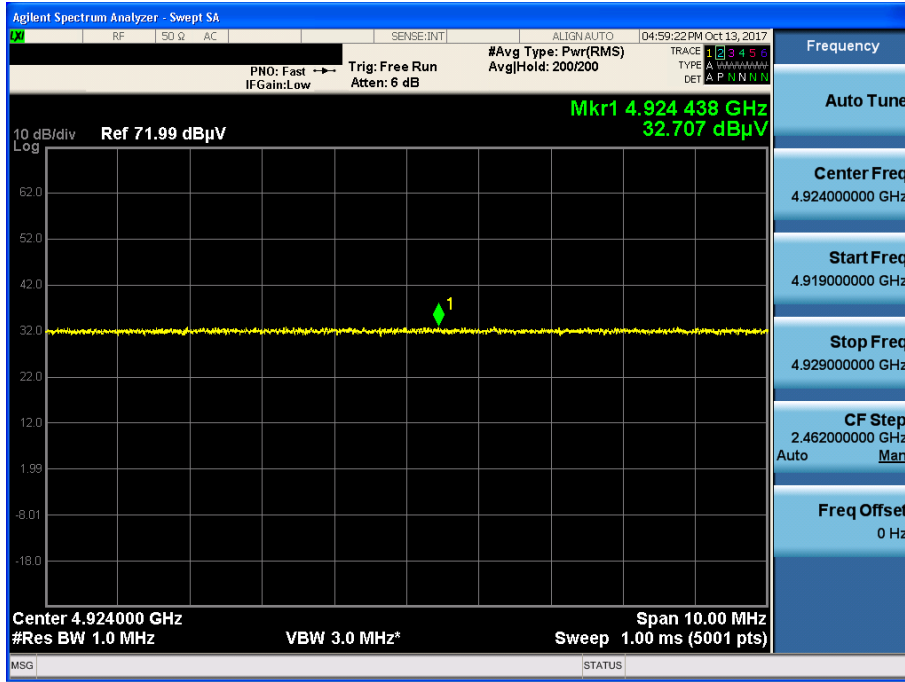
TM2 & ANT1 & Middle & X & Ver

Detector Mode : AV



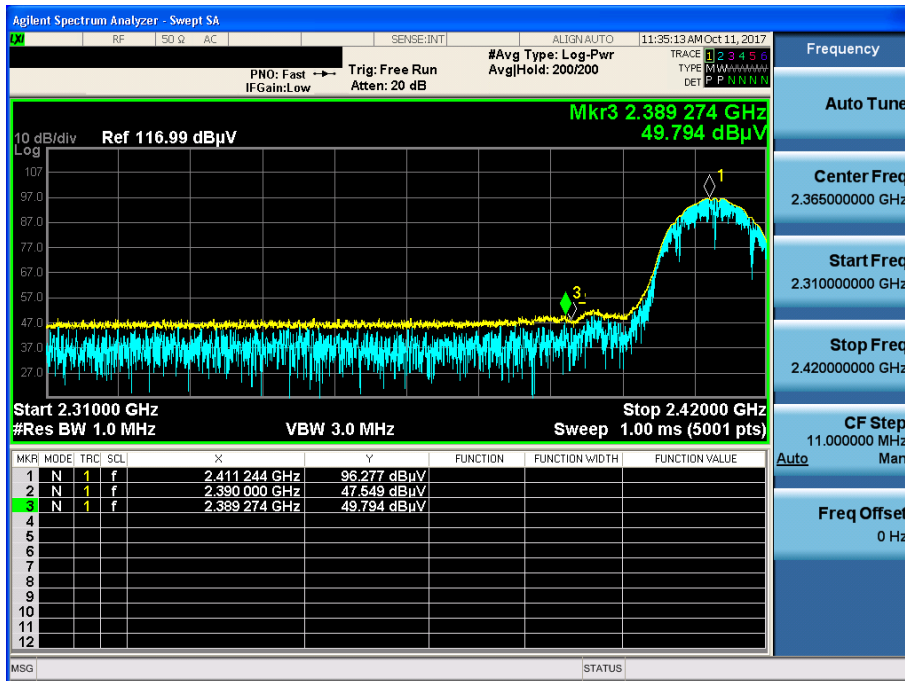
TM3 & ANT1 & Highest & X & Ver

Detector Mode : AV



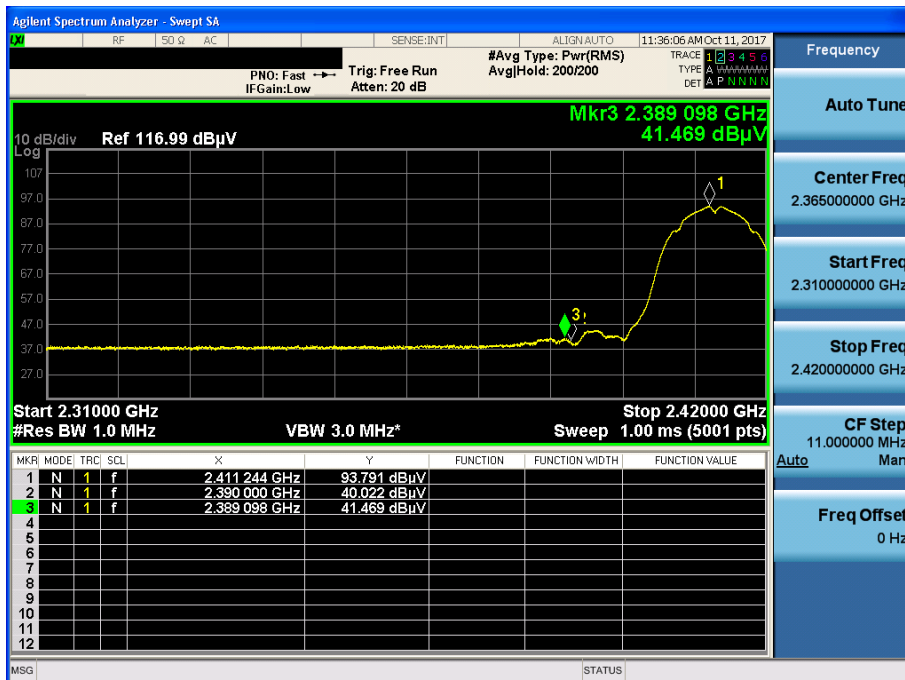
TM1 & ANT2 & Lowest & Y & Hor

Detector Mode : PK



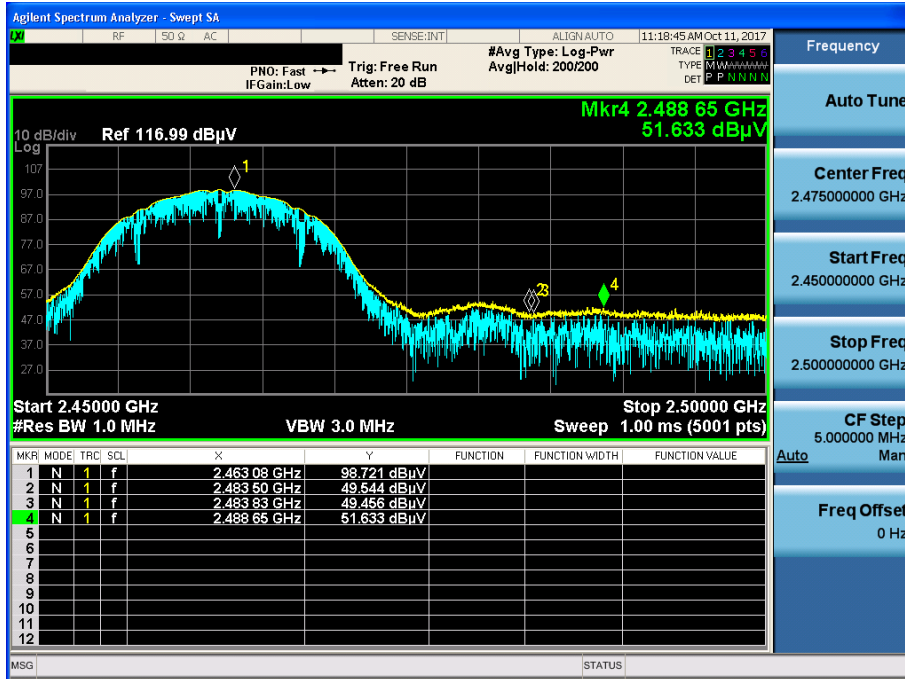
TM1 & ANT2 & Lowest & Y & Hor

Detector Mode : AV



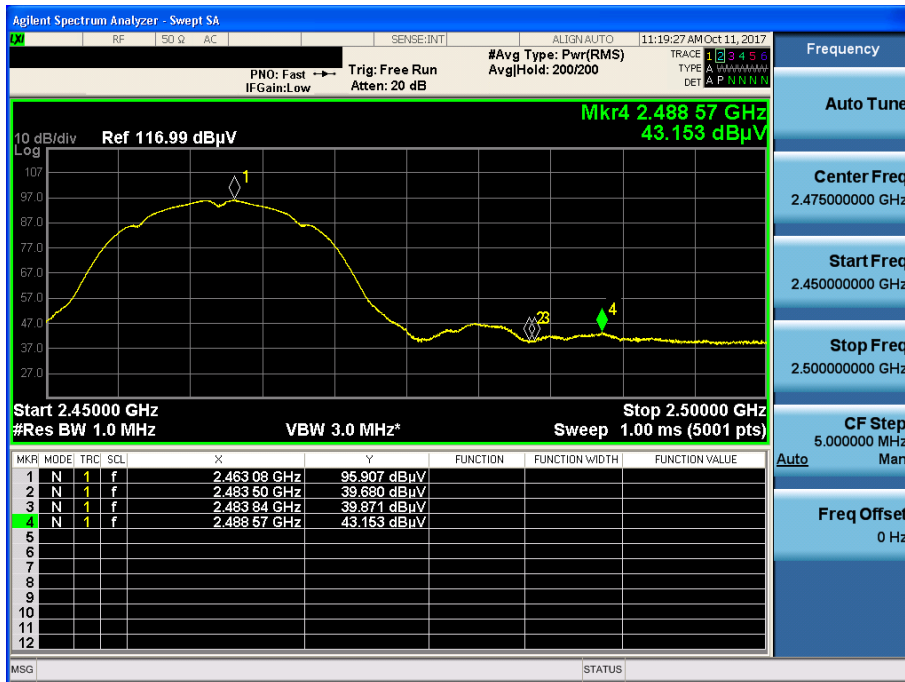
TM1 & ANT2 & Highest & Y & Hor

Detector Mode : PK



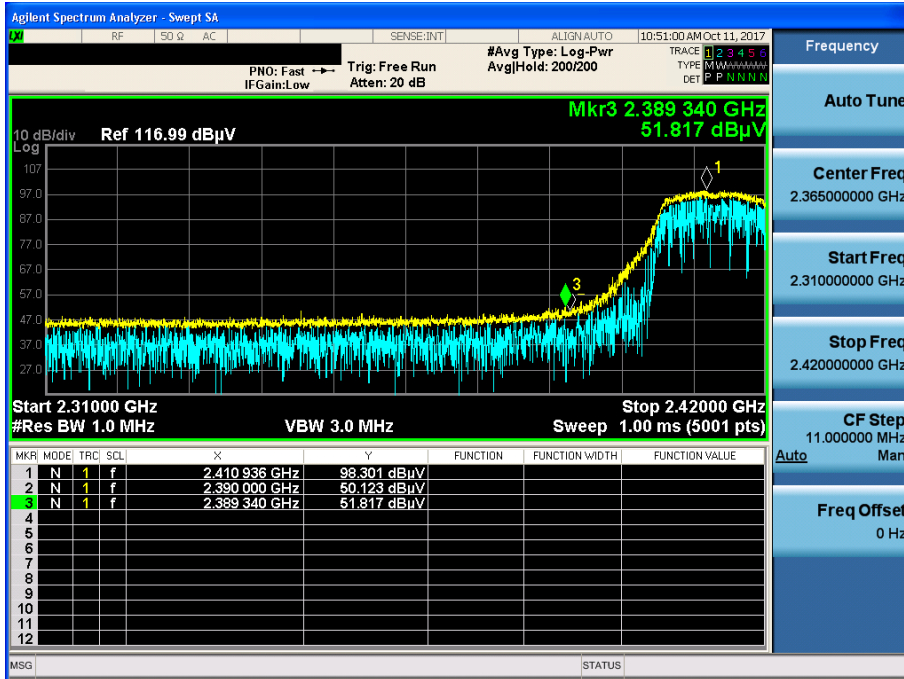
TM1 & ANT2 & Highest & Y & Hor

Detector Mode : AV



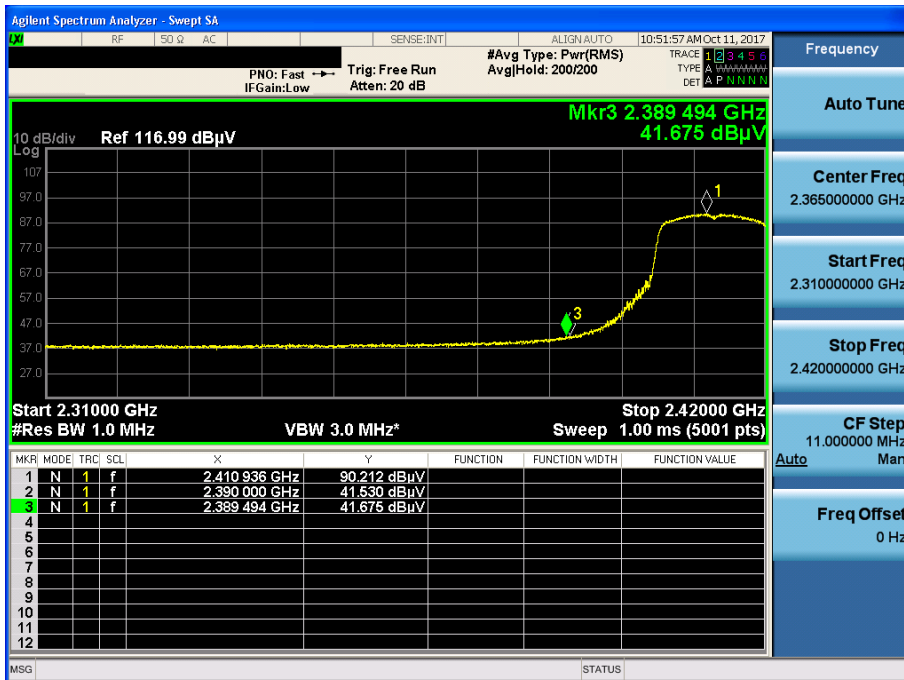
TM2 & ANT2 & Lowest & Z & Hor

Detector Mode : PK



TM2 & ANT2 & Lowest & Z & Hor

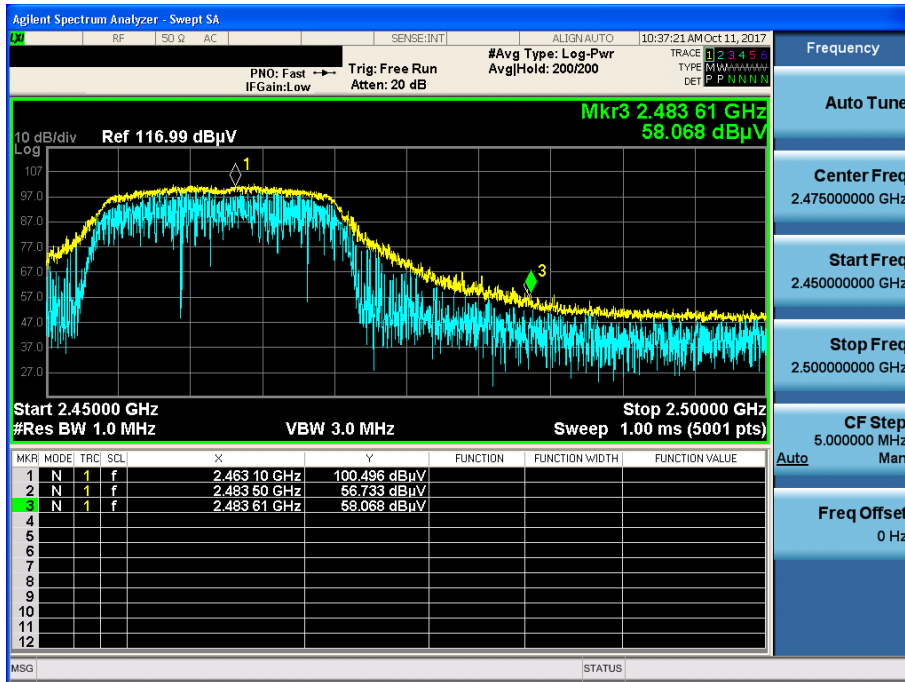
Detector Mode : AV





TM2 & ANT2 & Highest & Z & Hor

Detector Mode : PK



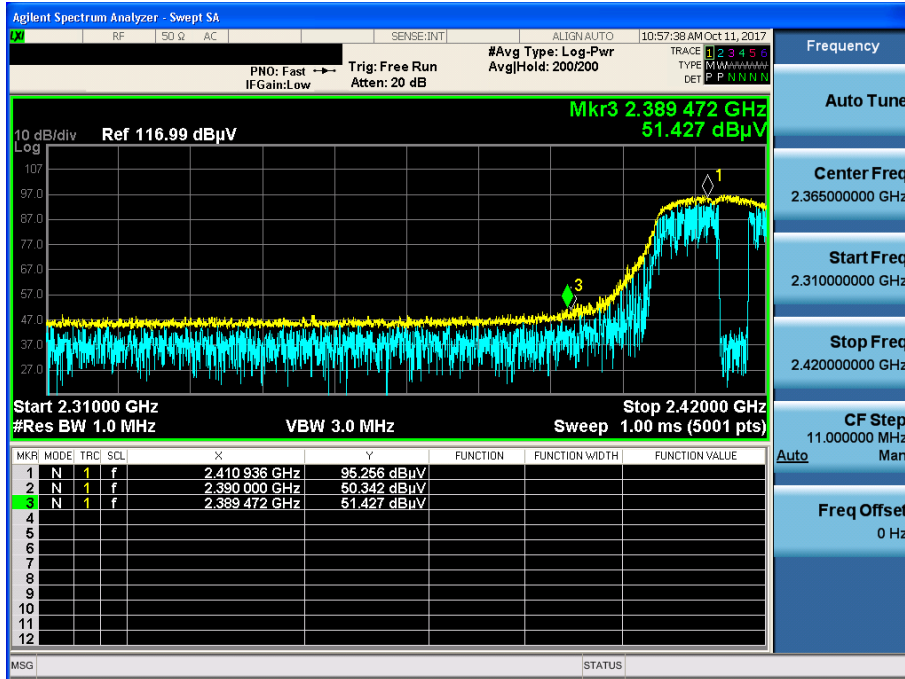
TM2 & ANT2 & Highest & Z & Hor

Detector Mode : AV



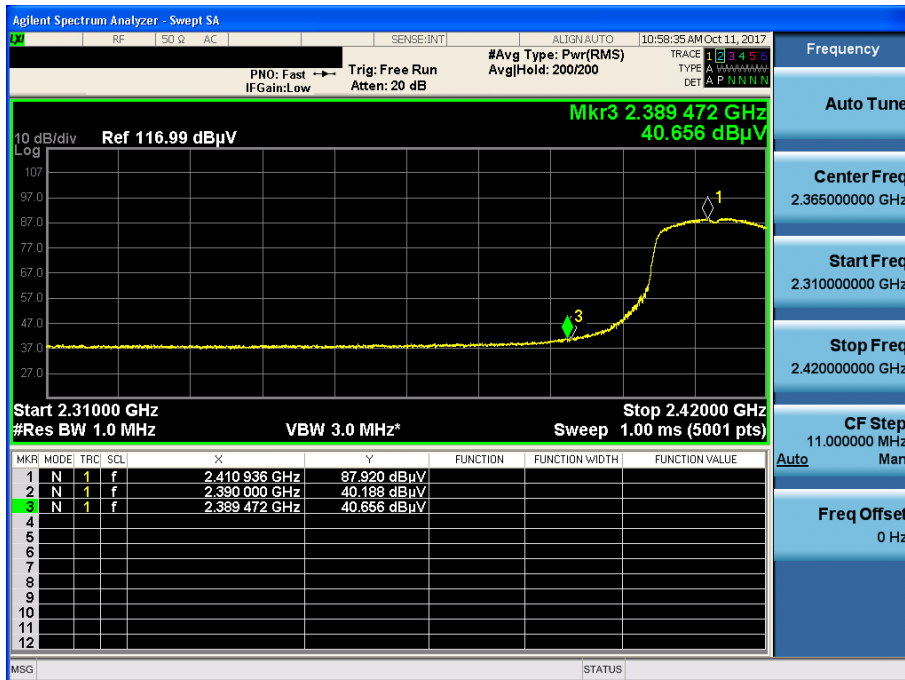
TM3 & ANT2 & Lowest & Z & Hor

Detector Mode : PK



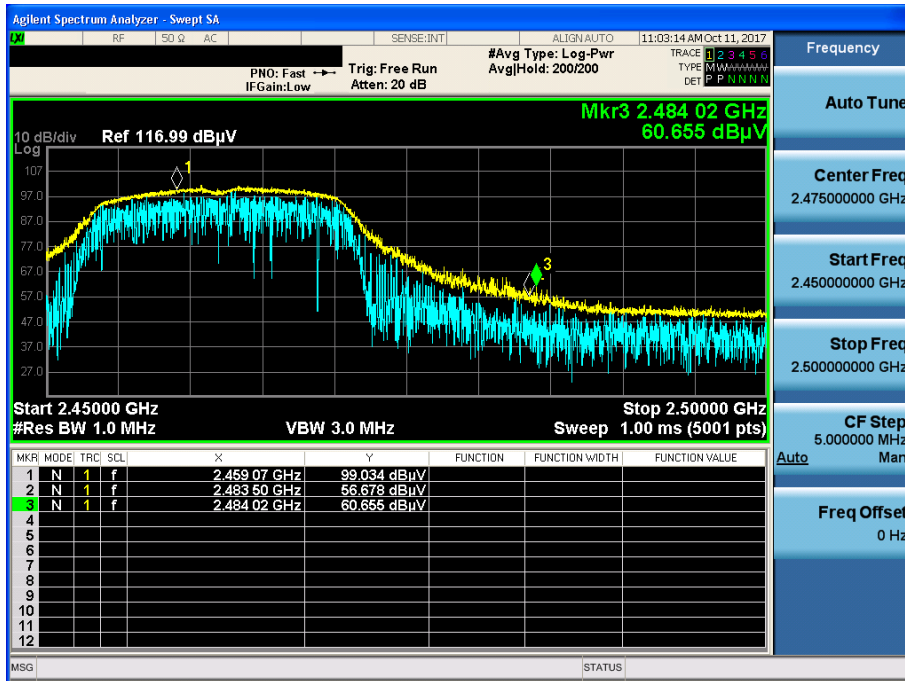
TM3 & ANT2 & Lowest & Z & Hor

Detector Mode : AV



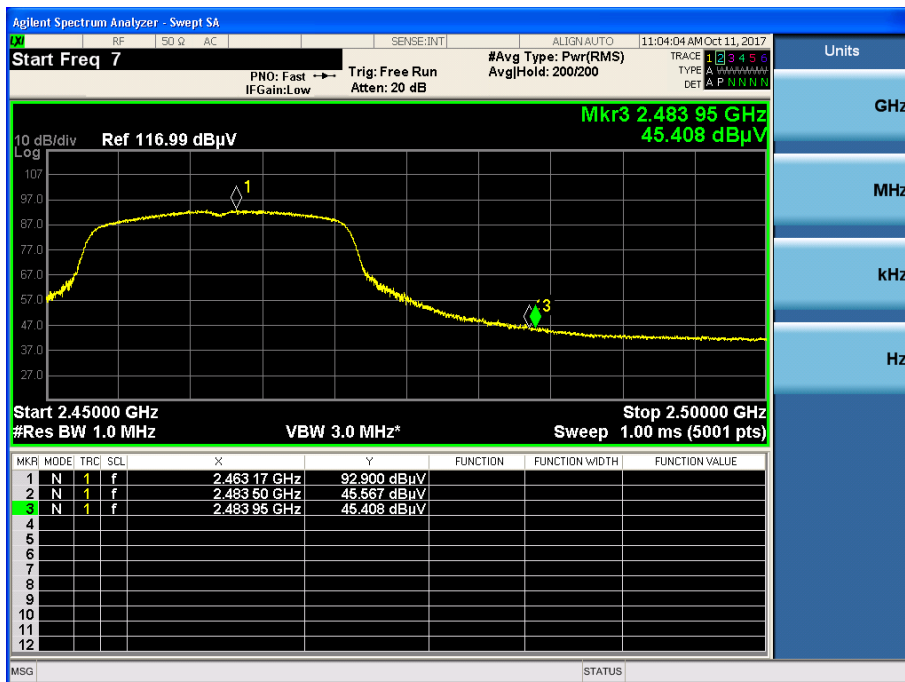
TM3 & ANT2 & Highest & Z & Hor

Detector Mode : PK



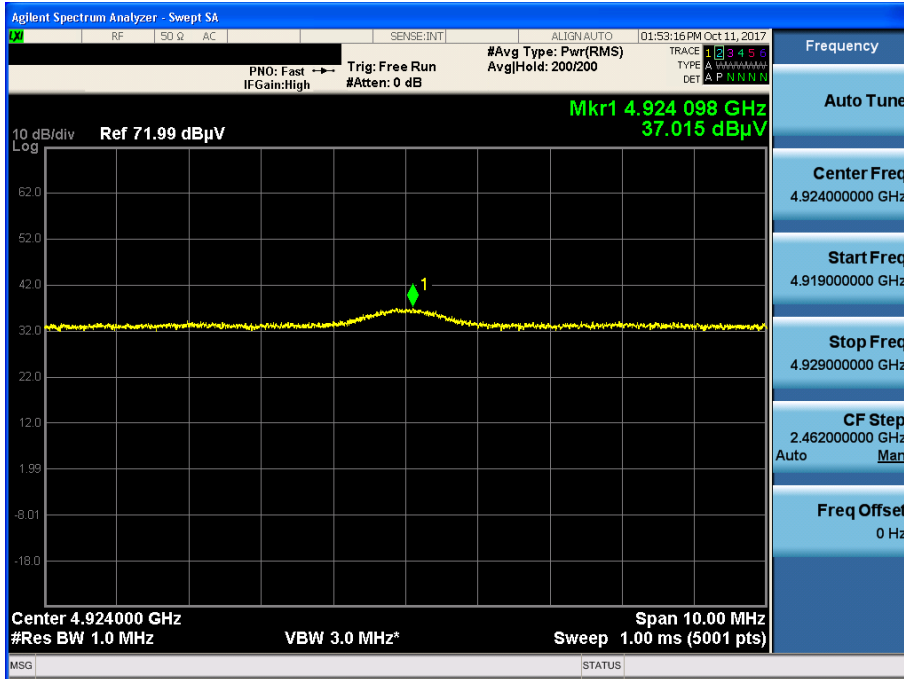
TM3 & ANT2 & Highest & Z & Hor

Detector Mode : AV



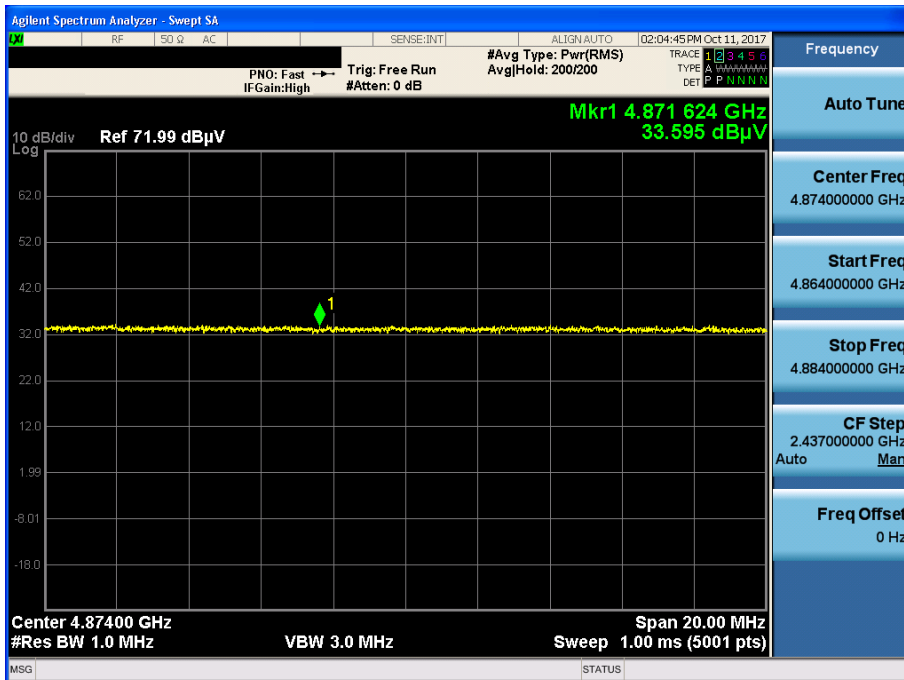
TM1 & ANT2 & Highest & X & Ver

Detector Mode : AV



TM2 & ANT2 & Middle & X & Ver

Detector Mode : AV



TM3 & ANT2 & Highest & X & Ver

Detector Mode : AV

