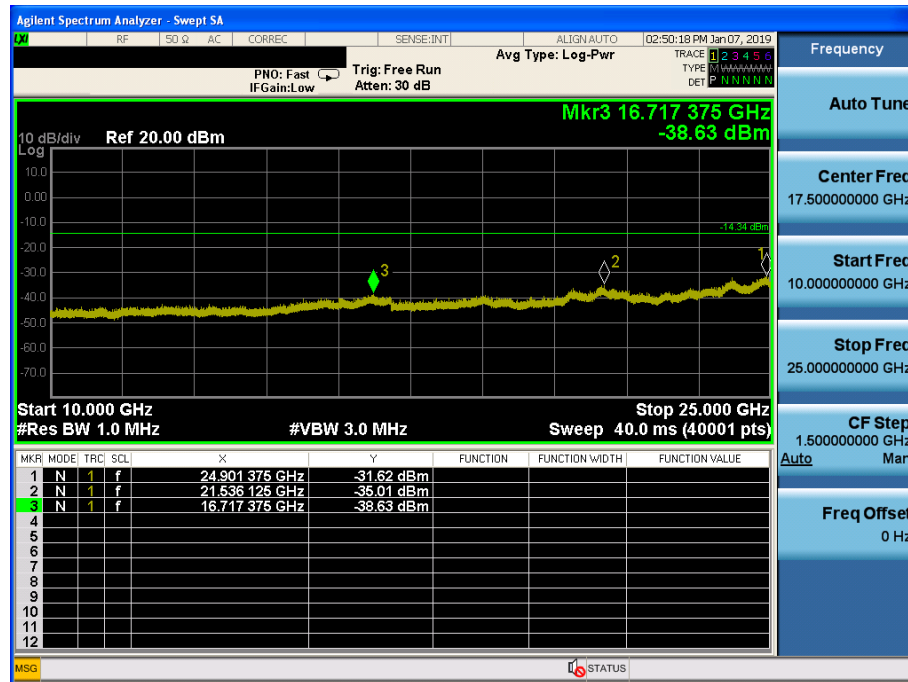
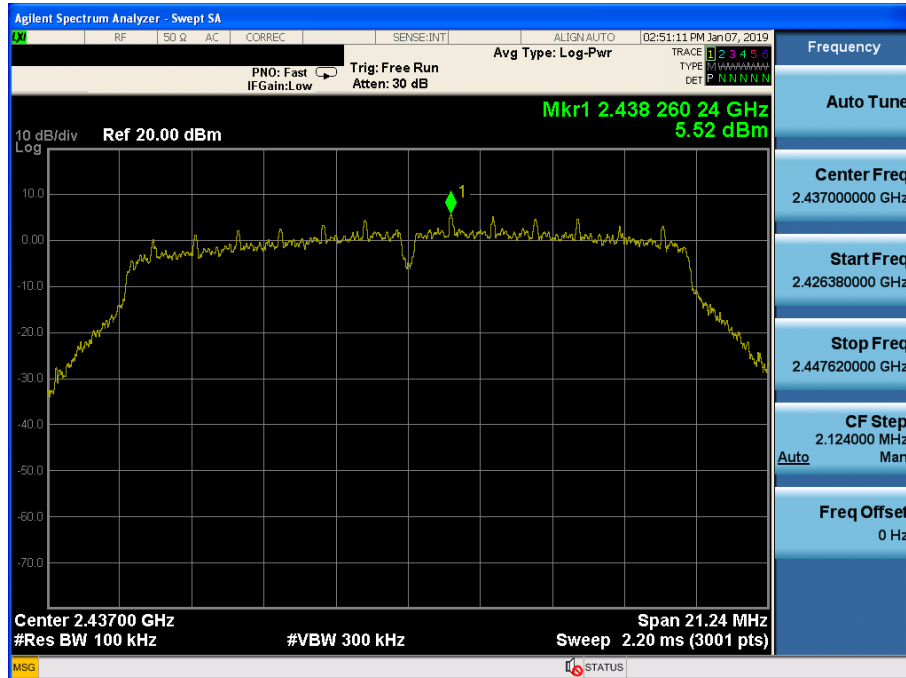


## Conducted Spurious Emissions

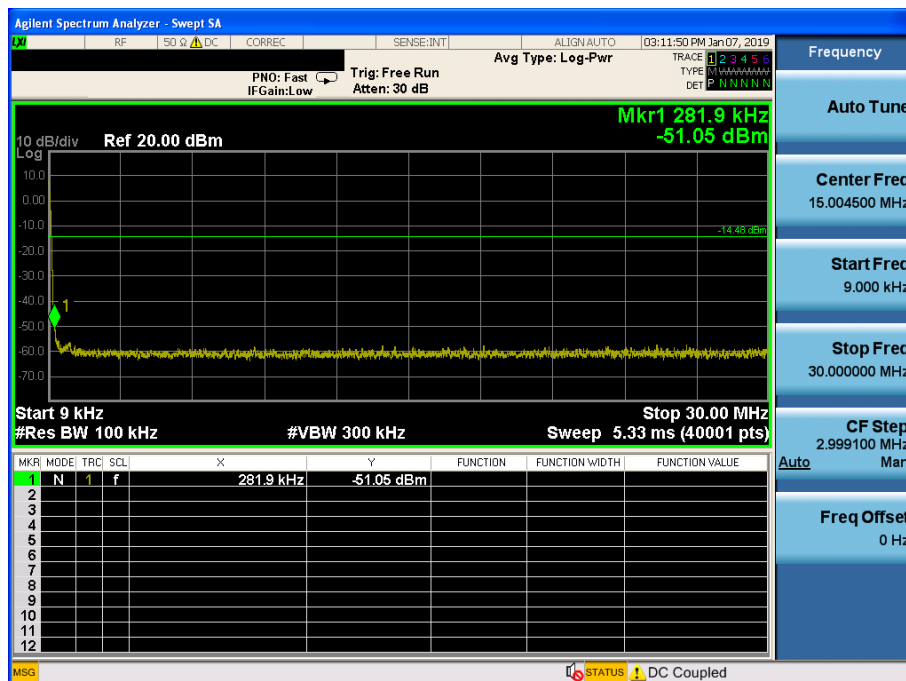


## TM 2 &amp; 2437

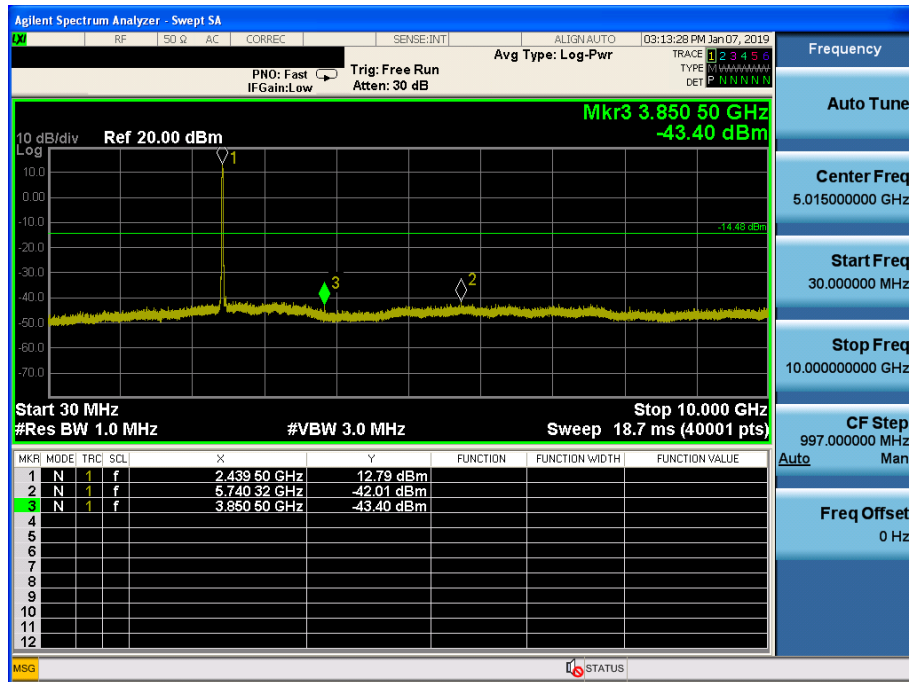
## Reference



## Conducted Spurious Emissions

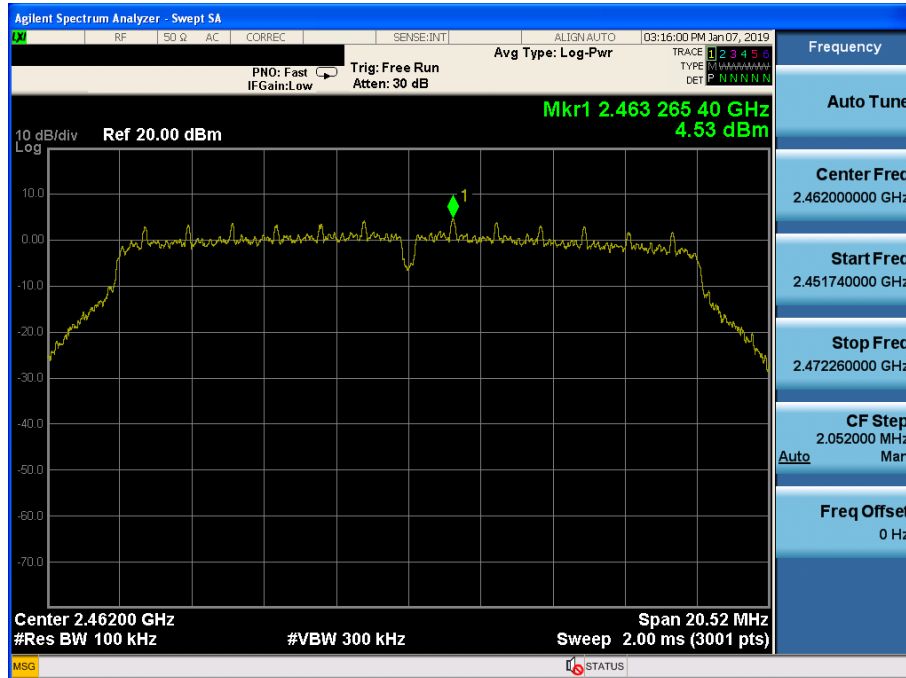


## Conducted Spurious Emissions



## TM 2 & 2462

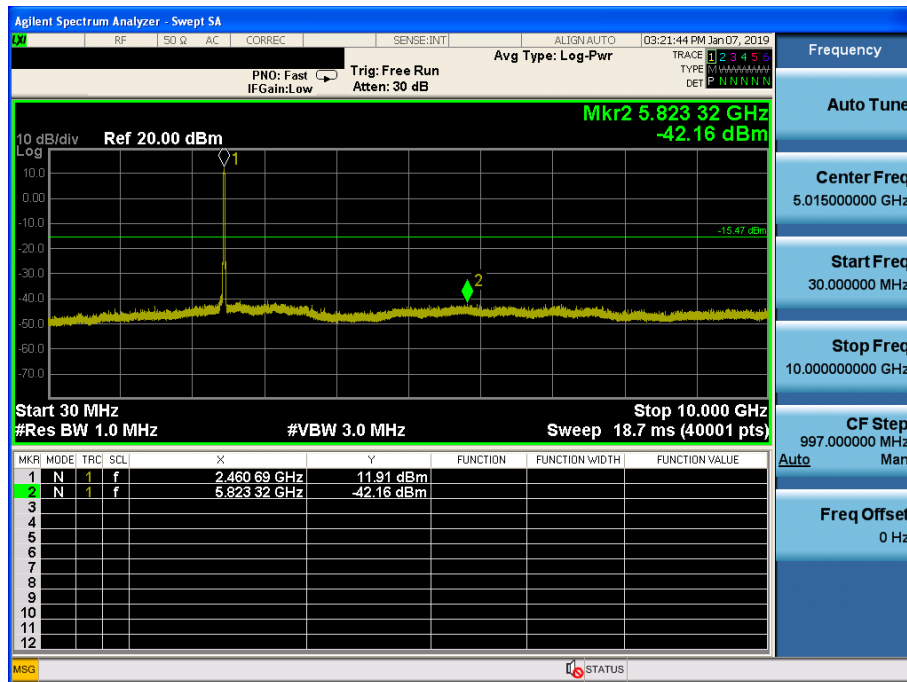
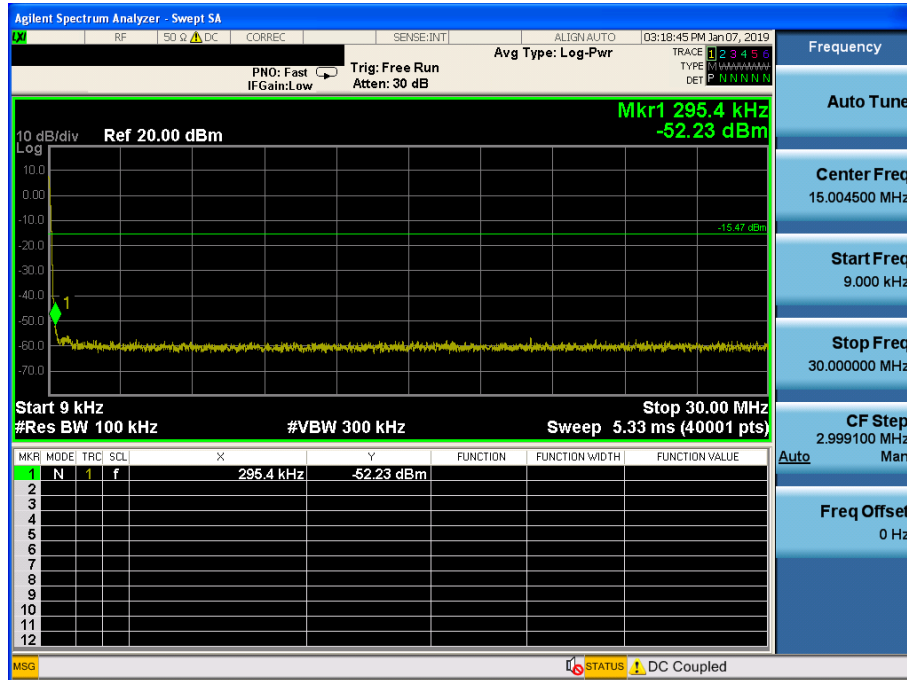
### Reference



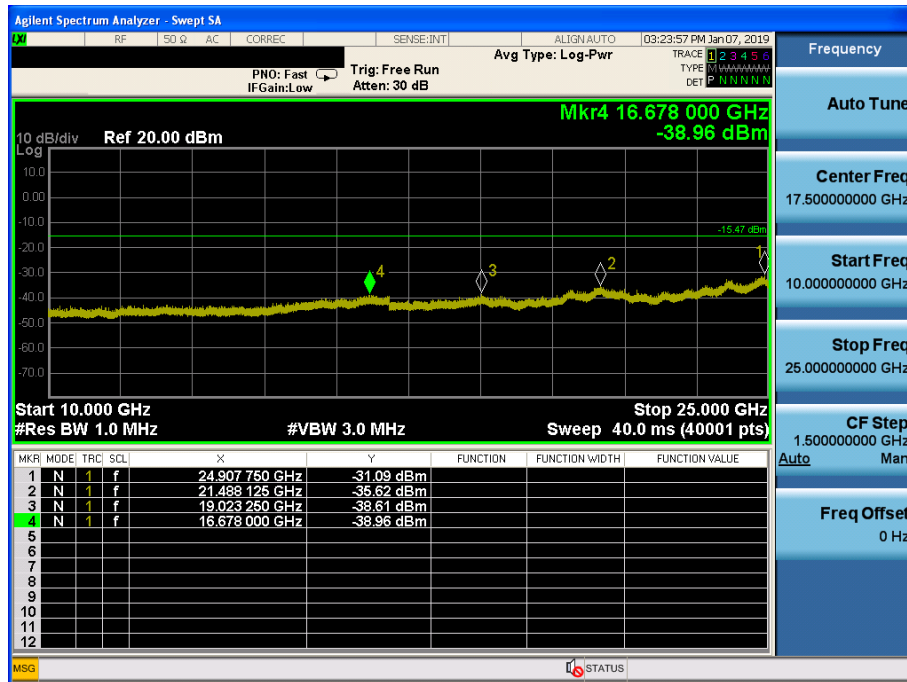
### High Band-edge



## Conducted Spurious Emissions

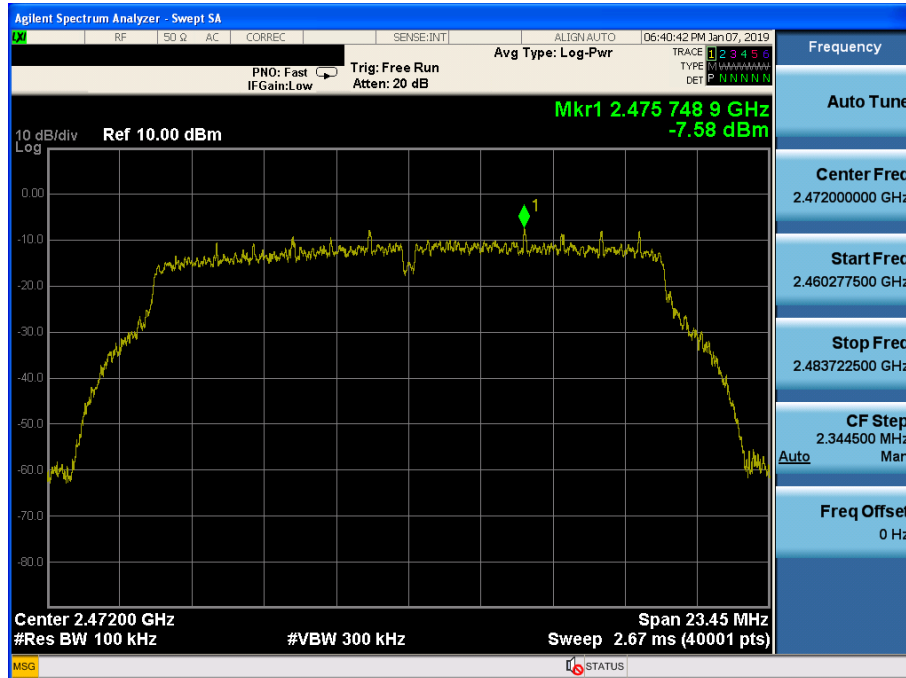


## Conducted Spurious Emissions

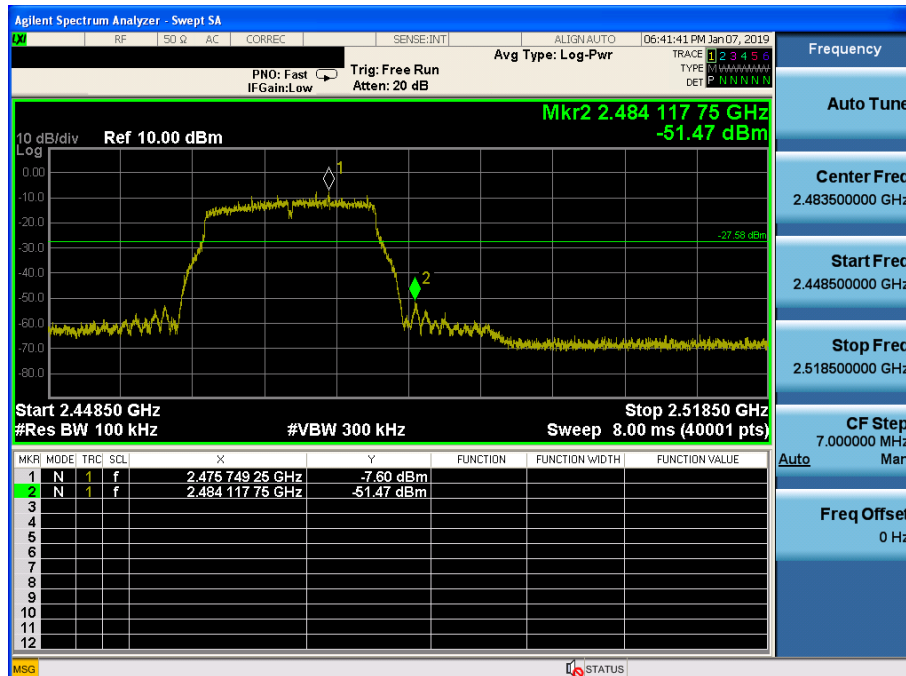


## TM 2 & 2472

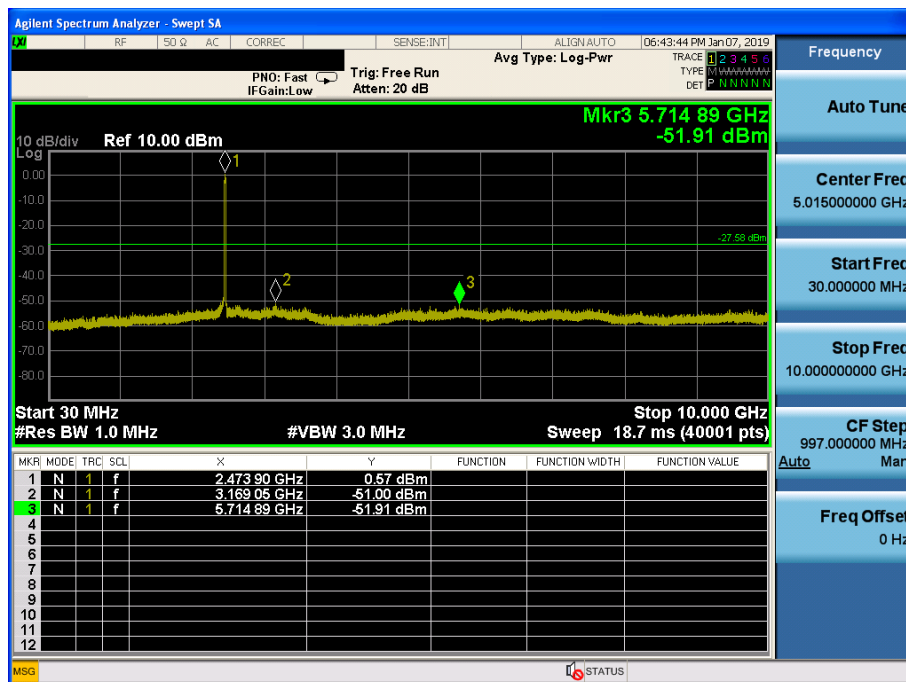
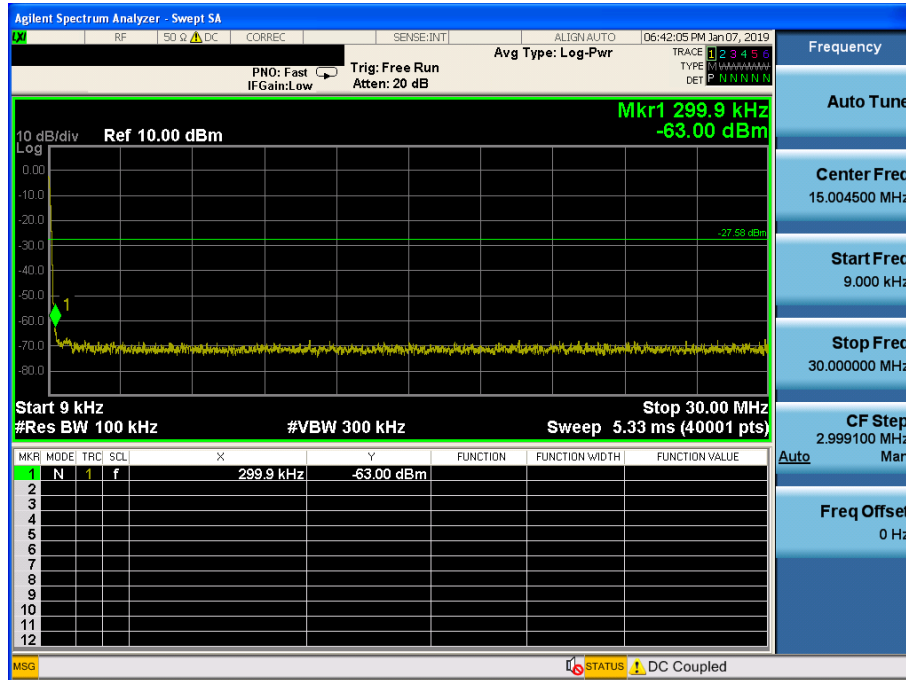
### Reference



### High Band-edge



## Conducted Spurious Emissions

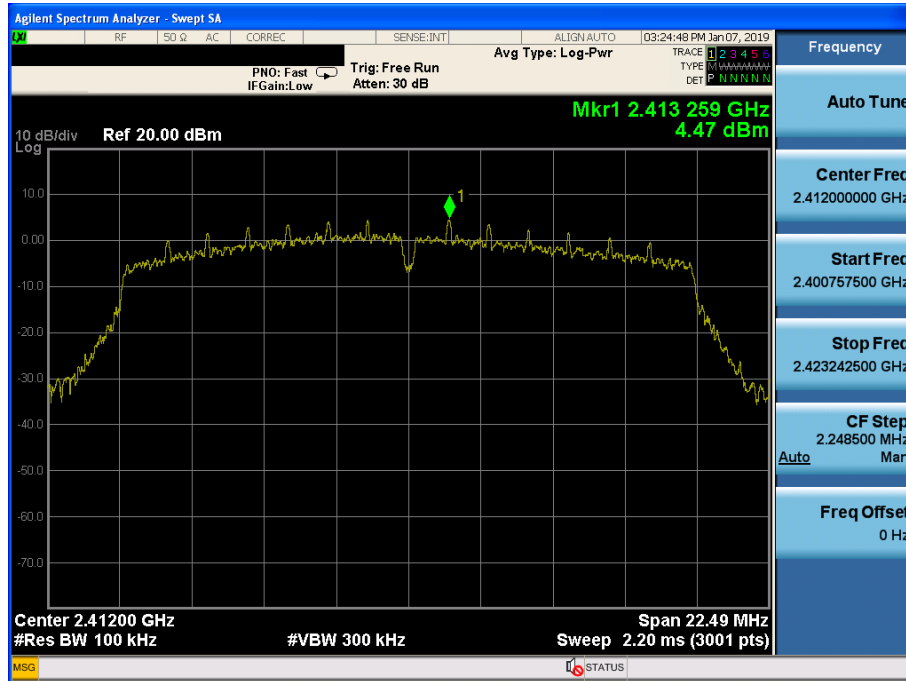


## Conducted Spurious Emissions

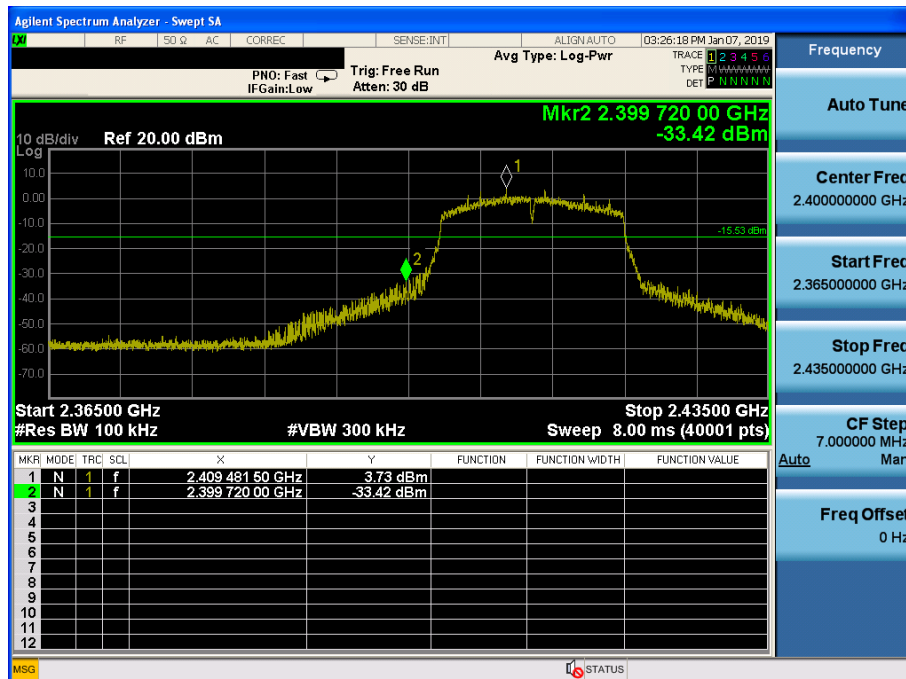


## TM 3 & 2412

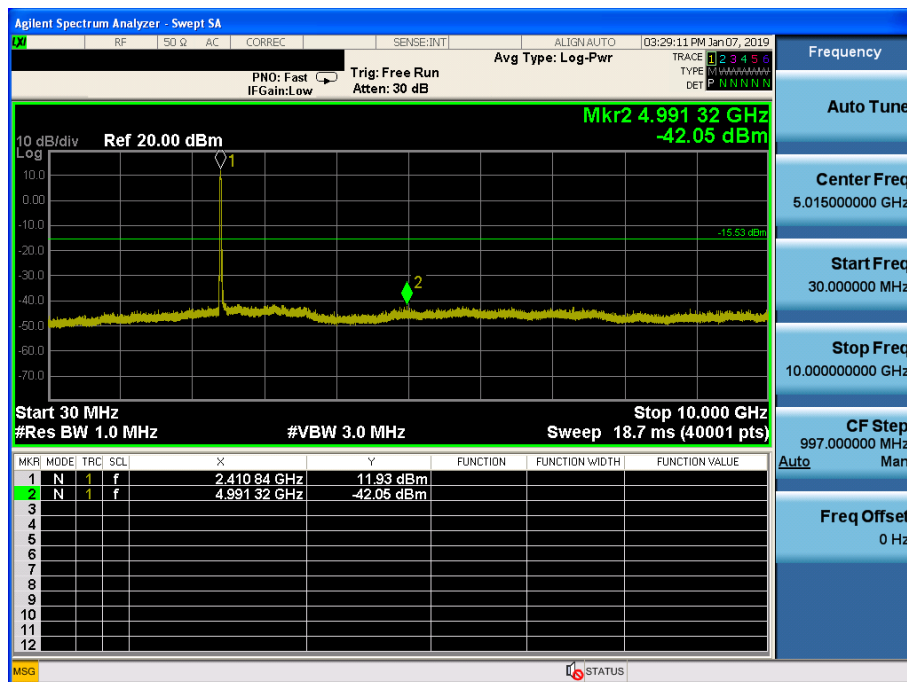
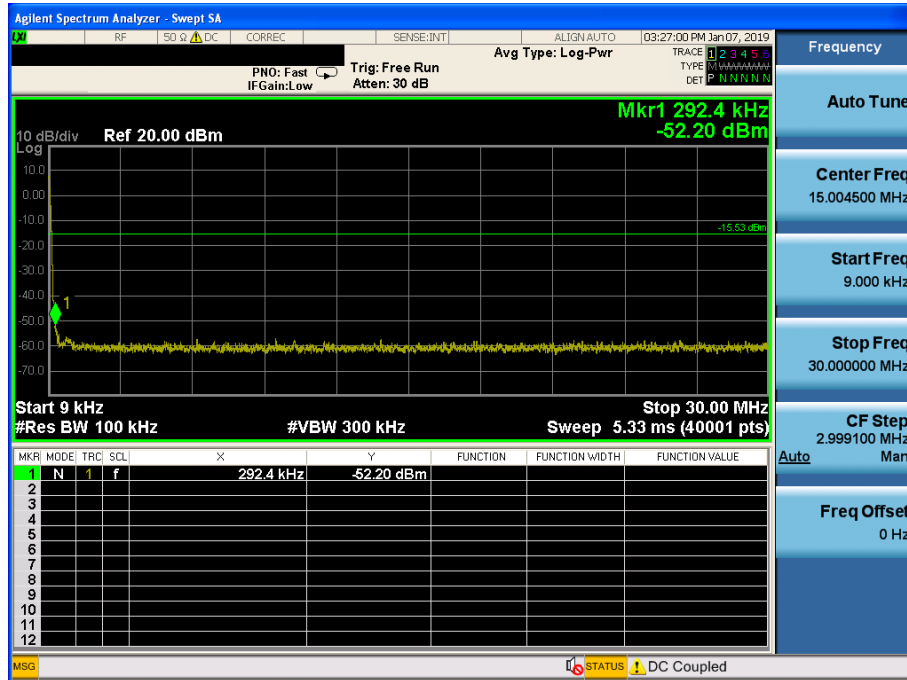
### Reference



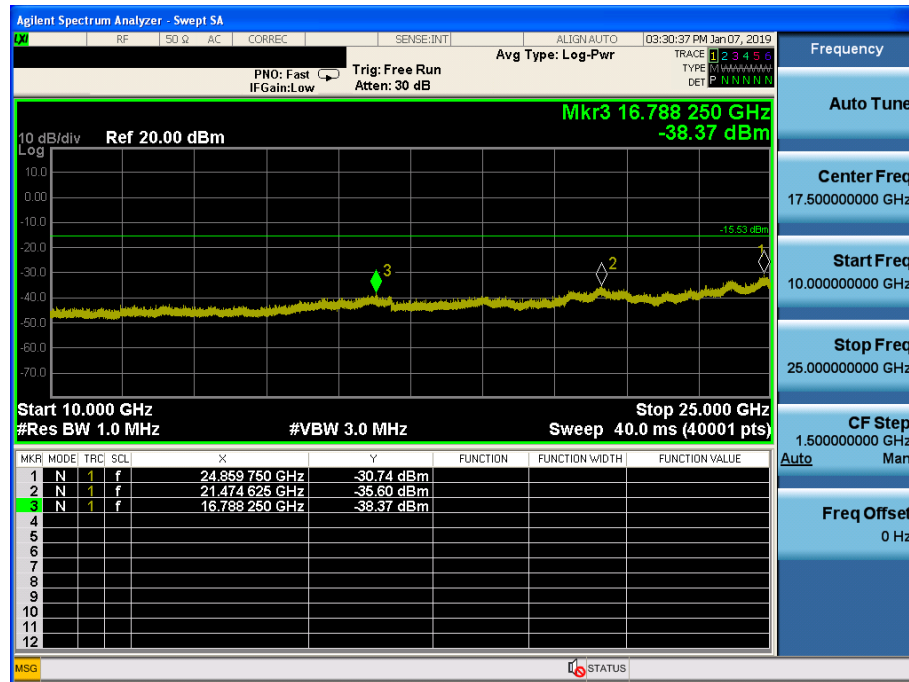
### Low Band-edge



## Conducted Spurious Emissions

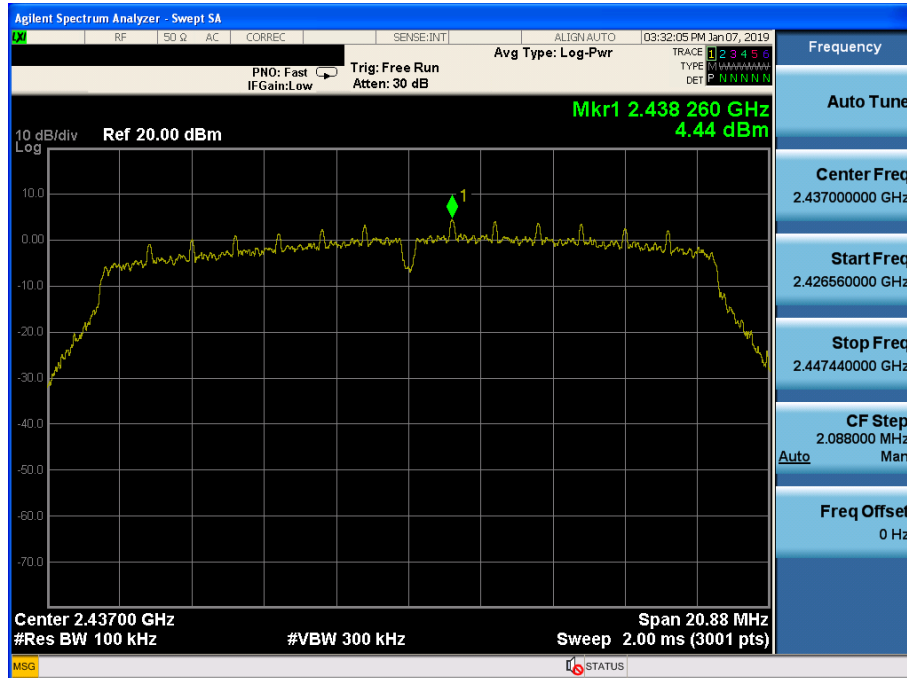


## Conducted Spurious Emissions

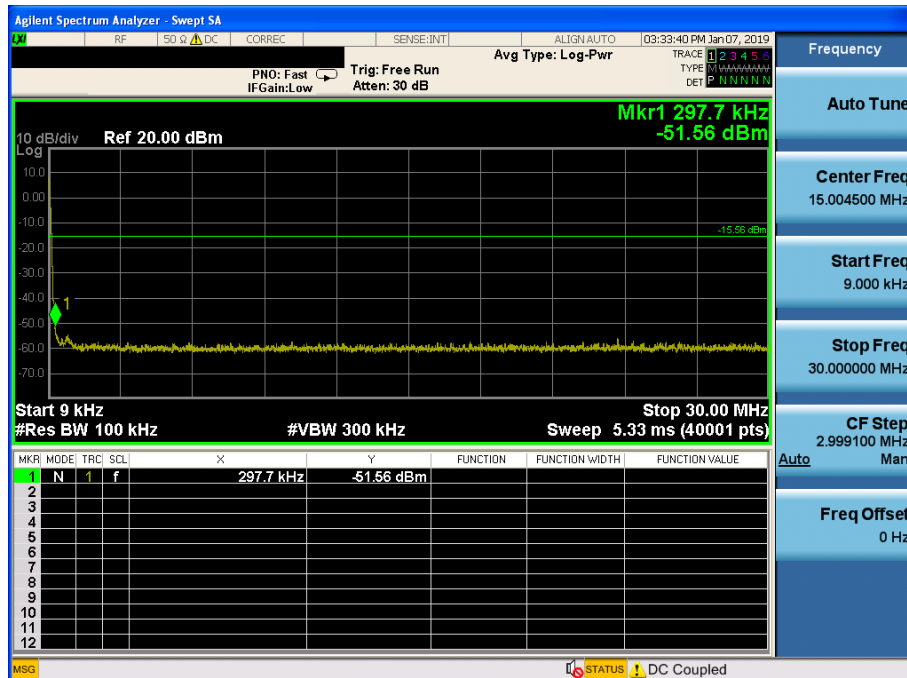


# TM 3 & 2437

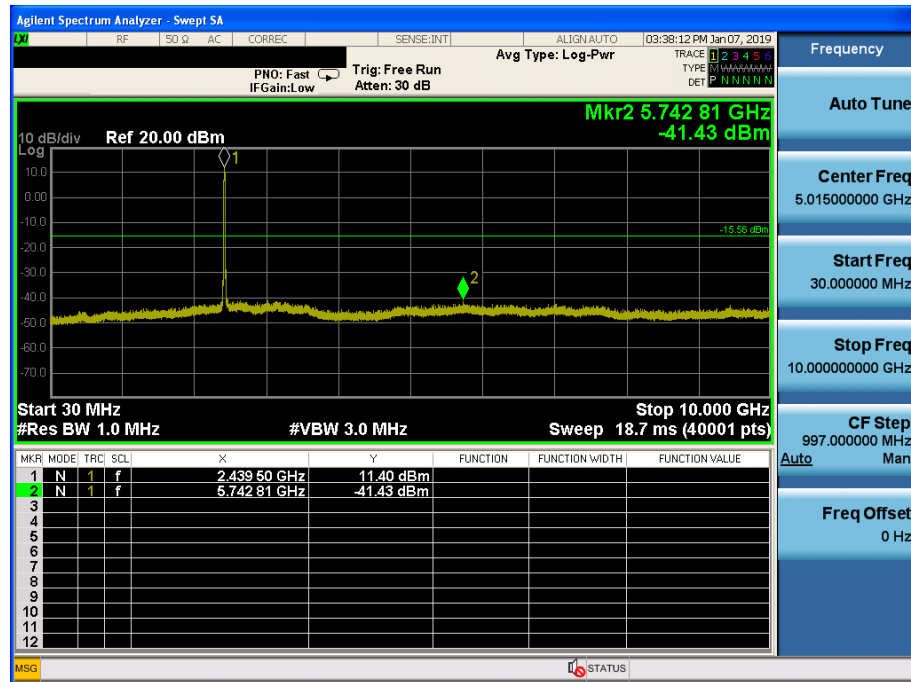
## Reference



## Conducted Spurious Emissions

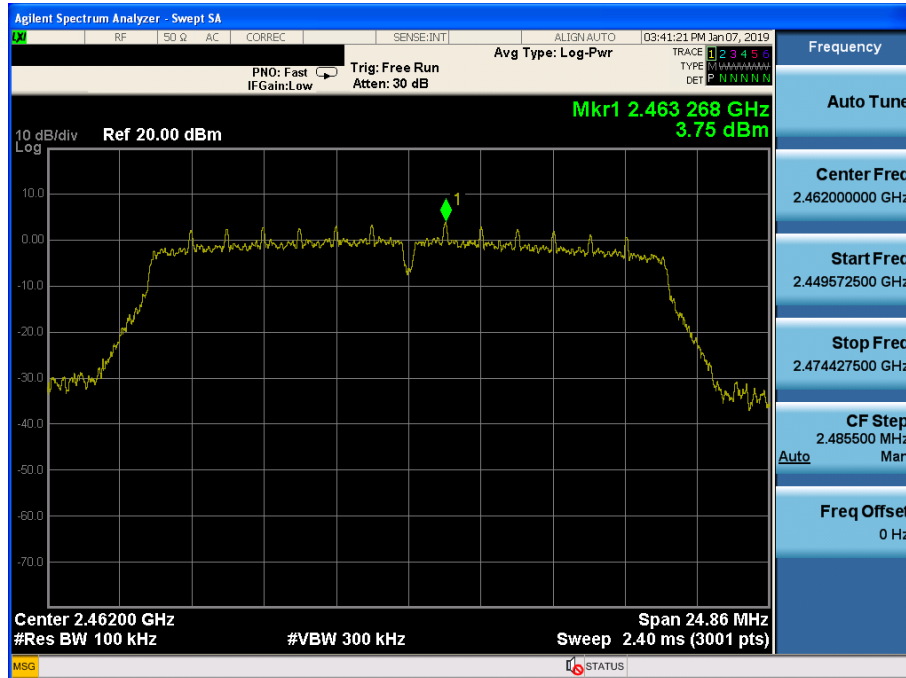


## Conducted Spurious Emissions

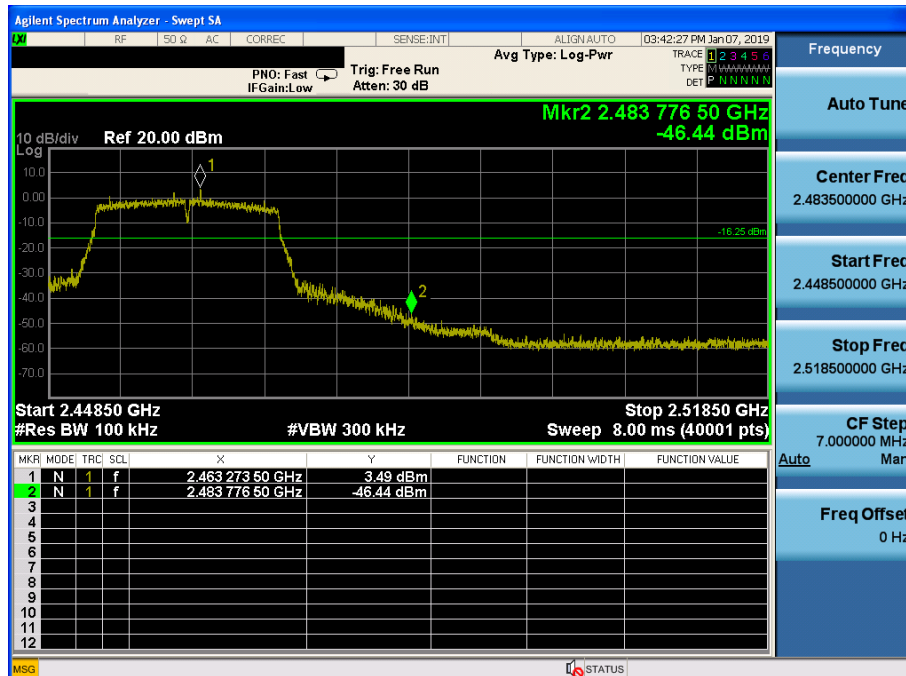


## TM 3 & 2462

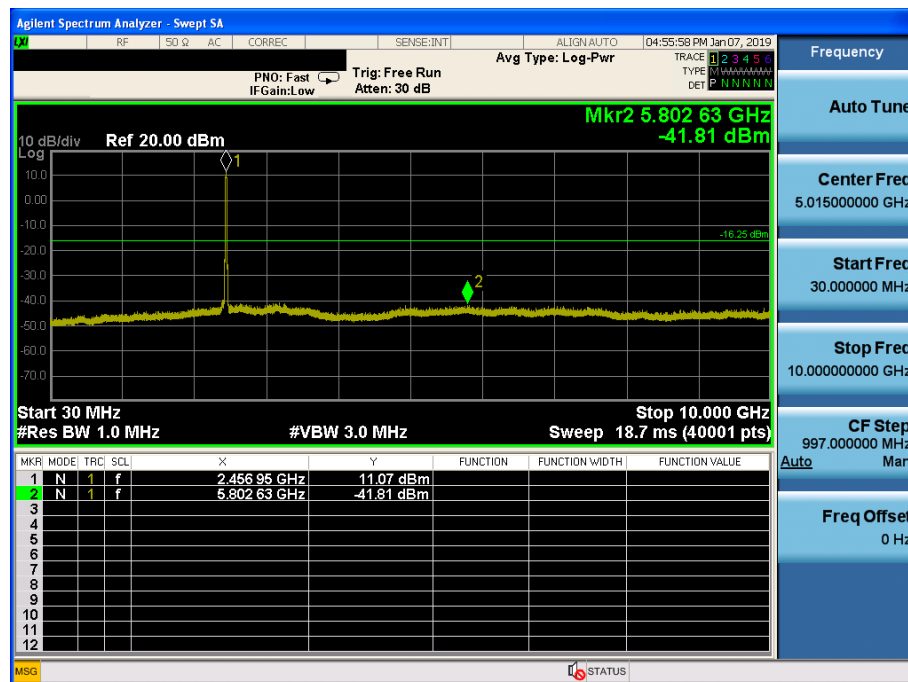
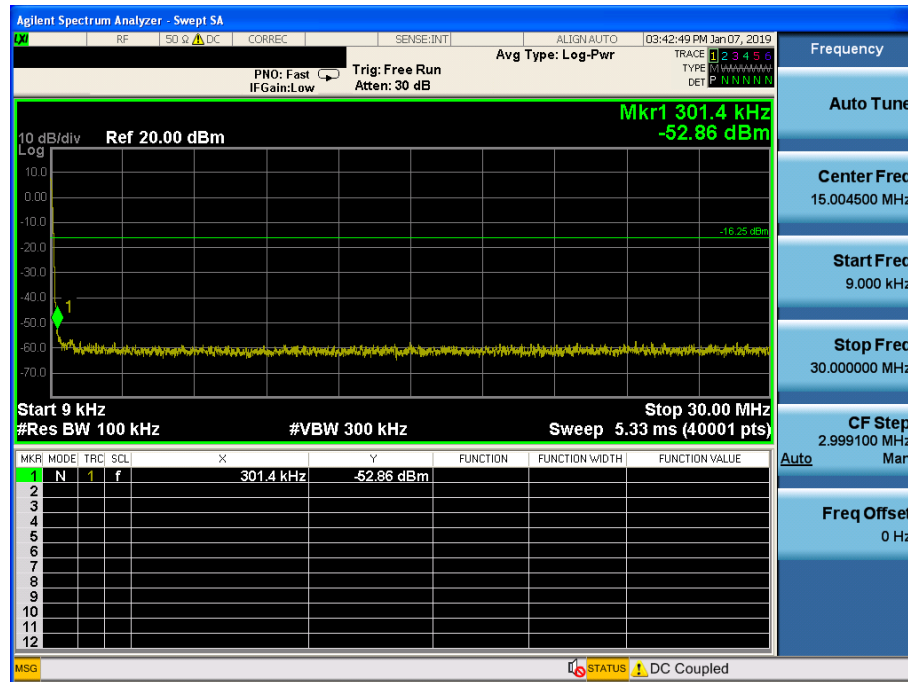
### Reference



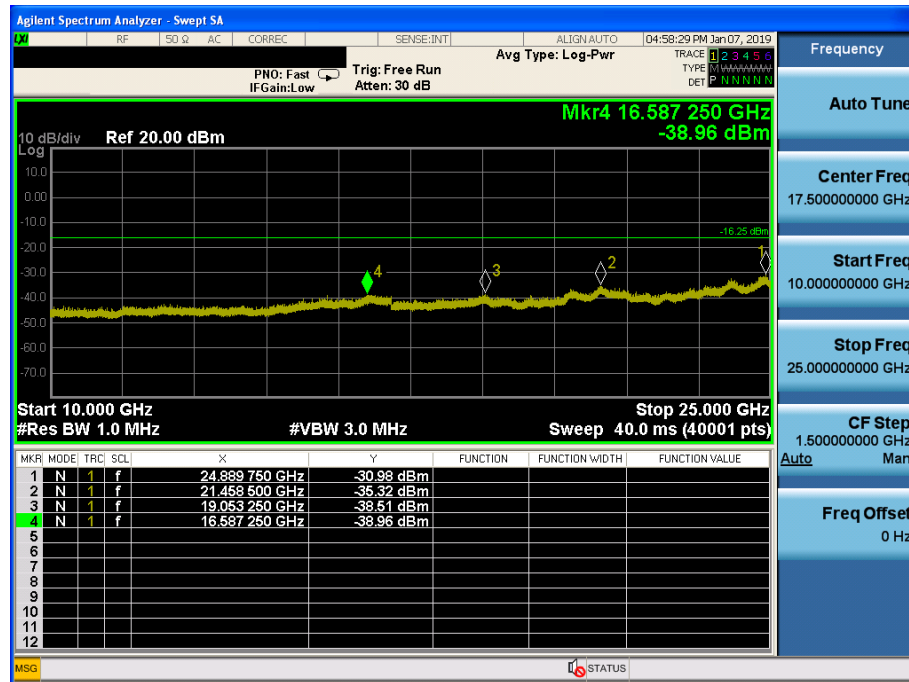
### High Band-edge



## Conducted Spurious Emissions

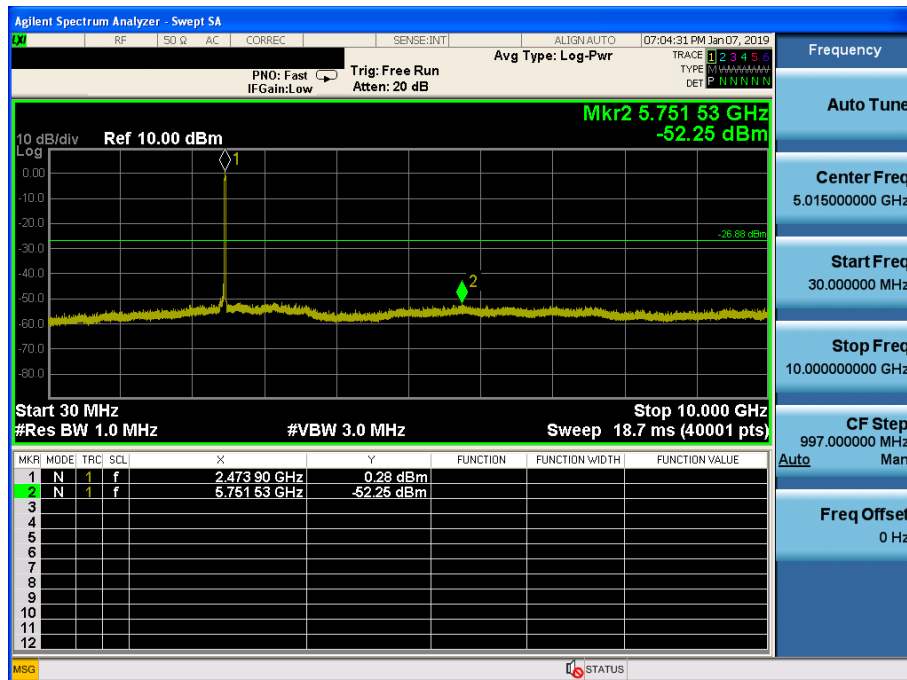
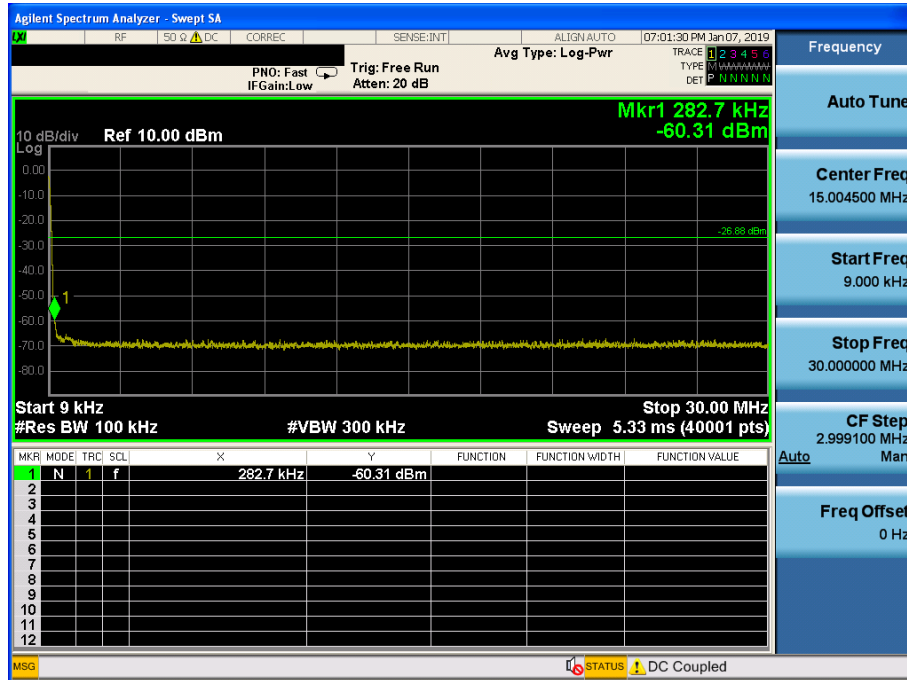


## Conducted Spurious Emissions

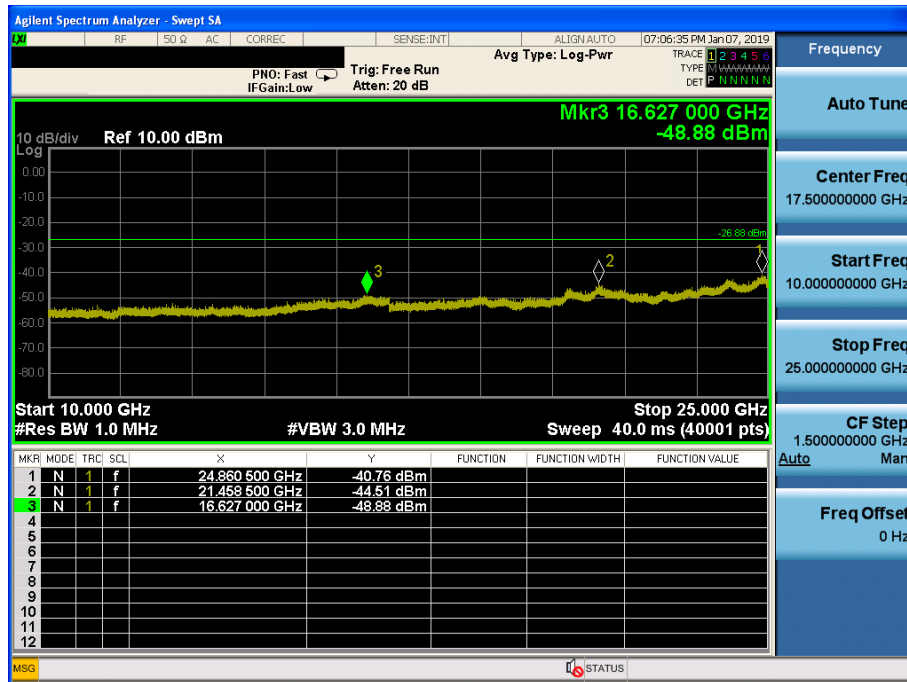




## Conducted Spurious Emissions



## 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, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the 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.

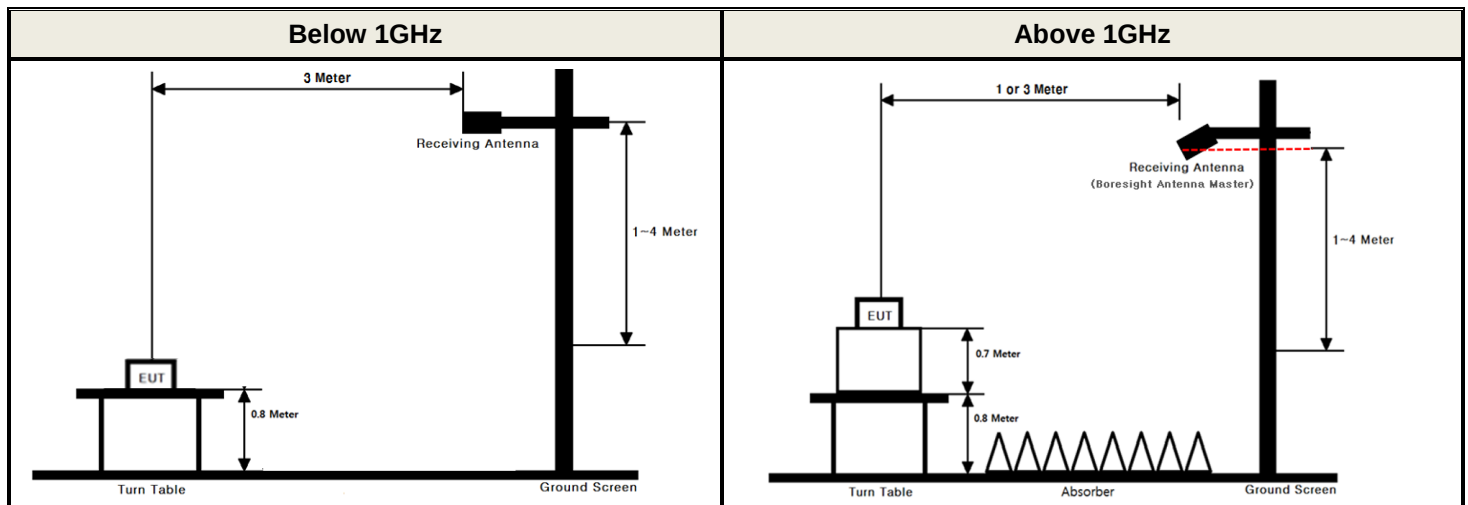
#### ▪ FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

| 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 ~ 12.52025 | 149.9 ~ 150.05    | 1645.5 ~ 1646.5 | 7.25 ~ 7.75  | 17.7 ~ 21.4   |
| 4.125 ~ 4.128     | 12.57675 ~ 12.57725 | 156.52475 ~       | 1660 ~ 1710     | 8.025 ~ 8.5  | 22.01 ~ 23.12 |
| 4.17725 ~ 4.17775 | 13.36 ~ 13.41       | 156.52525         | 1718.8 ~ 1722.2 | 9.0 ~ 9.2    | 23.6 ~ 24.0   |
| 4.20725 ~ 4.20775 | 16.42 ~ 16.423      | 156.7 ~ 156.9     | 2200 ~ 2300     | 9.3 ~ 9.5    | 31.2 ~ 31.8   |
| 6.215 ~ 6.218     | 16.69475 ~ 16.69525 | 162.0125 ~ 167.17 | 2310 ~ 2390     | 10.6 ~ 12.7  | 36.43 ~ 36.5  |
| 6.26775 ~ 6.26825 | 16.80425 ~ 16.80475 | 167.72 ~ 173.2    | 2483.5 ~ 2500   | 13.25 ~ 13.4 | Above 38.6    |
| 6.31175 ~ 6.31225 | 25.5 ~ 25.67        | 240 ~ 285         | 2655 ~ 2900     |              |               |
| 8.291 ~ 8.294     | 37.5 ~ 38.25        | 322 ~ 335.4       | 3260 ~ 3267     |              |               |
| 8.362 ~ 8.366     | 73 ~ 74.6           | 399.90 ~ 410      | 3332 ~ 3339     |              |               |
| 8.37625 ~ 8.38675 | 74.8 ~ 75.2         | 608 ~ 614         | 3345.8 ~ 3358   |              |               |
|                   |                     | 960 ~ 1240        | 3600 ~ 4400     |              |               |

▪ **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.

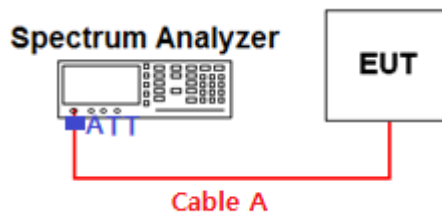
## ■ Test Configuration



## ■ 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.

## ■ Conducted Measurement



Path loss information

| Frequency (GHz)       | Path Loss (dB) | Frequency (GHz) | Path Loss (dB) |
|-----------------------|----------------|-----------------|----------------|
| 0.03                  | 3.83           | 15              | 4.17           |
| 1                     | 3.90           | 20              | 4.97           |
| 2.412 & 2.437 & 2.462 | 3.94           | 25              | 5.86           |
| 5                     | 4.60           | -               | -              |
| 10                    | 4.67           | -               | -              |

Note 1: The path loss from EUT to Spectrum analyzer was measured and used for test.

Path loss (S/A's correction factor) = Cable A

(Attenuator, Applied only when it was used externally)

## ■ 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

| Test Mode | Date rate | Duty Cycle (%) | Duty Cycle Correction Factor (dB) |
|-----------|-----------|----------------|-----------------------------------|
| TM 1      | 1 Mbps    | 98.94          | 0.05                              |
| TM 2      | 6 Mbps    | 96.53          | 0.16                              |
| TM 3      | MCS 0     | 95.82          | 0.19                              |

## ■ Test Results: **Comply**

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

**Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 1**

| Tested Frequency | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------------------|-----------------|---------|---------------------|---------------|----------------|------------|-----------|----------|-----------------|----------------|-------------|
| 2412             | 2389.32         | H       | X                   | PK            | 52.15          | 2.31       | N/A       | N/A      | 54.46           | 74.00          | 19.54       |
|                  | 2389.56         | H       | X                   | AV            | 42.33          | 2.31       | N/A       | N/A      | 44.64           | 54.00          | 9.36        |
|                  | 4823.87         | H       | Y                   | PK            | 50.77          | 0.84       | N/A       | N/A      | 51.61           | 74.00          | 22.39       |
|                  | 4823.90         | H       | Y                   | AV            | 40.81          | 0.84       | N/A       | N/A      | 41.65           | 54.00          | 12.35       |
|                  | 7237.24         | H       | Y                   | PK            | 47.99          | 7.63       | N/A       | N/A      | 55.62           | 74.00          | 18.38       |
|                  | 7235.27         | H       | Y                   | AV            | 39.21          | 7.63       | N/A       | N/A      | 46.84           | 54.00          | 7.16        |
| 2437             | 4874.03         | H       | Y                   | PK            | 50.25          | 0.87       | N/A       | N/A      | 51.12           | 74.00          | 22.88       |
|                  | 4873.88         | H       | Y                   | AV            | 40.83          | 0.87       | N/A       | N/A      | 41.70           | 54.00          | 12.30       |
|                  | 7310.94         | H       | Y                   | PK            | 47.59          | 7.76       | N/A       | N/A      | 55.35           | 74.00          | 18.65       |
|                  | 7310.19         | H       | Y                   | AV            | 37.34          | 7.76       | N/A       | N/A      | 45.10           | 54.00          | 8.90        |
| 2462             | 2483.98         | H       | X                   | PK            | 52.86          | 2.61       | N/A       | N/A      | 55.47           | 74.00          | 18.53       |
|                  | 2483.74         | H       | X                   | AV            | 43.01          | 2.61       | N/A       | N/A      | 45.62           | 54.00          | 8.38        |
|                  | 4923.90         | H       | Y                   | PK            | 50.33          | 0.98       | N/A       | N/A      | 51.31           | 74.00          | 22.69       |
|                  | 4924.16         | H       | Y                   | AV            | 40.35          | 0.98       | N/A       | N/A      | 41.33           | 54.00          | 12.67       |
|                  | 7386.05         | H       | Y                   | PK            | 47.43          | 7.68       | N/A       | N/A      | 55.11           | 74.00          | 18.89       |
|                  | 7386.44         | H       | Y                   | AV            | 37.11          | 7.68       | N/A       | N/A      | 44.79           | 54.00          | 9.21        |
| 2472             | 2484.01         | H       | X                   | PK            | 53.34          | 2.61       | N/A       | N/A      | 55.95           | 74.00          | 18.05       |
|                  | 2483.79         | H       | X                   | AV            | 42.93          | 2.61       | N/A       | N/A      | 45.54           | 54.00          | 8.46        |
|                  | 4943.55         | H       | Y                   | PK            | 50.33          | 1.03       | N/A       | N/A      | 51.36           | 74.00          | 22.64       |
|                  | 4943.58         | H       | Y                   | AV            | 39.31          | 1.03       | N/A       | N/A      | 40.34           | 54.00          | 13.66       |
|                  | 7416.08         | H       | Y                   | PK            | 47.16          | 7.63       | N/A       | N/A      | 54.79           | 74.00          | 19.21       |
|                  | 7415.92         | H       | Y                   | AV            | 36.93          | 7.63       | N/A       | N/A      | 44.56           | 54.00          | 9.44        |

**Note.**

- The radiated emissions were investigated 9kHz 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
- Information of Distance Factor.  
For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to the result.  
- Calculation of distance factor =  $20 \log(\text{applied distance} / \text{required distance}) = 20 \log(1 \text{ m} / 3 \text{ m}) = -9.54 \text{ dB}$

## Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 2

| Tested Frequency | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------------------|-----------------|---------|---------------------|---------------|----------------|------------|-----------|----------|-----------------|----------------|-------------|
| 2412             | 2389.51         | H       | X                   | PK            | 54.19          | 2.31       | N/A       | N/A      | 56.50           | 74.00          | 17.50       |
|                  | 2389.71         | H       | X                   | AV            | 43.33          | 2.31       | 0.16      | N/A      | 45.80           | 54.00          | 8.20        |
|                  | 4823.79         | H       | Y                   | PK            | 50.48          | 0.84       | N/A       | N/A      | 51.32           | 74.00          | 22.68       |
|                  | 4823.87         | H       | Y                   | AV            | 39.83          | 0.84       | 0.16      | N/A      | 40.83           | 54.00          | 13.17       |
|                  | 7233.85         | H       | Y                   | PK            | 48.42          | 7.62       | N/A       | N/A      | 56.04           | 74.00          | 17.96       |
|                  | 7234.19         | H       | Y                   | AV            | 37.17          | 7.62       | 0.16      | N/A      | 44.95           | 54.00          | 9.05        |
| 2437             | 4873.73         | H       | Y                   | PK            | 50.07          | 0.87       | N/A       | N/A      | 50.94           | 74.00          | 23.06       |
|                  | 4873.72         | H       | Y                   | AV            | 39.76          | 0.87       | 0.16      | N/A      | 40.79           | 54.00          | 13.21       |
|                  | 7314.77         | H       | Y                   | PK            | 47.97          | 7.75       | N/A       | N/A      | 55.72           | 74.00          | 18.28       |
|                  | 7314.41         | H       | Y                   | AV            | 36.92          | 7.75       | 0.16      | N/A      | 44.83           | 54.00          | 9.17        |
| 2462             | 2483.66         | H       | X                   | PK            | 60.31          | 2.61       | N/A       | N/A      | 62.92           | 74.00          | 11.08       |
|                  | 2483.78         | H       | X                   | AV            | 45.67          | 2.61       | 0.16      | N/A      | 48.44           | 54.00          | 5.56        |
|                  | 4924.14         | H       | Y                   | PK            | 49.91          | 0.98       | N/A       | N/A      | 50.89           | 74.00          | 23.11       |
|                  | 4924.02         | H       | Y                   | AV            | 39.23          | 0.98       | 0.16      | N/A      | 40.37           | 54.00          | 13.63       |
|                  | 7384.78         | H       | Y                   | PK            | 47.54          | 7.68       | N/A       | N/A      | 55.22           | 74.00          | 18.78       |
|                  | 7383.95         | H       | Y                   | AV            | 36.63          | 7.68       | 0.16      | N/A      | 44.47           | 54.00          | 9.53        |
| 2472             | 2483.52         | H       | X                   | PK            | 54.22          | 2.61       | N/A       | N/A      | 56.83           | 74.00          | 17.17       |
|                  | 2483.57         | H       | X                   | AV            | 44.62          | 2.61       | 0.16      | N/A      | 47.39           | 54.00          | 6.61        |
|                  | 4943.96         | H       | Y                   | PK            | 50.15          | 1.03       | N/A       | N/A      | 51.18           | 74.00          | 22.82       |
|                  | 4943.96         | H       | Y                   | AV            | 39.07          | 1.03       | 0.16      | N/A      | 40.26           | 54.00          | 13.74       |
|                  | 7416.10         | H       | Y                   | PK            | 47.17          | 7.63       | N/A       | N/A      | 54.80           | 74.00          | 19.20       |
|                  | 7416.23         | H       | Y                   | AV            | 36.96          | 7.63       | 0.16      | N/A      | 44.75           | 54.00          | 9.25        |

### Note.

- The radiated emissions were investigated 9kHz 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
- Information of Distance Factor.  
For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to the result.  
- Calculation of distance factor =  $20 \log(\text{applied distance} / \text{required distance}) = 20 \log(1 \text{ m} / 3 \text{ m}) = -9.54 \text{ dB}$

### Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : **TM 3**

| Tested Frequency | Frequency (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | T.F (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------------------|-----------------|---------|---------------------|---------------|----------------|------------|-----------|----------|-----------------|----------------|-------------|
| 2412             | 2389.43         | H       | X                   | PK            | 52.59          | 2.31       | N/A       | N/A      | 54.90           | 74.00          | 19.10       |
|                  | 2389.67         | H       | X                   | AV            | 42.62          | 2.31       | 0.19      | N/A      | 45.12           | 54.00          | 8.88        |
|                  | 4824.46         | H       | Y                   | PK            | 49.96          | 0.84       | N/A       | N/A      | 50.80           | 74.00          | 23.20       |
|                  | 4823.68         | H       | Y                   | AV            | 39.56          | 0.84       | 0.19      | N/A      | 40.59           | 54.00          | 13.41       |
|                  | 7231.24         | H       | Y                   | PK            | 47.63          | 7.62       | N/A       | N/A      | 55.25           | 74.00          | 18.75       |
|                  | 7229.78         | H       | Y                   | AV            | 37.11          | 7.62       | 0.19      | N/A      | 44.92           | 54.00          | 9.08        |
| 2437             | 4874.03         | H       | Y                   | PK            | 50.54          | 0.87       | N/A       | N/A      | 51.41           | 74.00          | 22.59       |
|                  | 4874.04         | H       | Y                   | AV            | 39.56          | 0.87       | 0.19      | N/A      | 40.62           | 54.00          | 13.38       |
|                  | 7313.70         | H       | Y                   | PK            | 46.92          | 7.76       | N/A       | N/A      | 54.68           | 74.00          | 19.32       |
|                  | 7312.49         | H       | Y                   | AV            | 36.71          | 7.76       | 0.19      | N/A      | 44.66           | 54.00          | 9.34        |
| 2462             | 2483.90         | H       | X                   | PK            | 68.38          | 2.61       | N/A       | N/A      | 70.99           | 74.00          | 3.01        |
|                  | 2483.74         | H       | X                   | AV            | 48.16          | 2.61       | 0.19      | N/A      | 50.96           | 54.00          | 3.04        |
|                  | 4923.96         | H       | Y                   | PK            | 49.88          | 0.98       | N/A       | N/A      | 50.86           | 74.00          | 23.14       |
|                  | 4924.34         | H       | Y                   | AV            | 39.26          | 0.98       | 0.19      | N/A      | 40.43           | 54.00          | 13.57       |
|                  | 7386.27         | H       | Y                   | PK            | 46.63          | 7.68       | N/A       | N/A      | 54.31           | 74.00          | 19.69       |
|                  | 7385.95         | H       | Y                   | AV            | 36.61          | 7.68       | 0.19      | N/A      | 44.48           | 54.00          | 9.52        |
| 2472             | 2483.53         | H       | X                   | PK            | 54.84          | 2.61       | N/A       | N/A      | 57.45           | 74.00          | 16.55       |
|                  | 2483.52         | H       | X                   | AV            | 45.28          | 2.61       | 0.19      | N/A      | 48.08           | 54.00          | 5.92        |
|                  | 4944.05         | H       | Y                   | PK            | 50.09          | 1.03       | N/A       | N/A      | 51.12           | 74.00          | 22.88       |
|                  | 4943.62         | H       | Y                   | AV            | 39.27          | 1.03       | 0.19      | N/A      | 40.49           | 54.00          | 13.51       |
|                  | 7416.03         | H       | Y                   | PK            | 48.69          | 7.63       | N/A       | N/A      | 56.32           | 74.00          | 17.68       |
|                  | 7416.45         | H       | Y                   | AV            | 36.78          | 7.63       | 0.19      | N/A      | 44.60           | 54.00          | 9.40        |

#### **Note.**

- The radiated emissions were investigated 9kHz 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
- Information of Distance Factor.  
For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to the result.  
- Calculation of distance factor =  $20 \log(\text{applied distance} / \text{required distance}) = 20 \log(1 \text{ m} / 3 \text{ m}) = -9.54 \text{ dB}$

## 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<br>(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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### ■ 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)

Test Mode: TM 2 &amp; 2437 MHz

## Results of Conducted Emission

DTNC

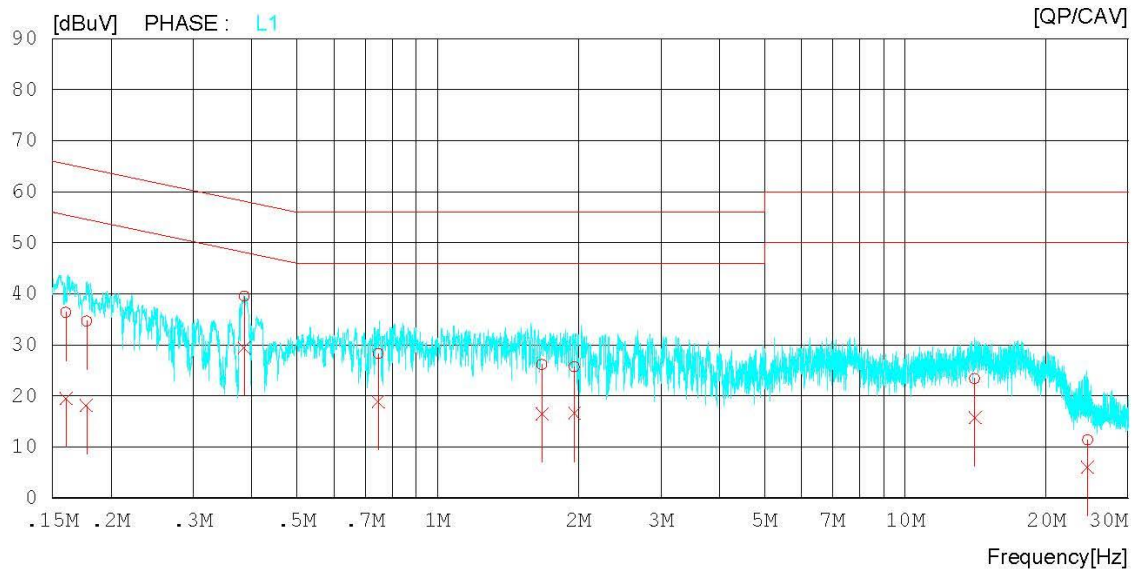
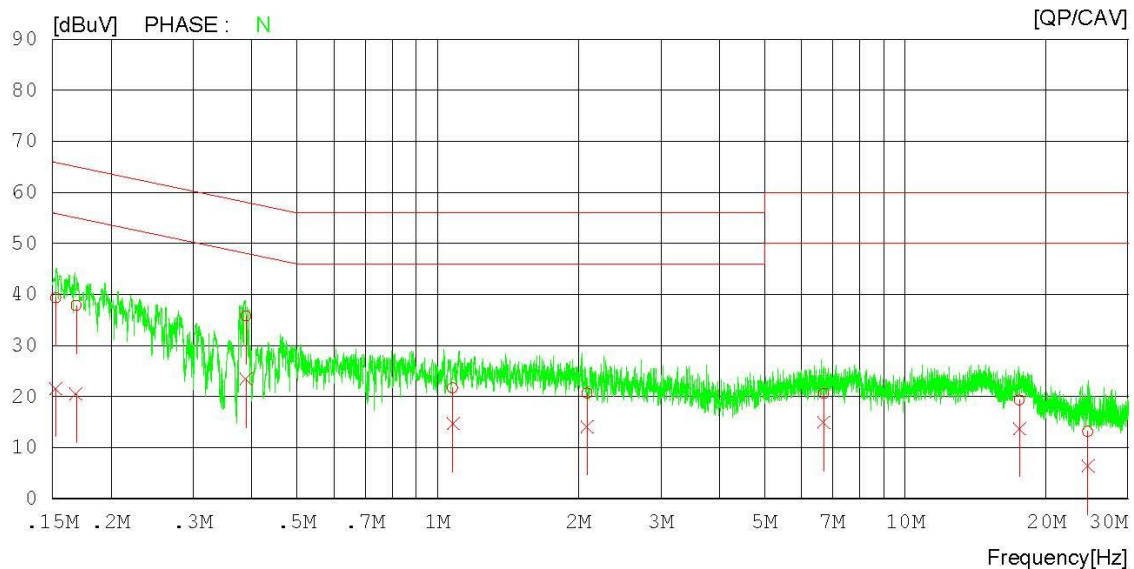
Date 2019-01-02

Order No.  
Model No. LM-X420HM  
Serial No.  
Test Condition 2.4G (WLAN)

Reference No.  
Power Supply 120 V, 60 Hz  
Temp/Humi. 23 'C / 45 %  
Operator SunGeun Lee

Memo

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



## AC Line Conducted Emissions (List)

Test Mode: TM 2 & 2437 MHz

## Results of Conducted Emission

DTNC

Date 2019-01-02

Order No.  
Model No. LM-X420HM  
Serial No.  
Test Condition 2.4G (WLAN)

Reference No.  
Power Supply 120 V, 60 Hz  
Temp/Humi. 23 'C / 45 %  
Operator SunGeun Lee

Memo

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] | QP<br>[dBuV] | CAV<br>[dBuV] |       |
| 1  | 0.15248       | 29.07        | 11.30         | 10.28            | 39.35        | 21.58         | 65.86        | 55.86         | 26.51        | 34.28         | N     |
| 2  | 0.16852       | 27.72        | 10.29         | 10.19            | 37.91        | 20.48         | 65.03        | 55.03         | 27.12        | 34.55         | N     |
| 3  | 0.38886       | 25.79        | 13.46         | 10.02            | 35.81        | 23.48         | 58.09        | 48.09         | 22.28        | 24.61         | N     |
| 4  | 1.07760       | 11.69        | 4.64          | 10.05            | 21.74        | 14.69         | 56.00        | 46.00         | 34.26        | 31.31         | N     |
| 5  | 2.08640       | 10.54        | 4.06          | 10.11            | 20.65        | 14.17         | 56.00        | 46.00         | 35.35        | 31.83         | N     |
| 6  | 6.69460       | 10.33        | 4.68          | 10.29            | 20.62        | 14.97         | 60.00        | 50.00         | 39.38        | 35.03         | N     |
| 7  | 17.54840      | 8.74         | 3.17          | 10.56            | 19.30        | 13.73         | 60.00        | 50.00         | 40.70        | 36.27         | N     |
| 8  | 24.58240      | 2.50         | -4.21         | 10.65            | 13.15        | 6.44          | 60.00        | 50.00         | 46.85        | 43.56         | N     |
| 9  | 0.16031       | 26.15        | 9.22          | 10.20            | 36.35        | 19.42         | 65.45        | 55.45         | 29.10        | 36.03         | L1    |
| 10 | 0.17735       | 24.56        | 7.96          | 10.11            | 34.67        | 18.07         | 64.61        | 54.61         | 29.94        | 36.54         | L1    |
| 11 | 0.38575       | 29.51        | 19.46         | 9.99             | 39.50        | 29.45         | 58.15        | 48.15         | 18.65        | 18.70         | L1    |
| 12 | 0.74650       | 18.30        | 8.84          | 10.01            | 28.31        | 18.85         | 56.00        | 46.00         | 27.69        | 27.15         | L1    |
| 13 | 1.67320       | 16.10        | 6.43          | 10.06            | 26.16        | 16.49         | 56.00        | 46.00         | 29.84        | 29.51         | L1    |
| 14 | 1.96080       | 15.60        | 6.52          | 10.07            | 25.67        | 16.59         | 56.00        | 46.00         | 30.33        | 29.41         | L1    |
| 15 | 14.08720      | 12.92        | 5.21          | 10.45            | 23.37        | 15.66         | 60.00        | 50.00         | 36.63        | 34.34         | L1    |
| 16 | 24.53520      | 0.77         | -4.58         | 10.59            | 11.36        | 6.01          | 60.00        | 50.00         | 48.64        | 43.99         | L1    |

## 9. 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                      | 18/12/19               | 19/12/19                    | MY48010133         |
| Spectrum Analyzer                   | Agilent Technologies   | N9020A                      | 18/12/19               | 19/12/19                    | MY48011700         |
| Attenuator                          | SMAJK                  | SMAJK-2-3                   | 18/07/04               | 19/07/04                    | 4                  |
| DC Power Supply                     | Agilent Technologies   | 66332A                      | 18/07/02               | 19/07/02                    | US37473422         |
| Multimeter                          | FLUKE                  | 17B                         | 18/12/18               | 19/12/18                    | 26030065WS         |
| Signal Generator                    | Rohde Schwarz          | SMBV100A                    | 18/12/19               | 19/12/19                    | 255571             |
| Signal Generator                    | ANRITSU                | MG3695C                     | 18/12/10               | 19/12/10                    | 173501             |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 18/12/27               | 19/12/27                    | 120612-1           |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 18/12/27               | 19/12/27                    | 120612-2           |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 18/07/09               | 19/07/09                    | N/A                |
| HYGROMETER                          | TESTO                  | 608-H1                      | 18/02/10               | 19/02/10                    | 34862883           |
| Loop Antenna                        | Schwarzbeck            | FMZB1513                    | 18/01/30               | 20/01/30                    | 1513-128           |
| BILOG ANTENNA                       | Schwarzbeck            | VULB 9160                   | 18/07/13               | 20/07/13                    | 3359               |
| Horn Antenna                        | ETS-Lindgren           | 3115                        | 18/01/30               | 20/01/30                    | 6419               |
| Horn Antenna                        | Schwarzbeck            | BBHA 9120C                  | 17/12/04               | 19/12/04                    | 9120C-561          |
| Horn Antenna                        | A.H.Systems Inc.       | SAS-574                     | 17/07/31               | 19/07/31                    | 155                |
| PreAmplifier                        | tsj                    | MLA-0118-J01-45             | 18/02/08               | 19/02/08                    | 17138              |
| PreAmplifier                        | tsj                    | MLA-1840-J02-45             | 18/07/06               | 19/07/06                    | 16966-10728        |
| PreAmplifier                        | H.P                    | 8447D                       | 18/12/18               | 19/12/18                    | 2944A07774         |
| Attenuator                          | SMAJK                  | SMAJK-2-3                   | 18/07/02               | 19/07/02                    | 3                  |
| Attenuator                          | Aeroflex/Weinschel     | 56-3                        | 18/07/02               | 19/07/02                    | Y2370              |
| Attenuator                          | SRTechnology           | F01-B0606-01                | 18/07/02               | 19/07/02                    | 13092403           |
| Attenuator                          | Hefei Shunze           | SS5T2.92-10-40              | 18/07/03               | 19/07/03                    | 16012202           |
| High Pass Filter                    | Wainwright Instruments | WHNX8.0/26.5-6SS            | 18/07/03               | 19/07/03                    | 3                  |
| High Pass Filter                    | Wainwright Instruments | WHKX12-935-1000-15000-40SS  | 18/07/02               | 19/07/02                    | 8                  |
| High Pass Filter                    | Wainwright Instruments | WHKX10-2838-3300-18000-60SS | 18/07/02               | 19/07/02                    | 1                  |
| Power Meter & Wide Bandwidth Sensor | Anritsu                | ML2495A<br>MA2490A          | 18/04/17               | 19/04/17                    | 1306007<br>1249001 |
| EMI Test Receiver                   | Rohde Schwarz          | ESR7                        | 18/02/13               | 19/02/13                    | 101061             |
| EMI Test Receiver                   | Rohde Schwarz          | ESCi7                       | 18/02/12               | 19/02/12                    | 100910             |
| PULSE LIMITER                       | Rohde Schwarz          | ESH3-Z2                     | 18/09/27               | 19/09/27                    | 101333             |
| LISN                                | SCHWARZBECK            | NNLK 8121                   | 18/03/20               | 19/03/20                    | 06183              |
| Cable                               | Radiall                | TESTPRO3                    | 18/07/06               | 19/07/06                    | M-01               |
| Cable                               | Junkosha               | MWX315                      | 18/11/19               | 19/11/19                    | M-05               |
| Cable                               | Junkosha               | MWX221                      | 18/11/19               | 19/11/19                    | M-06               |
| Cable                               | Junkosha               | MWX241                      | 18/06/25               | 19/06/25                    | G-04               |
| Cable                               | Junkosha               | MWX241                      | 18/06/25               | 19/06/25                    | G-07               |
| Cable                               | DT&C                   | Cable                       | 18/07/06               | 19/07/06                    | G-13               |
| Cable                               | DT&C                   | Cable                       | 18/07/06               | 19/07/06                    | G-14               |
| Cable                               | HUBER+SUHNER           | SUCOFLEX 104                | 18/07/06               | 19/07/06                    | G-15               |
| Cable                               | DT&C                   | Cable                       | 18/06/25               | 19/06/25                    | RF-18              |
| Cable                               | DT&C                   | Cable                       | 18/07/05               | 19/07/05                    | RF-82              |

Note 1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017

Note 2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

## APPENDIX I

### Duty cycle plots

#### ▪ Test Procedure

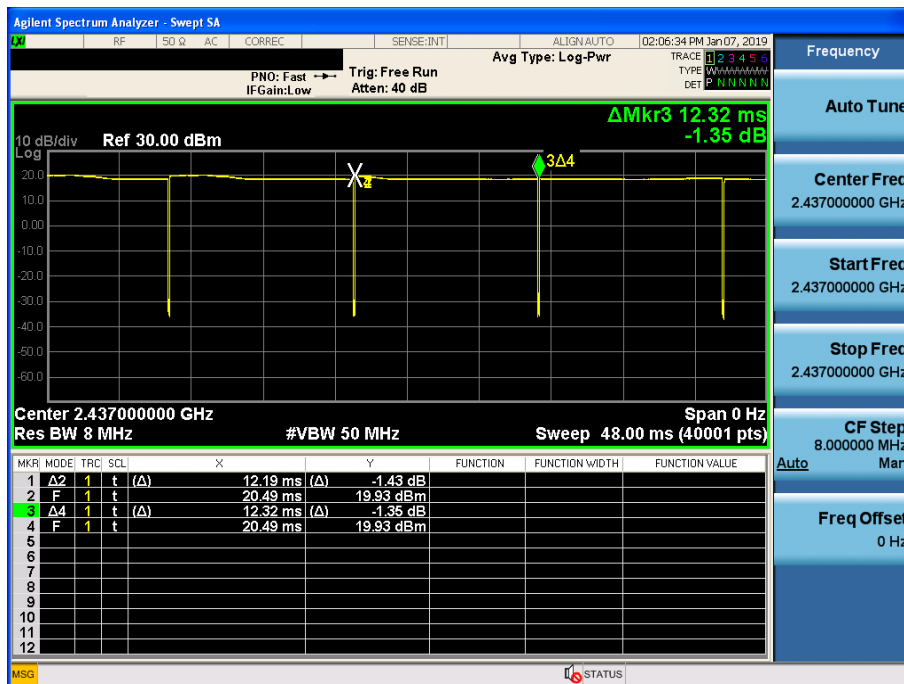
Duty Cycle was measured using **section 6.0 b) of KDB558074 D01V05** :

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.)

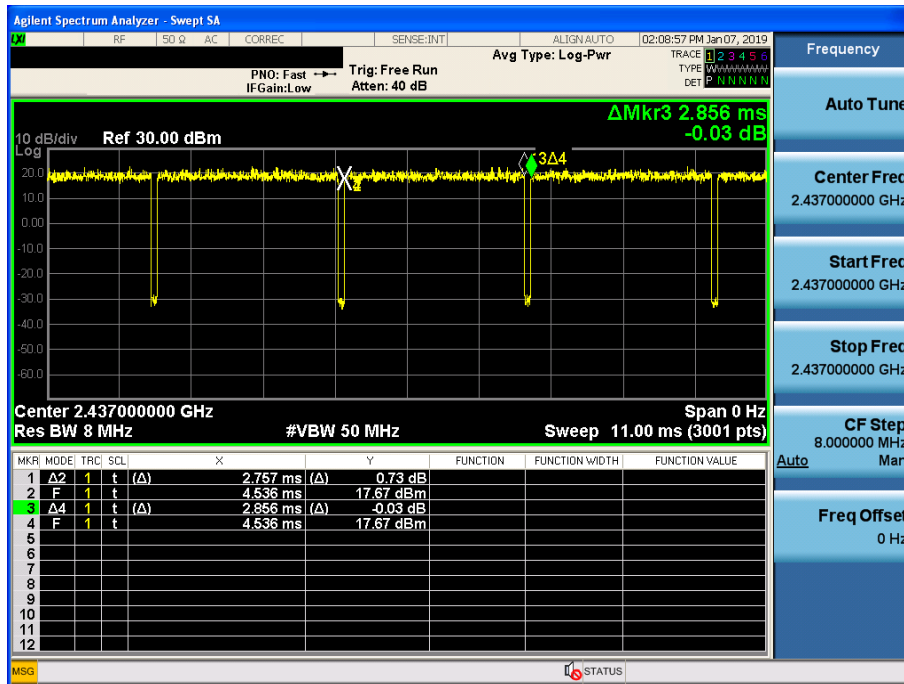
### Duty Cycle

TM 1 & 2437



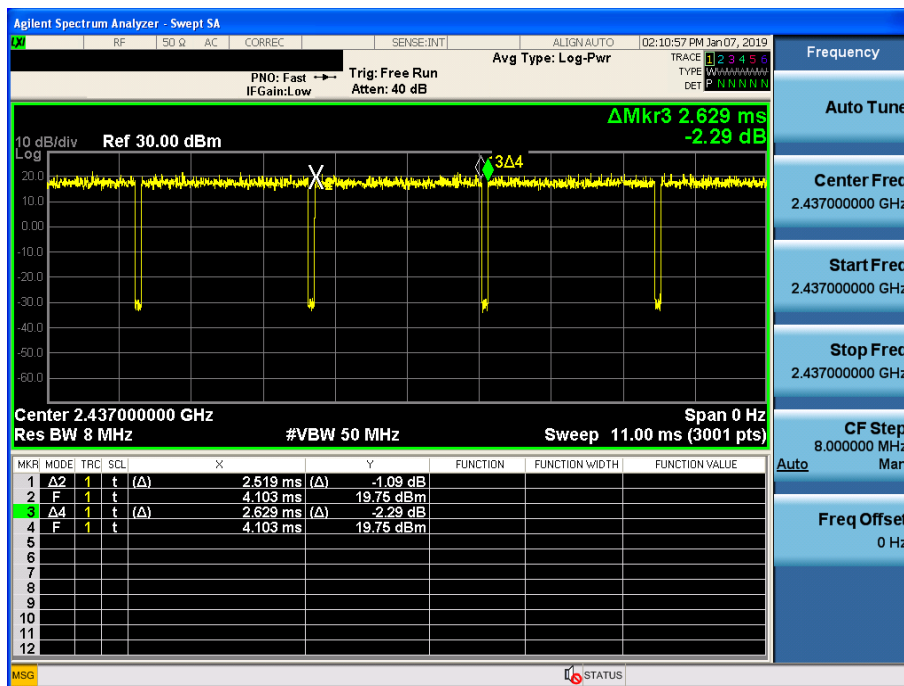
# Duty Cycle

TM 2 & 2437



# Duty Cycle

TM 3 & 2437

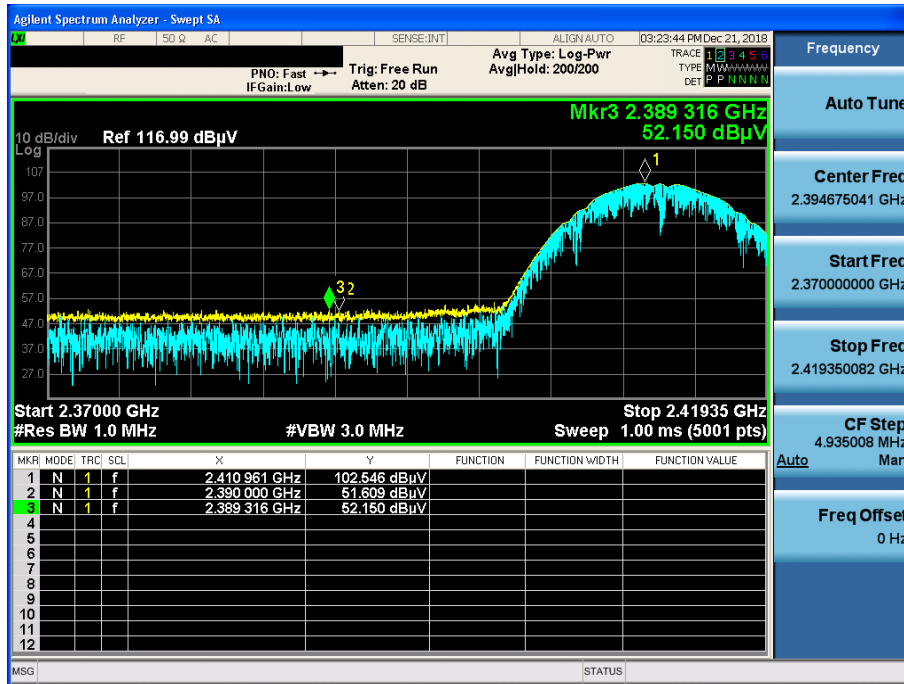


## APPENDIX II

## Unwanted Emissions (Radiated) Test Plot

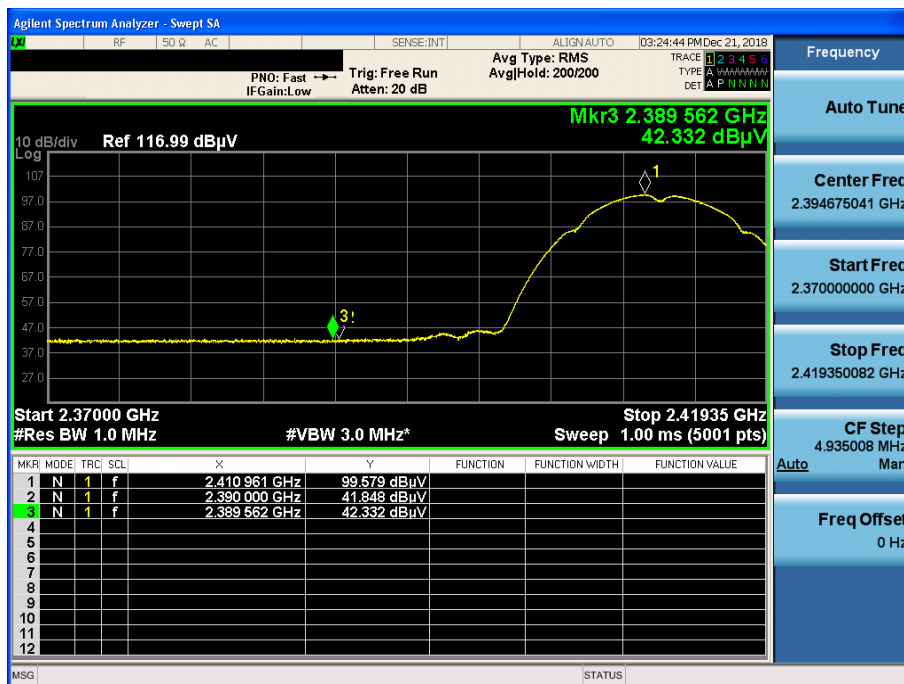
TM 1 & 2412 & X axis & Hor

**Detector Mode : PK**



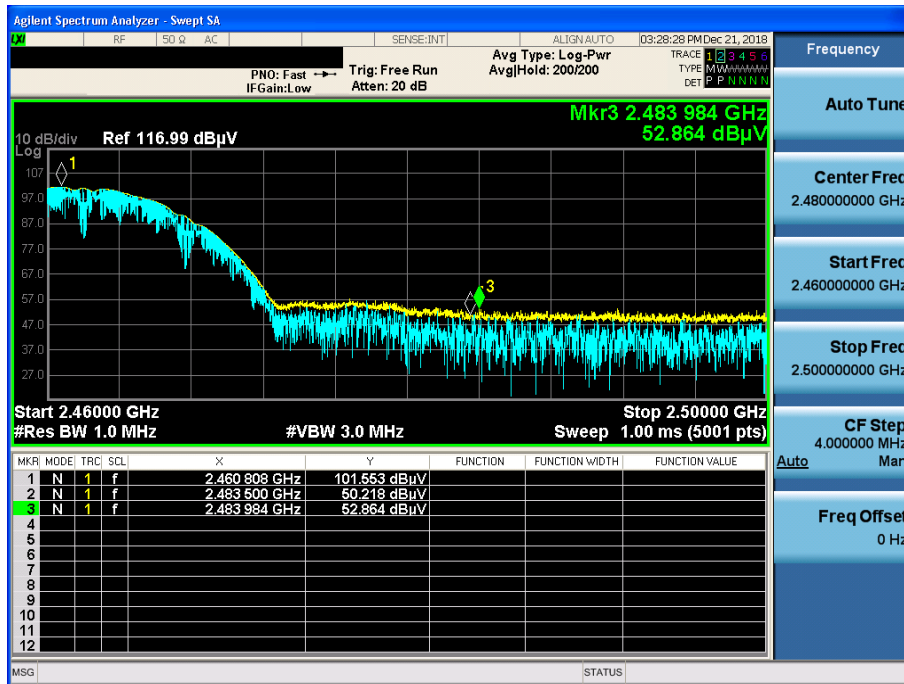
TM 1 & 2412 & X axis & Hor

**Detector Mode : AV**



TM 1 & 2462 & X axis & Hor

Detector Mode : PK



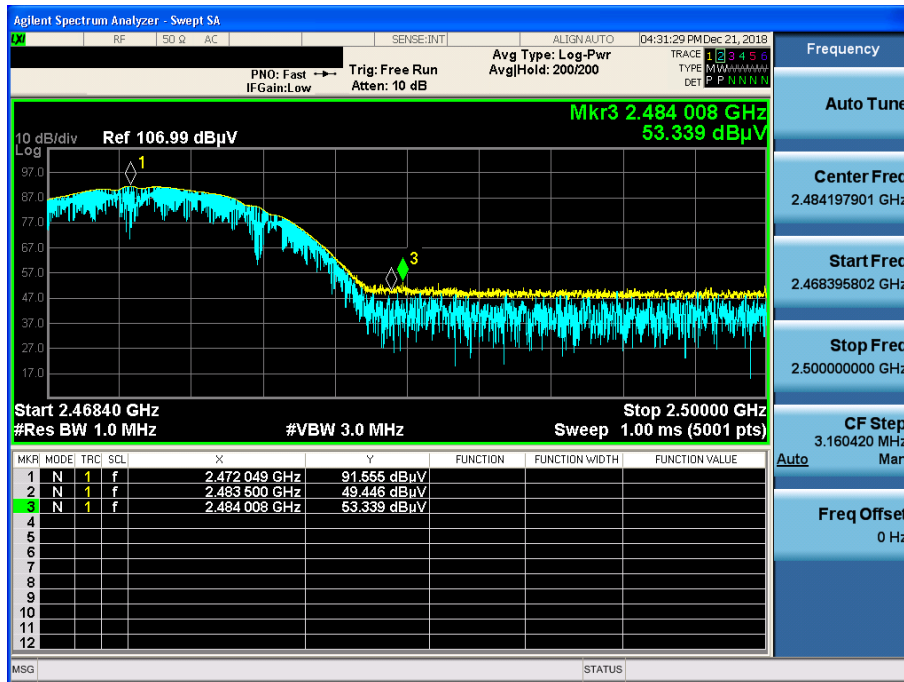
TM 1 & 2462 & X axis & Hor

Detector Mode : AV



TM 1 & 2472 & X axis & Hor

Detector Mode : PK



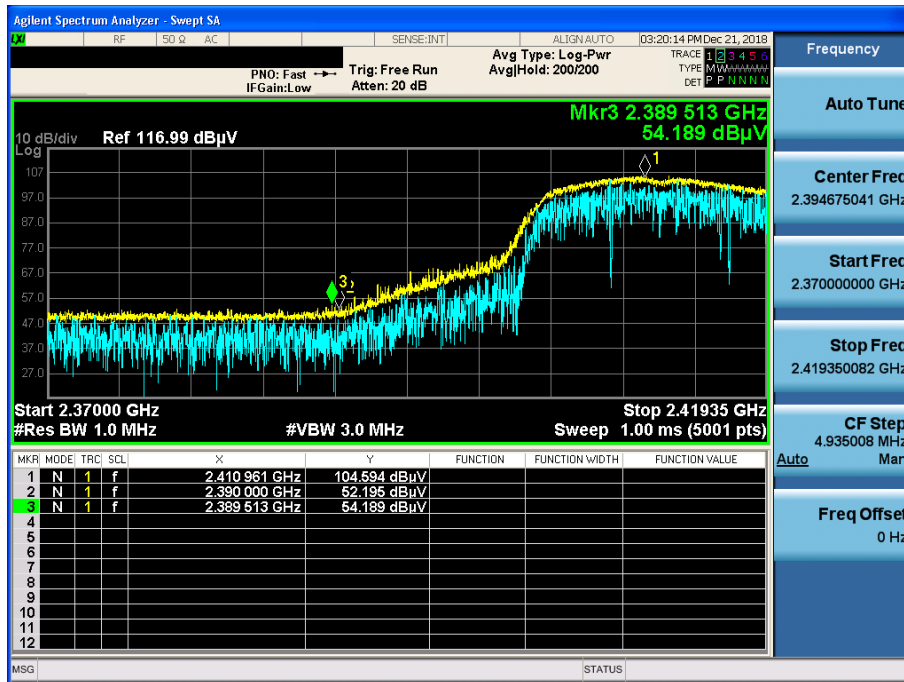
TM 1 & 2472 & X axis & Hor

Detector Mode : AV



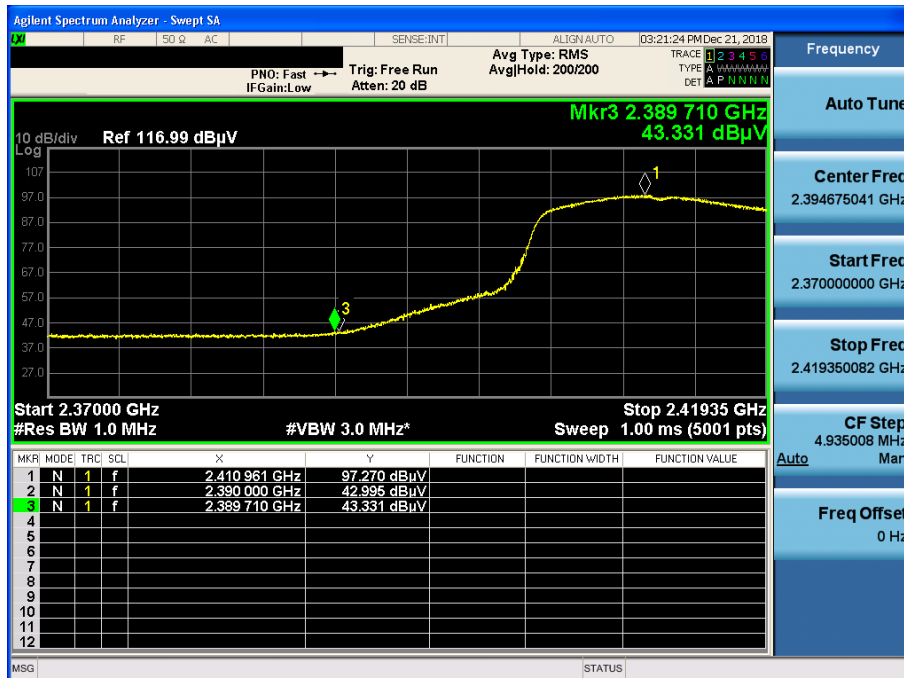
TM 2 & 2412 & X axis & Hor

Detector Mode : PK



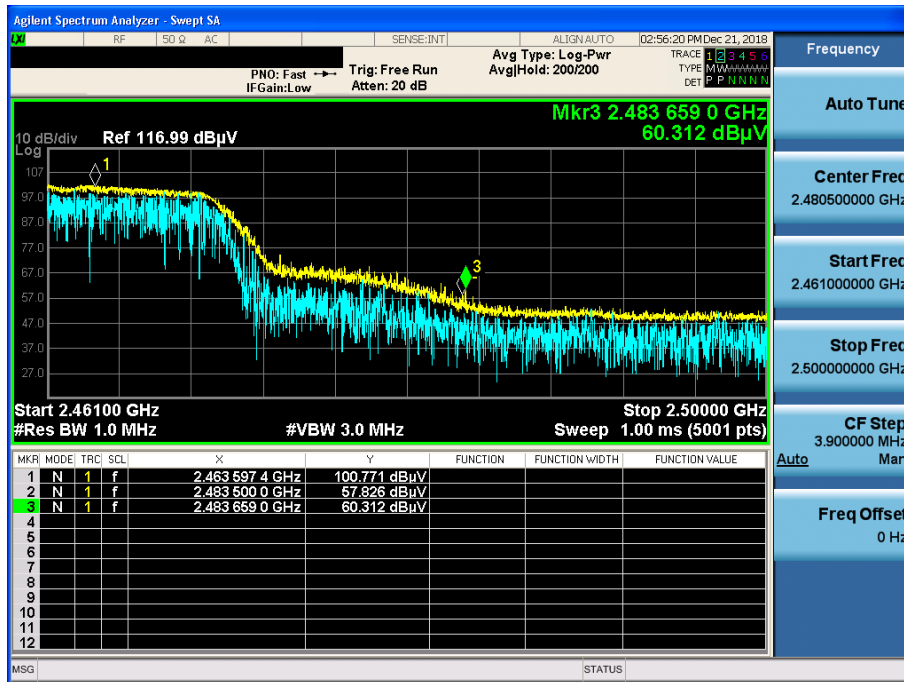
TM 2 & 2412 & X axis & Hor

Detector Mode : AV



TM 2 & 2462 & X axis & Hor

Detector Mode : PK



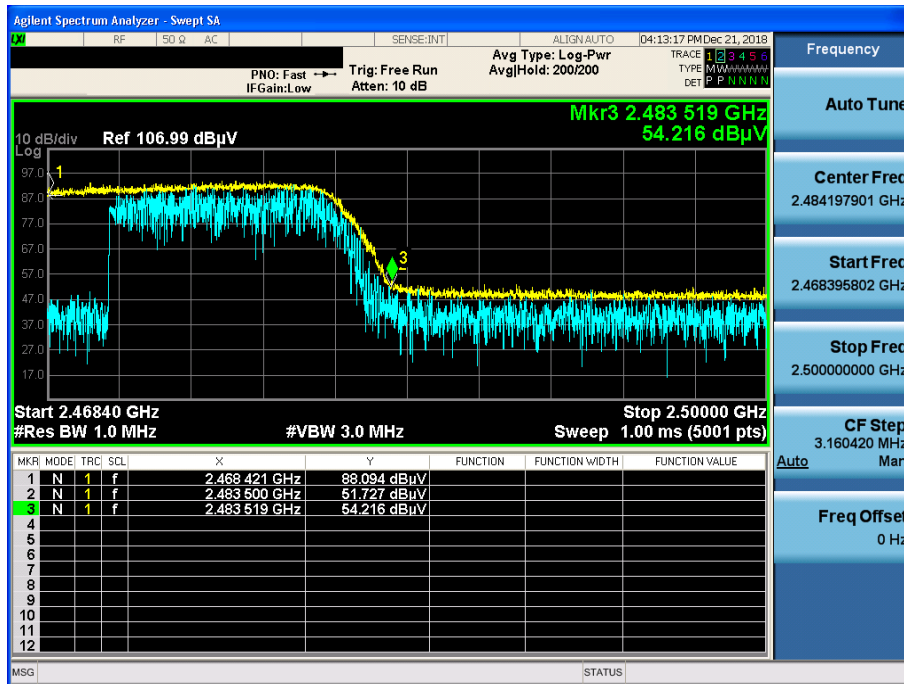
TM 2 & 2462 & X axis & Hor

Detector Mode : AV



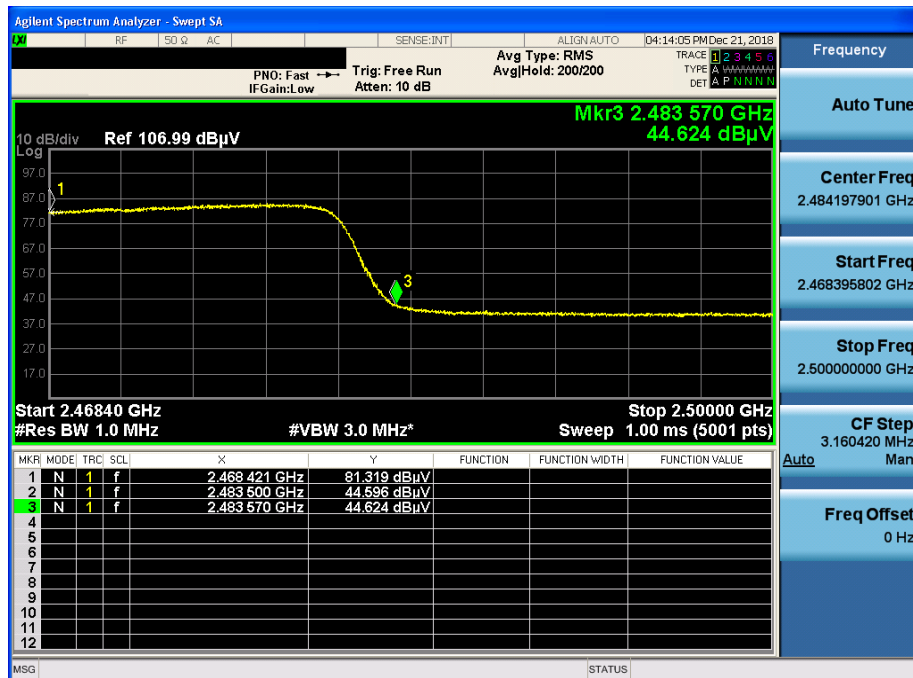
TM 2 & 2472 & X axis & Hor

Detector Mode : PK



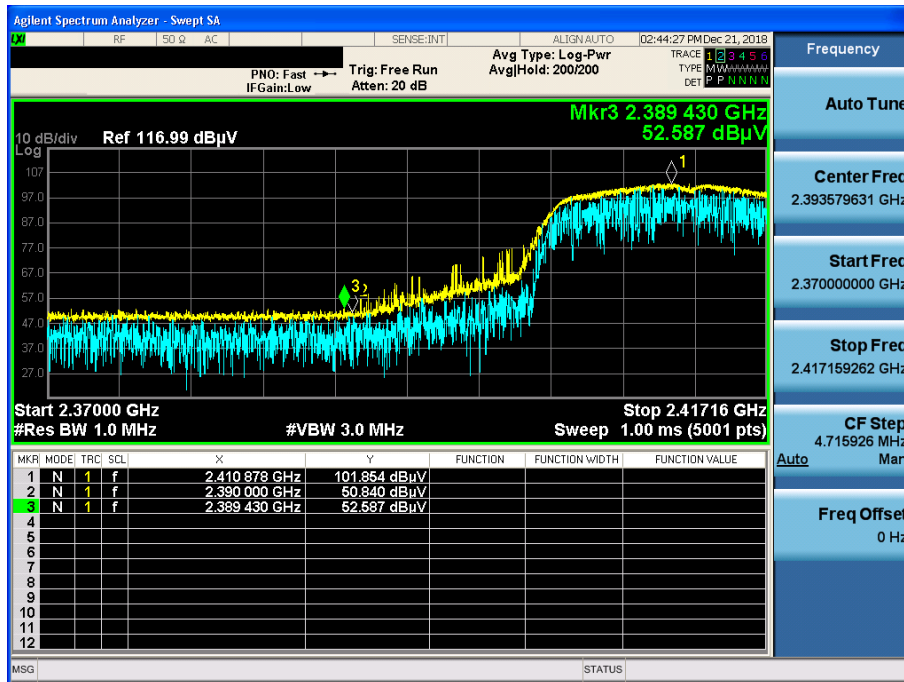
TM 2 & 2472 & X axis & Hor

Detector Mode : AV



TM 3 & 2412 & X axis & Hor

Detector Mode : PK



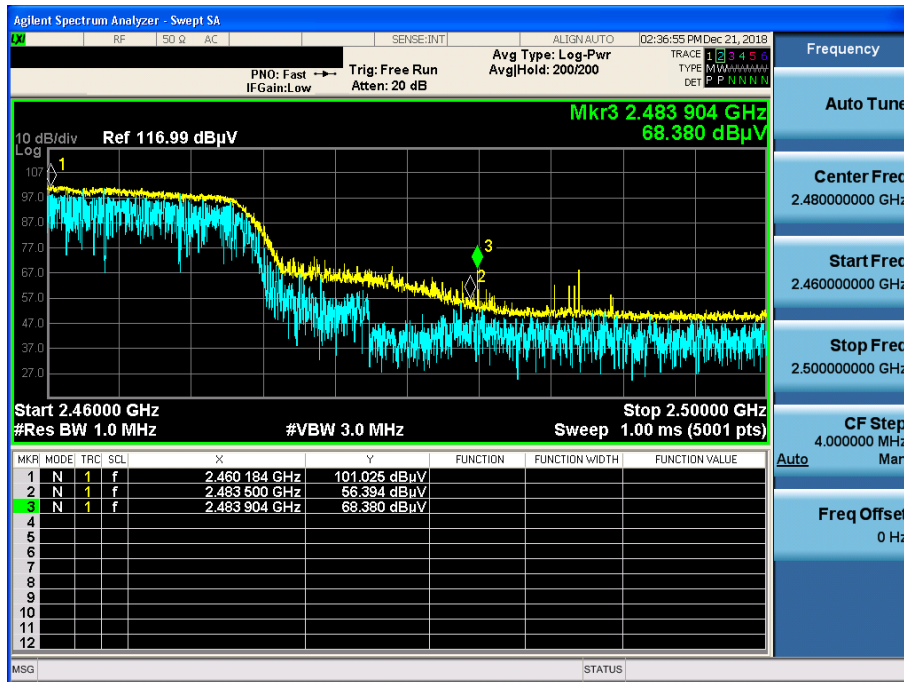
TM 3 & 2412 & X axis & Hor

Detector Mode : AV



TM 3 & 2462 & X axis & Hor

Detector Mode : PK



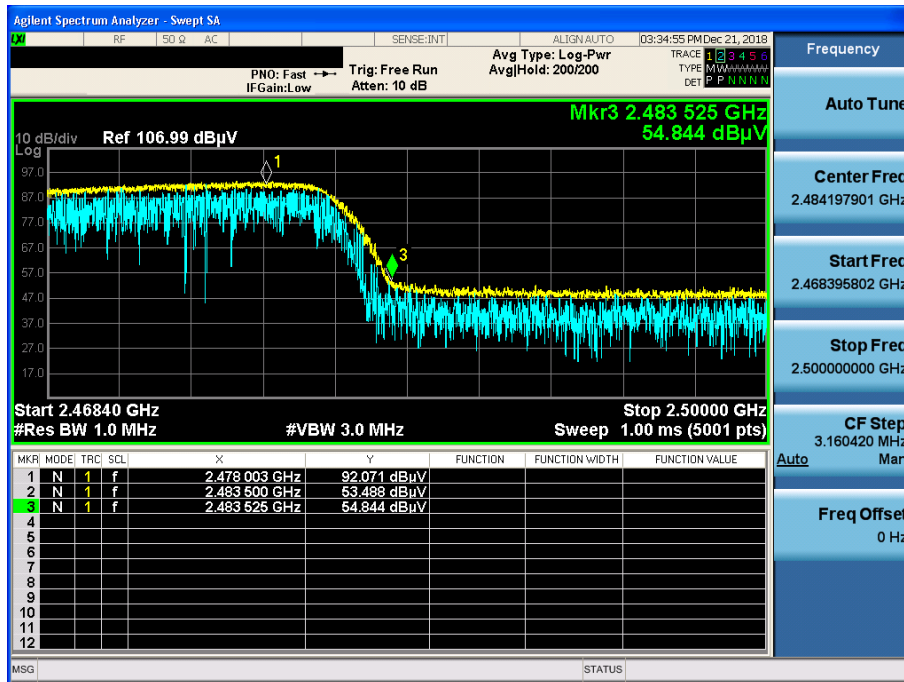
TM 3 & 2462 & X axis & Hor

Detector Mode : AV



TM 3 & 2472 & X axis & Hor

Detector Mode : PK



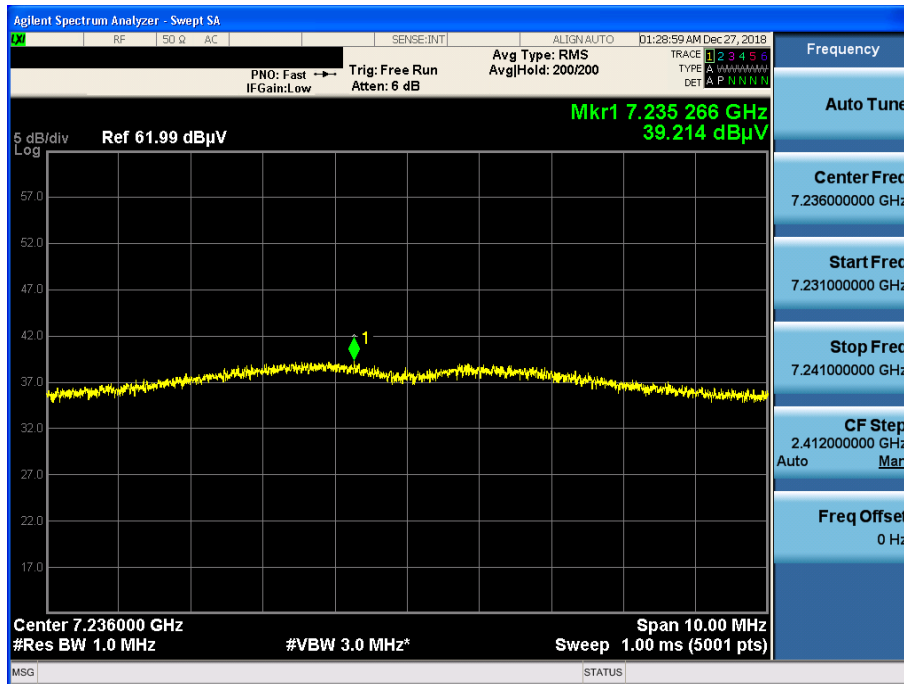
TM 3 & 2472 & X axis & Hor

Detector Mode : AV



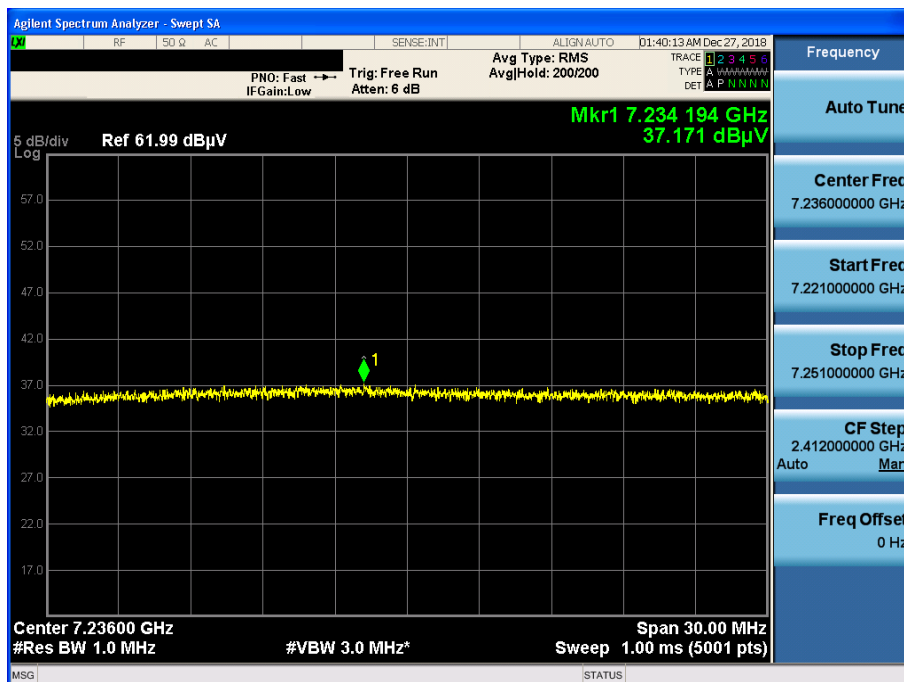
TM 1 & 2412 & Y axis & Hor

Detector Mode : AV



TM 2 & 2412 & Y axis & Hor

Detector Mode : AV



TM 3 & 2412 & Y axis & Hor

Detector Mode : AV

