

Appendix C

RF Test Data for 2.4G WIFI (Conducted Measurement)

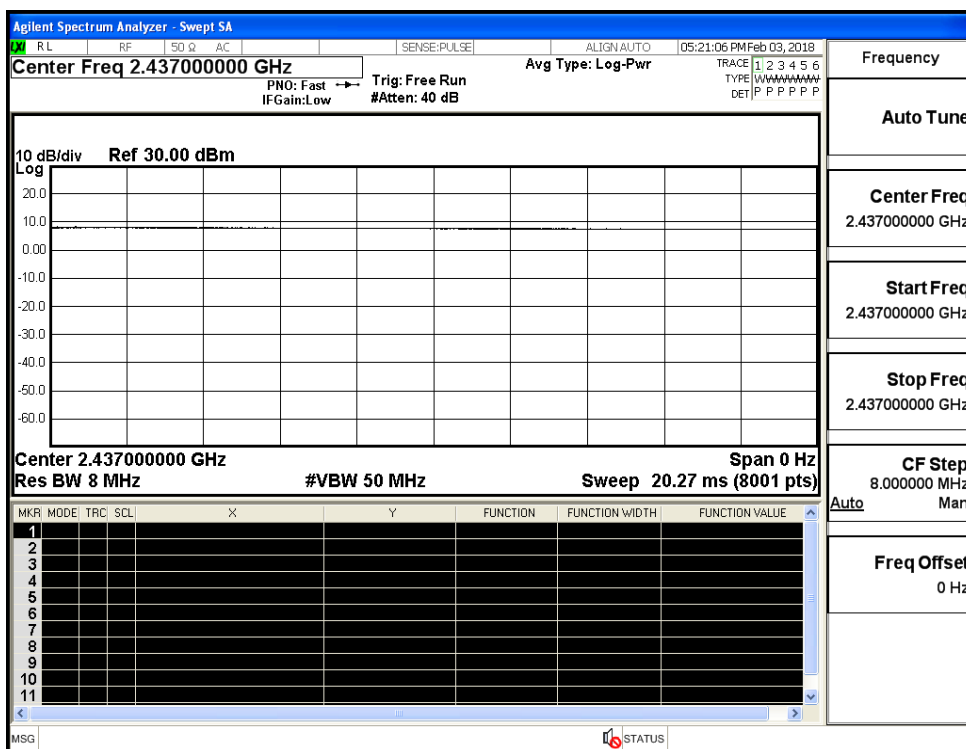
Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 23.5 °C |
| Relative Humidity: | 51.6% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | Mina.xu |
| Supervised by: | Tom.Liu |

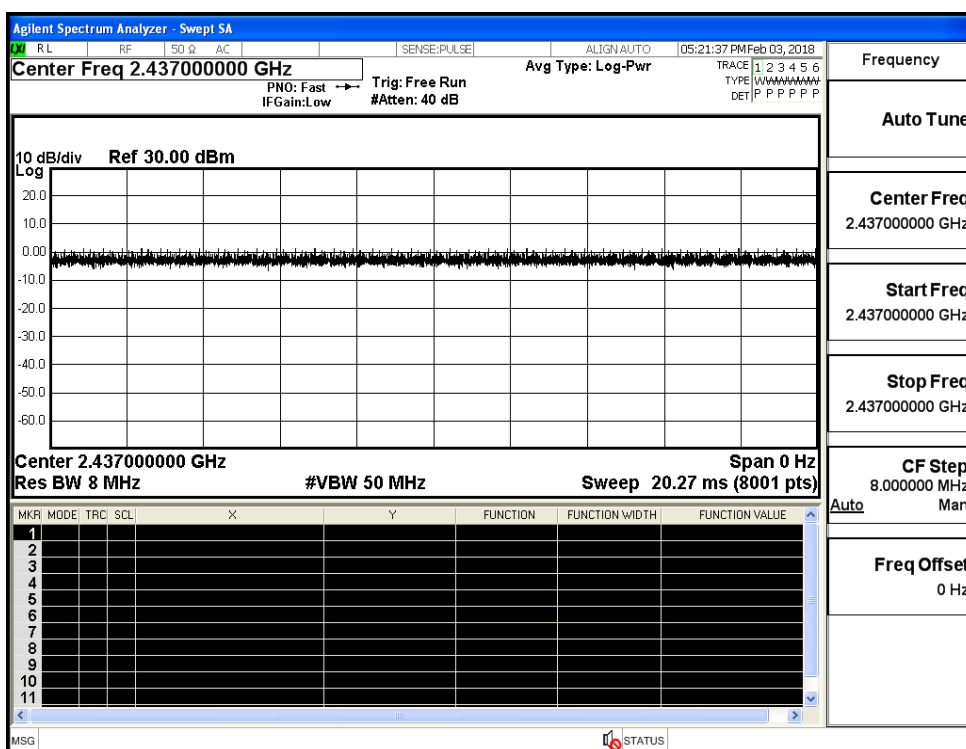
1 Duty Cycle

| Test Mode | Test Channel | Ant | Duty Cycle[%] | Verdict |
|-----------|--------------|------|---------------|---------|
| 11B | 2437 | Ant1 | 100 | PASS |
| 11G | 2437 | Ant1 | 100 | PASS |
| 11N20SISO | 2437 | Ant1 | 100 | PASS |
| 11N40SISO | 2437 | Ant1 | 100 | PASS |

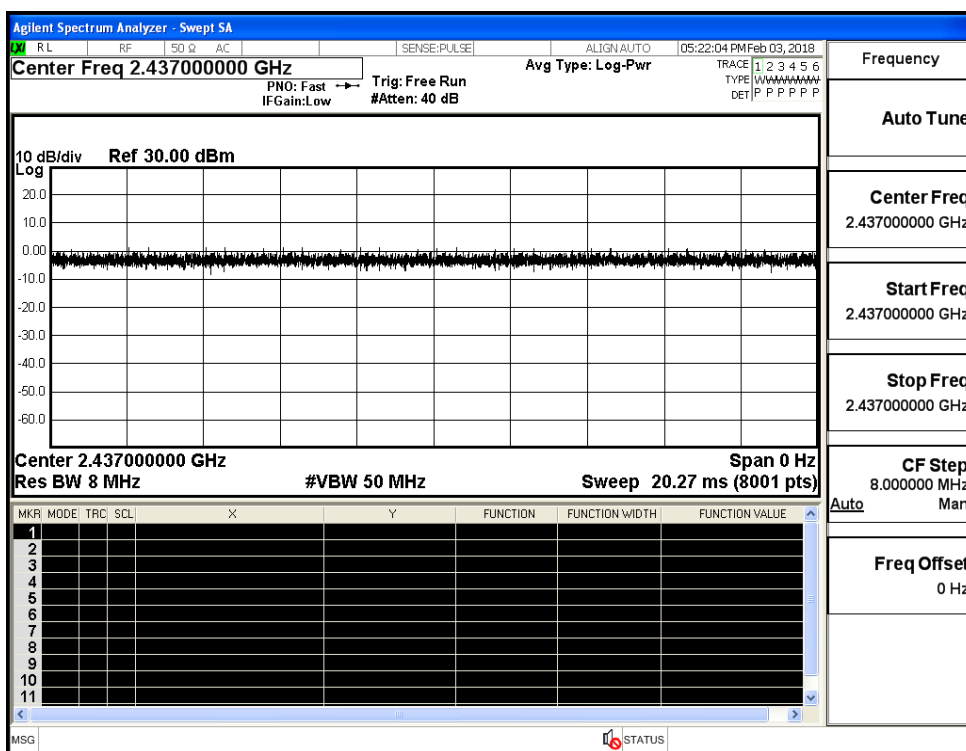
Duty Cycle_11B_2437_Ant1



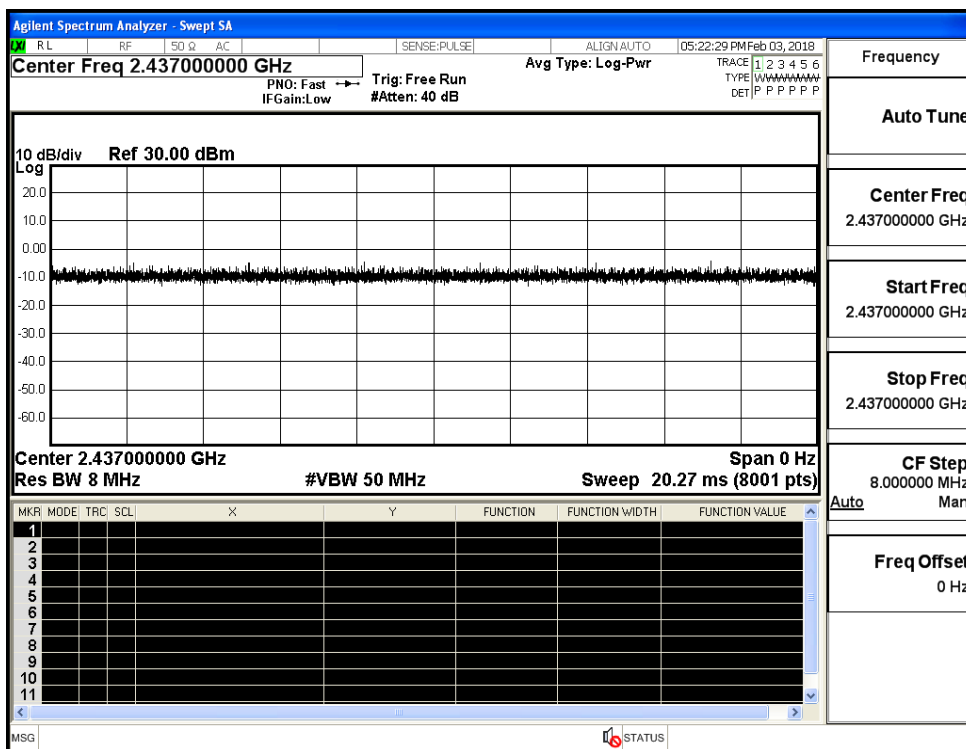
Duty Cycle_11G_2437_Ant1



Duty Cycle_11N20SISO_2437_Ant1



Duty Cycle_11N40SISO_2437_Ant1



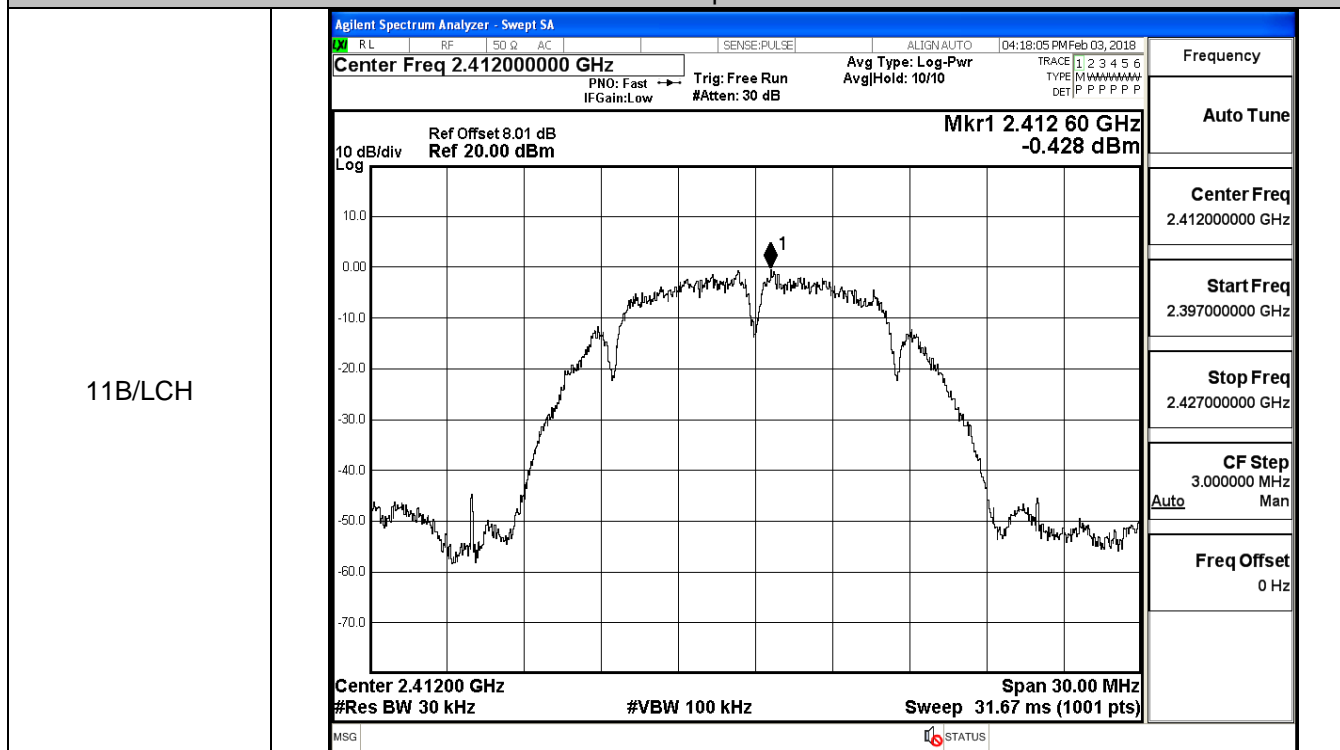
2 Maximum Conducted Output Power

| Mode | Channel | Meas.Level [dBm] | Limit [dBm] | Verdict |
|-----------|---------|------------------|-------------|---------|
| 11B | LCH | 15.68 | 30 | PASS |
| | MCH | 16.09 | 30 | PASS |
| | HCH | 15.57 | 30 | PASS |
| 11G | LCH | 16.38 | 30 | PASS |
| | MCH | 15.51 | 30 | PASS |
| | HCH | 15.43 | 30 | PASS |
| 11N20SISO | LCH | 16.42 | 30 | PASS |
| | MCH | 15.94 | 30 | PASS |
| | HCH | 15.84 | 30 | PASS |
| 11N40SISO | LCH | 15.27 | 30 | PASS |
| | MCH | 15.72 | 30 | PASS |
| | HCH | 15.73 | 30 | PASS |

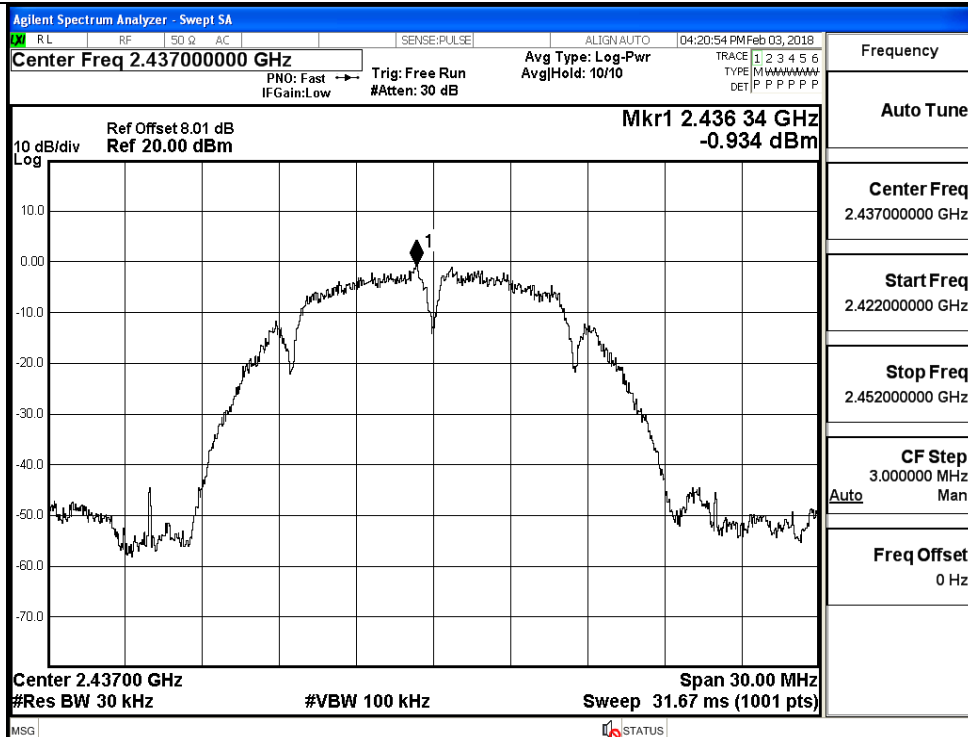
3 Maximum Power Spectral Density

| Mode | Channel | Meas.Level [dBm/30KHz] | Limit [dBm/3KHz] | Verdict |
|-----------|---------|------------------------|------------------|---------|
| 11B | LCH | -0.428 | 8 | PASS |
| | MCH | -0.934 | 8 | PASS |
| | HCH | -1.054 | 8 | PASS |
| 11G | LCH | -6.282 | 8 | PASS |
| | MCH | -7.917 | 8 | PASS |
| | HCH | -7.437 | 8 | PASS |
| 11N20SISO | LCH | -7.123 | 8 | PASS |
| | MCH | -7.375 | 8 | PASS |
| | HCH | -7.203 | 8 | PASS |
| 11N40SISO | LCH | -11.052 | 8 | PASS |
| | MCH | -10.484 | 8 | PASS |
| | HCH | -11.190 | 8 | PASS |

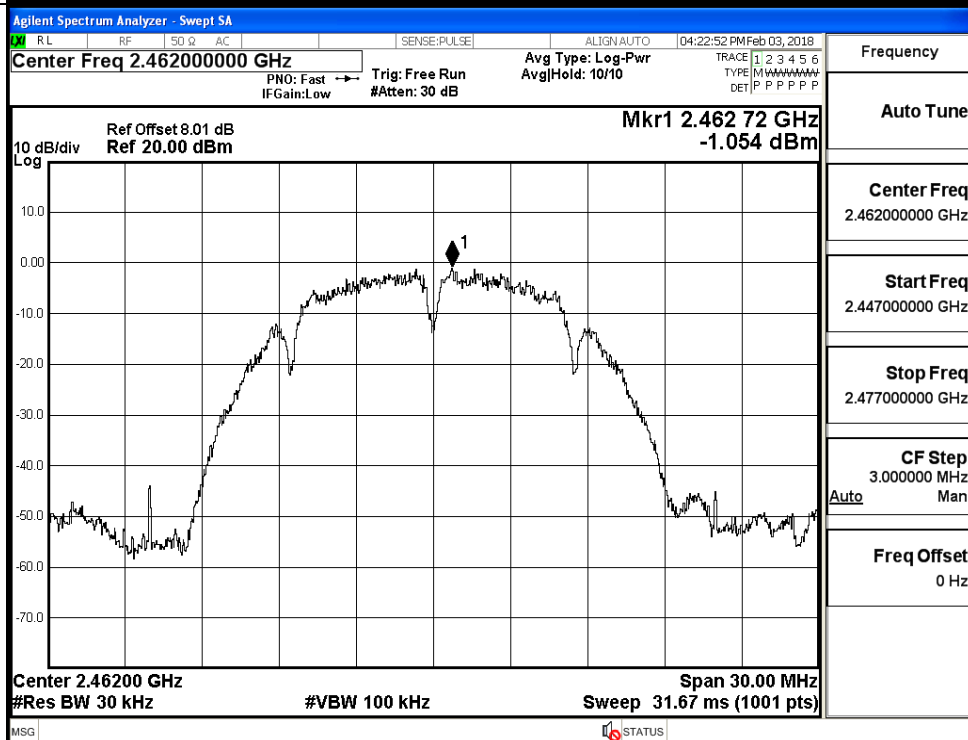
Test Graphs



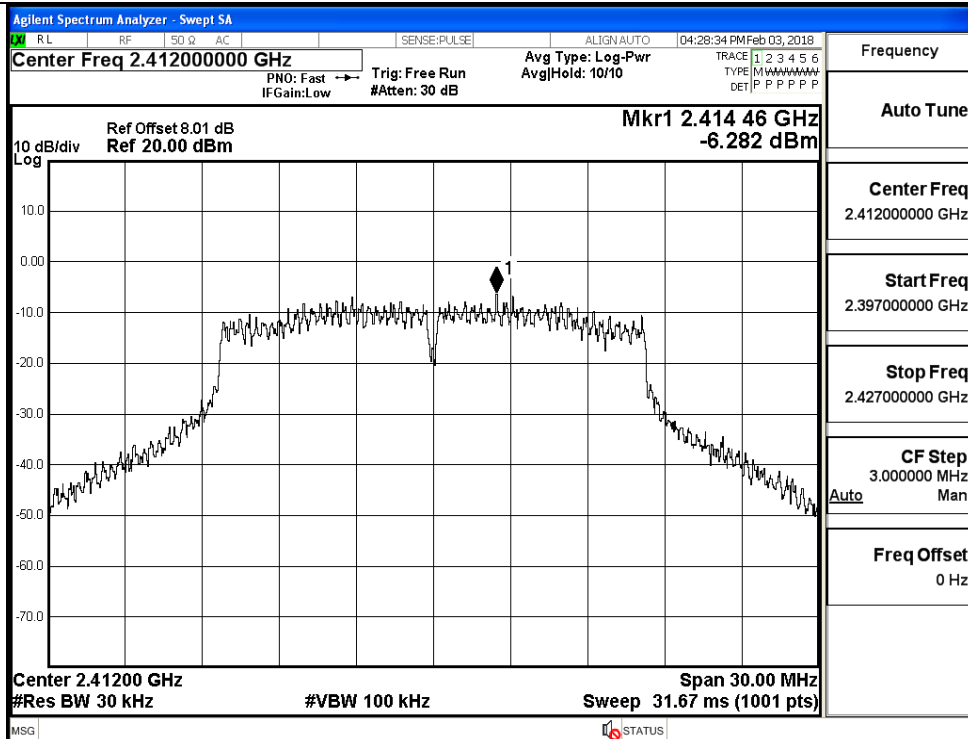
11B/MCH



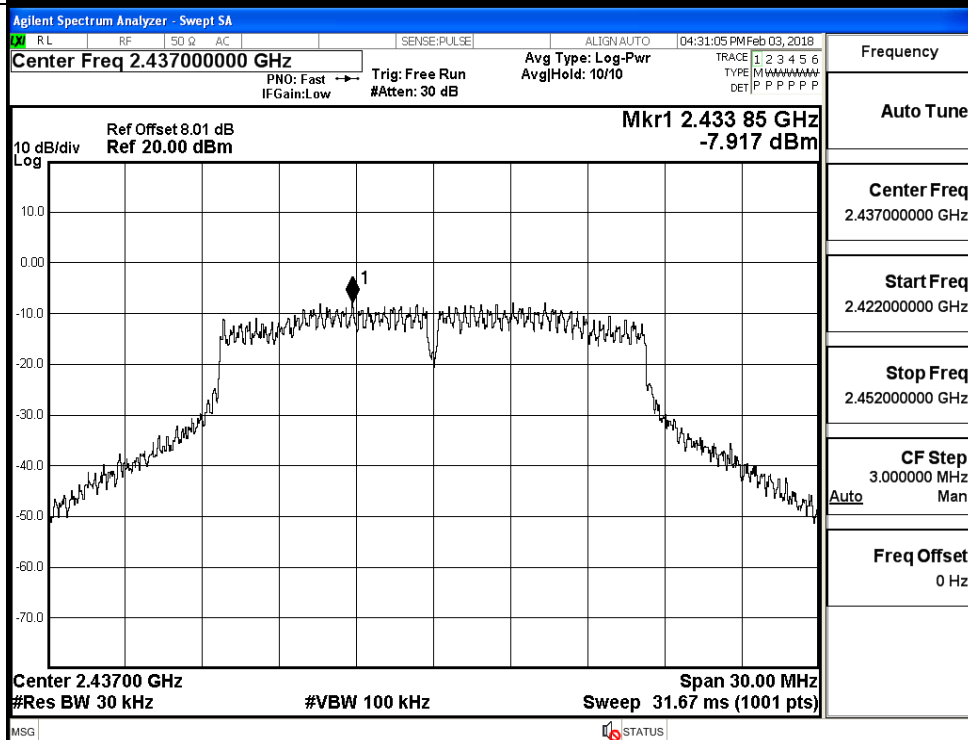
11B/HCH



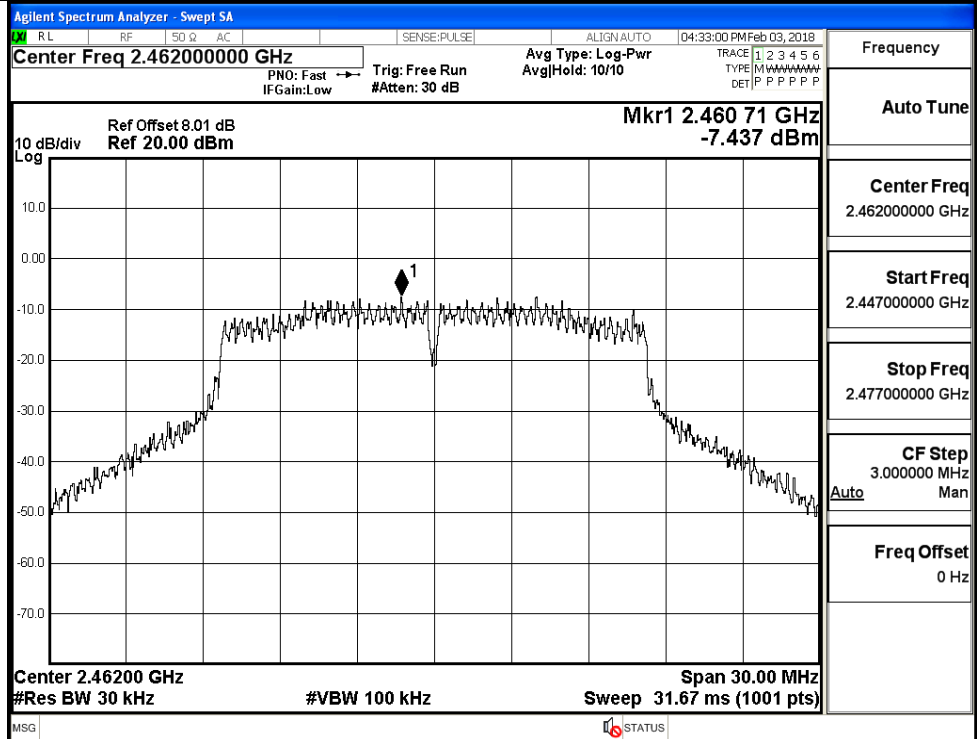
11G/LCH



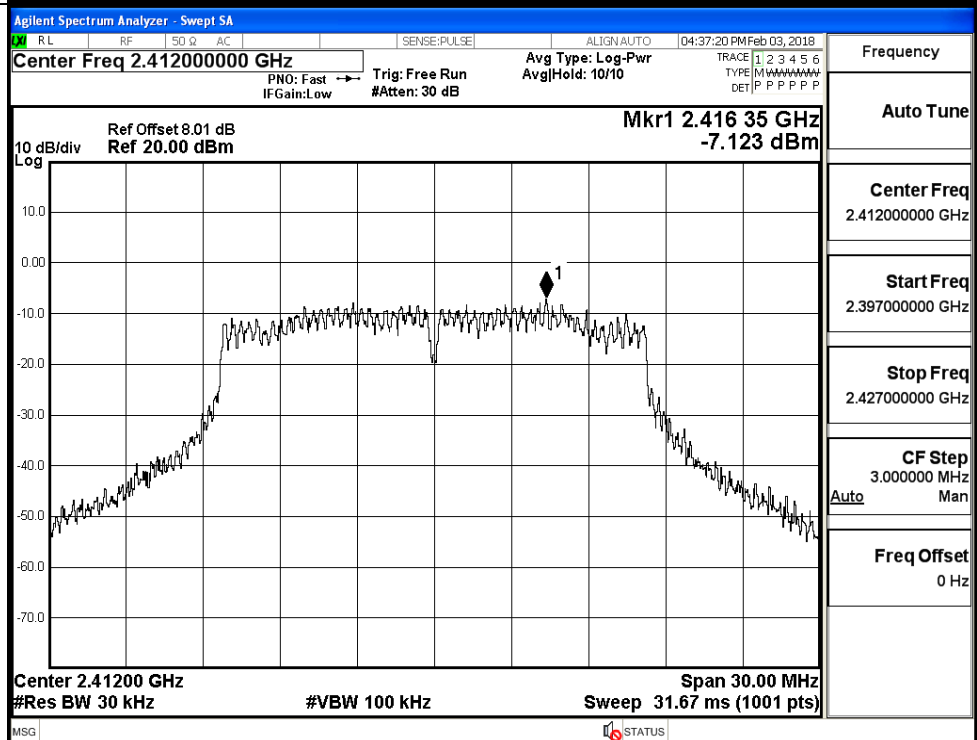
11G/MCH

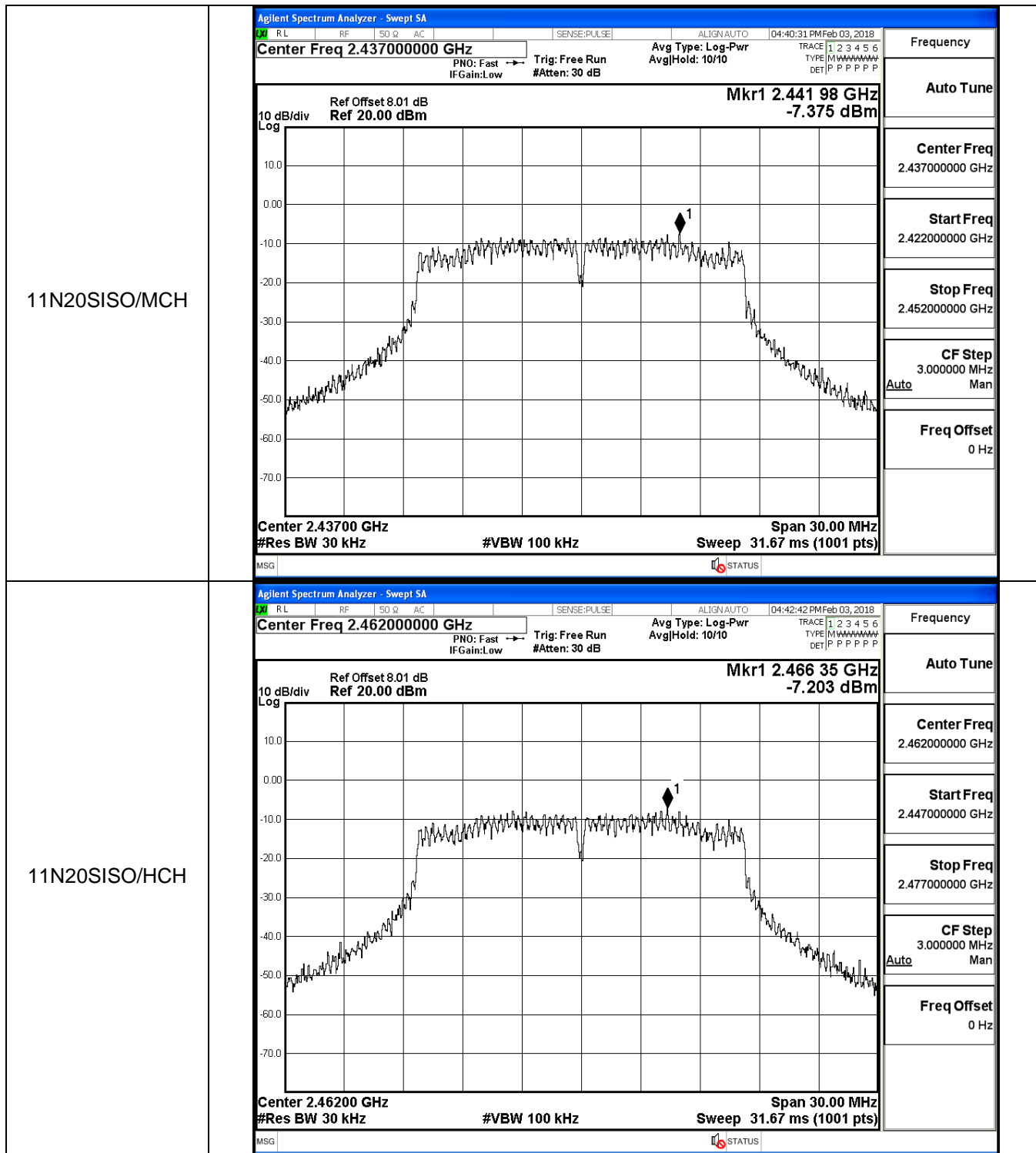


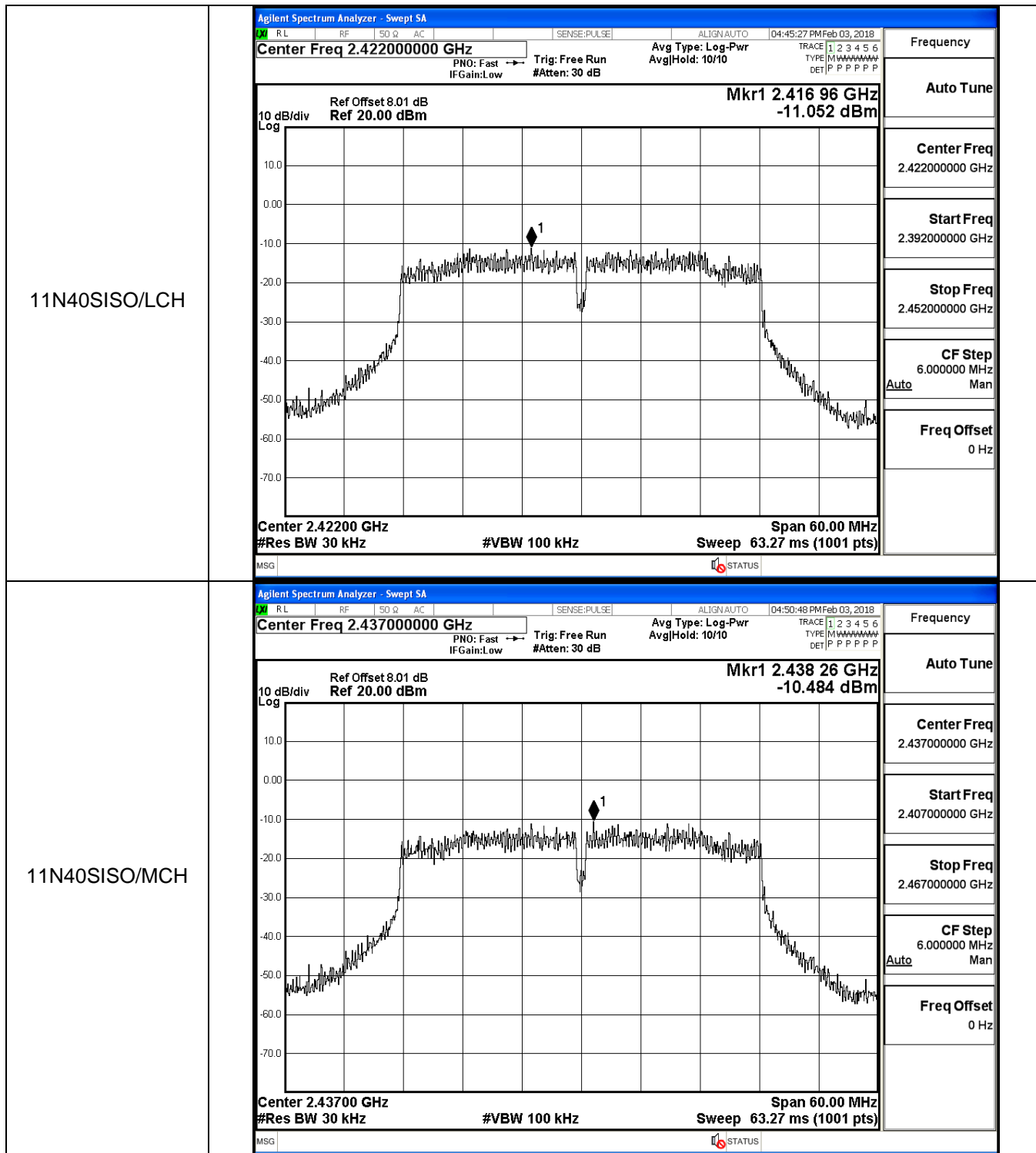
11G/HCH

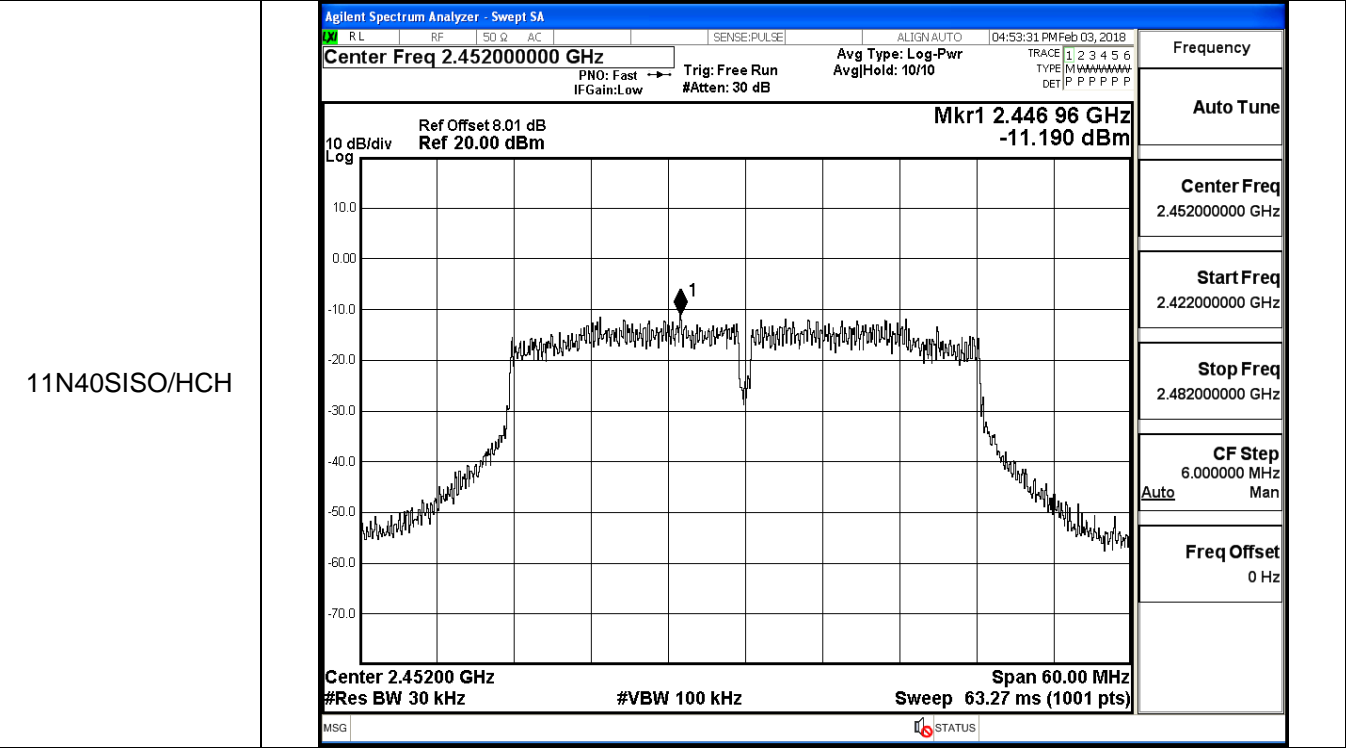


11N20SISO/LCH







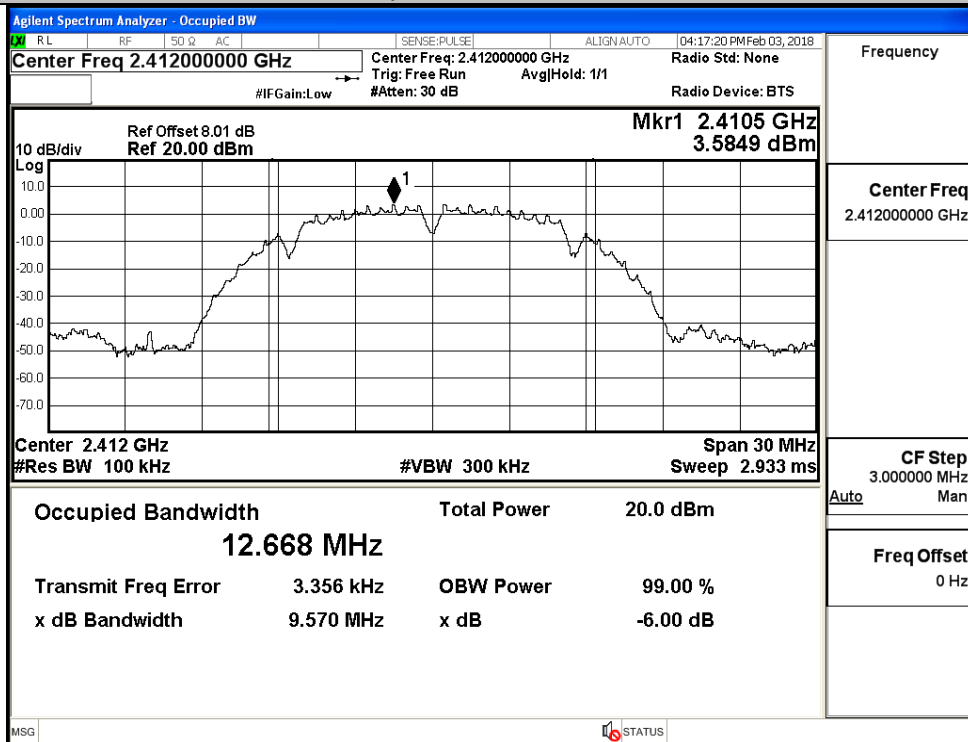


4 6dB Bandwidth

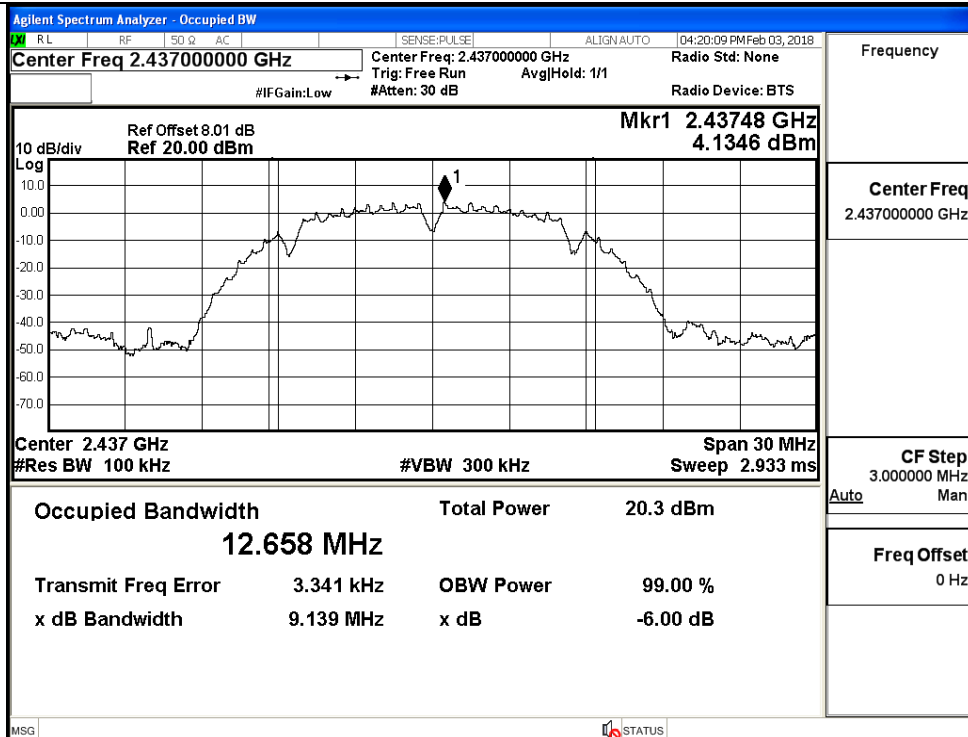
| Mode | Channel | 6dB Bandwidth [MHz] | Limit [MHz] | Verdict |
|-----------|---------|---------------------|-------------|---------|
| 11B | LCH | 9.570 | ≥ 0.5 | PASS |
| | MCH | 9.139 | ≥ 0.5 | PASS |
| | HCH | 9.140 | ≥ 0.5 | PASS |
| 11G | LCH | 15.11 | ≥ 0.5 | PASS |
| | MCH | 15.13 | ≥ 0.5 | PASS |
| | HCH | 15.14 | ≥ 0.5 | PASS |
| 11N20SISO | LCH | 16.32 | ≥ 0.5 | PASS |
| | MCH | 16.34 | ≥ 0.5 | PASS |
| | HCH | 16.35 | ≥ 0.5 | PASS |
| 11N40SISO | LCH | 35.17 | ≥ 0.5 | PASS |
| | MCH | 35.18 | ≥ 0.5 | PASS |
| | HCH | 35.13 | ≥ 0.5 | PASS |

Test Graphs

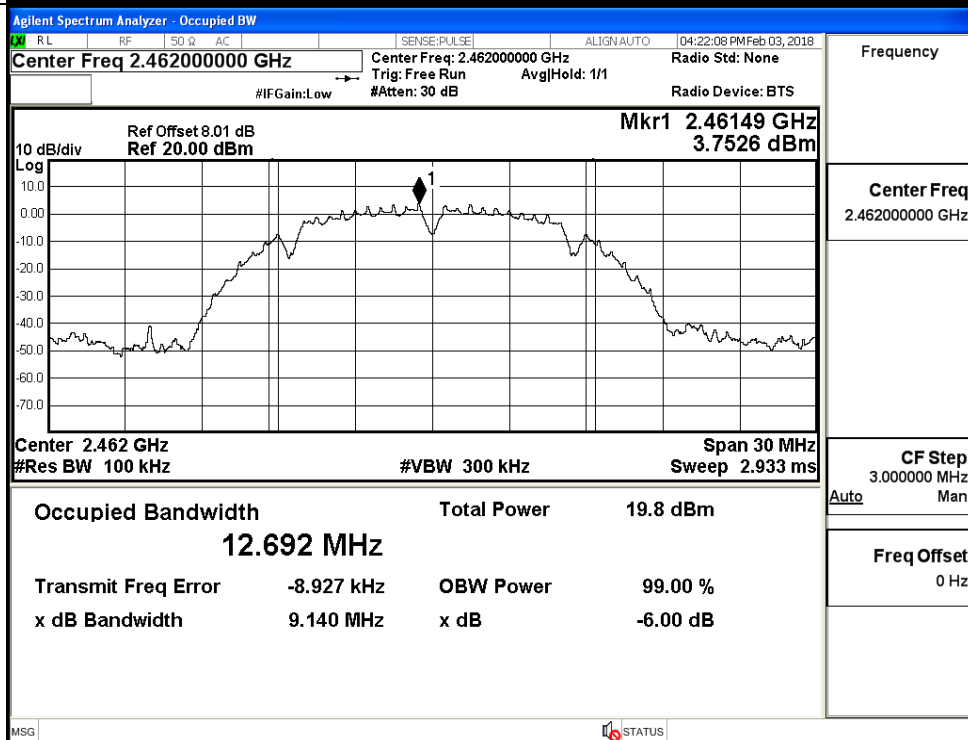
11B/LCH



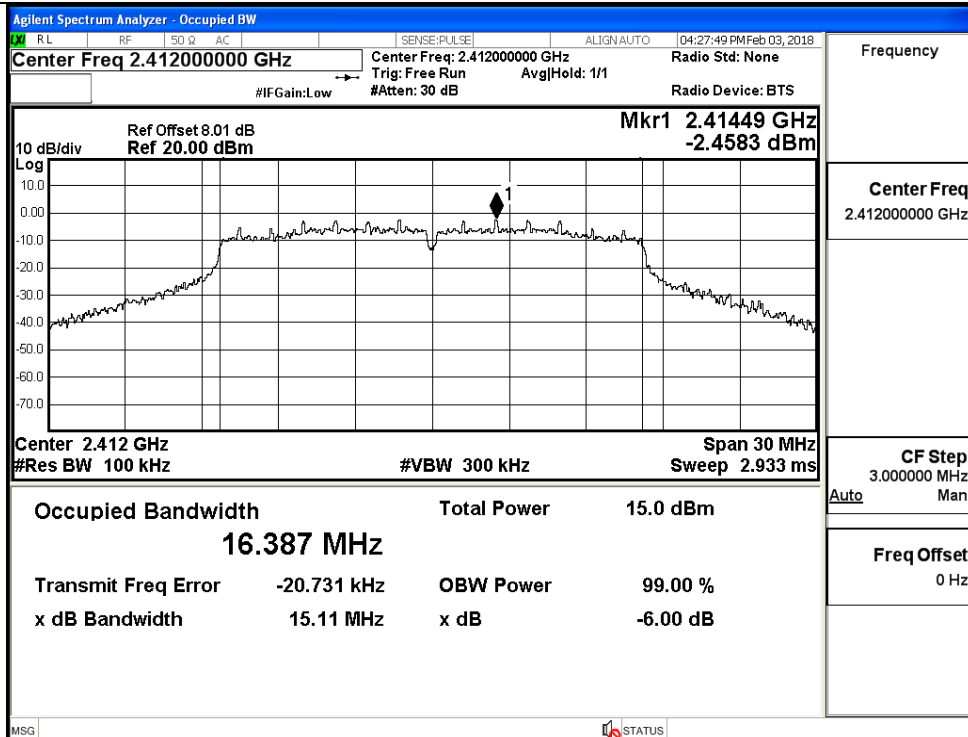
11B/MCH



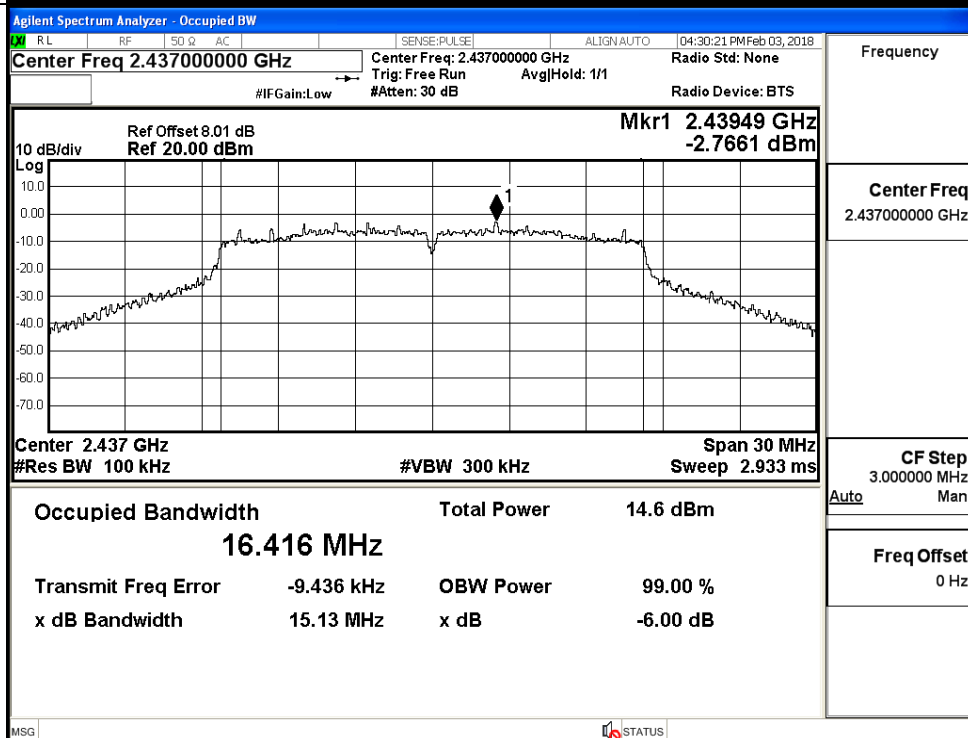
11B/HCH



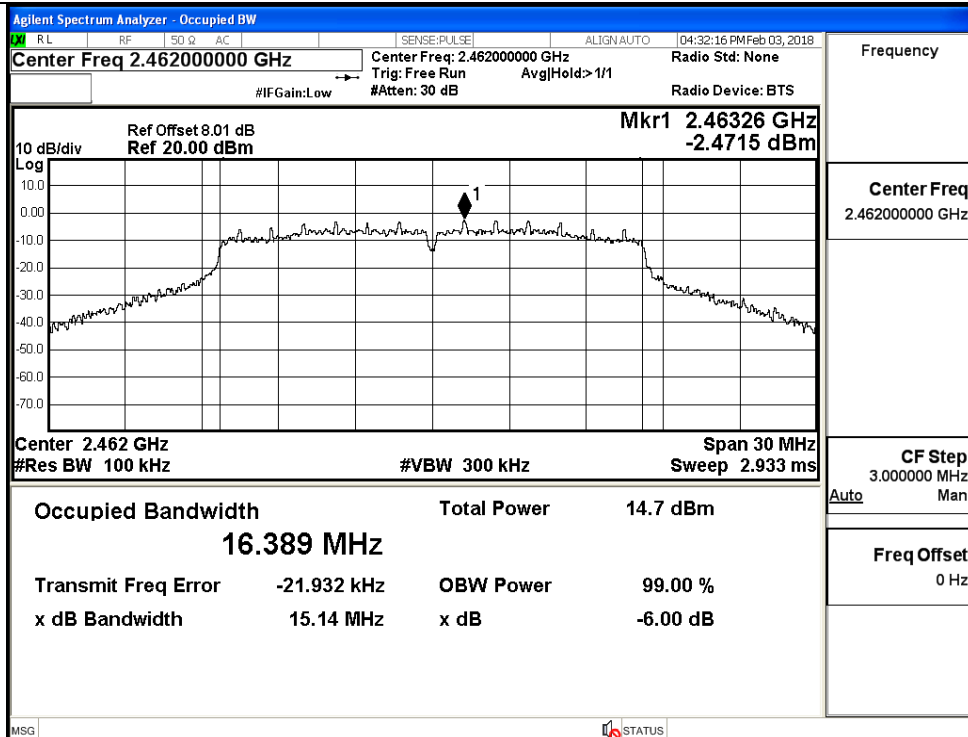
11G/LCH



11G/MCH



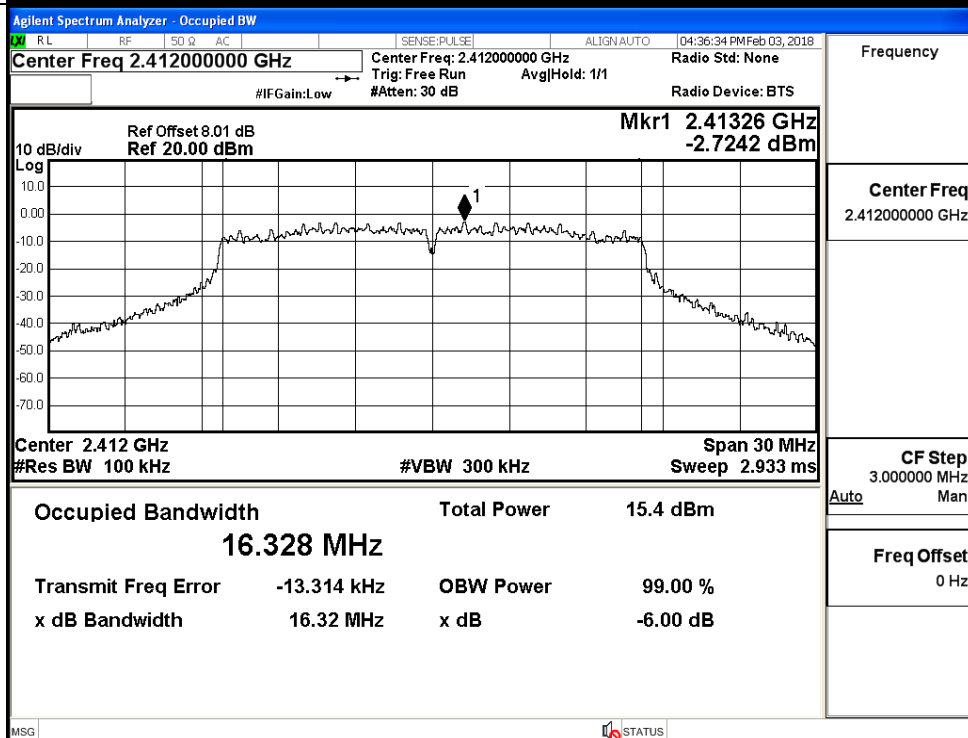
11G/HCH



Frequency

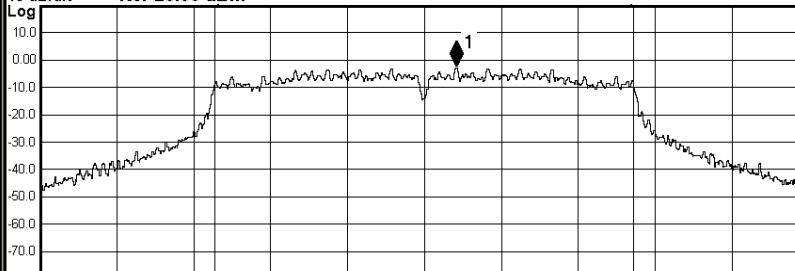
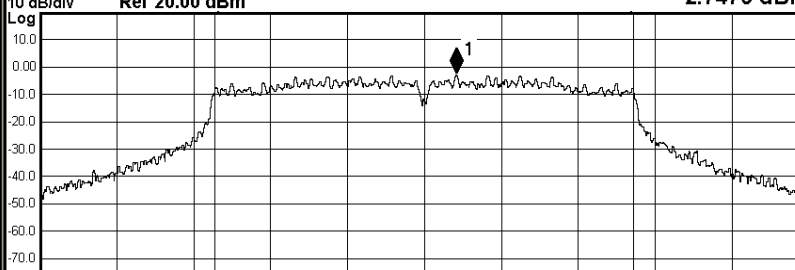
Center Freq
2.462000000 GHzCF Step
3.000000 MHz
Auto ManFreq Offset
0 Hz

11N20SISO/LCH



Frequency

Center Freq
2.412000000 GHzCF Step
3.000000 MHz
Auto ManFreq Offset
0 Hz

| | | |
|---------------|---|---|
| 11N20SISO/MCH | <div>Agilent Spectrum Analyzer - Occupied BW</div> <div> <div> <div> <div>RL</div> <div>RF</div> <div>50 Ω</div> <div>AC</div> </div> <div> <div>SENSE:PULSE</div> <div>ALIGN: AUTO</div> <div>04:39:46 PM Feb 03, 2018</div> </div> </div> <div> <div>Center Freq 2.437000000 GHz</div> <div> <div>Center Freq: 2.437000000 GHz</div> <div>Trig: Free Run</div> <div>Avg/Hold: 1/1</div> </div> <div>Radio Std: None</div> </div> <div> <div>#IF Gain: Low</div> <div>#Atten: 30 dB</div> <div>Radio Device: BTS</div> </div> <div> <div>10 dB/div</div> <div>Ref Offset 8.01 dB</div> <div>Ref 20.00 dBm</div> <div>Mkr1 2.43826 GHz</div> <div>-2.7148 dBm</div> </div>  <div> <div>Center 2.437 GHz</div> <div>#Res BW 100 kHz</div> <div>#VBW 300 kHz</div> <div>Span 30 MHz</div> <div>Sweep 2.933 ms</div> </div> <div> <div>Occupied Bandwidth</div> <div>16.322 MHz</div> <div>Total Power</div> <div>15.3 dBm</div> </div> <div> <div>Transmit Freq Error</div> <div>-8.042 kHz</div> <div>OBW Power</div> <div>99.00 %</div> </div> <div> <div>x dB Bandwidth</div> <div>16.34 MHz</div> <div>x dB</div> <div>-6.00 dB</div> </div> <div>MSG</div> <div>STATUS</div> </div> | <div>Frequency</div> <div>Center Freq</div> <div>2.437000000 GHz</div> <div>CF Step</div> <div>3.000000 MHz</div> <div>Auto</div> <div>Man</div> <div>Freq Offset</div> <div>0 Hz</div> |
| 11N20SISO/HCH | <div>Agilent Spectrum Analyzer - Occupied BW</div> <div> <div> <div> <div>RL</div> <div>RF</div> <div>50 Ω</div> <div>AC</div> </div> <div> <div>SENSE:PULSE</div> <div>ALIGN: AUTO</div> <div>04:41:57 PM Feb 03, 2018</div> </div> </div> <div> <div>Center Freq 2.462000000 GHz</div> <div> <div>Center Freq: 2.462000000 GHz</div> <div>Trig: Free Run</div> <div>Avg/Hold: 1/1</div> </div> <div>Radio Std: None</div> </div> <div> <div>#IF Gain: Low</div> <div>#Atten: 30 dB</div> <div>Radio Device: BTS</div> </div> <div> <div>10 dB/div</div> <div>Ref Offset 8.01 dB</div> <div>Ref 20.00 dBm</div> <div>Mkr1 2.46326 GHz</div> <div>-2.7476 dBm</div> </div>  <div> <div>Center 2.462 GHz</div> <div>#Res BW 100 kHz</div> <div>#VBW 300 kHz</div> <div>Span 30 MHz</div> <div>Sweep 2.933 ms</div> </div> <div> <div>Occupied Bandwidth</div> <div>16.334 MHz</div> <div>Total Power</div> <div>15.3 dBm</div> </div> <div> <div>Transmit Freq Error</div> <div>-12.843 kHz</div> <div>OBW Power</div> <div>99.00 %</div> </div> <div> <div>x dB Bandwidth</div> <div>16.35 MHz</div> <div>x dB</div> <div>-6.00 dB</div> </div> <div>MSG</div> <div>STATUS</div> </div> | <div>Frequency</div> <div>Center Freq</div> <div>2.462000000 GHz</div> <div>CF Step</div> <div>3.000000 MHz</div> <div>Auto</div> <div>Man</div> <div>Freq Offset</div> <div>0 Hz</div> |

| Device | Frequency | Center Freq | CF Step | Freq Offset |
|---------------|----------------|----------------|--------------|-------------|
| 11N40SISO/LCH | 2.42200000 GHz | 2.42200000 GHz | 6.000000 MHz | 0 Hz |
| 11N40SISO/MCH | 2.43700000 GHz | 2.43700000 GHz | 6.000000 MHz | 0 Hz |

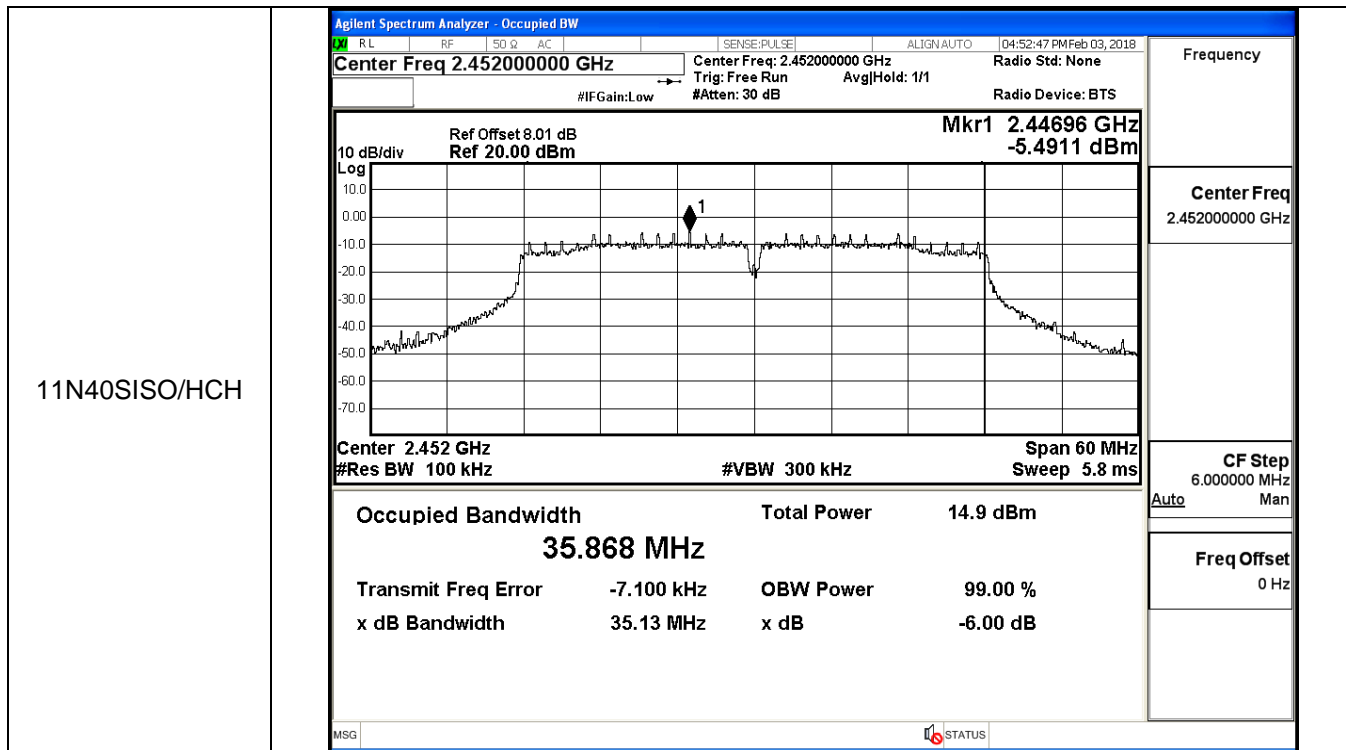
The figure displays two screenshots of an Agilent Spectrum Analyzer, showing the occupied bandwidth (OBW) of a signal. Both screenshots are taken from the same device, 11N40SISO, but at different frequencies: 2.422 GHz (LCH) and 2.437 GHz (MCH).

Top Screenshot (11N40SISO/LCH):

- Center Freq: 2.42200000 GHz
- Ref Offset: 8.01 dB
- Ref: 20.00 dBm
- Mkr1: 2.41696 GHz, -5.9858 dBm
- Center: 2.422 GHz
- Res BW: 100 kHz
- Span: 60 MHz
- Sweep: 5.8 ms
- VBW: 300 kHz
- Occupied Bandwidth: 35.919 MHz
- Total Power: 14.5 dBm
- Transmit Freq Error: 3.082 kHz
- OBW Power: 99.00 %
- x dB Bandwidth: 35.17 MHz
- x dB: -6.00 dB

Bottom Screenshot (11N40SISO/MCH):

- Center Freq: 2.43700000 GHz
- Ref Offset: 8.01 dB
- Ref: 20.00 dBm
- Mkr1: 2.44198 GHz, -5.6109 dBm
- Center: 2.437 GHz
- Res BW: 100 kHz
- Span: 60 MHz
- Sweep: 5.8 ms
- VBW: 300 kHz
- Occupied Bandwidth: 35.886 MHz
- Total Power: 14.8 dBm
- Transmit Freq Error: -1.318 kHz
- OBW Power: 99.00 %
- x dB Bandwidth: 35.18 MHz
- x dB: -6.00 dB

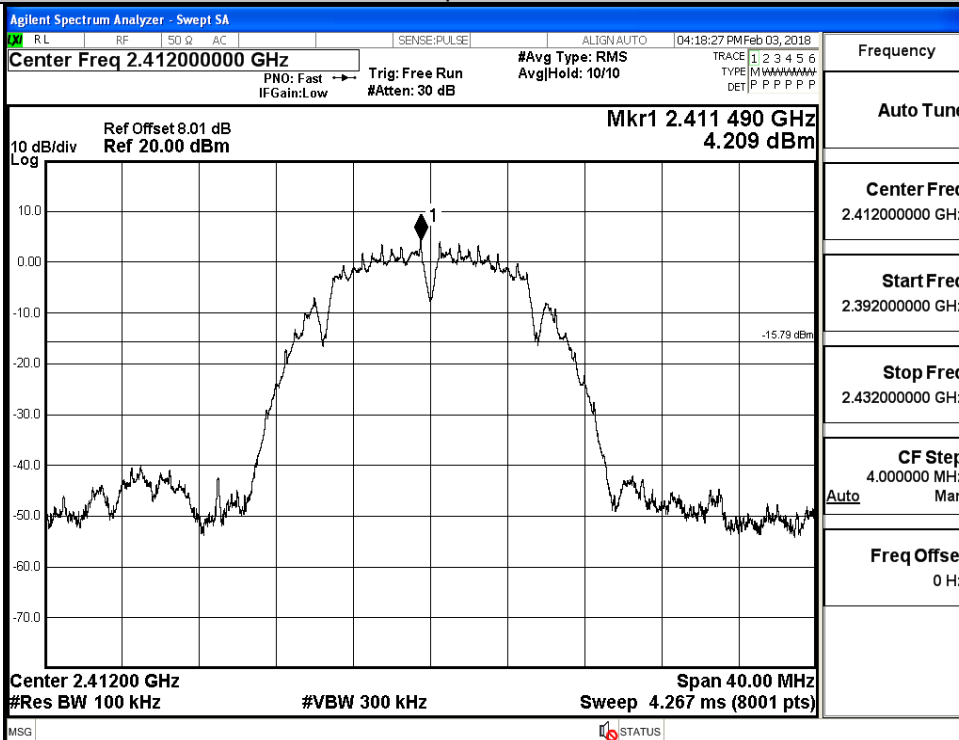


5 RF Conducted Spurious Emissions

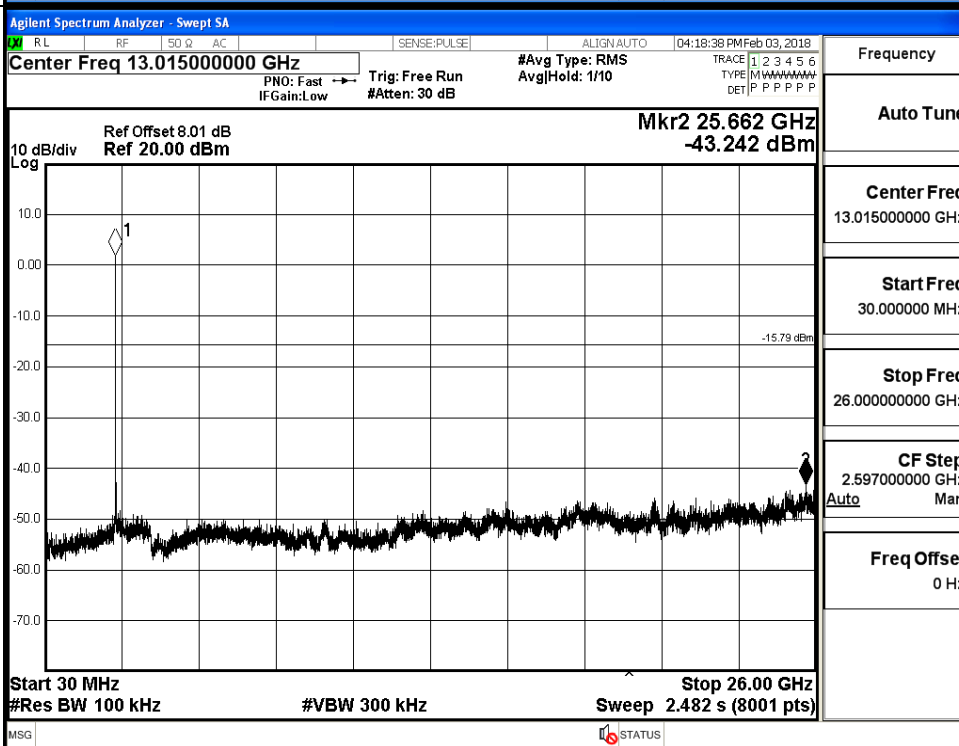
| Mode | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|------------|------------------|-------------|---------|
| 11B | LCH | 4.209 | -43.242 | -15.79 | PASS |
| | MCH | 4.183 | -43.389 | -15.82 | PASS |
| | HCH | 3.807 | -43.967 | -16.19 | PASS |
| 11G | LCH | -1.606 | -44.255 | -21.61 | PASS |
| | MCH | -2.012 | -44.147 | -22.01 | PASS |
| | HCH | -2.361 | -44.569 | -22.36 | PASS |
| 11N20 SISO | LCH | -2.422 | -43.106 | -22.42 | PASS |
| | MCH | -2.389 | -42.804 | -22.39 | PASS |
| | HCH | -2.463 | -44.487 | -22.46 | PASS |
| 11N40 SISO | LCH | -5.738 | -43.398 | -25.74 | PASS |
| | MCH | -5.881 | -44.039 | -25.88 | PASS |
| | HCH | -5.812 | -44.090 | -25.81 | PASS |

11B_LCH_Graphs

Pref/11B/LCH

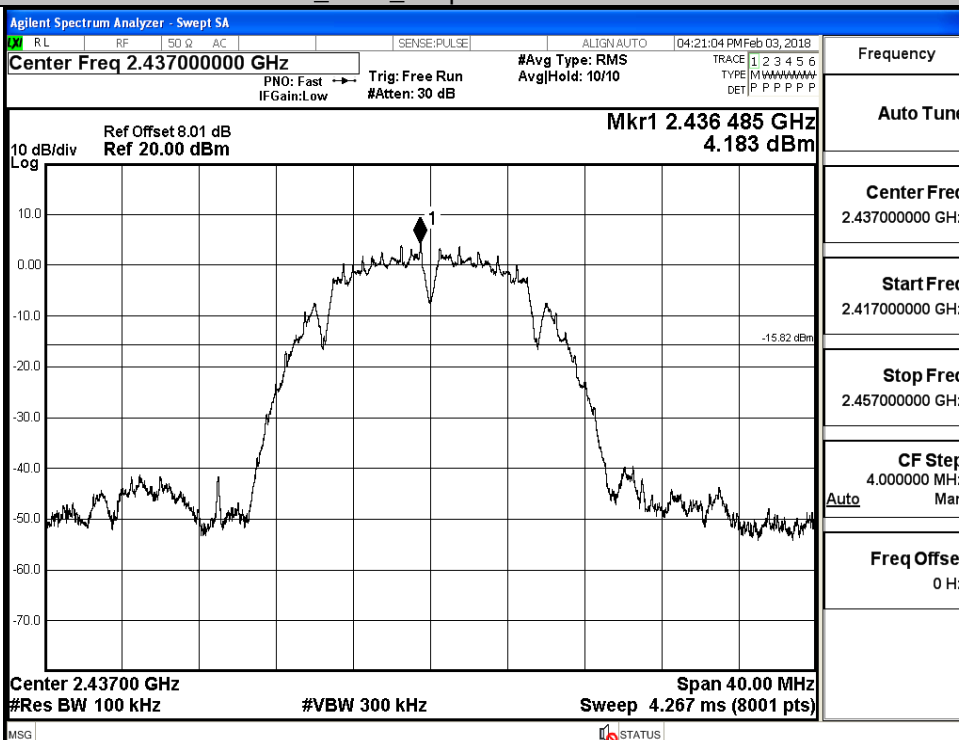


Puw/11B/LCH

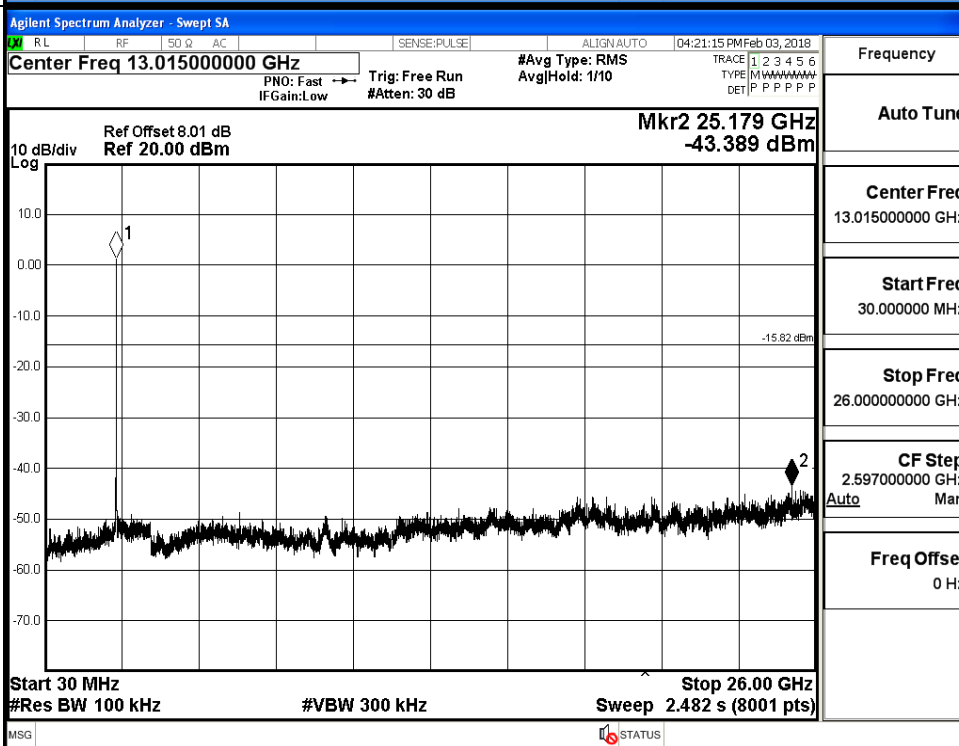


11B_MCH_Graphs

Pref/11B/MCH

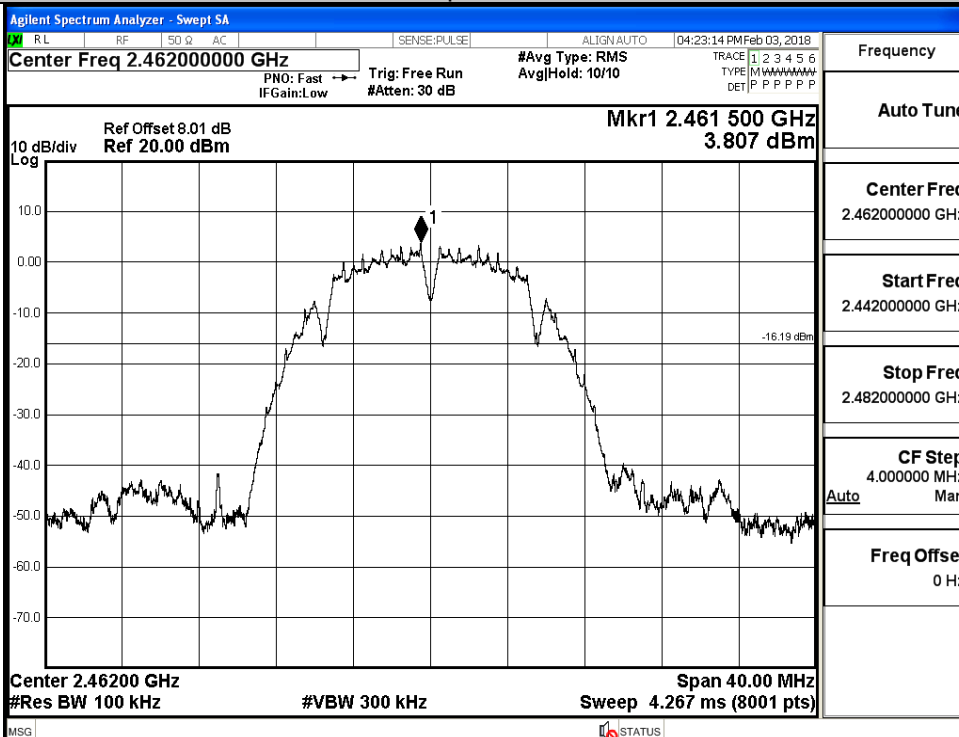


Puw/11B/MCH

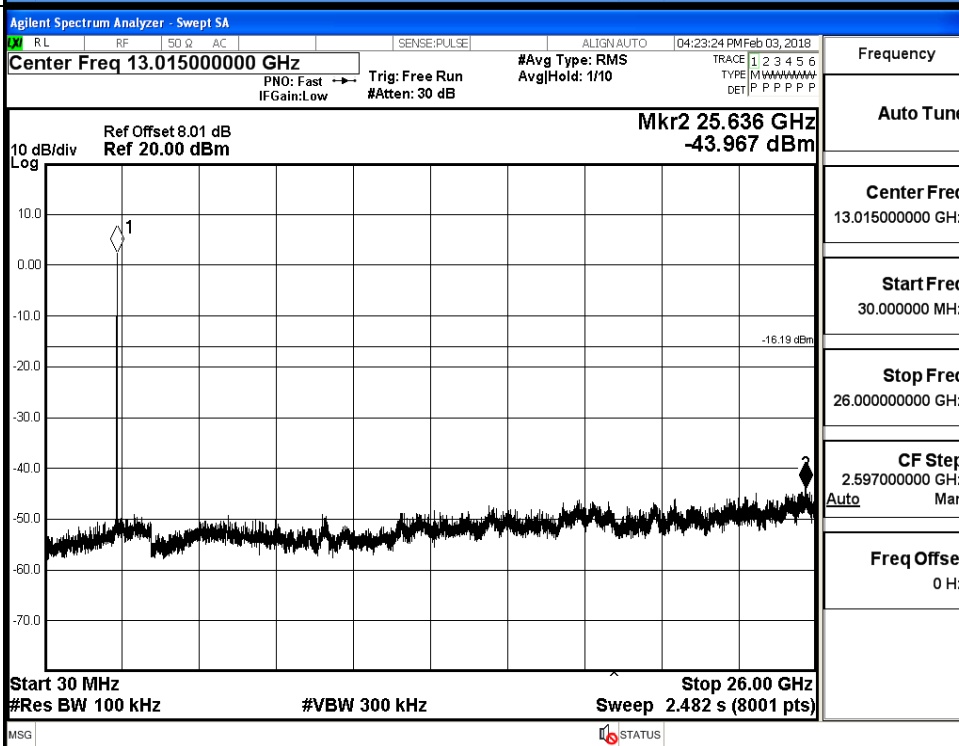


11B_HCH_Graphs

Pref/11B/HCH

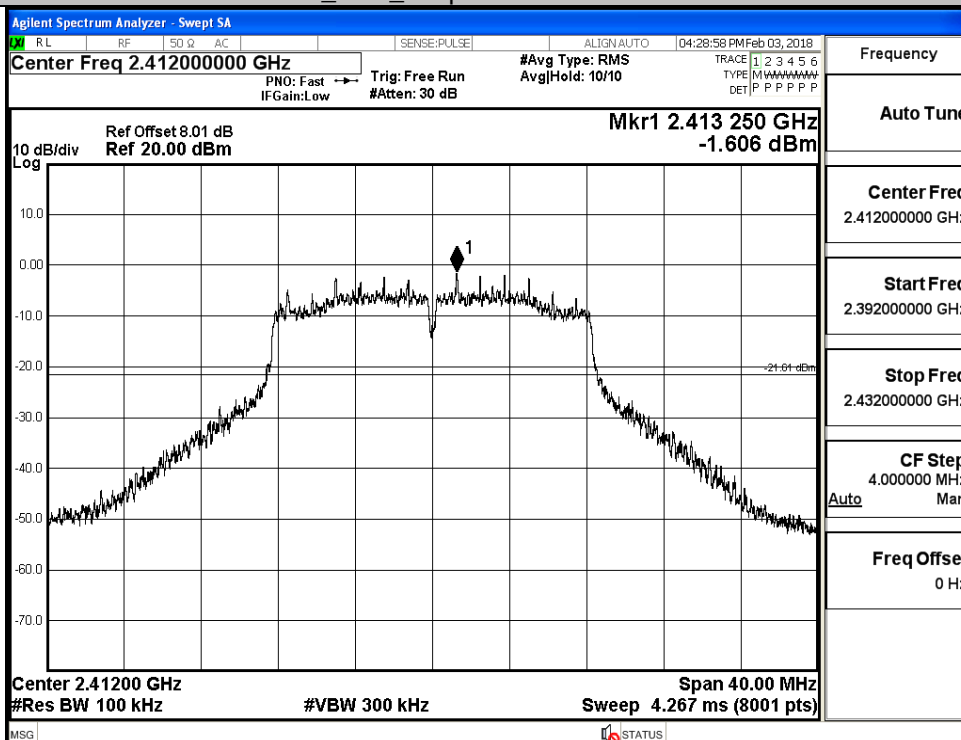


Puw/11B/HCH

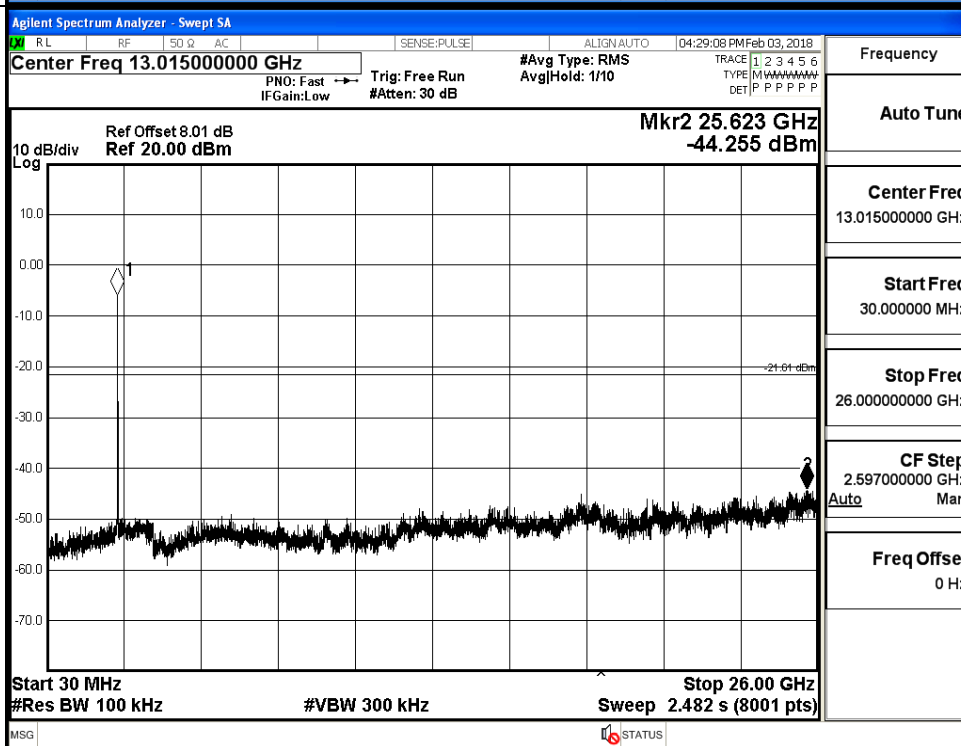


11G_LCH_Graphs

Pref/11G/LCH

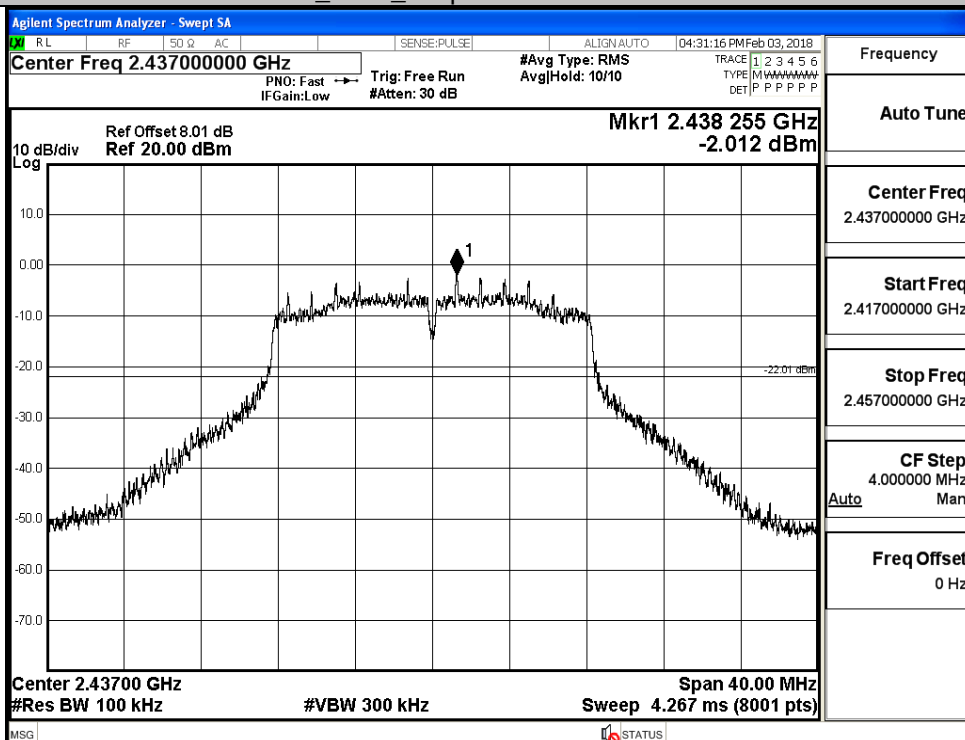


Puw/11G/LCH

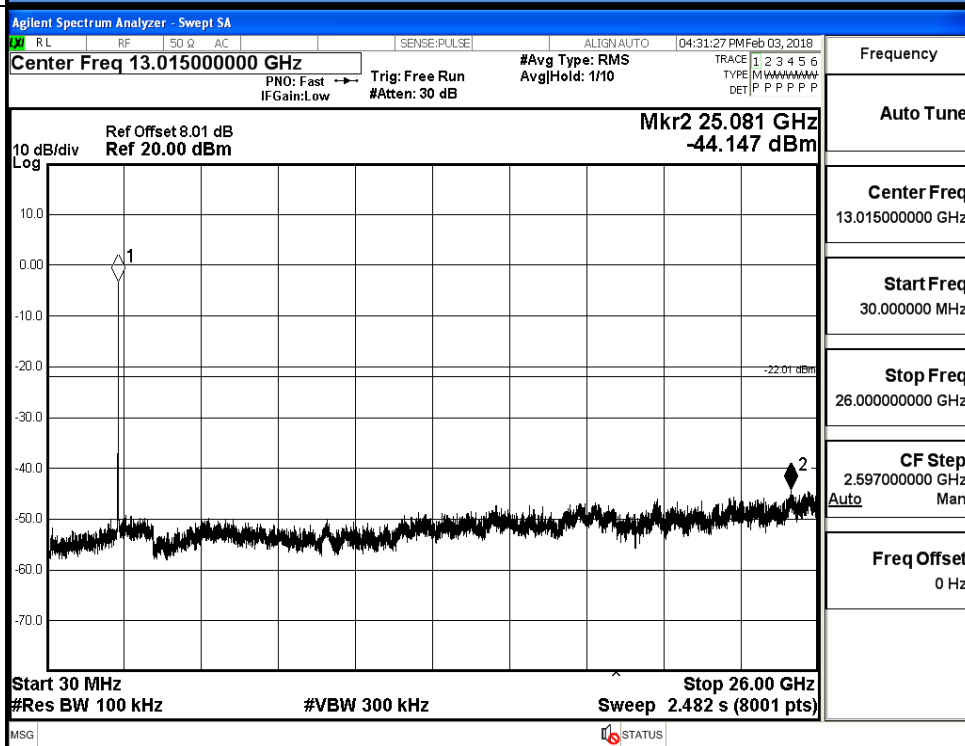


11G_MCH_Graphs

Pref/11G/MCH

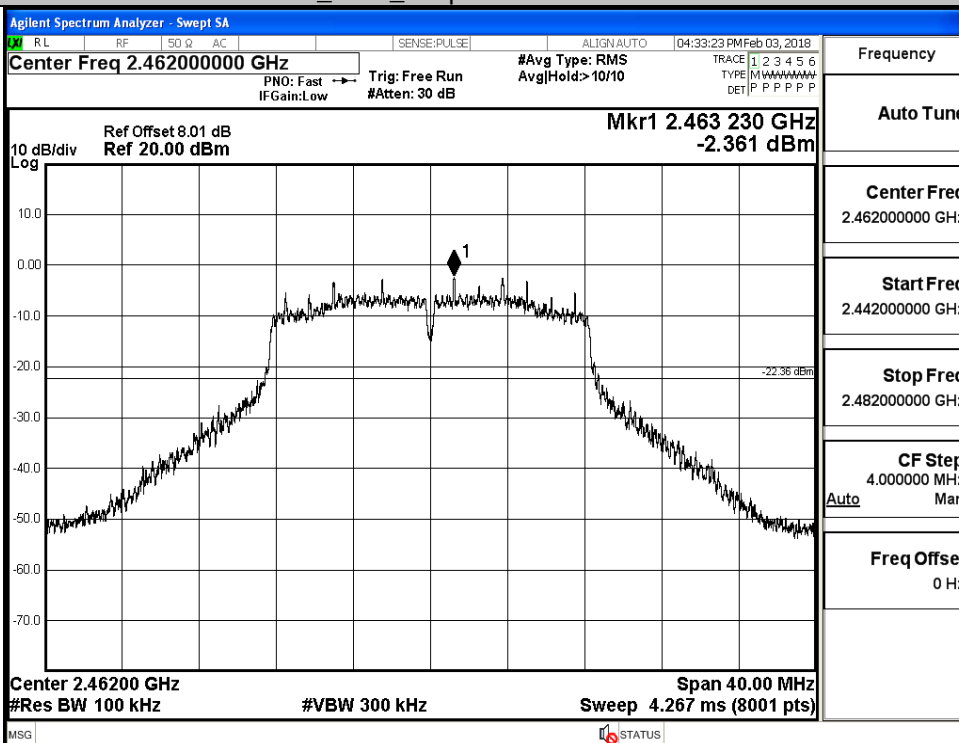


Puw/11G/MCH

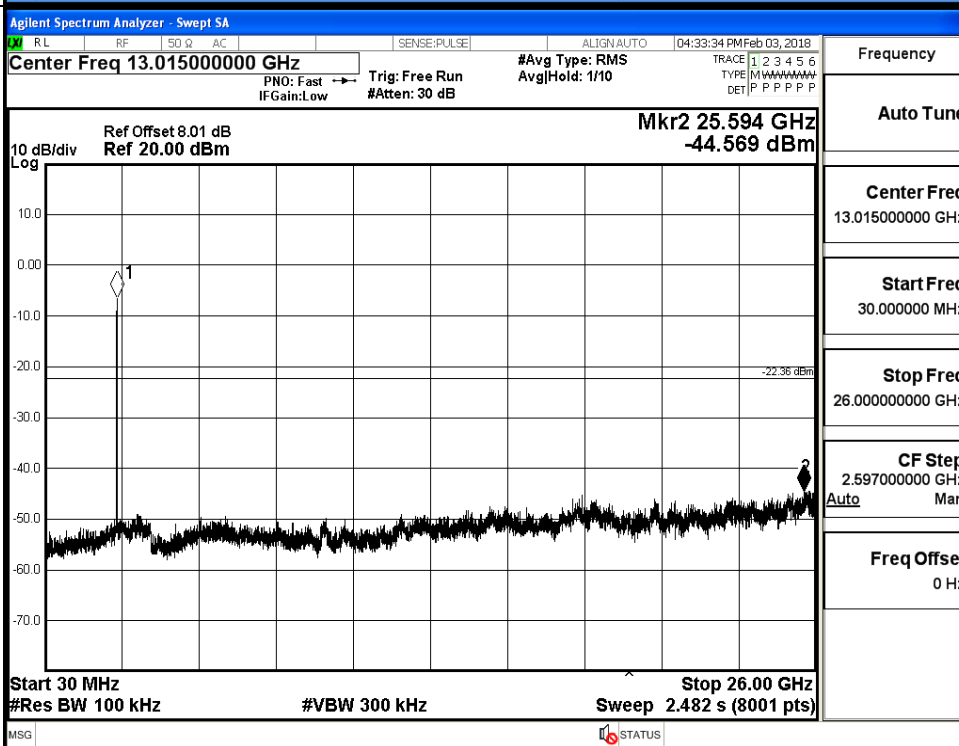


11G_HCH_Graphs

Pref/11G/HCH

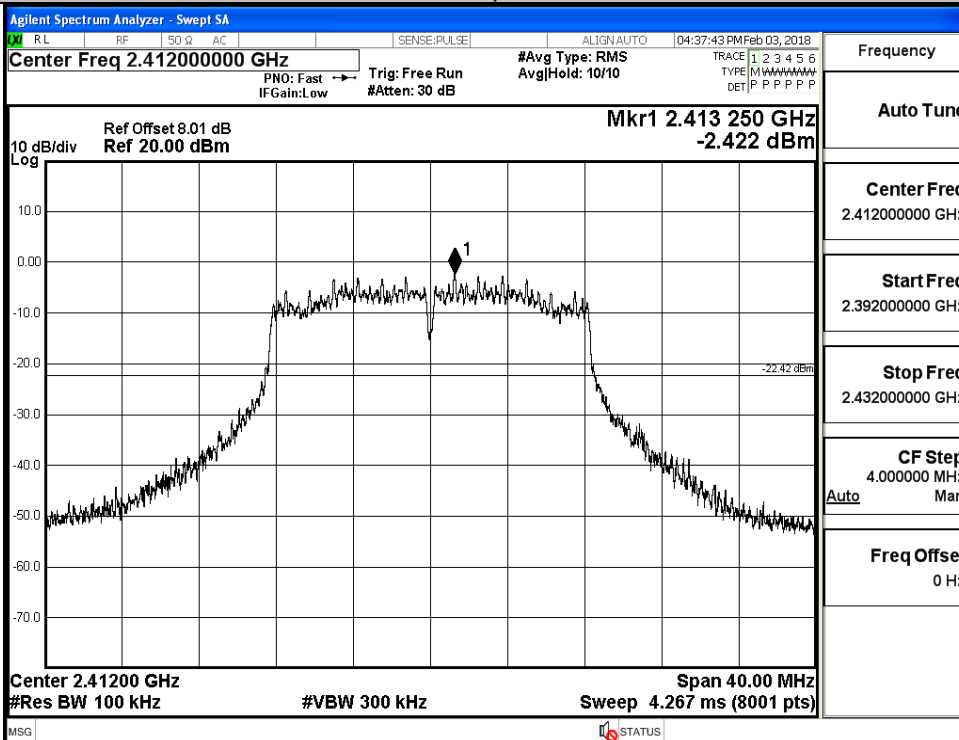


Puw/11G/HCH

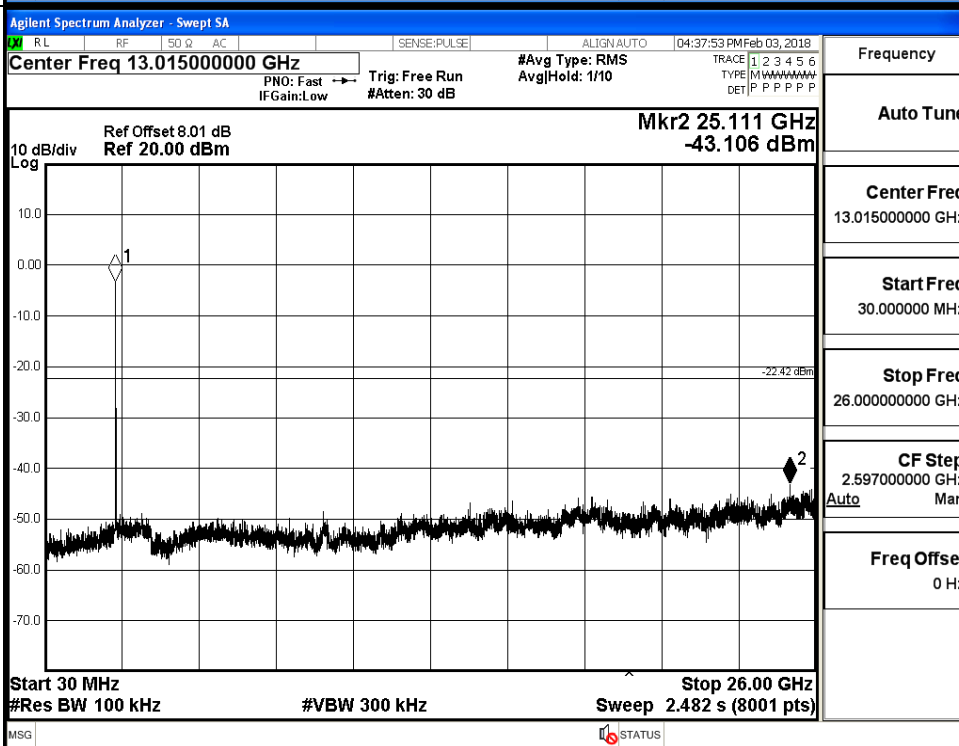


11N20ISO_LCH_Graphs

Pref/11N20SIS
O/LCH

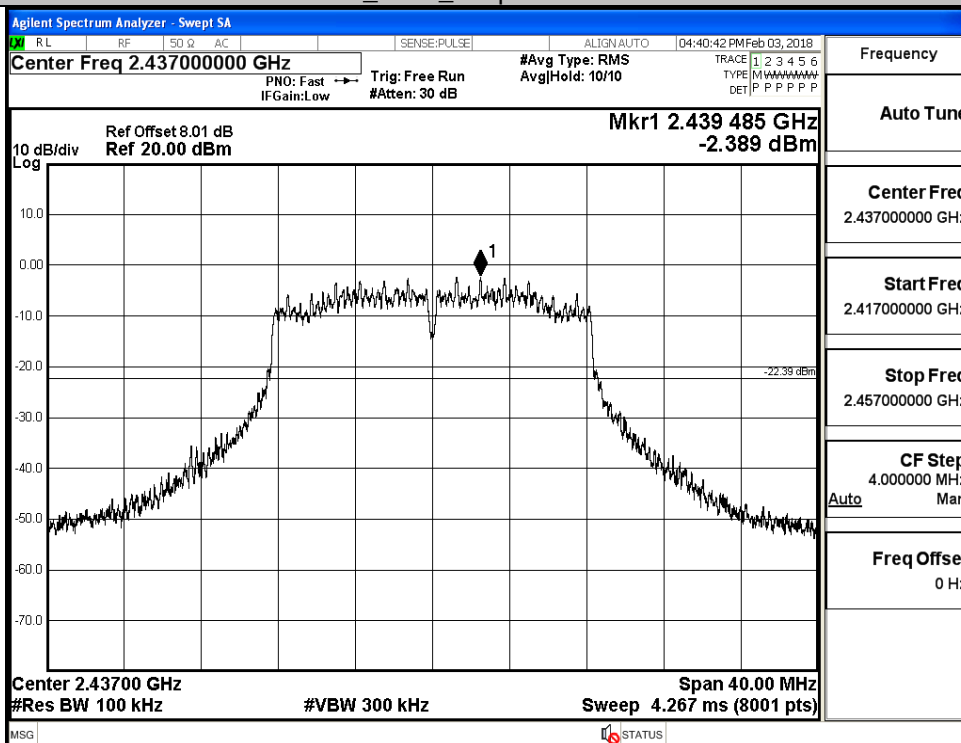


Puw/11N20
SISO/LCH

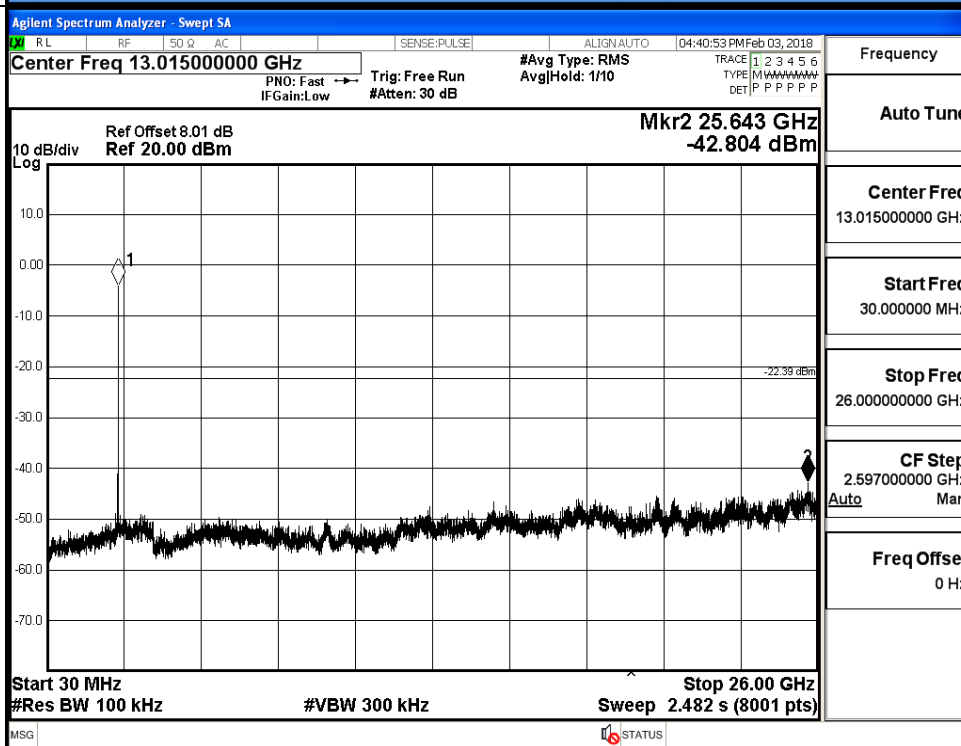


11N20SISO_MCH_Graphs

Pref/11N20
SISO/MCH

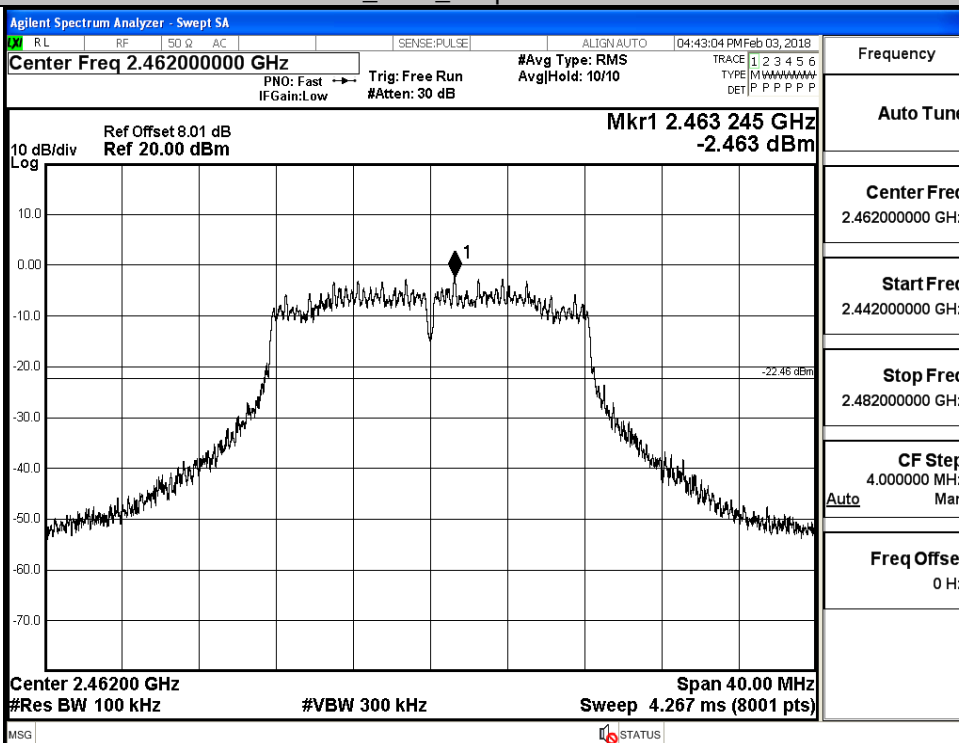


Puw/11N20
SISO/MCH

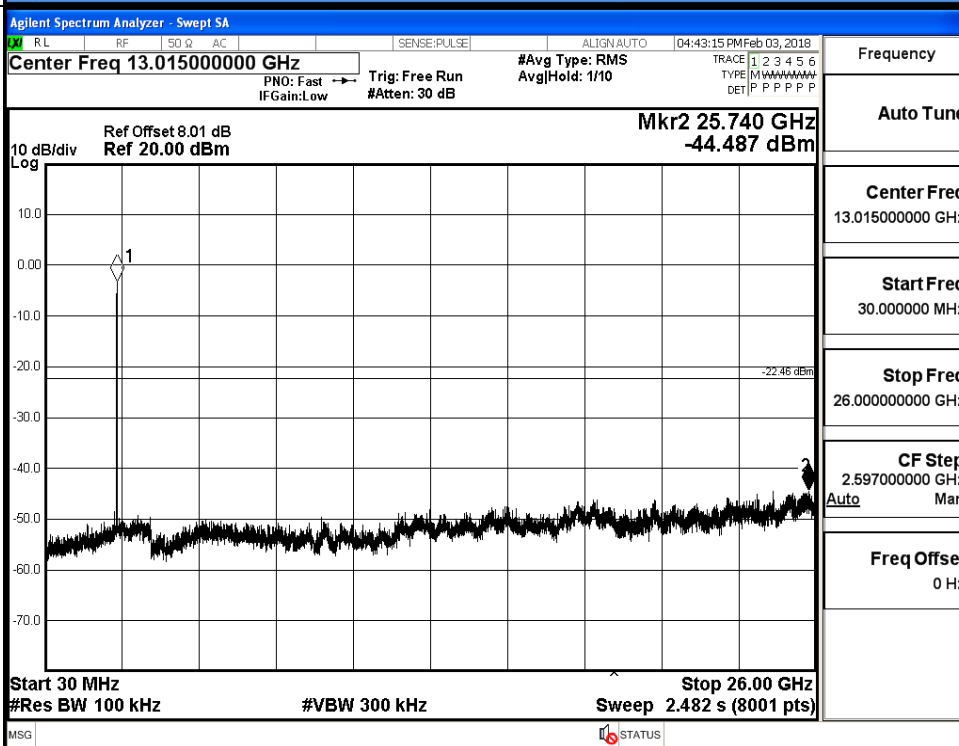


11N20ISO_HCH_Graphs

Pref/11N20
SISO/HCH

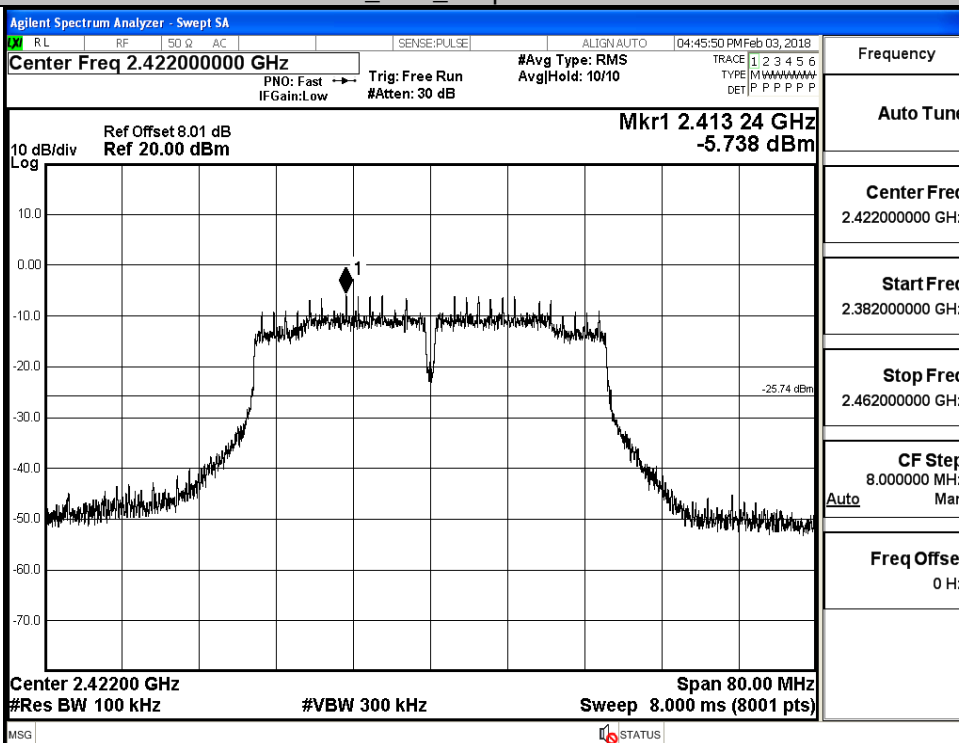


Puw/11N20
SISO/HCH

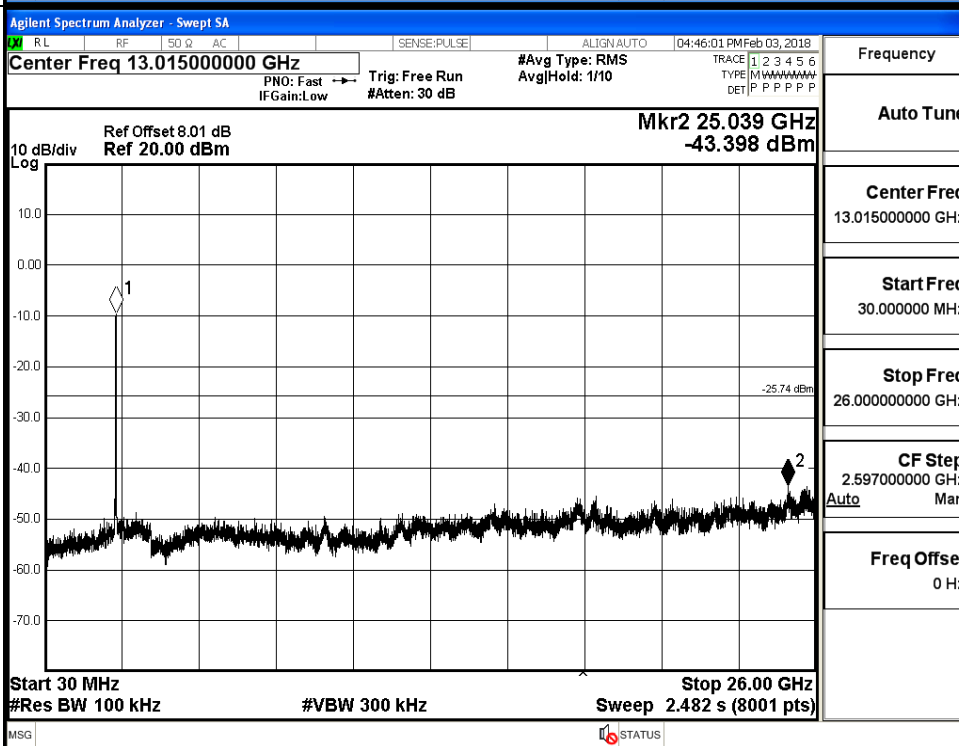


11N40SISO_LCH_Graphs

Pref/11N40
SISO/LCH

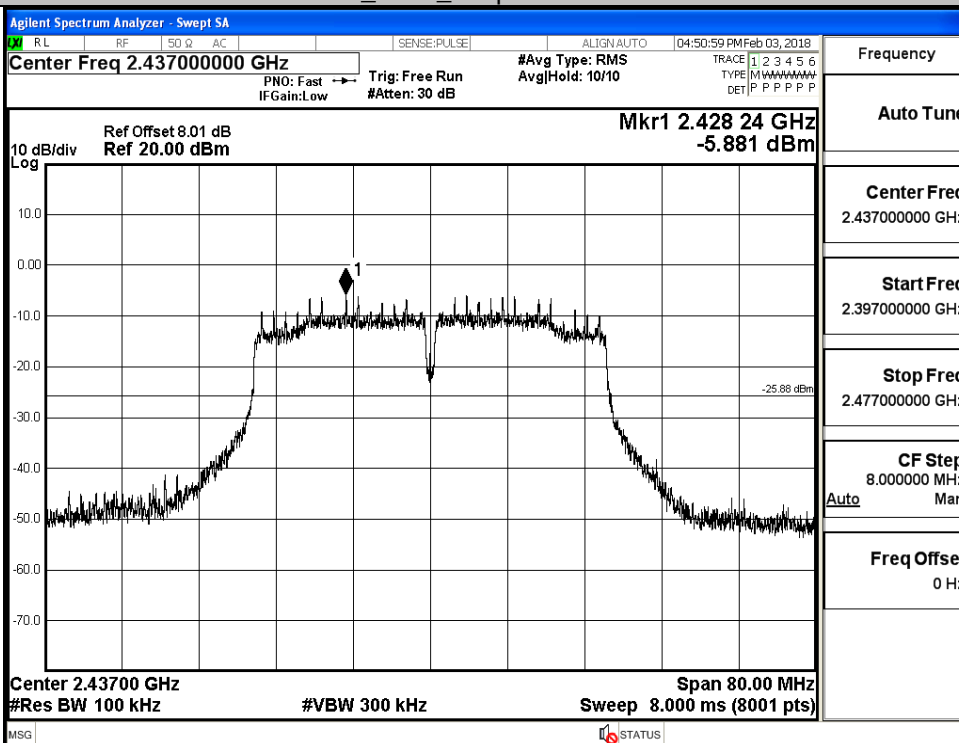


Puw/11N40
SISO/LCH

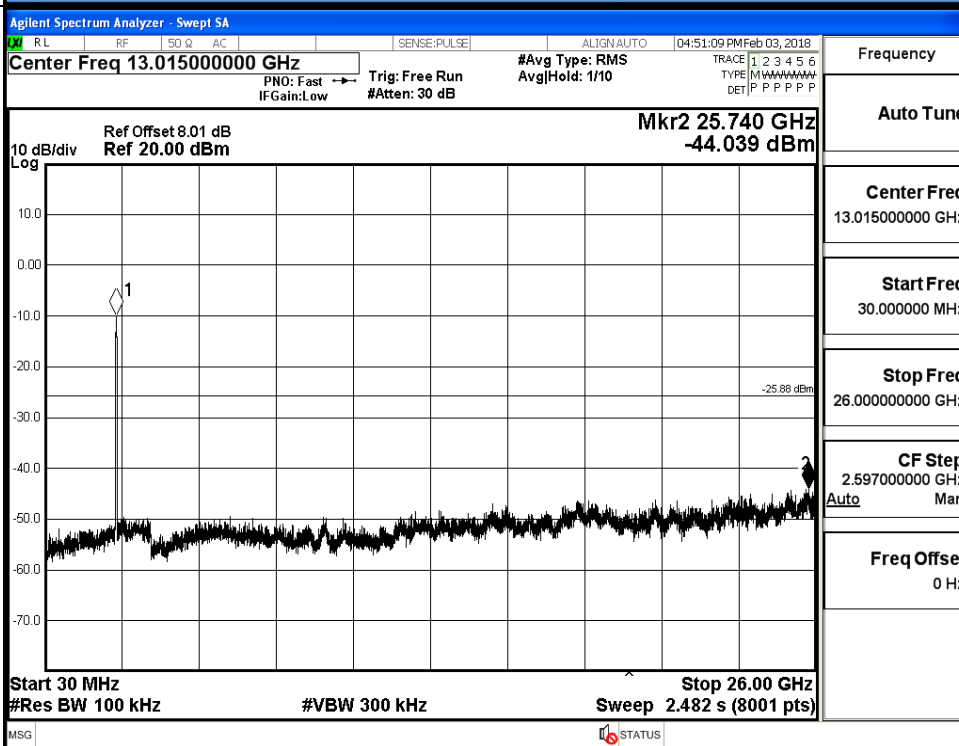


11N40SISO_MCH_Graphs

Pref/11N40
SISO/MCH

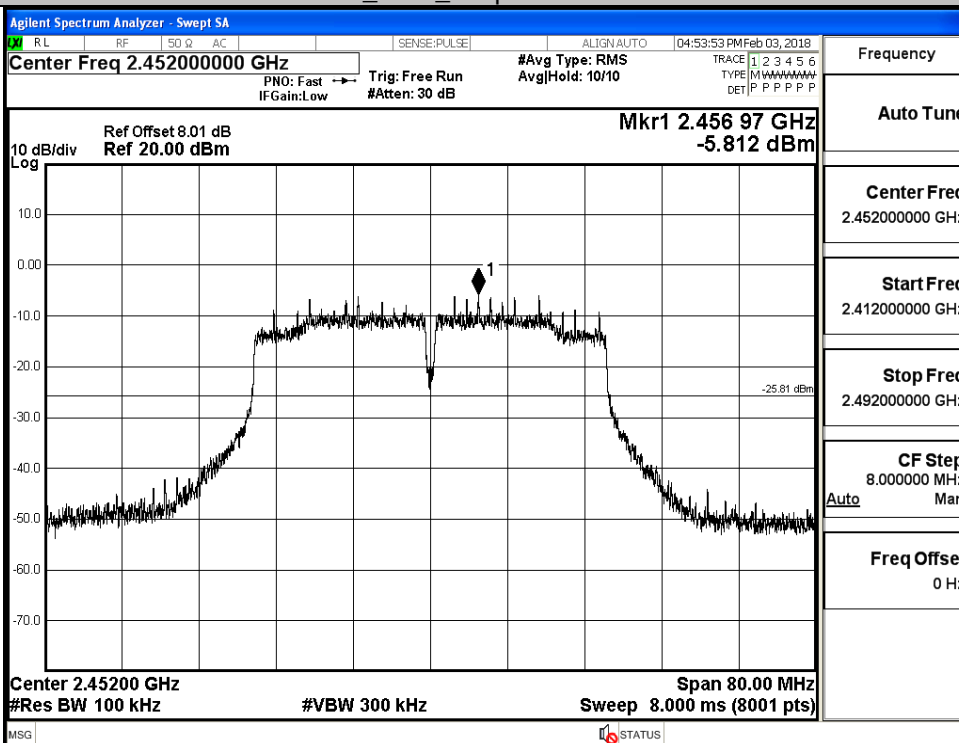


Puw/11N40
SISO/MCH

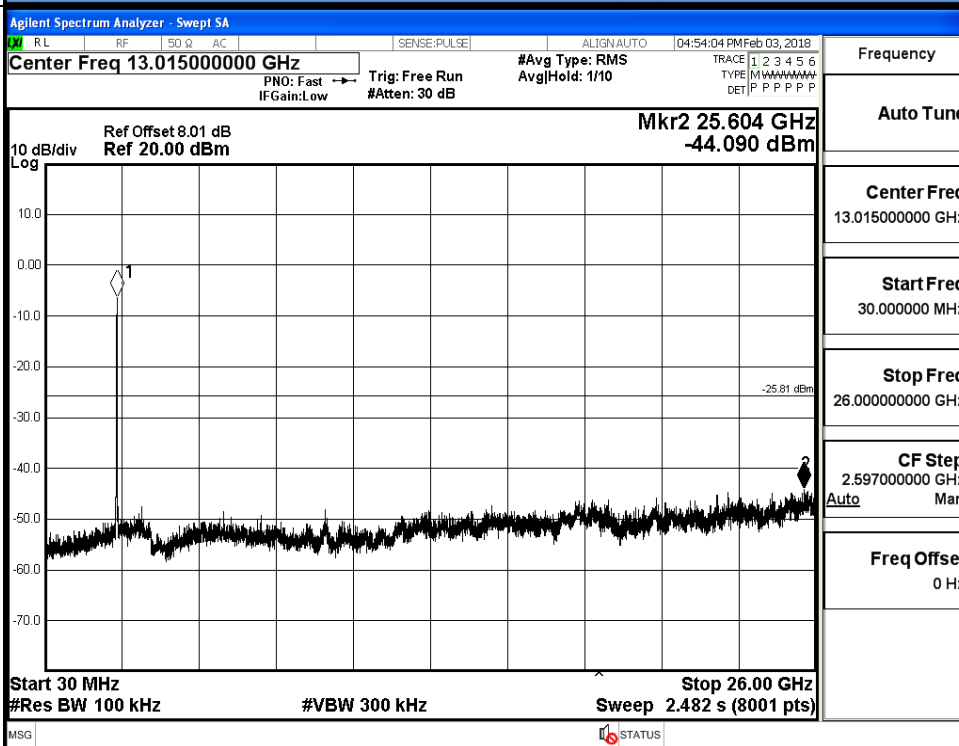


11N40SISO_HCH_Graphs

Pref/11N40
SISO/HCH



Puw/11N40
SISO/HCH

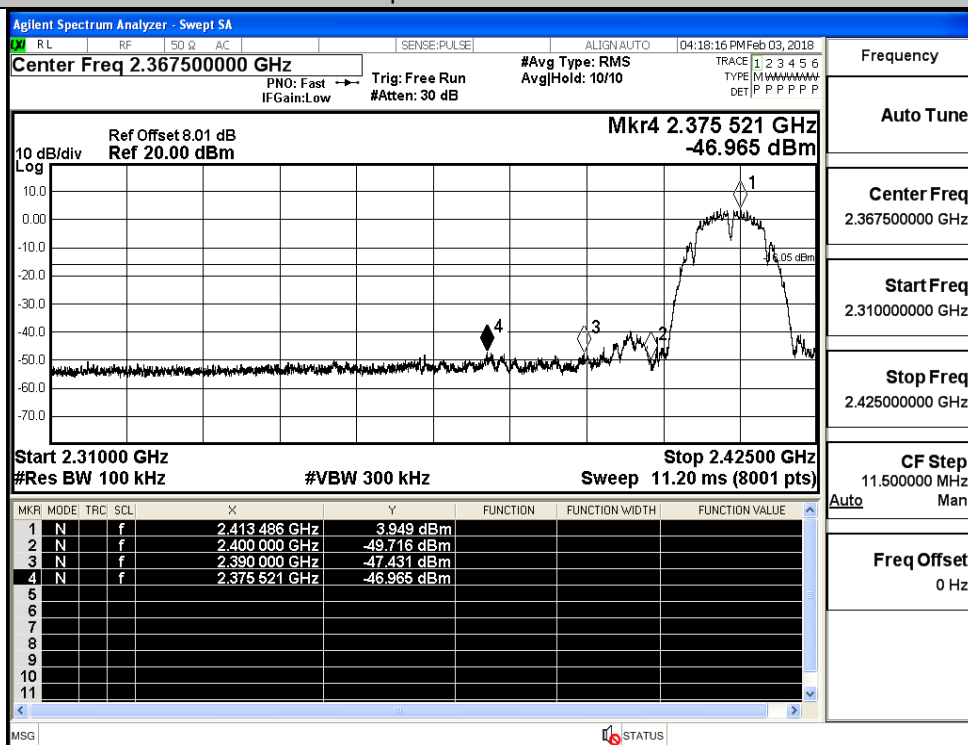


6 Band-edge for RF Conducted Emissions

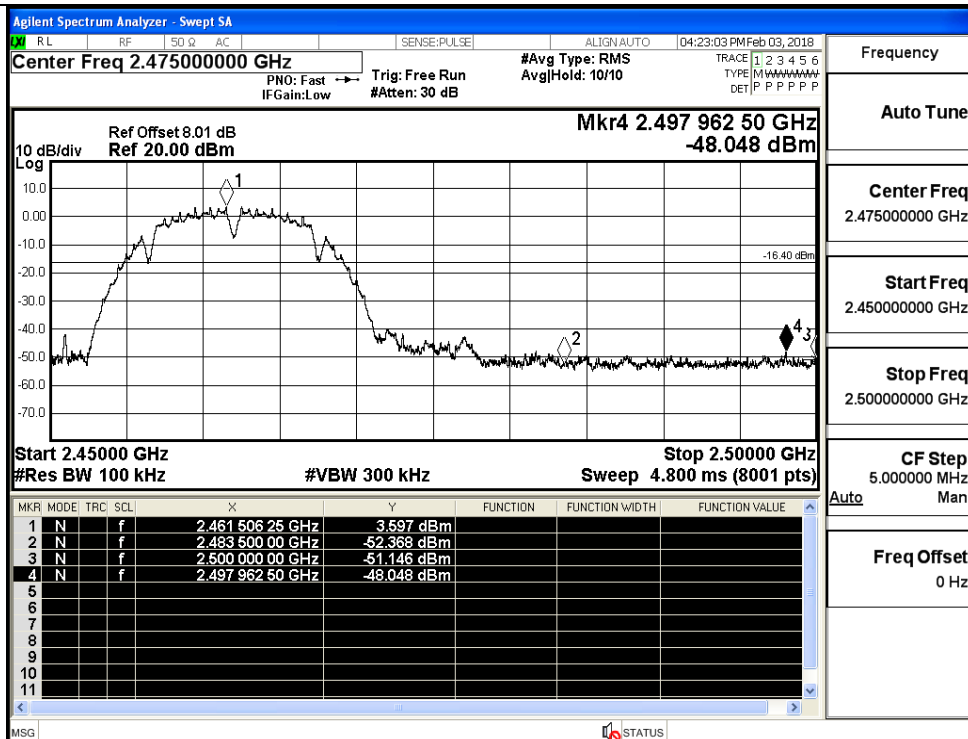
| Mode | Channel | Carrier Power[dBm] | Max.Spurious Level [dBm] | Limit [dBm] | Verdict |
|-----------|---------|--------------------|--------------------------|-------------|---------|
| 11B | LCH | 3.949 | -46.965 | -16.05 | PASS |
| | HCH | 3.597 | -48.048 | -16.40 | PASS |
| 11G | LCH | -2.030 | -47.562 | -22.03 | PASS |
| | HCH | -2.243 | -49.490 | -22.24 | PASS |
| 11N20SISO | LCH | -2.640 | -49.407 | -22.64 | PASS |
| | HCH | -2.322 | -48.754 | -22.32 | PASS |
| 11N40SISO | LCH | -5.716 | -43.037 | -25.72 | PASS |
| | HCH | -5.571 | -47.107 | -25.57 | PASS |

Test Graphs

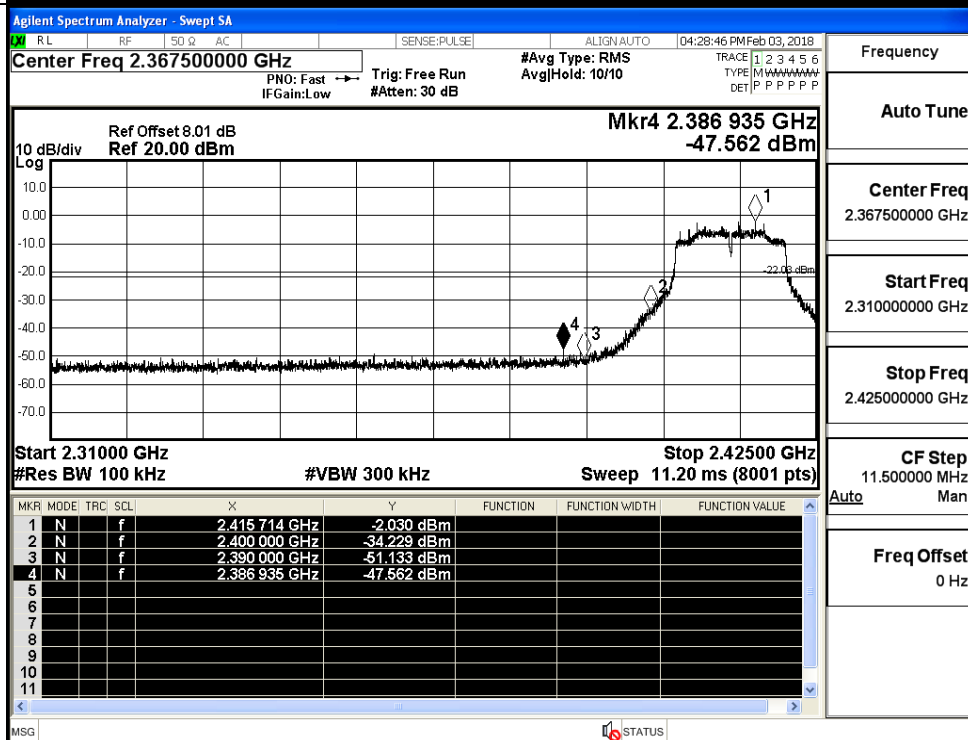
11B/LCH



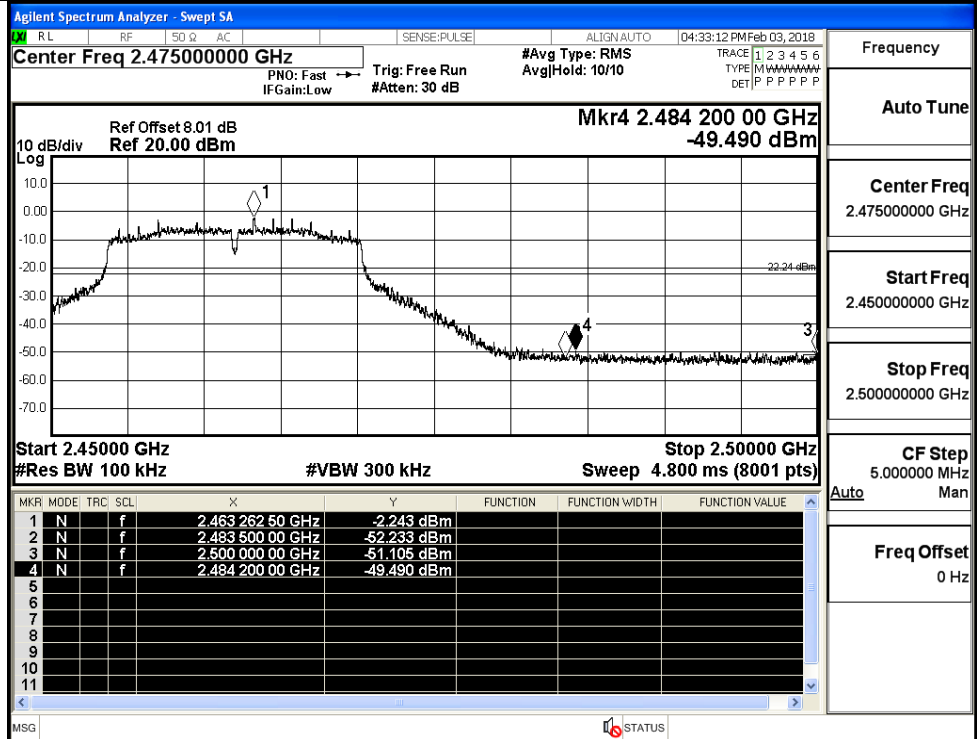
11B/HCH



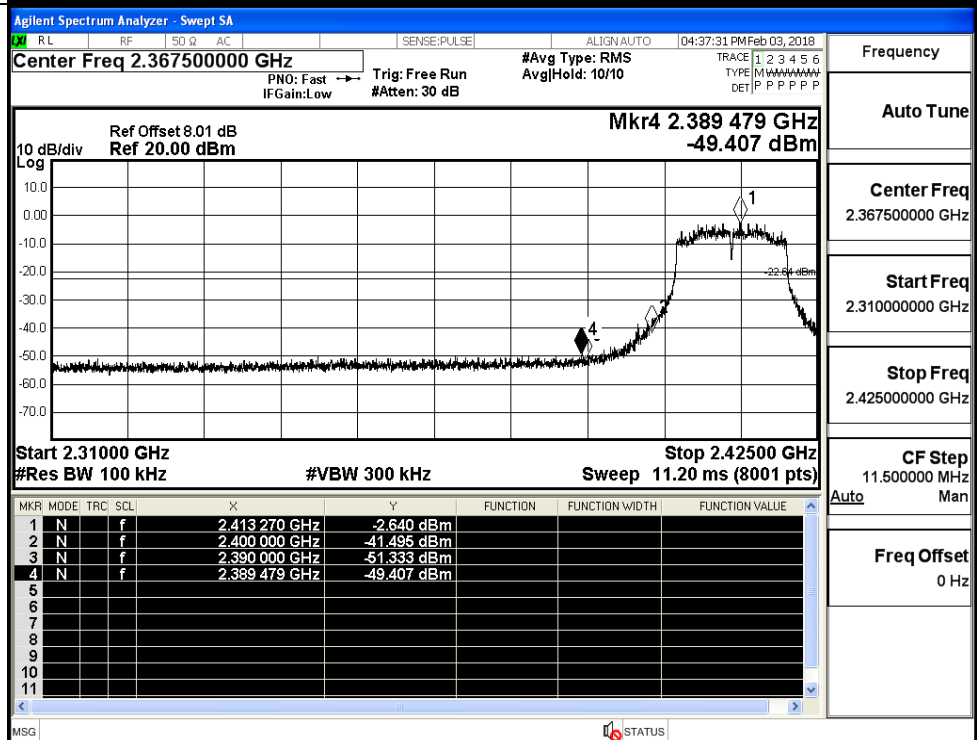
11G/LCH



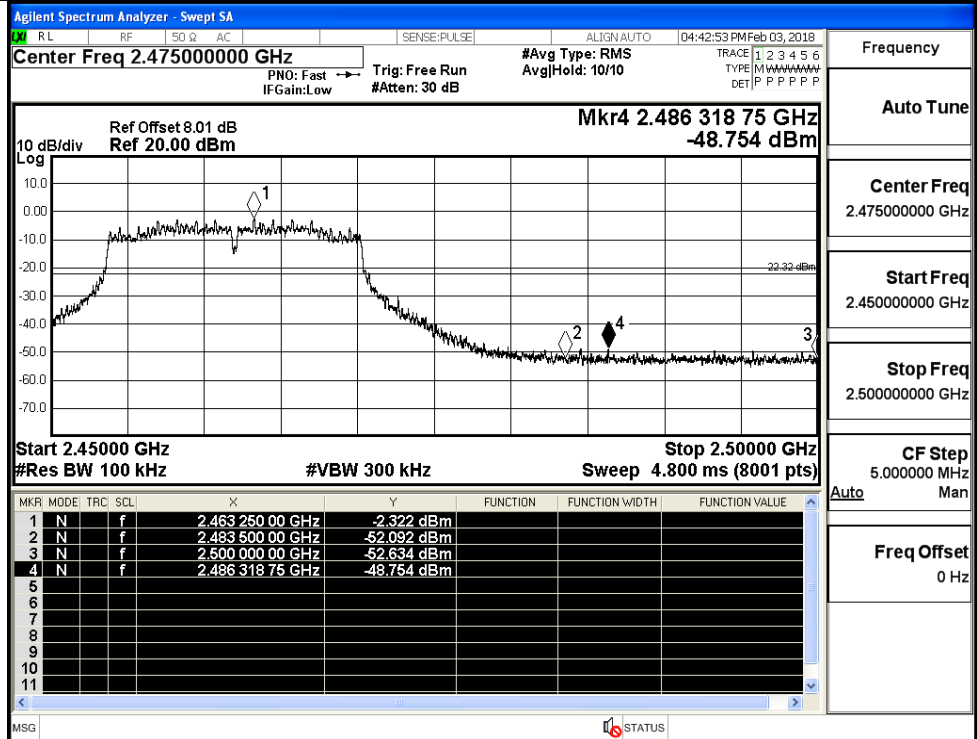
11G/HCH



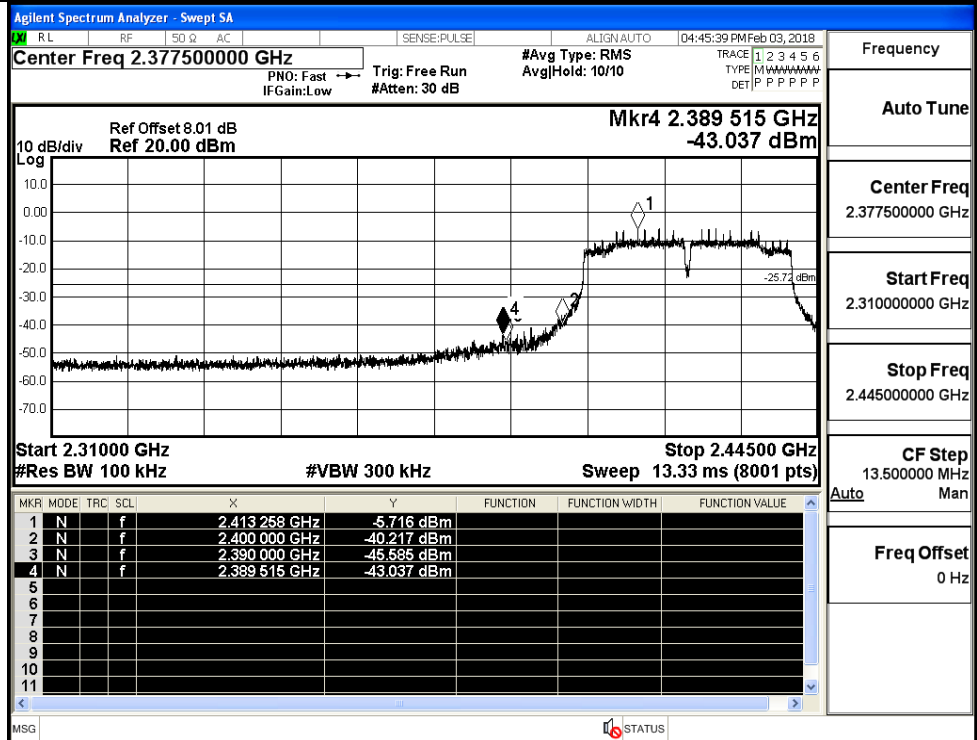
11N20SISO/LCH



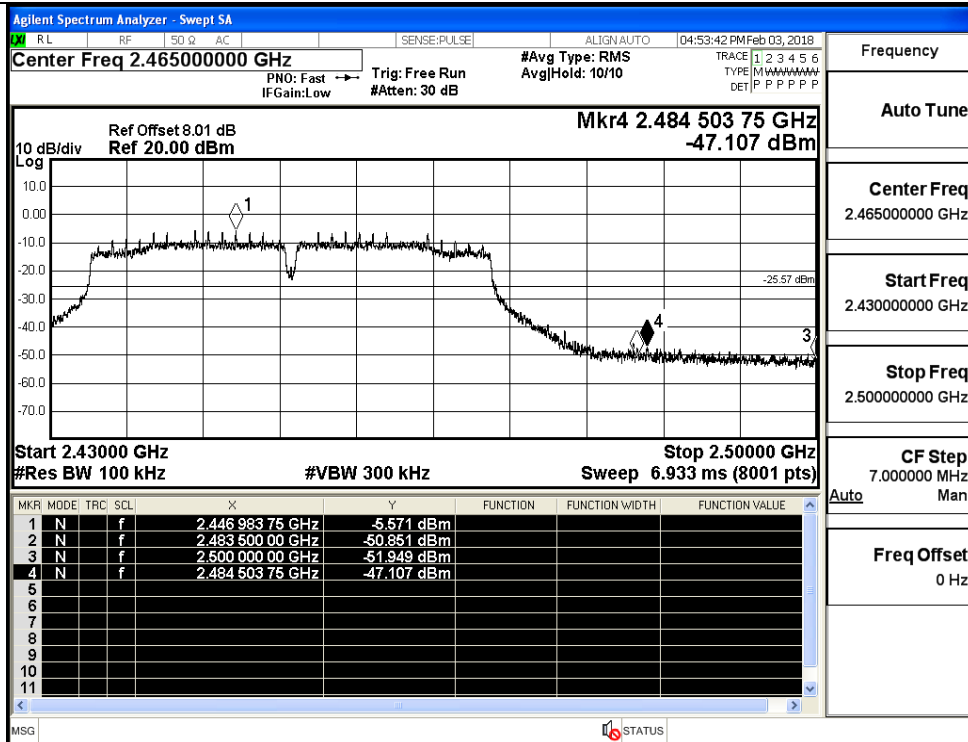
11N20SISO/HCH



11N40SISO/LCH



11N40SISO/HCH



Frequency

Auto Tune

Center Freq
2.465000000 GHz

Start Freq
2.430000000 GHz

Stop Freq
2.500000000 GHz

CF Step
7.000000 MHz

Auto Man

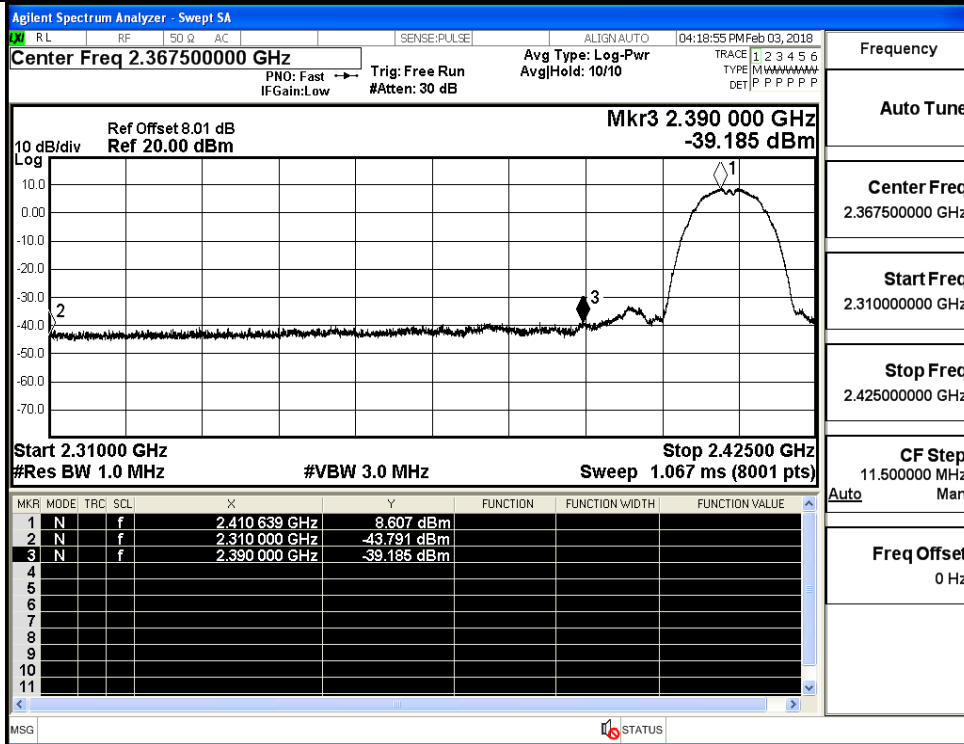
Freq Offset
0 Hz

7 Restrict-band band-edge measurements

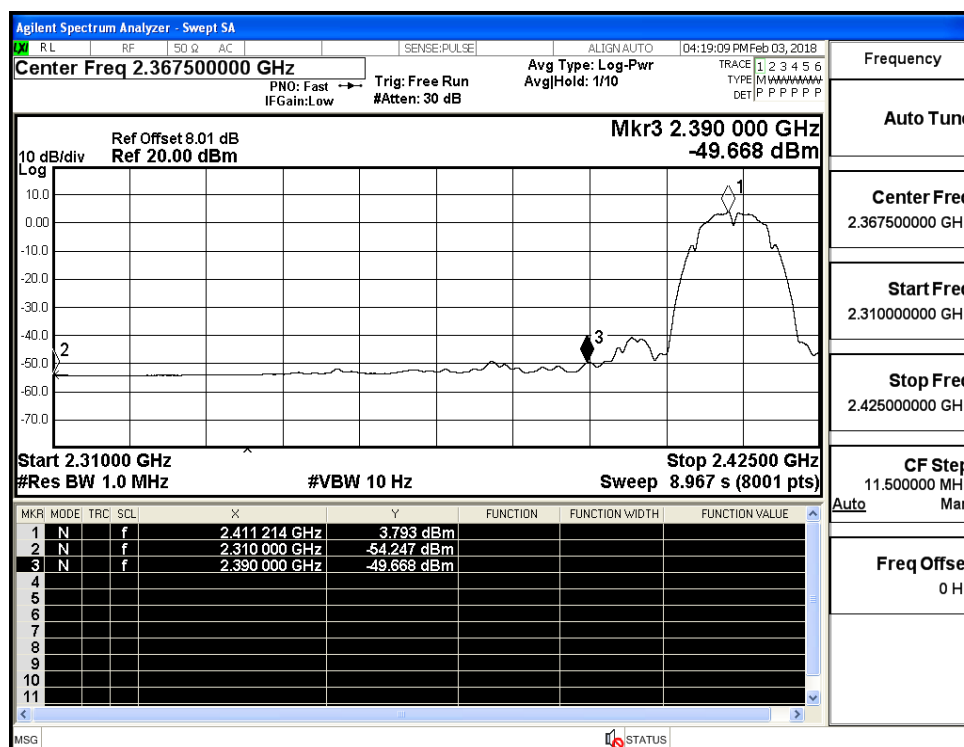
| Test Mode | Test Channel | Ant | Freq. | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|------------|--------------|------|--------|-------------|------|---------------|------------|----------|----------------|---------|
| 11B | 2412 | Ant0 | 2310.0 | -43.79 | 2.0 | 0 | 53.44 | PEAK | 74 | PASS |
| | 2412 | Ant0 | 2310.0 | -54.25 | 2.0 | 0 | 42.98 | AV | 54 | PASS |
| | 2412 | Ant0 | 2390.0 | -39.19 | 2.0 | 0 | 58.04 | PEAK | 74 | PASS |
| | 2412 | Ant0 | 2390.0 | -49.67 | 2.0 | 0 | 47.56 | AV | 54 | PASS |
| | 2462 | Ant0 | 2483.5 | -41.14 | 2.0 | 0 | 56.09 | PEAK | 74 | PASS |
| | 2462 | Ant0 | 2483.5 | -52.30 | 2.0 | 0 | 44.93 | AV | 54 | PASS |
| | 2462 | Ant0 | 2500.0 | -40.34 | 2.0 | 0 | 56.89 | PEAK | 74 | PASS |
| | 2462 | Ant0 | 2500.0 | -52.32 | 2.0 | 0 | 44.91 | AV | 54 | PASS |
| 11G | 2412 | Ant0 | 2310.0 | -44.40 | 2.0 | 0 | 52.83 | PEAK | 74 | PASS |
| | 2412 | Ant0 | 2310.0 | -54.31 | 2.0 | 0 | 42.92 | AV | 54 | PASS |
| | 2412 | Ant0 | 2390.0 | -40.62 | 2.0 | 0 | 56.61 | PEAK | 74 | PASS |
| | 2412 | Ant0 | 2390.0 | -51.60 | 2.0 | 0 | 45.63 | AV | 54 | PASS |
| | 2462 | Ant0 | 2483.5 | -40.45 | 2.0 | 0 | 56.78 | PEAK | 74 | PASS |
| | 2462 | Ant0 | 2483.5 | -52.37 | 2.0 | 0 | 44.86 | AV | 54 | PASS |
| | 2462 | Ant0 | 2500.0 | -42.60 | 2.0 | 0 | 54.63 | PEAK | 74 | PASS |
| | 2462 | Ant0 | 2500.0 | -52.98 | 2.0 | 0 | 44.25 | AV | 54 | PASS |
| 11N20 SISO | 2412 | Ant0 | 2310.0 | -44.06 | 2.0 | 0 | 53.17 | PEAK | 74 | PASS |
| | 2412 | Ant0 | 2310.0 | -54.32 | 2.0 | 0 | 42.91 | AV | 54 | PASS |
| | 2412 | Ant0 | 2390.0 | -42.49 | 2.0 | 0 | 54.74 | PEAK | 74 | PASS |
| | 2412 | Ant0 | 2390.0 | -52.19 | 2.0 | 0 | 45.04 | AV | 54 | PASS |
| | 2462 | Ant0 | 2483.5 | -40.57 | 2.0 | 0 | 56.66 | PEAK | 74 | PASS |
| | 2462 | Ant0 | 2483.5 | -52.55 | 2.0 | 0 | 44.68 | AV | 54 | PASS |
| | 2462 | Ant0 | 2500.0 | -41.76 | 2.0 | 0 | 55.47 | PEAK | 74 | PASS |
| | 2462 | Ant0 | 2500.0 | -53.03 | 2.0 | 0 | 44.20 | AV | 54 | PASS |
| 11N40 SISO | 2422 | Ant0 | 2310.0 | -44.00 | 2.0 | 0 | 53.23 | PEAK | 74 | PASS |
| | 2422 | Ant0 | 2310.0 | -54.29 | 2.0 | 0 | 42.94 | AV | 54 | PASS |

| | | | | | | | | | | |
|--|------|------|--------|--------|-----|---|-------|------|----|------|
| | 2422 | Ant0 | 2390.0 | -35.95 | 2.0 | 0 | 61.28 | PEAK | 74 | PASS |
| | 2422 | Ant0 | 2390.0 | -48.12 | 2.0 | 0 | 49.11 | AV | 54 | PASS |
| | 2452 | Ant0 | 2483.5 | -40.59 | 2.0 | 0 | 56.64 | PEAK | 74 | PASS |
| | 2452 | Ant0 | 2483.5 | -50.36 | 2.0 | 0 | 46.87 | AV | 54 | PASS |
| | 2452 | Ant0 | 2500.0 | -41.42 | 2.0 | 0 | 55.81 | PEAK | 74 | PASS |
| | 2452 | Ant0 | 2500.0 | -52.53 | 2.0 | 0 | 44.70 | AV | 54 | PASS |

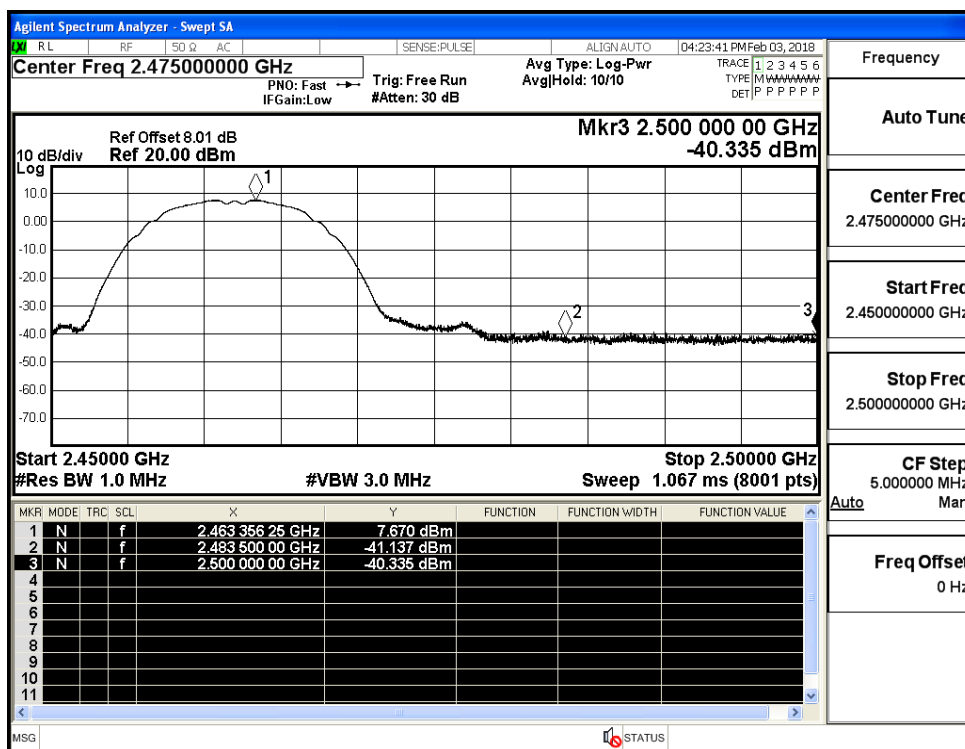
Restrict-band band-edge measurements_11B_2412_Ant1_PEAK



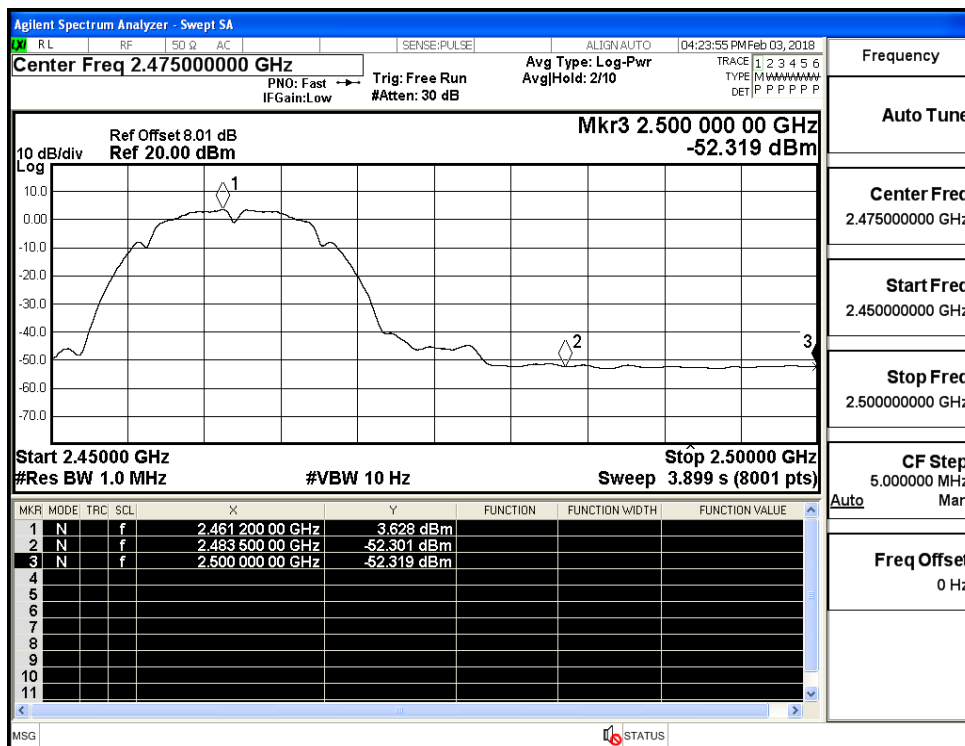
Restrict-band band-edge measurements_11B_2412_Ant1_AV



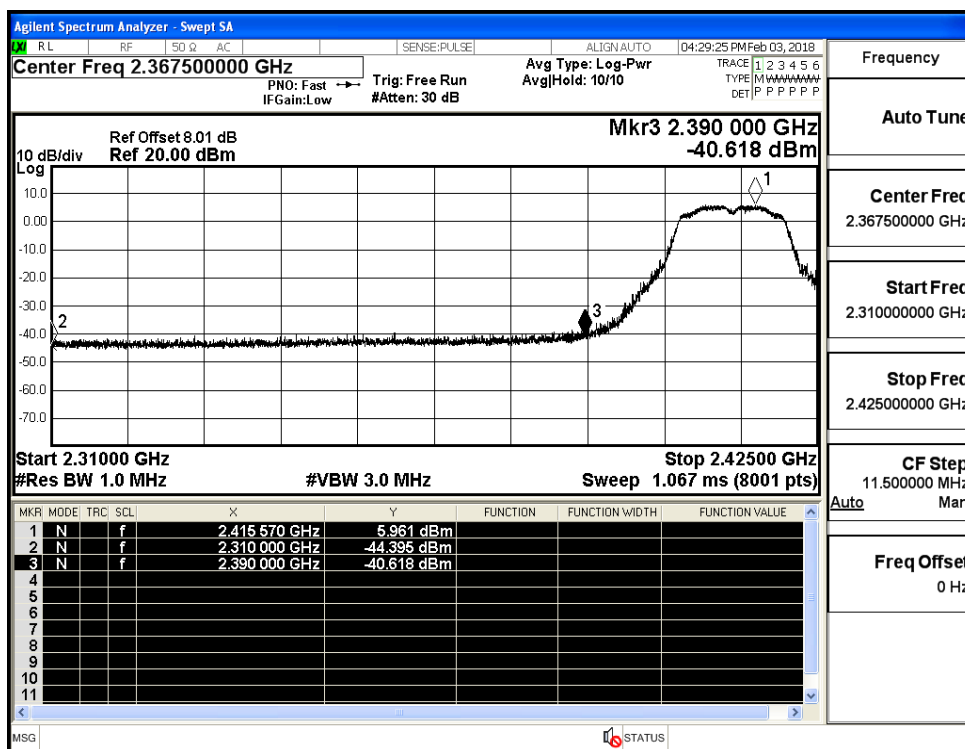
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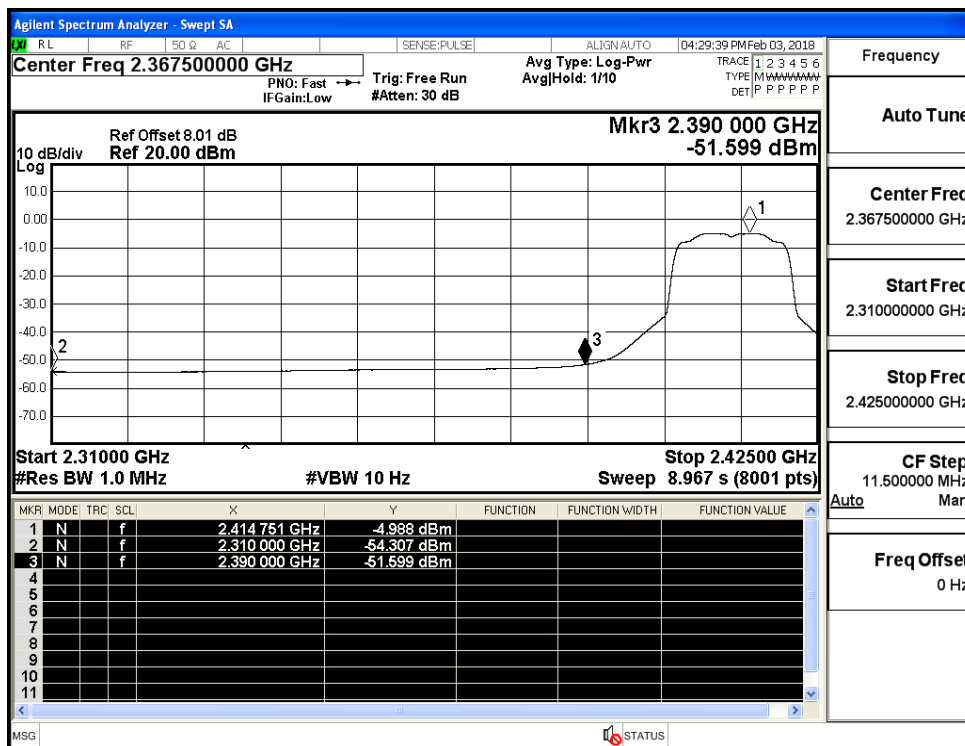
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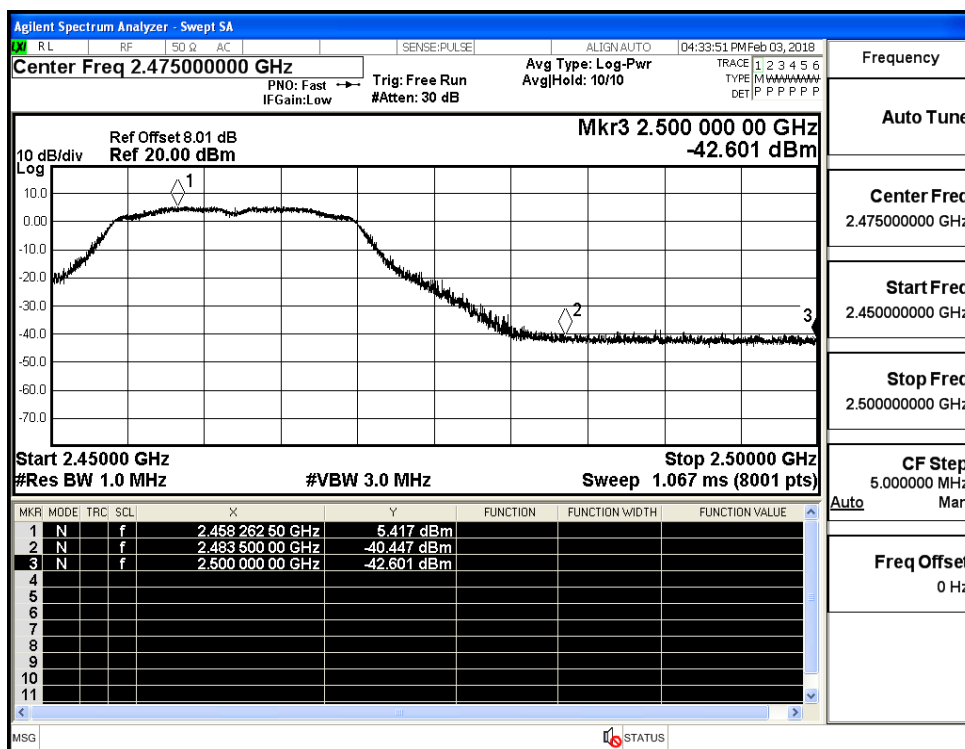
Restrict-band band-edge measurements_11G_2412_Ant1_PEAK



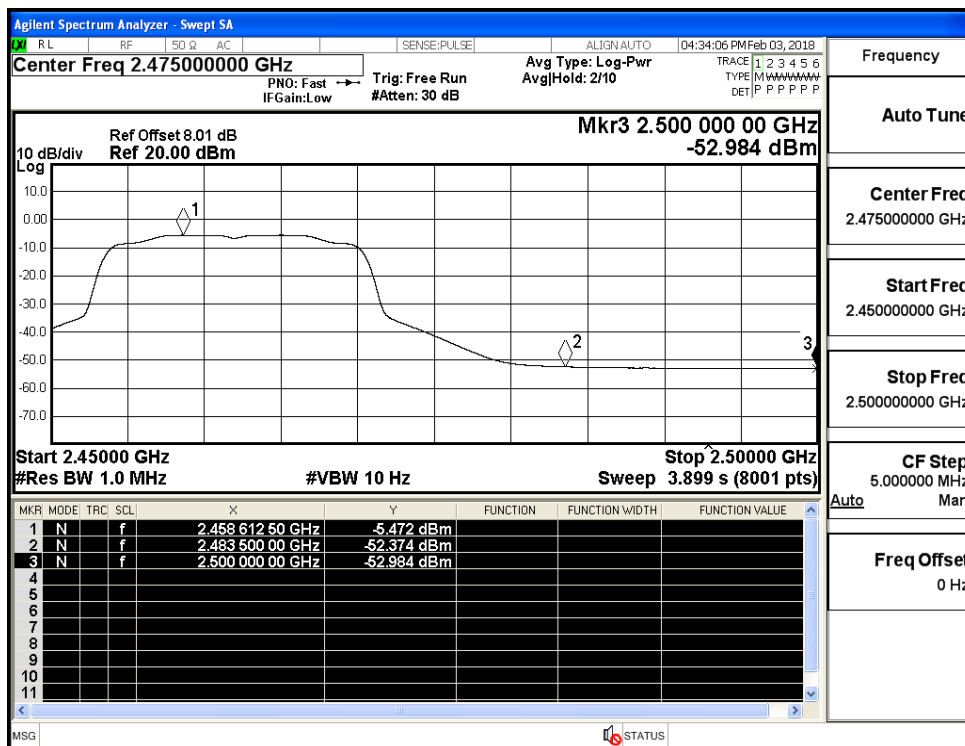
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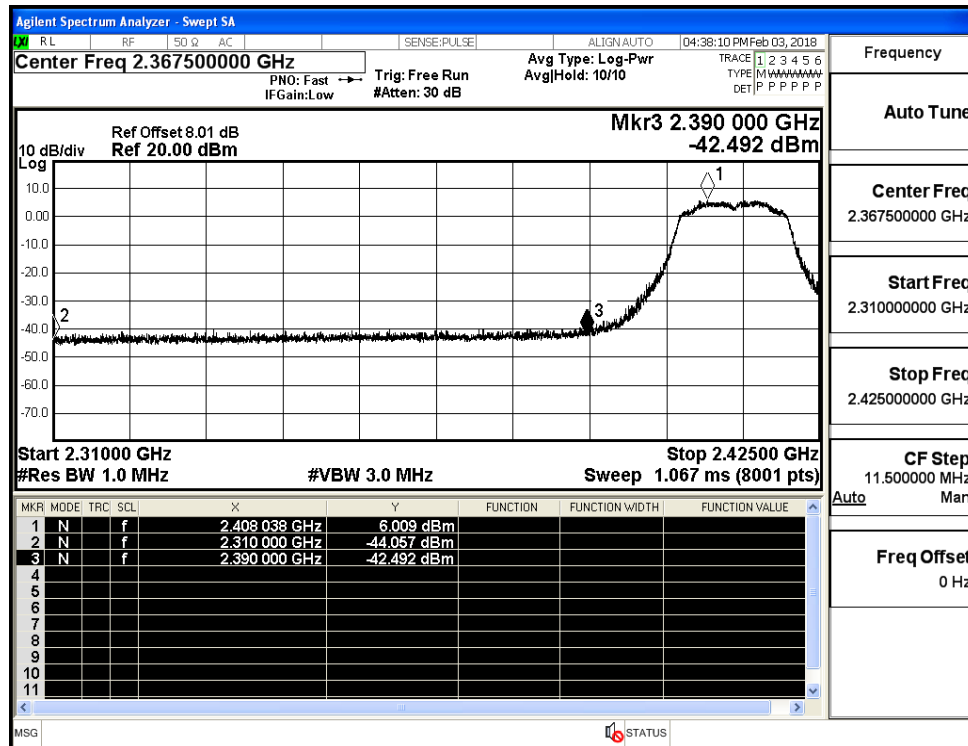
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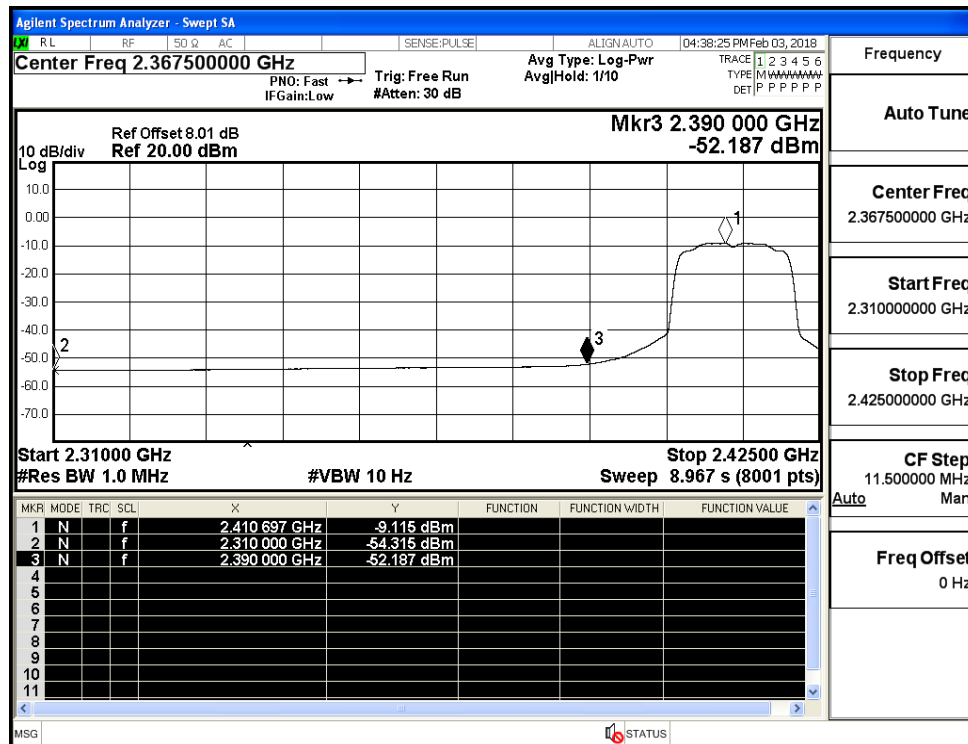
Restrict-band band-edge measurements_11G_2462_Ant1_AV



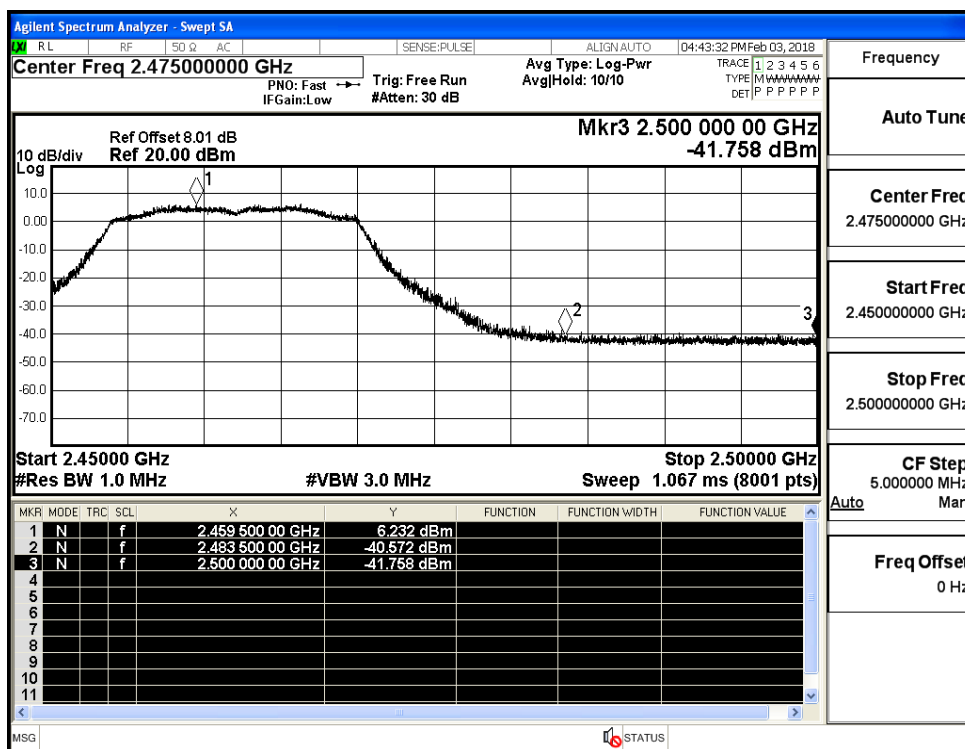
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_PEAK



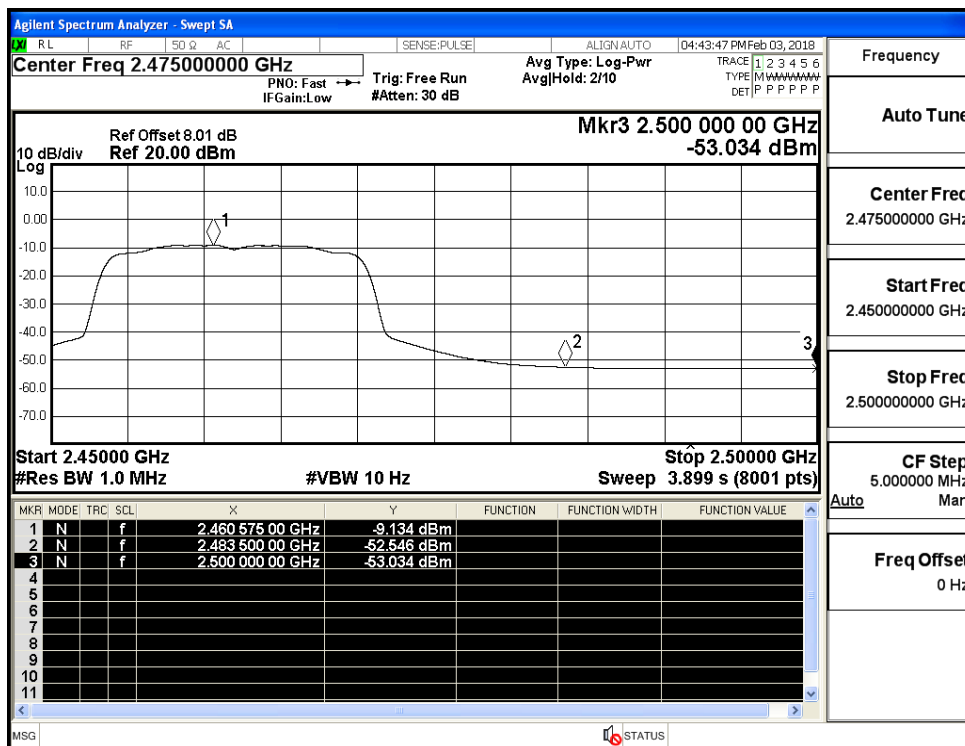
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_AV



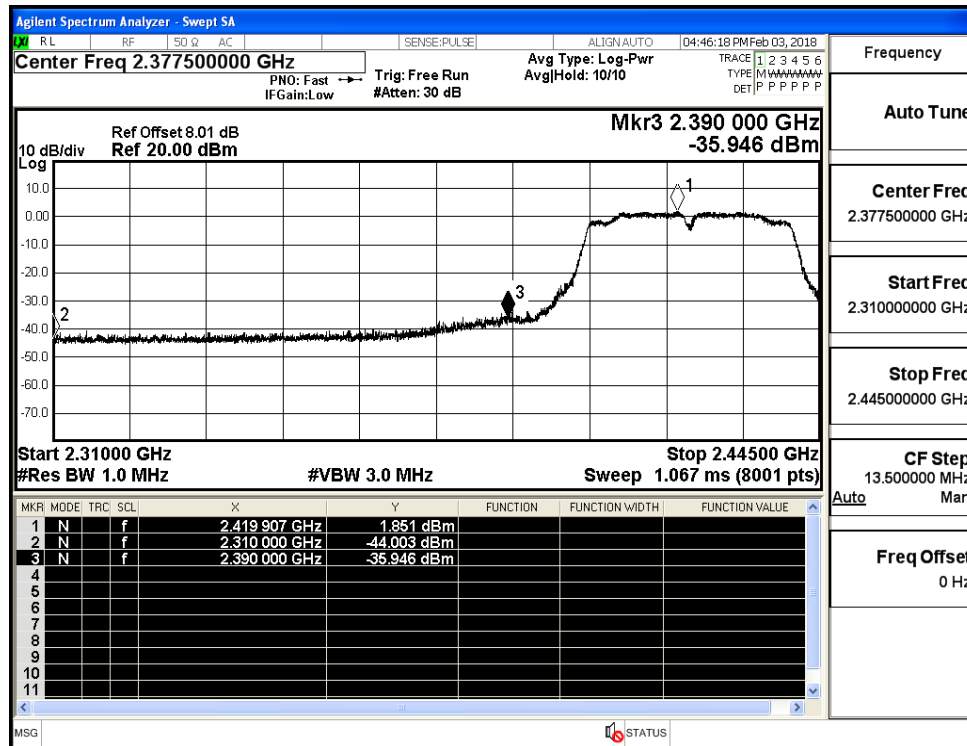
Restrict-band band-edge measurements_11N20SISO_2462_Ant1_PEAK



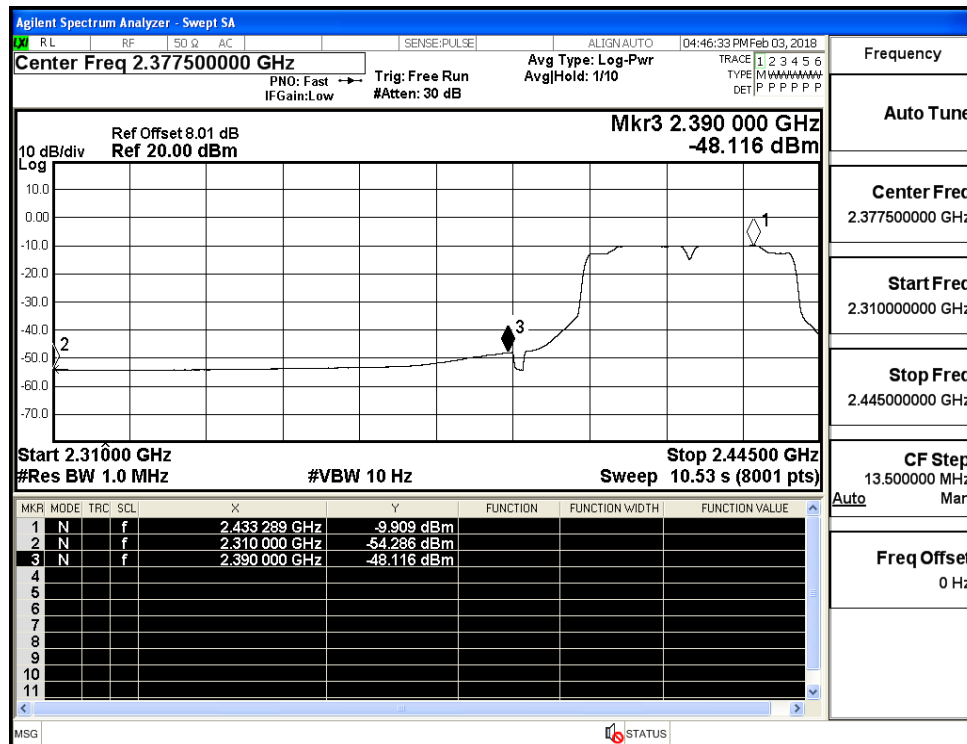
Restrict-band band-edge measurements_11N20SISO_2462_Ant1_AV



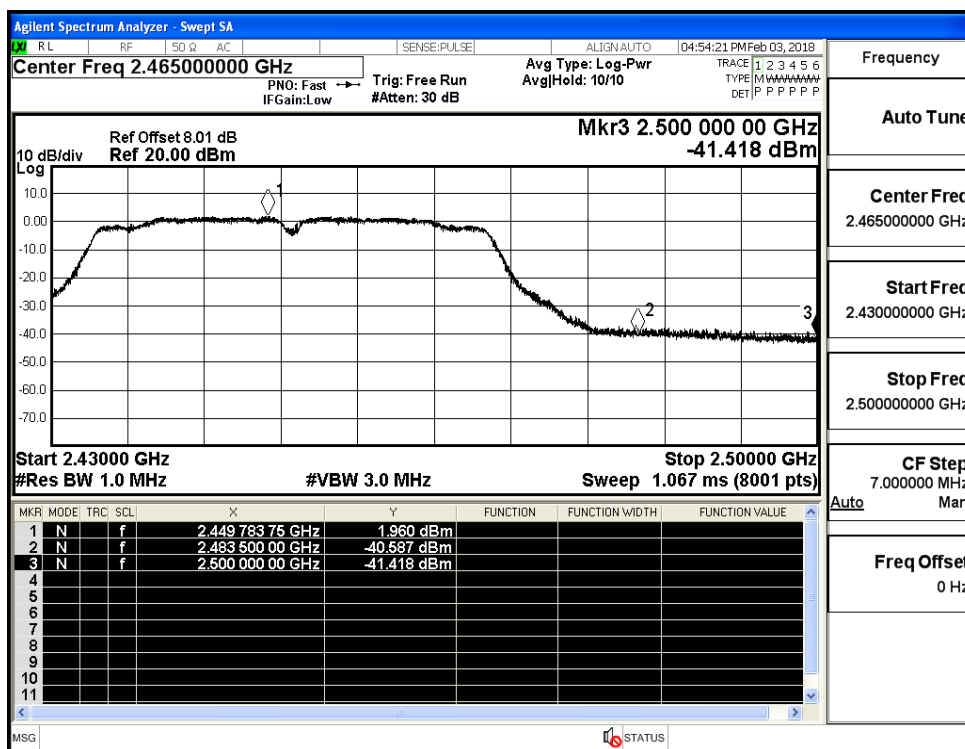
Restrict-band band-edge measurements_11N40SISO_2422_Ant1_PEAK



Restrict-band band-edge measurements_11N40SISO_2422_Ant1_AV



Restrict-band band-edge measurements_11N40SISO_2452_Ant1_PEAK



Restrict-band band-edge measurements_11N40SISO_2452_Ant1_AV

