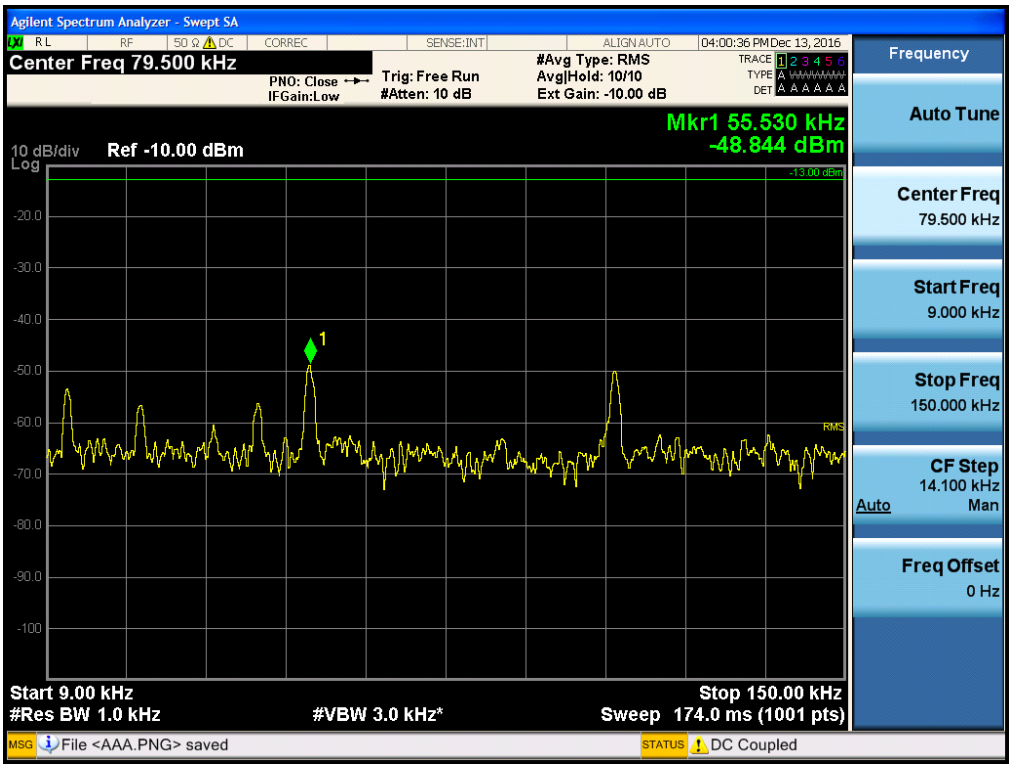
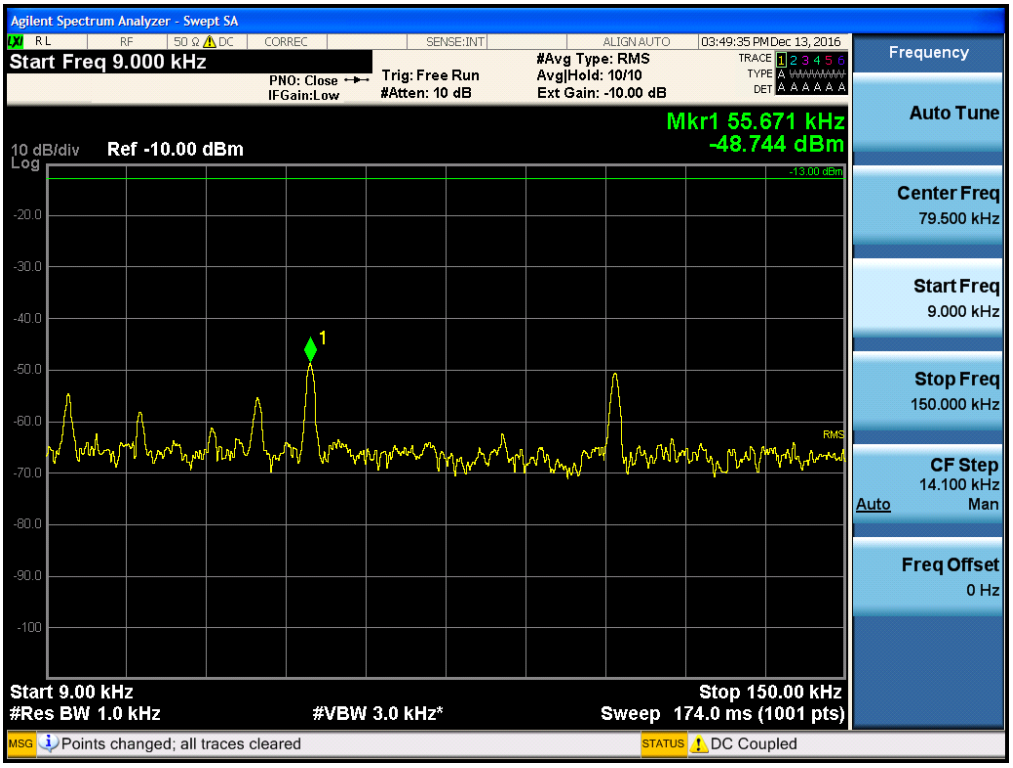
## Single channel Enhancer Plots of Spurious Emission for AWS BAND LTE 5MHz

### Conducted Spurious Emissions (9 kHz – 150 kHz)

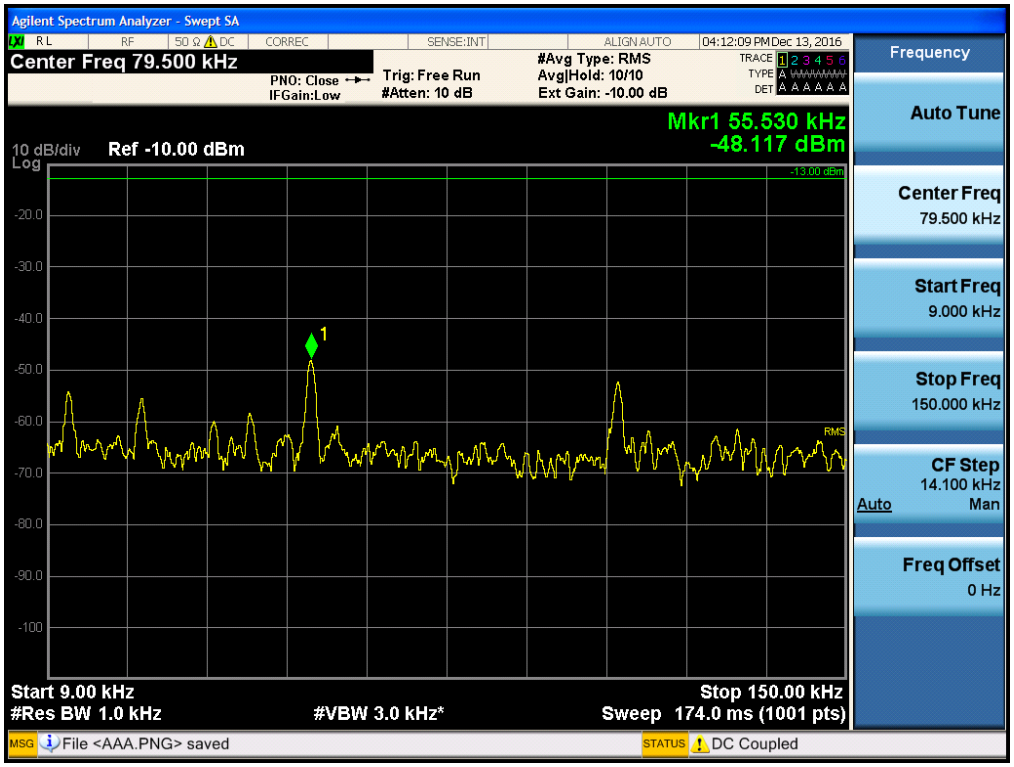
**[Downlink Low]**




**[Downlink Middle]**

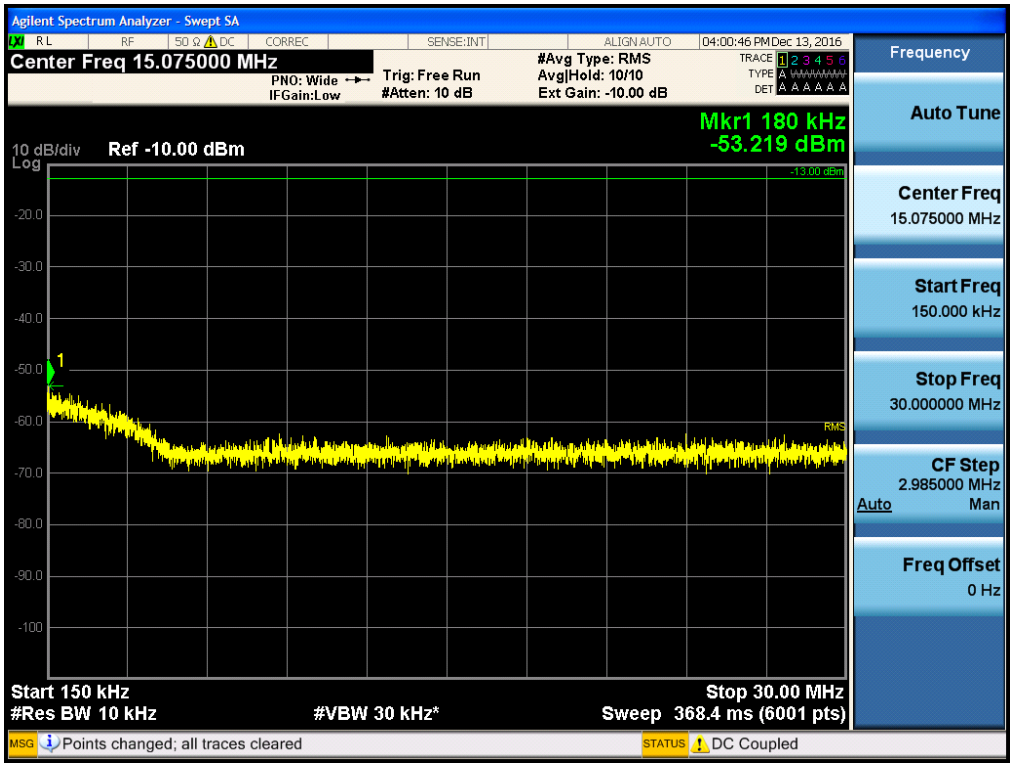


**[Downlink High]**



**Conducted Spurious Emissions (150 kHz – 30 MHz)**

**[Downlink Low]**

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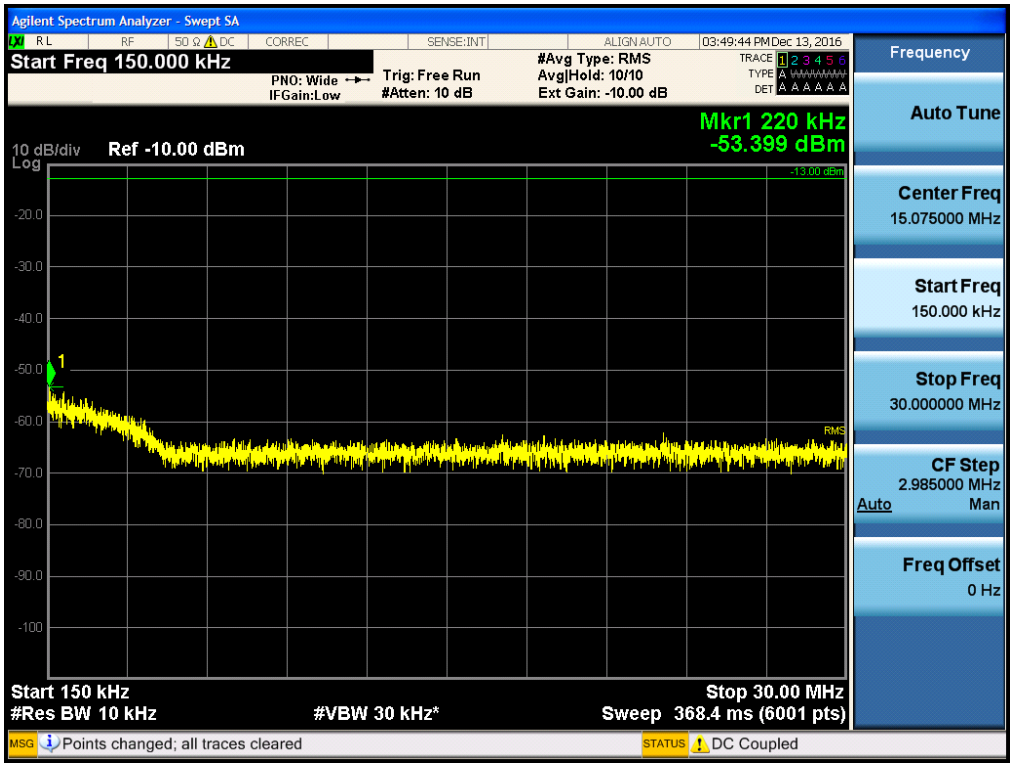
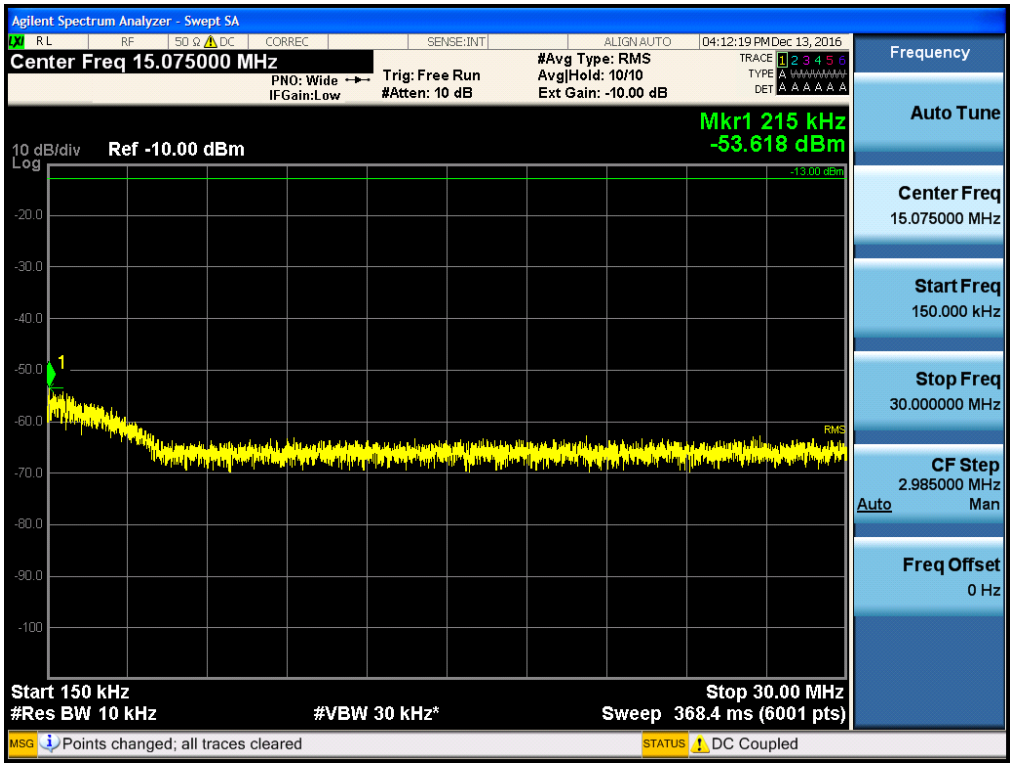
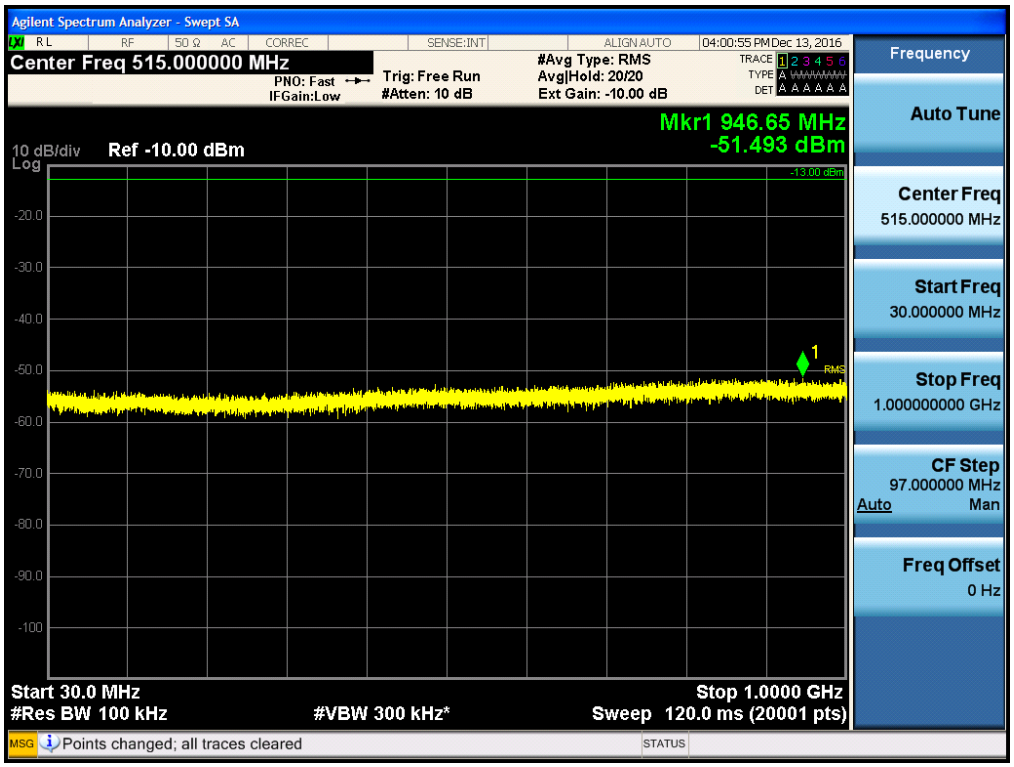


**[Downlink High]**



**Conducted Spurious Emissions (30 MHz – 1 GHz)**

**[Downlink Low]**

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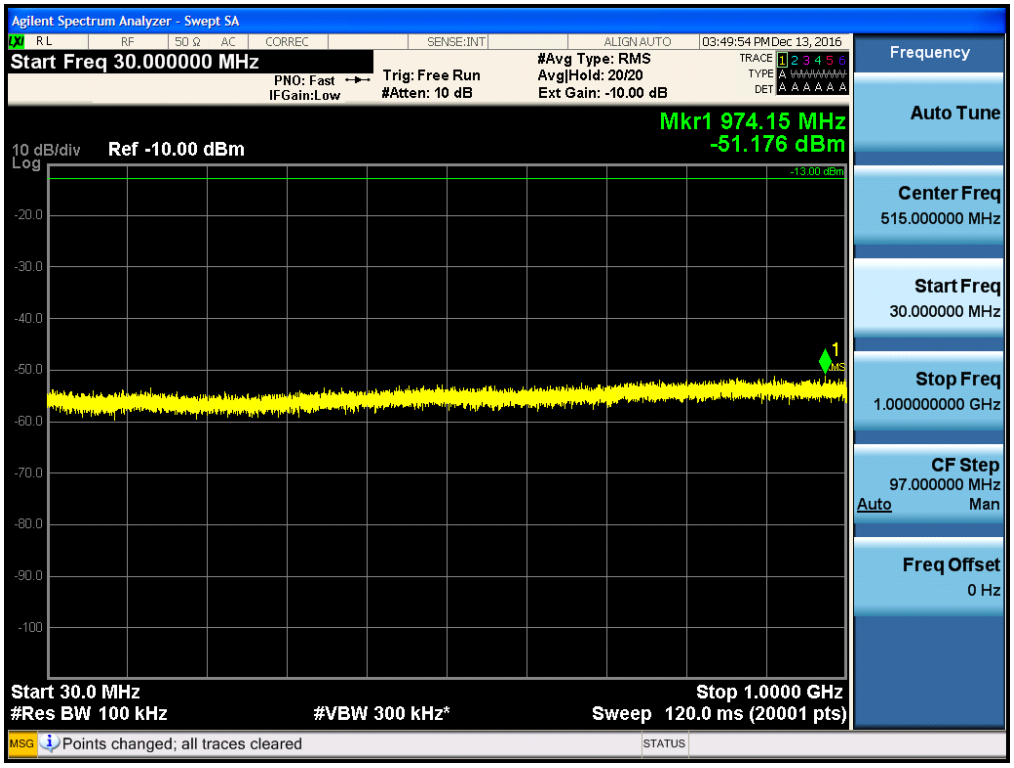

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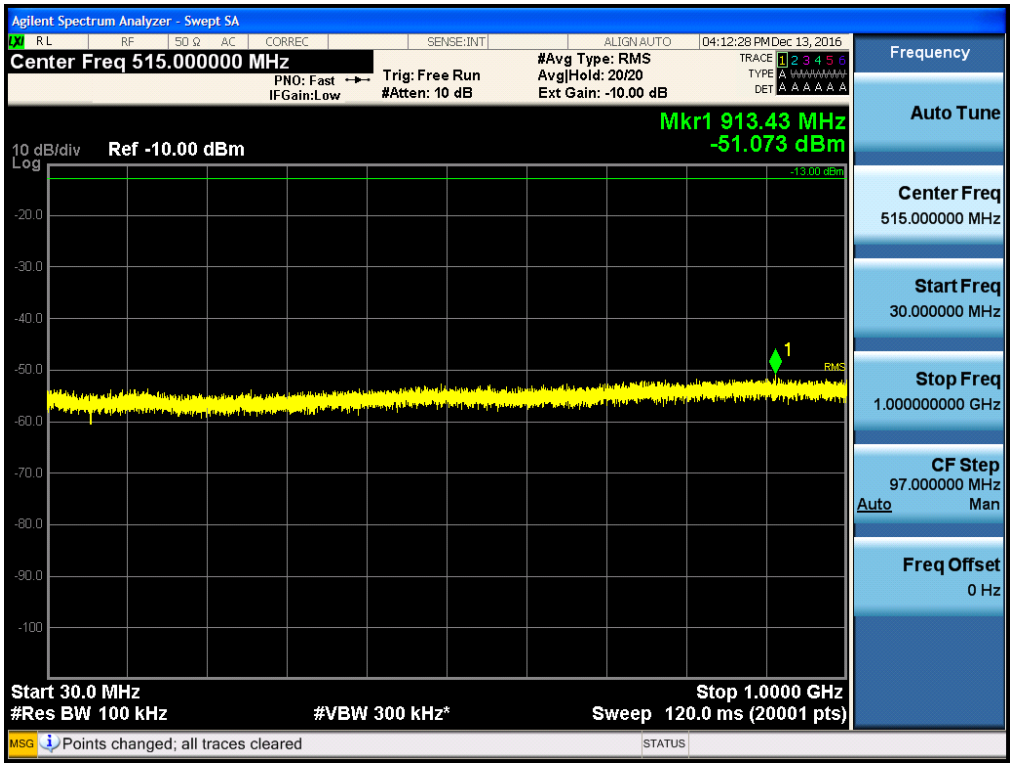
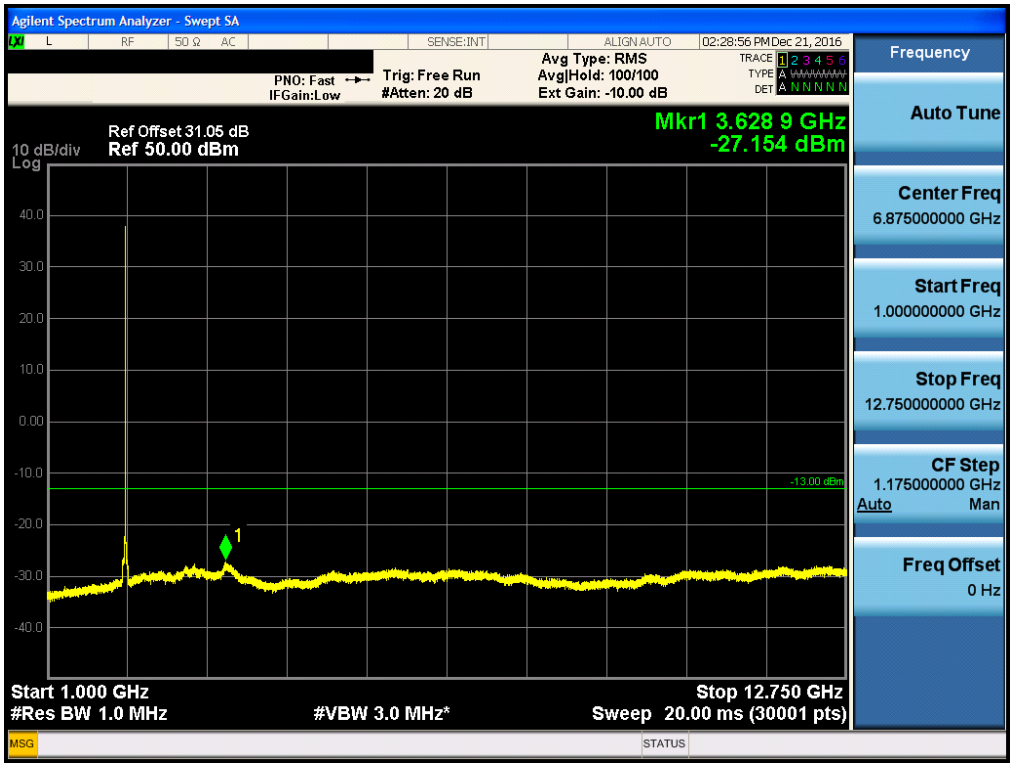


**Conducted Spurious Emissions (1 GHz – 12.75 GHz)**

**[Downlink Low]**


**[Downlink Middle]**

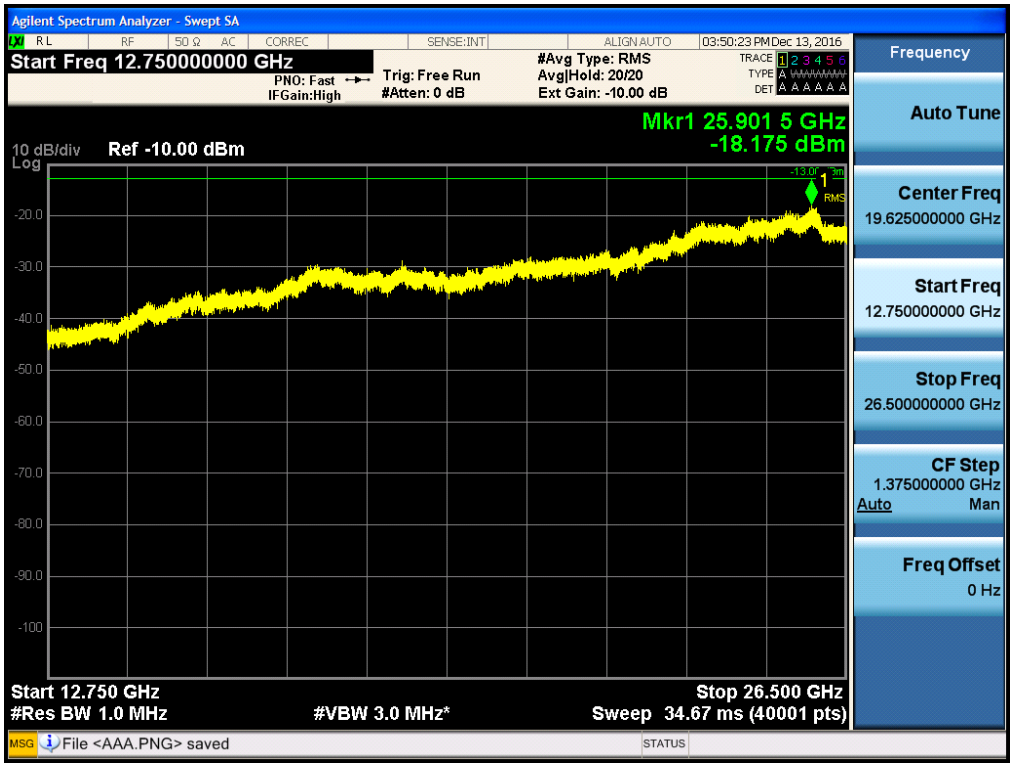


**[Downlink High]**

**Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)**

**[Downlink Low]**


**[Downlink Middle]**

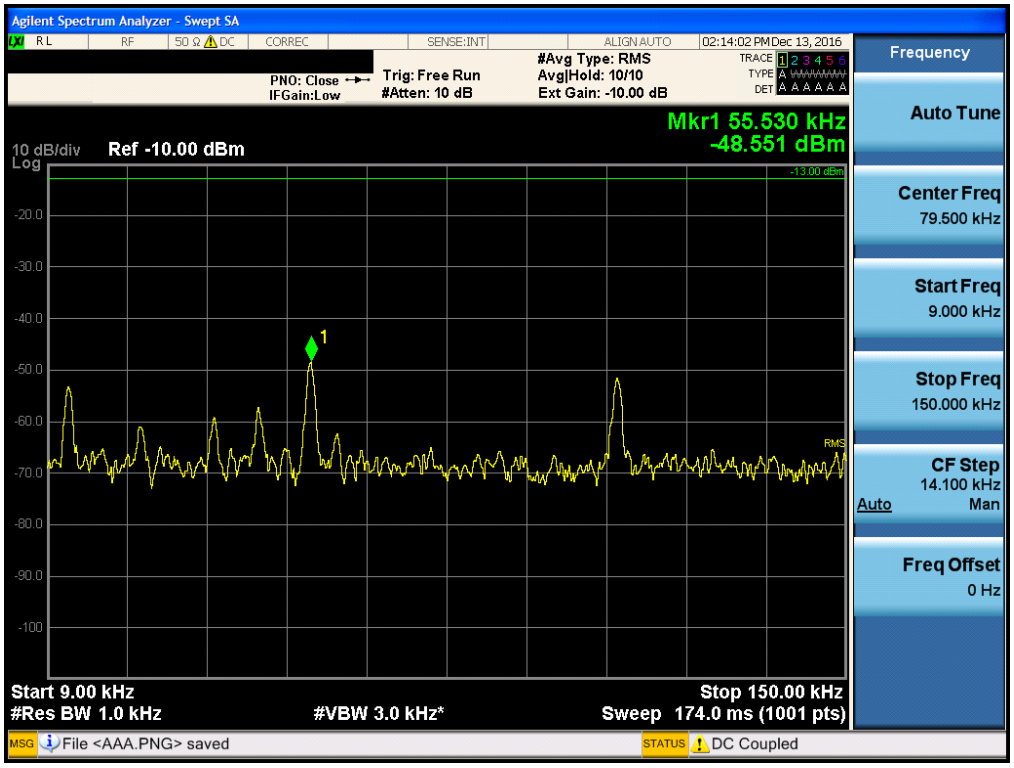


**[Downlink High]**

## Single channel Enhancer Plots of Spurious Emission for AWS BAND LTE 10MHz

### Conducted Spurious Emissions (9 kHz – 150 kHz)

**[Downlink Low]**

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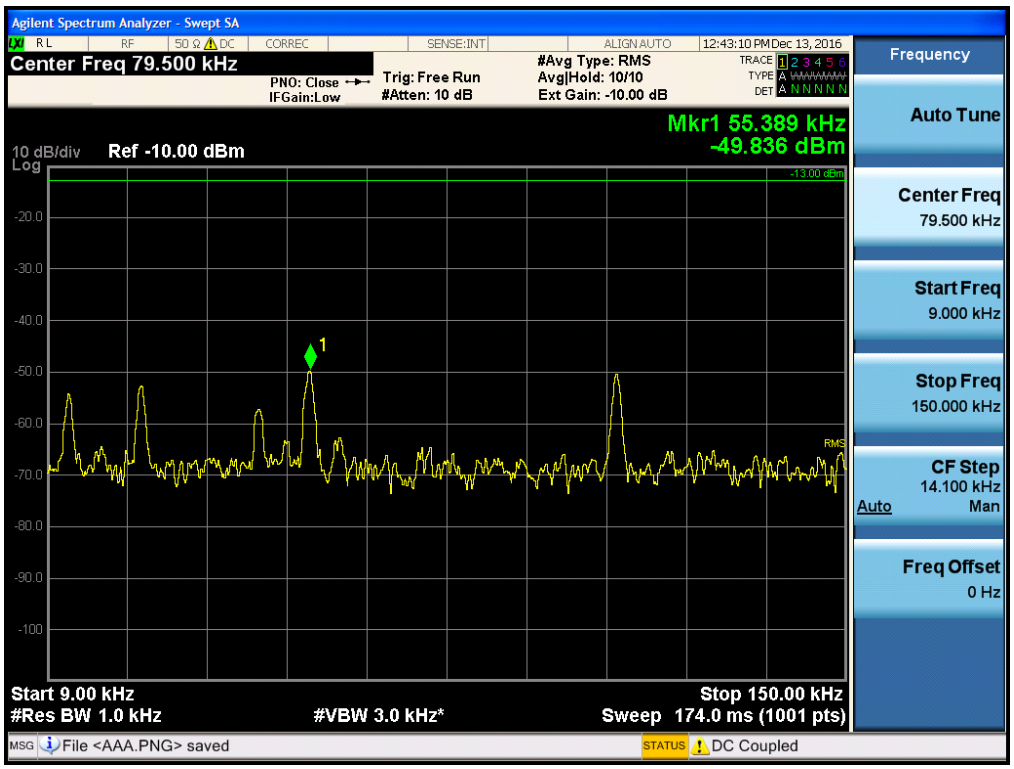
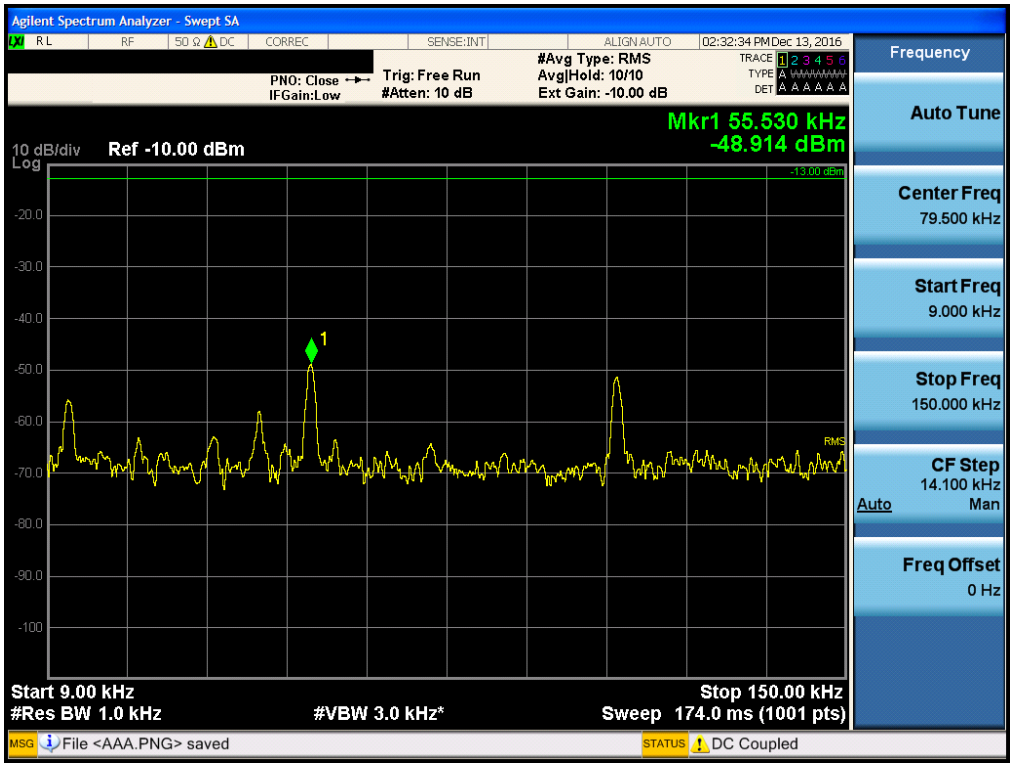
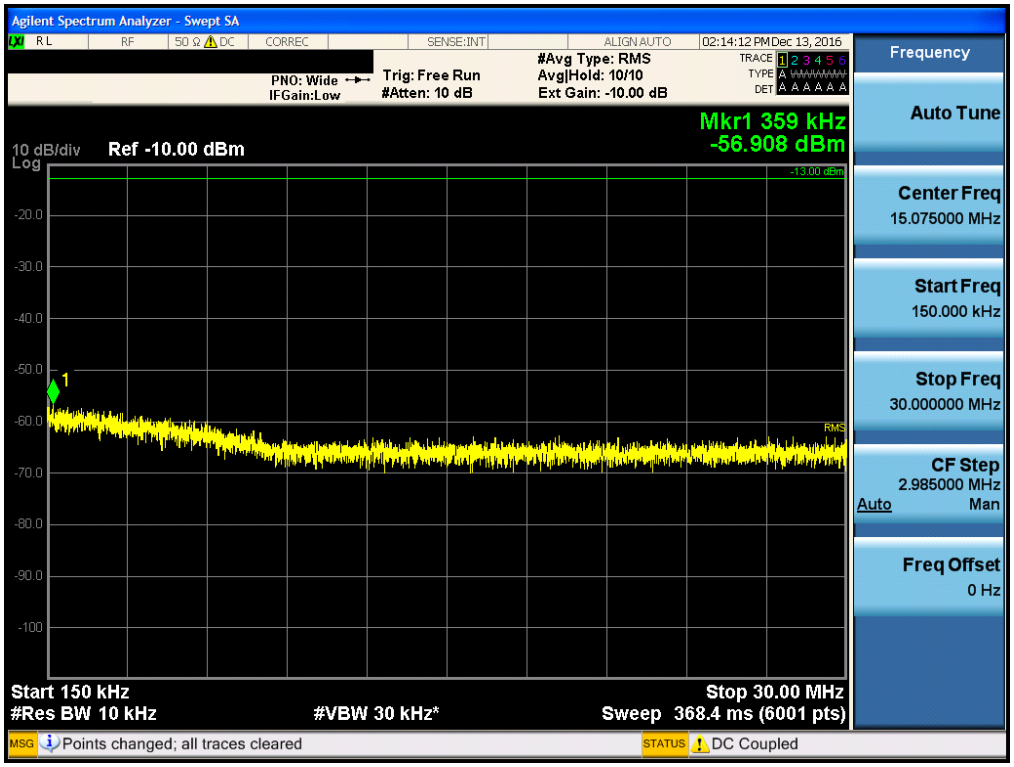


**[Downlink High]**



**Conducted Spurious Emissions (150 kHz – 30 MHz)**

**[Downlink Low]**

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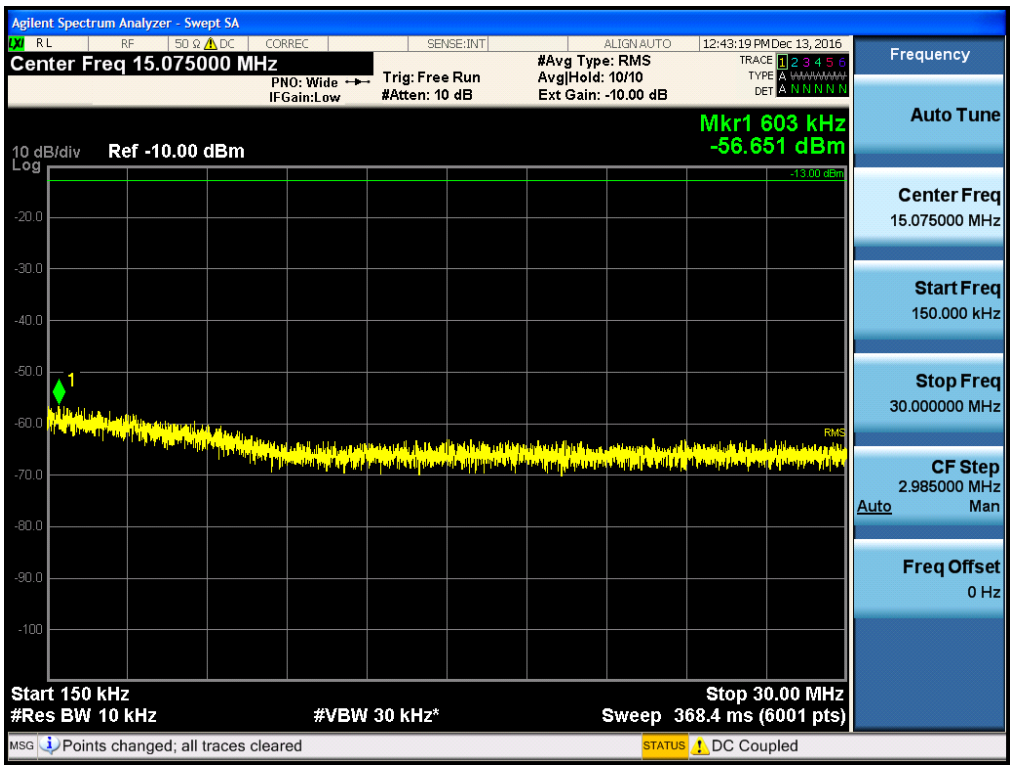
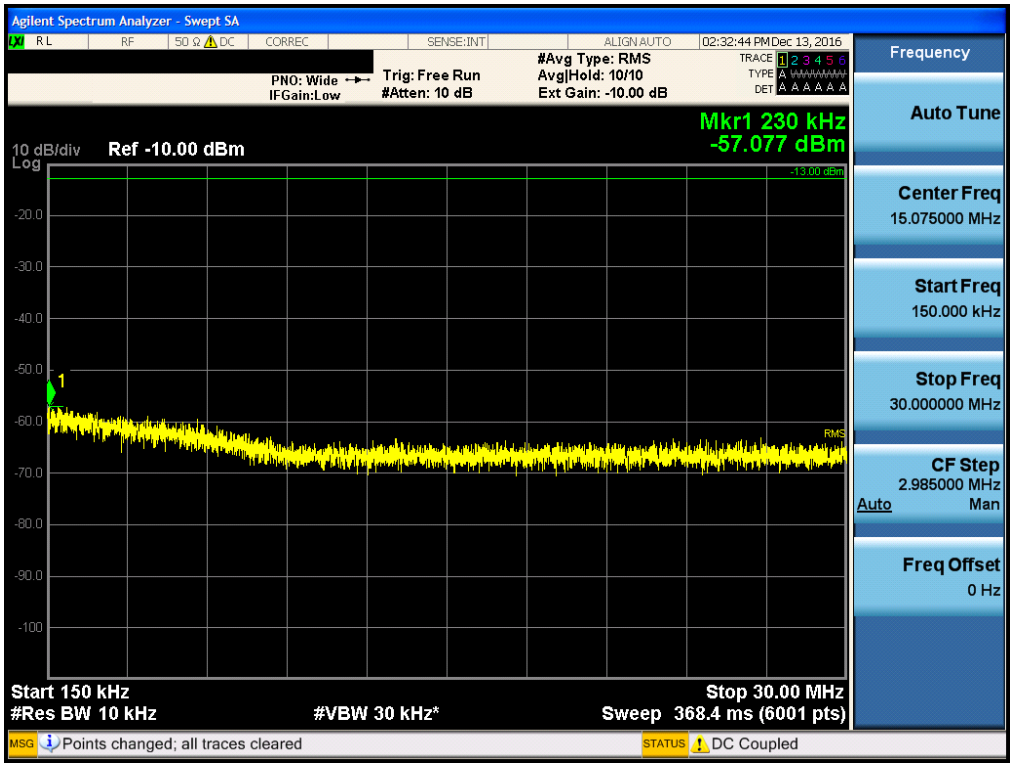
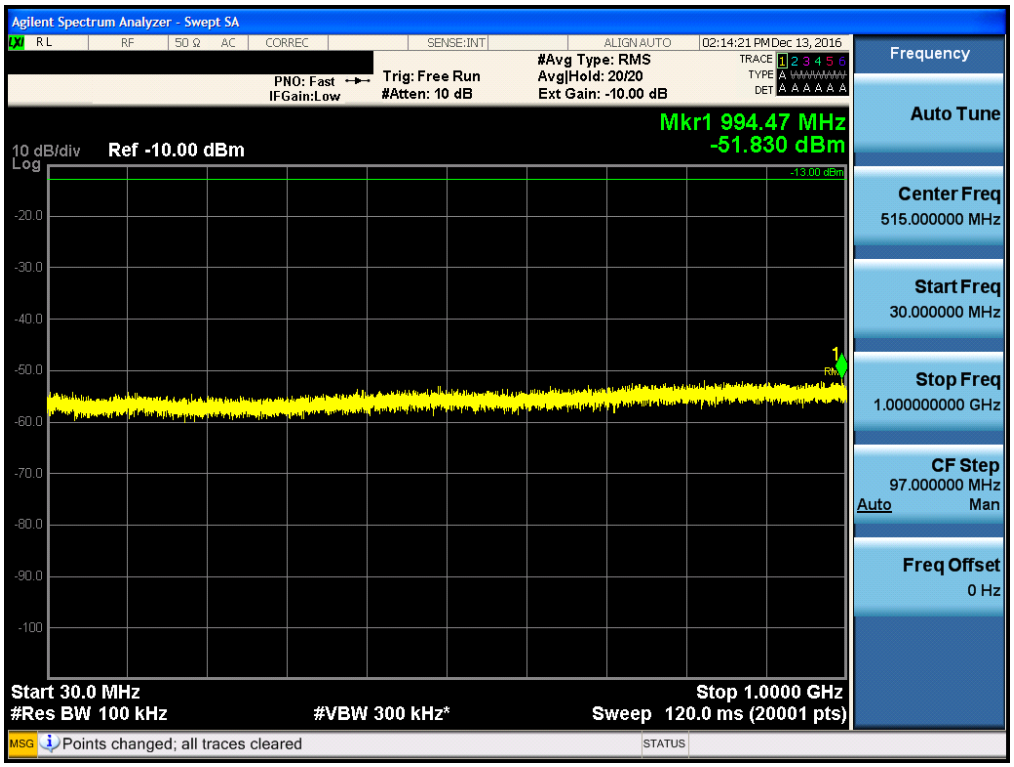


**[Downlink High]**

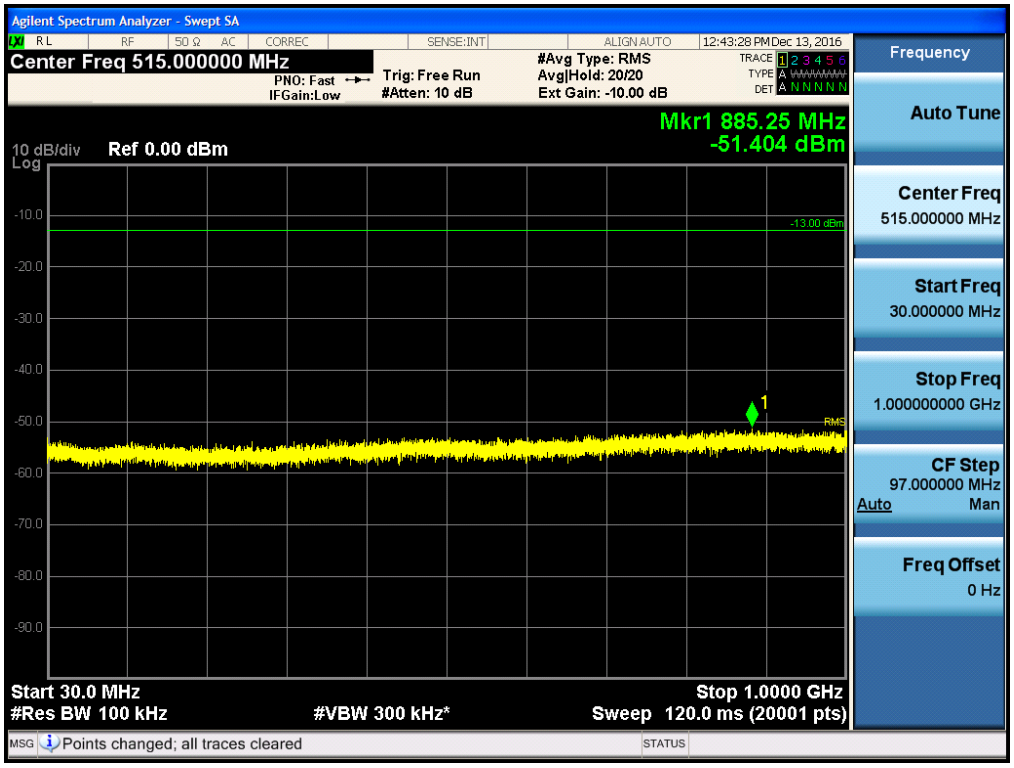


**Conducted Spurious Emissions (30 MHz – 1 GHz)**

**[Downlink Low]**




**[Downlink Middle]**



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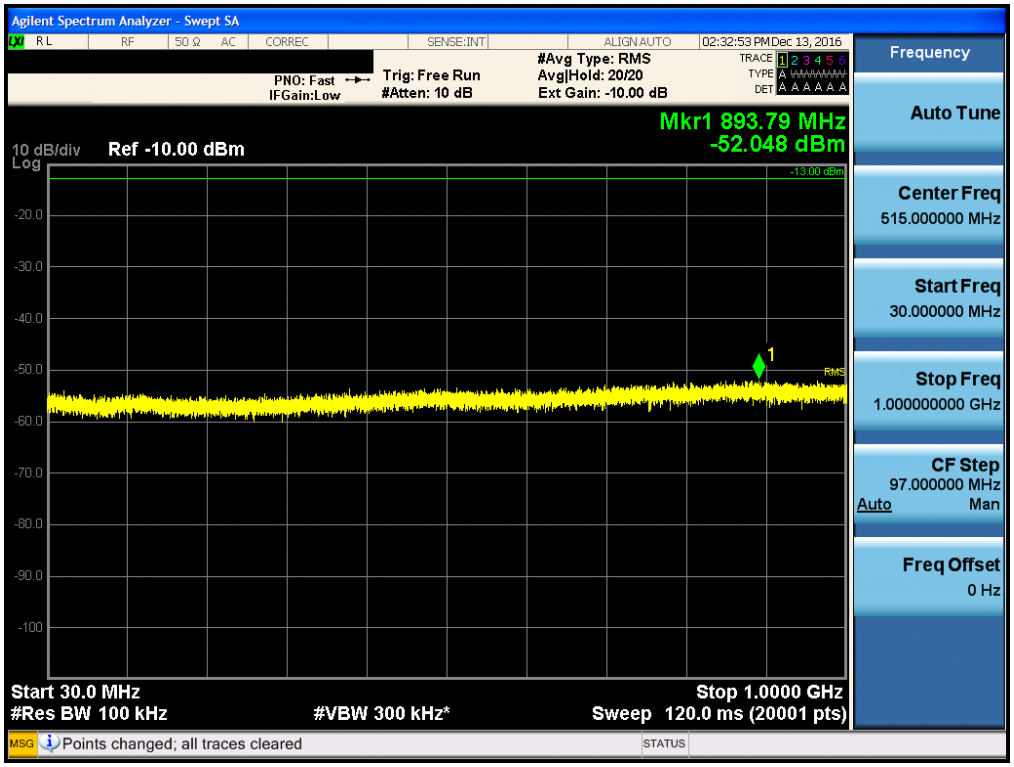
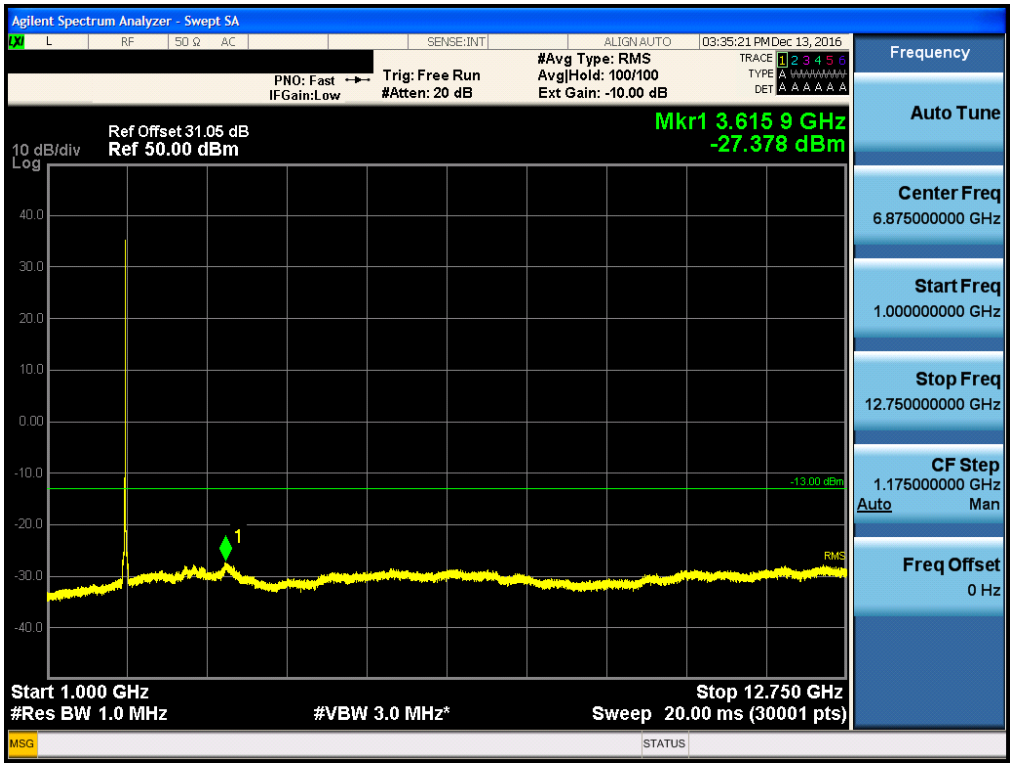


**Conducted Spurious Emissions (1 GHz – 12.75 GHz)**

**[Downlink Low]**


**[Downlink Middle]**

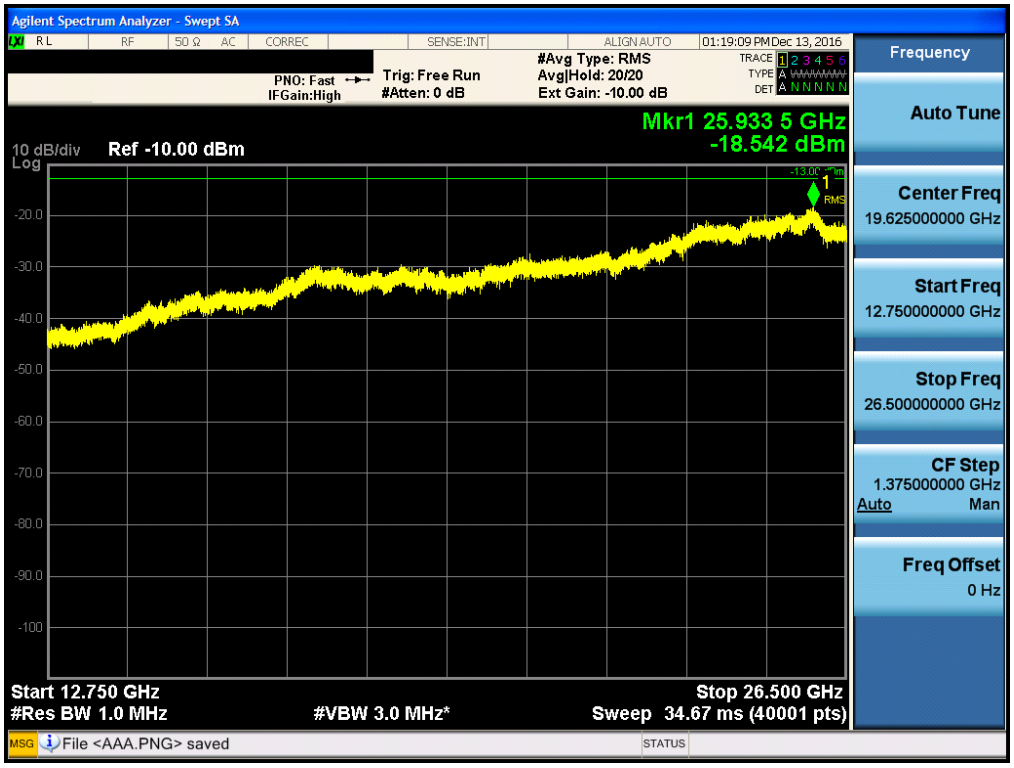


**[Downlink High]**

**Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)**

**[Downlink Low]**


**[Downlink Middle]**



**[Downlink High]**

## Single channel Enhancer Plots of Spurious Emission for AWSBAND CDMA

### Conducted Spurious Emissions (9 kHz – 150 kHz)

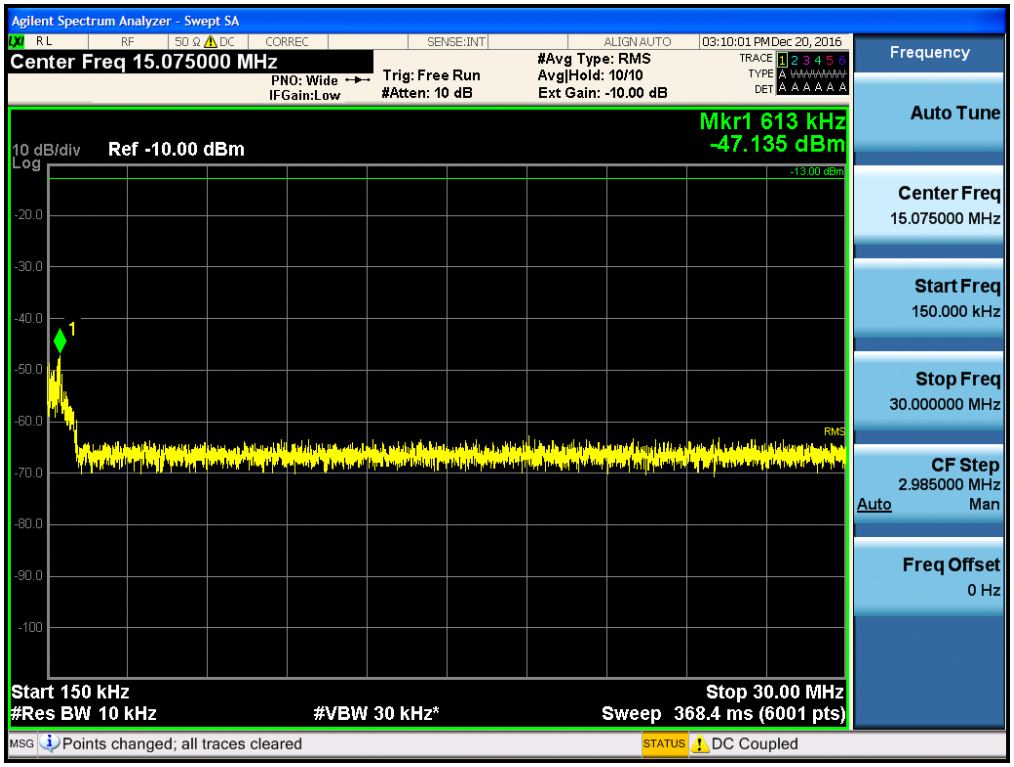
**[Downlink Low]**


**[Downlink Middle]**

**[Downlink High]**

**Conducted Spurious Emissions (150 kHz – 30 MHz)**

**[Downlink Low]**

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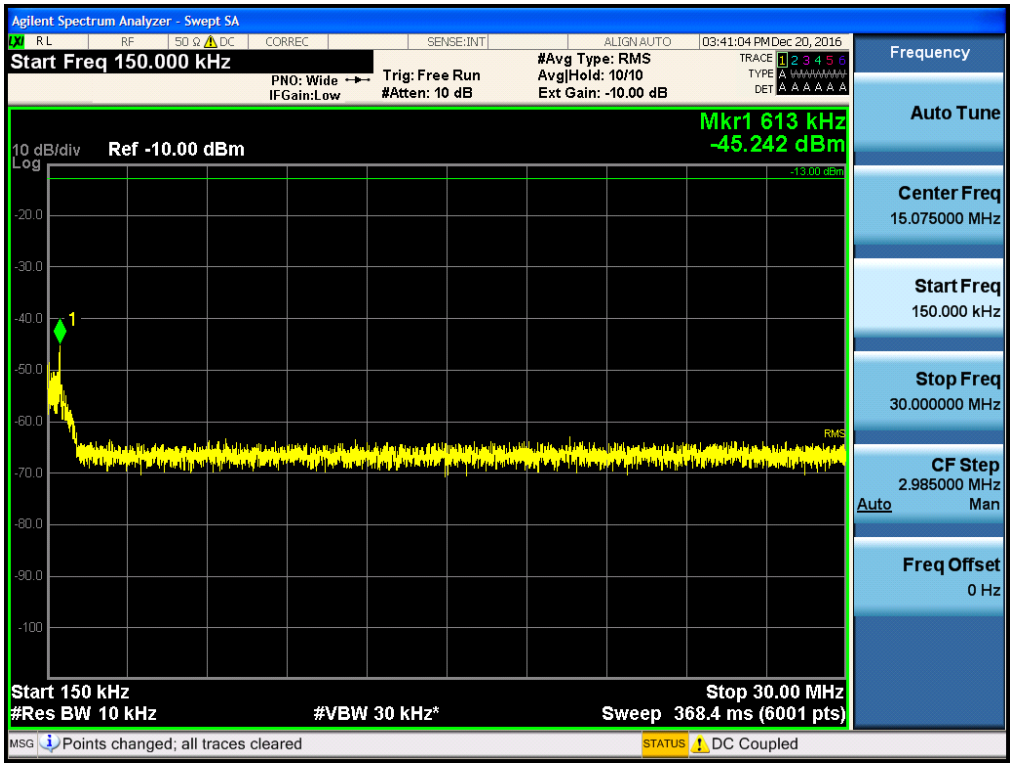

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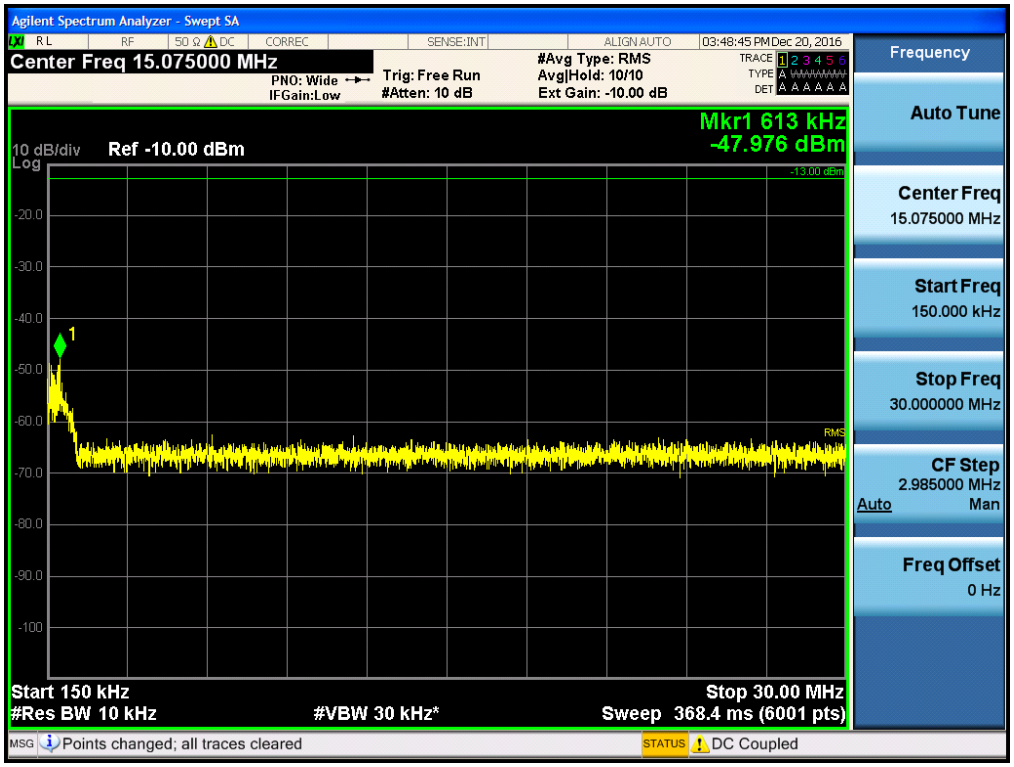
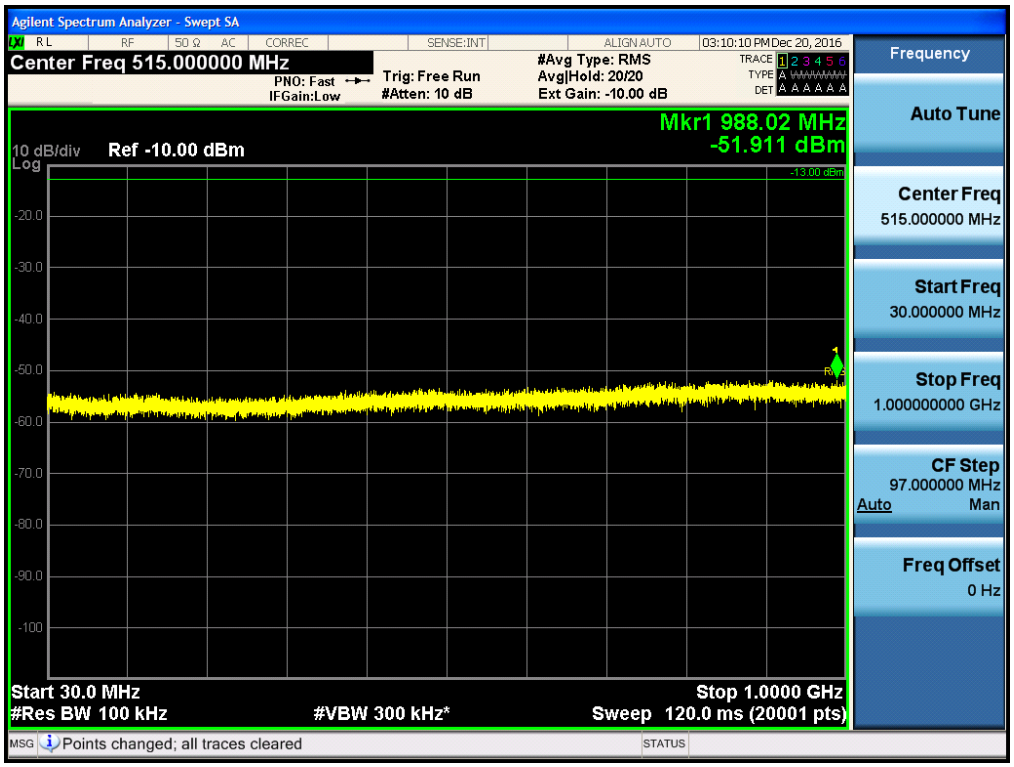


**Conducted Spurious Emissions (30 MHz – 1 GHz)**

**[Downlink Low]**

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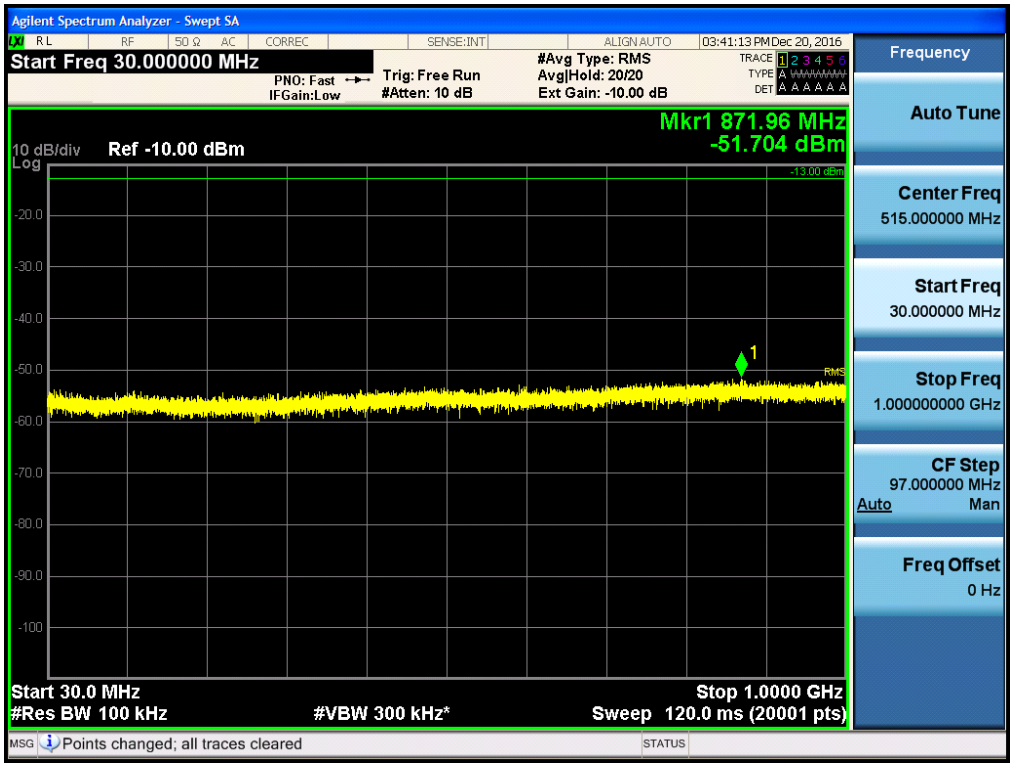

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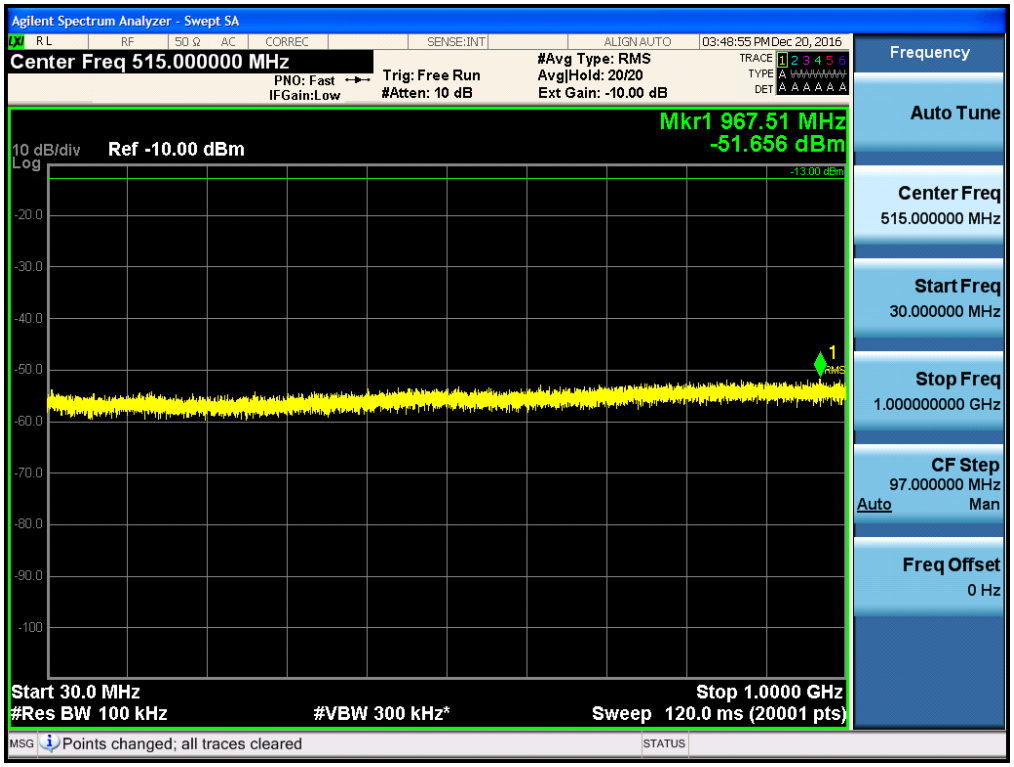
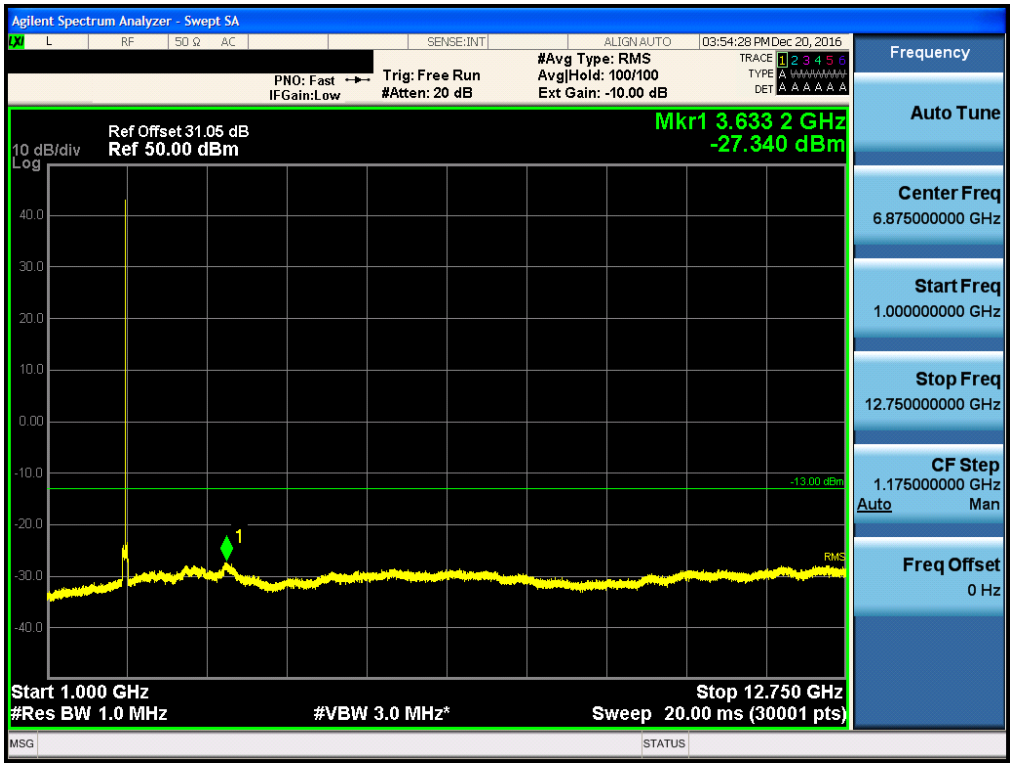


**Conducted Spurious Emissions (1 GHz – 12.75 GHz)**

**[Downlink Low]**


**[Downlink Middle]**



**[Downlink High]**

**Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)**

**[Downlink Low]**

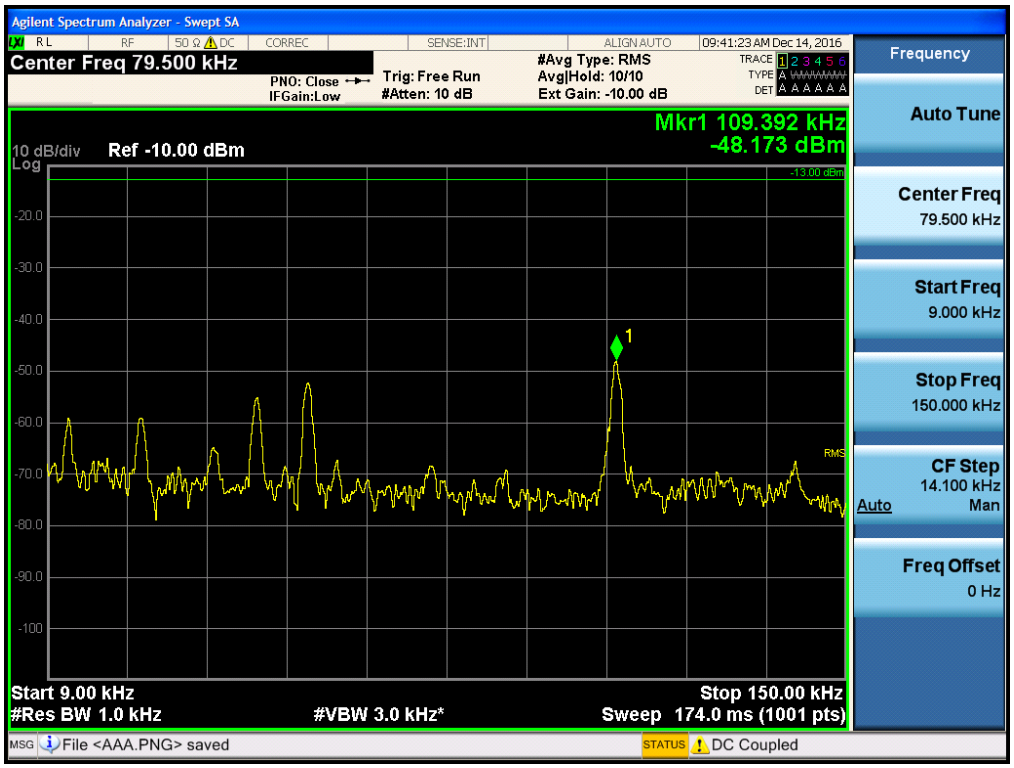

**[Downlink Middle]**

**[Downlink High]**

## Single channel Enhancer Plots of Spurious Emission for AWSBAND WCDMA

### Conducted Spurious Emissions (9 kHz – 150 kHz)

**[Downlink Low]**

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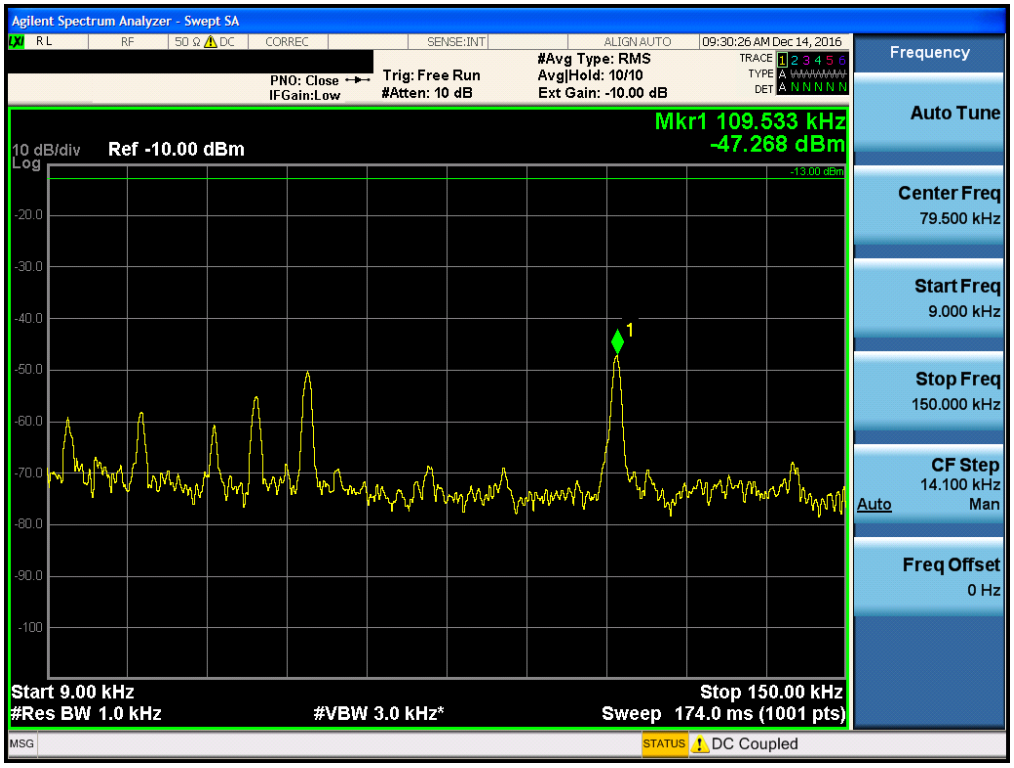
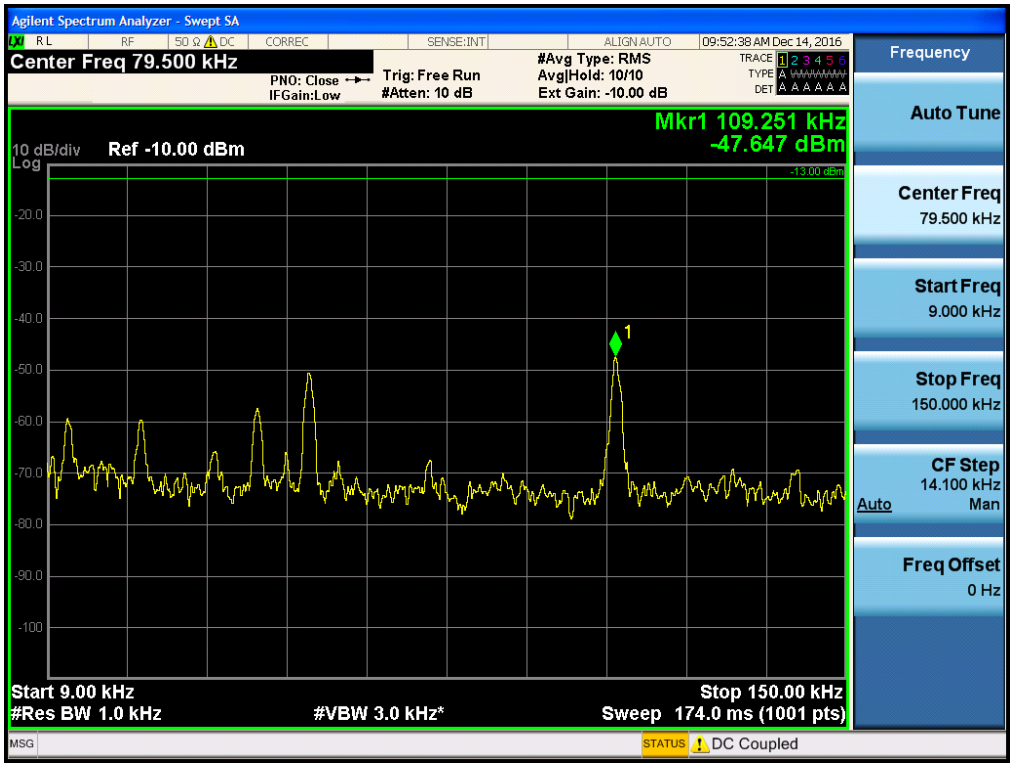
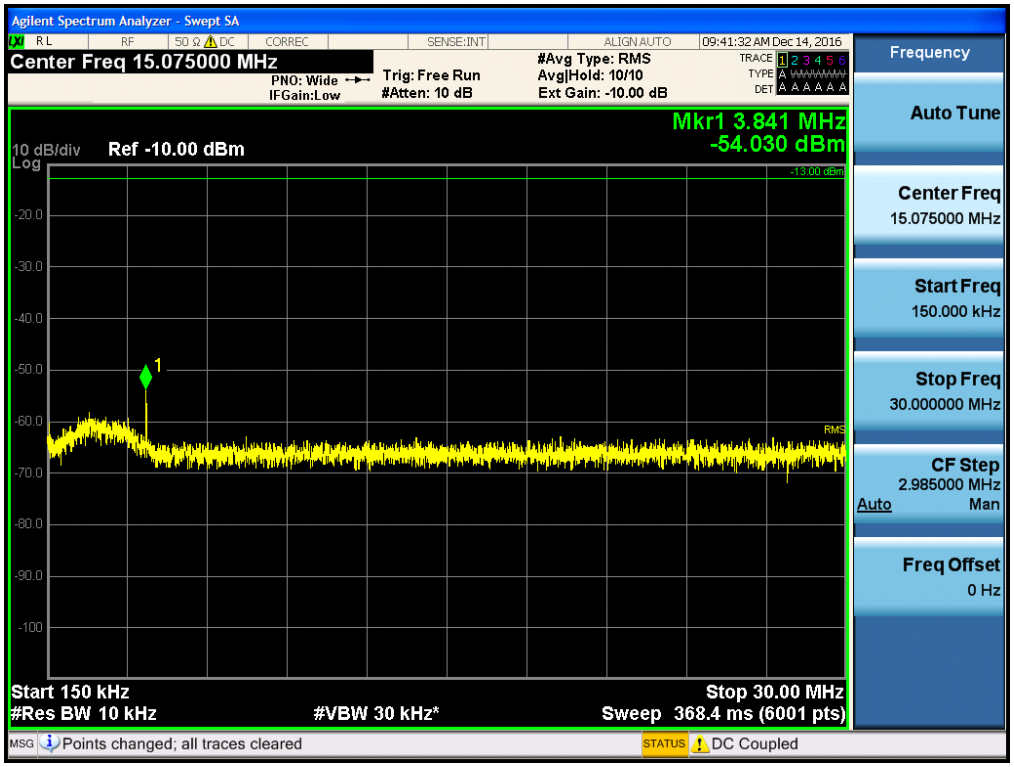


**[Downlink High]**



**Conducted Spurious Emissions (150 kHz – 30 MHz)**

**[Downlink Low]**

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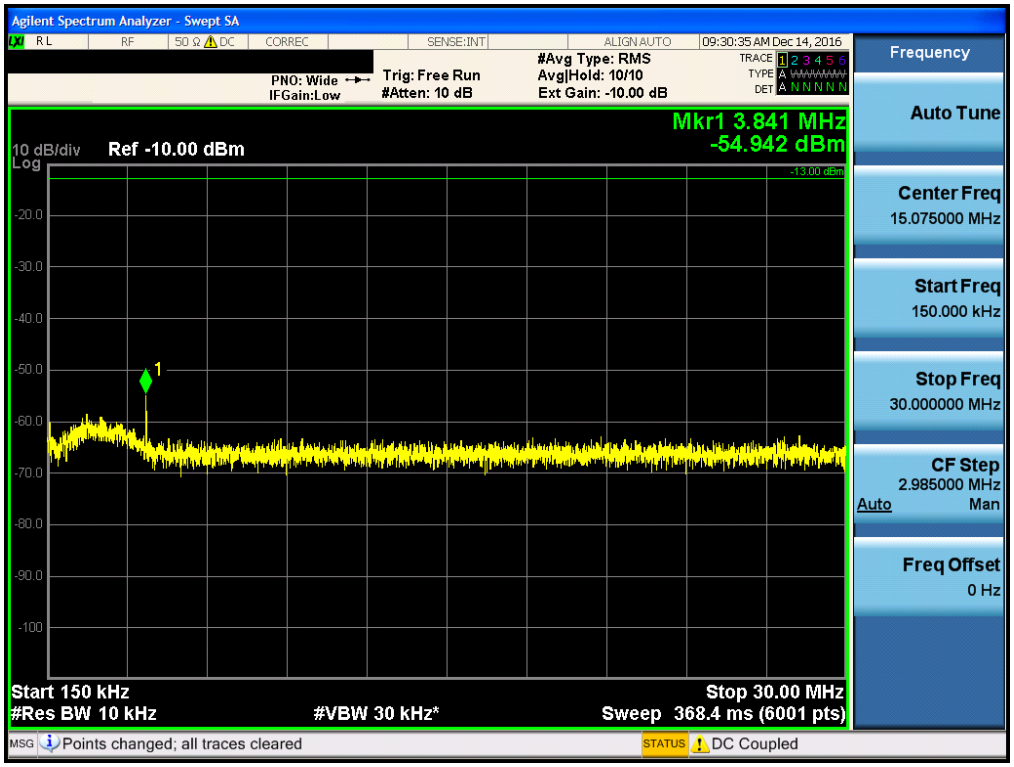

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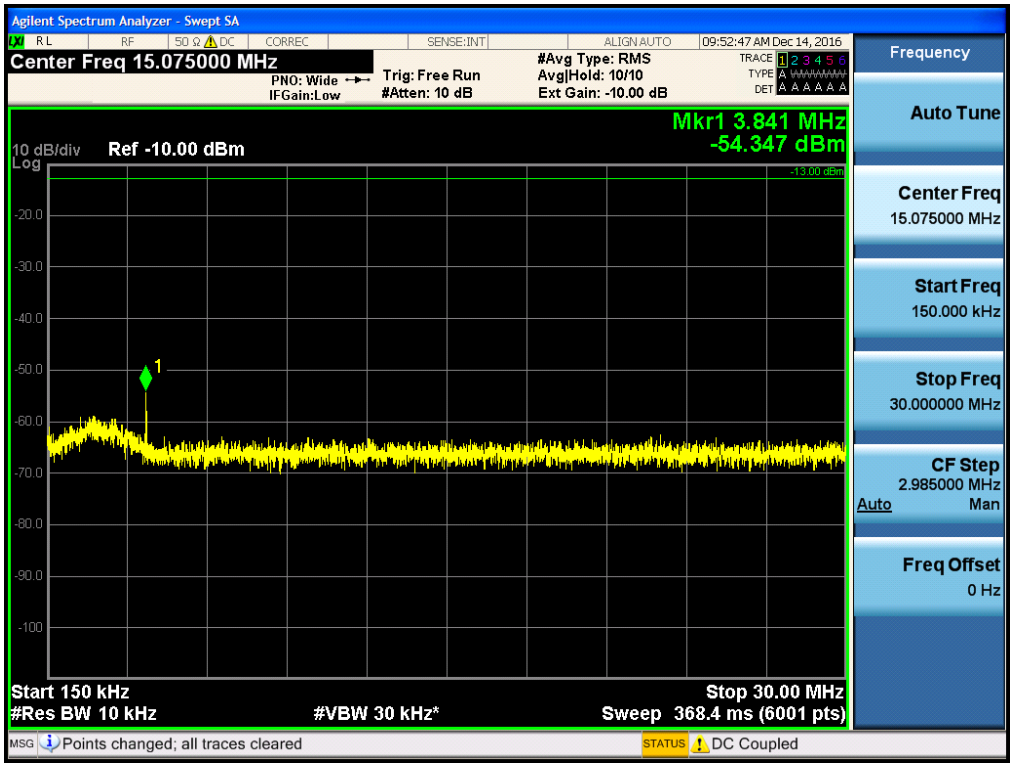
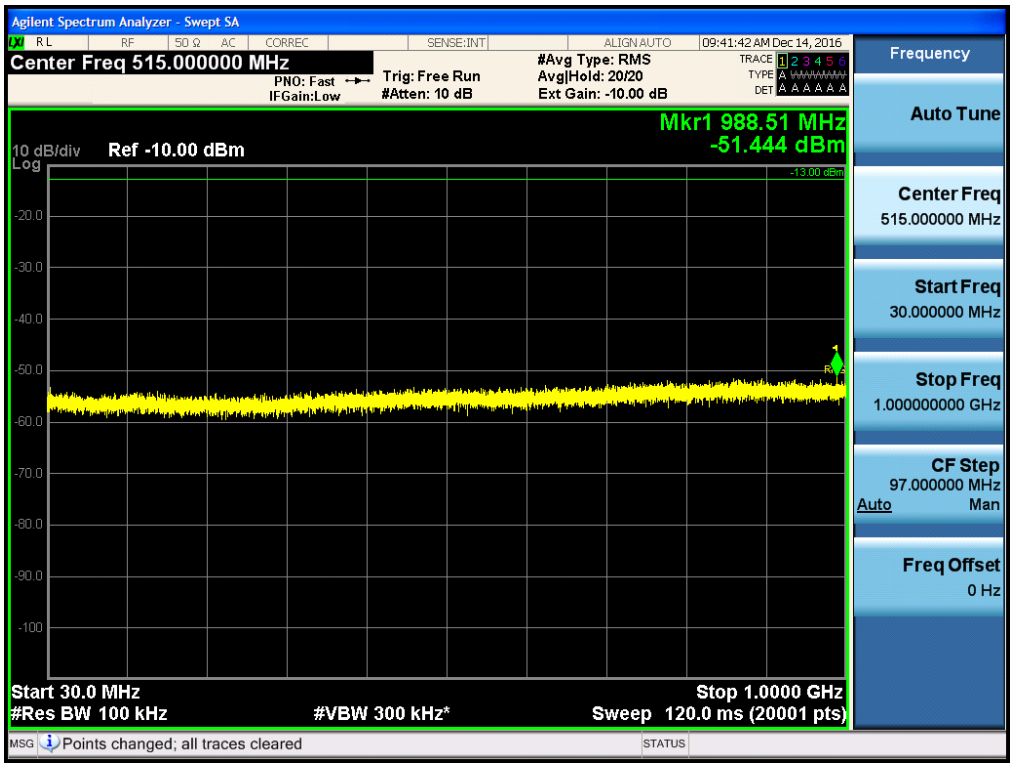


**Conducted Spurious Emissions (30 MHz – 1 GHz)**

**[Downlink Low]**

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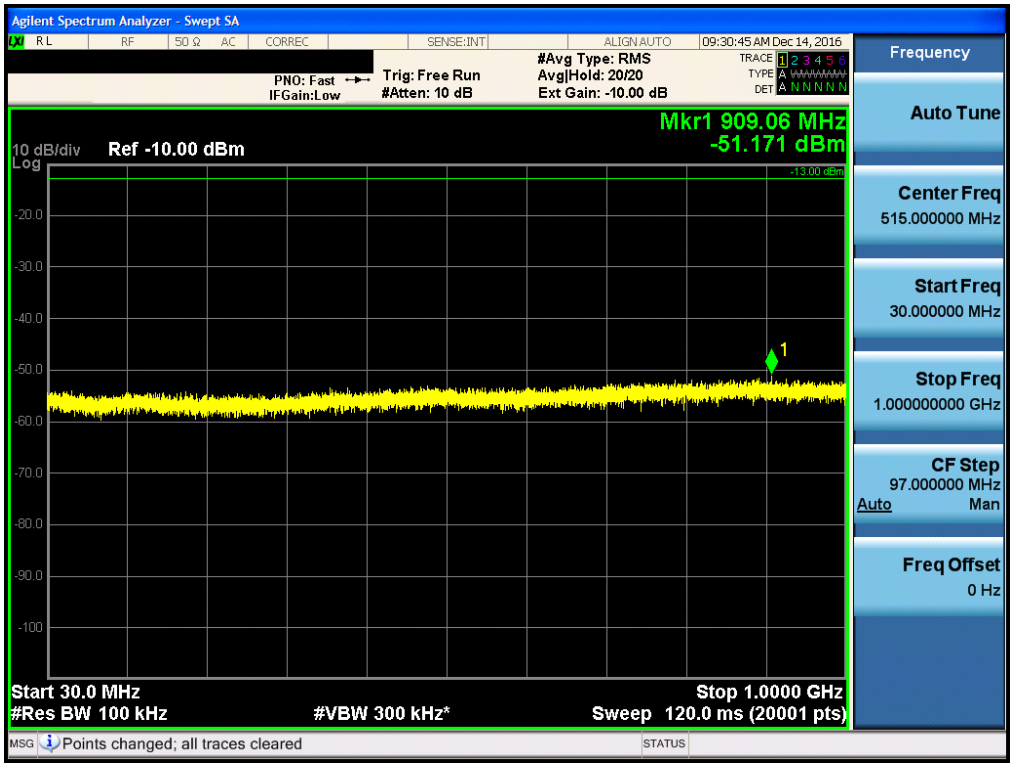

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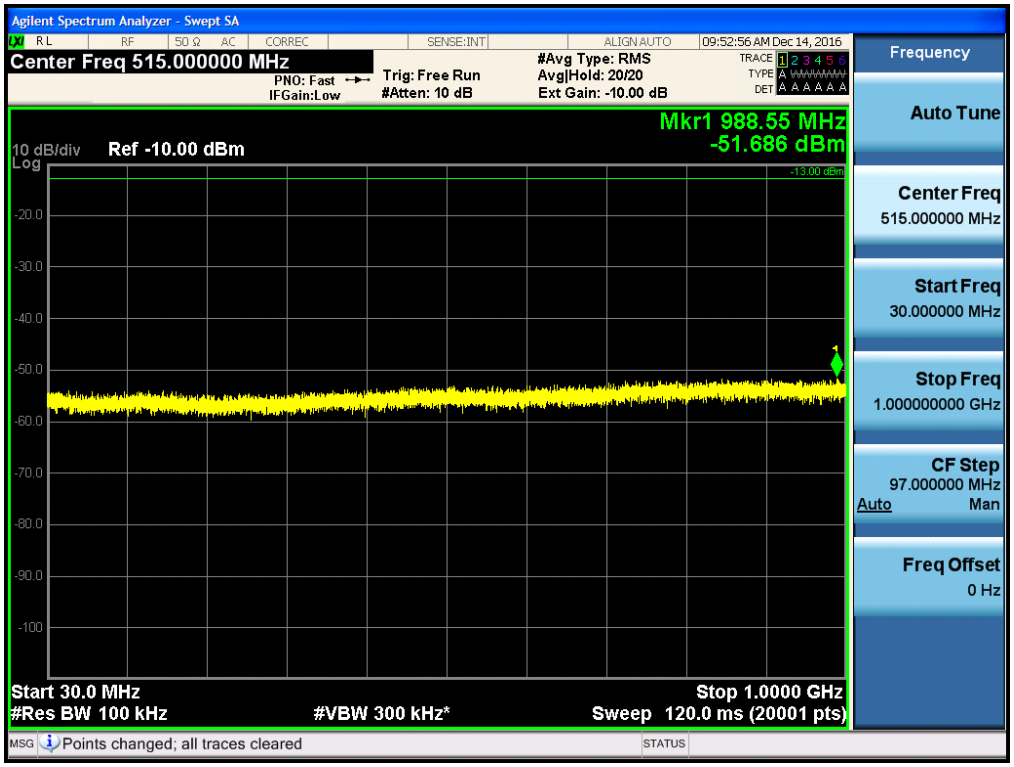
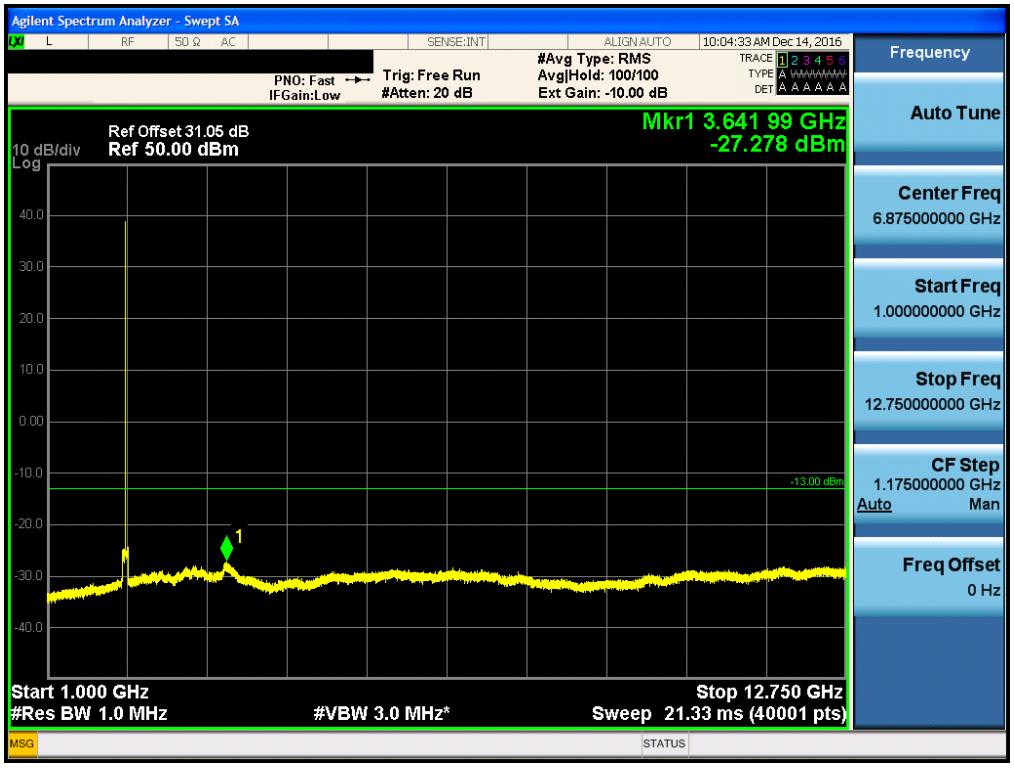


**Conducted Spurious Emissions (1 GHz – 12.75 GHz)**

**[Downlink Low]**


**[Downlink Middle]**

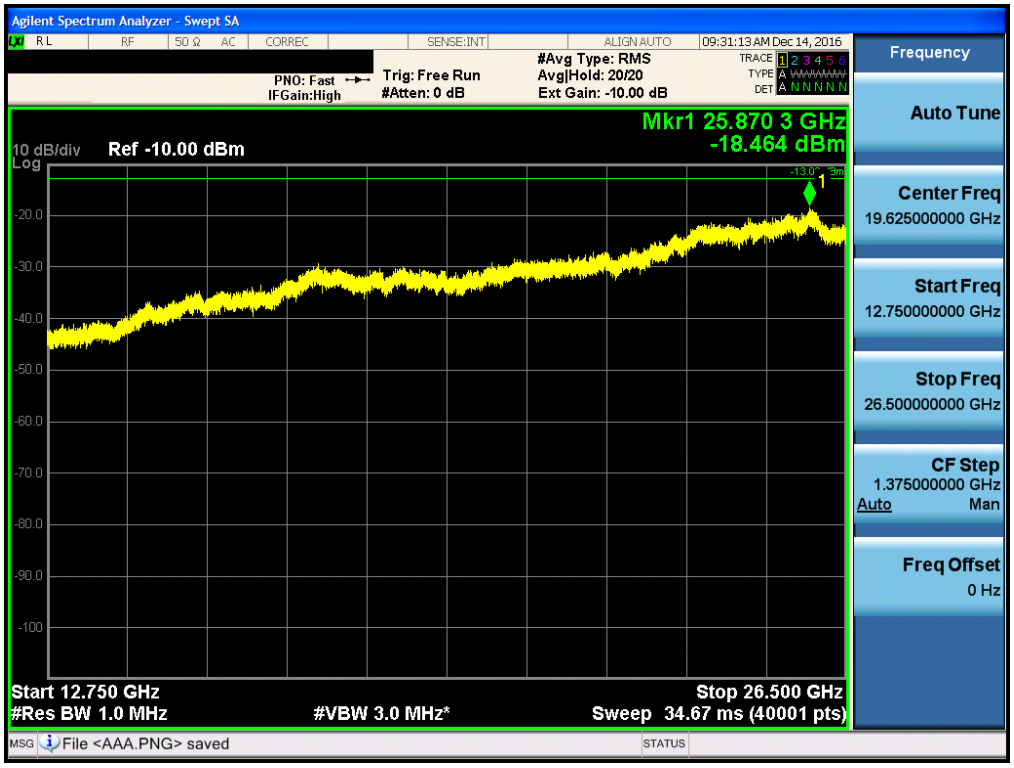


**[Downlink High]**

**Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)**

**[Downlink Low]**


**[Downlink Middle]**

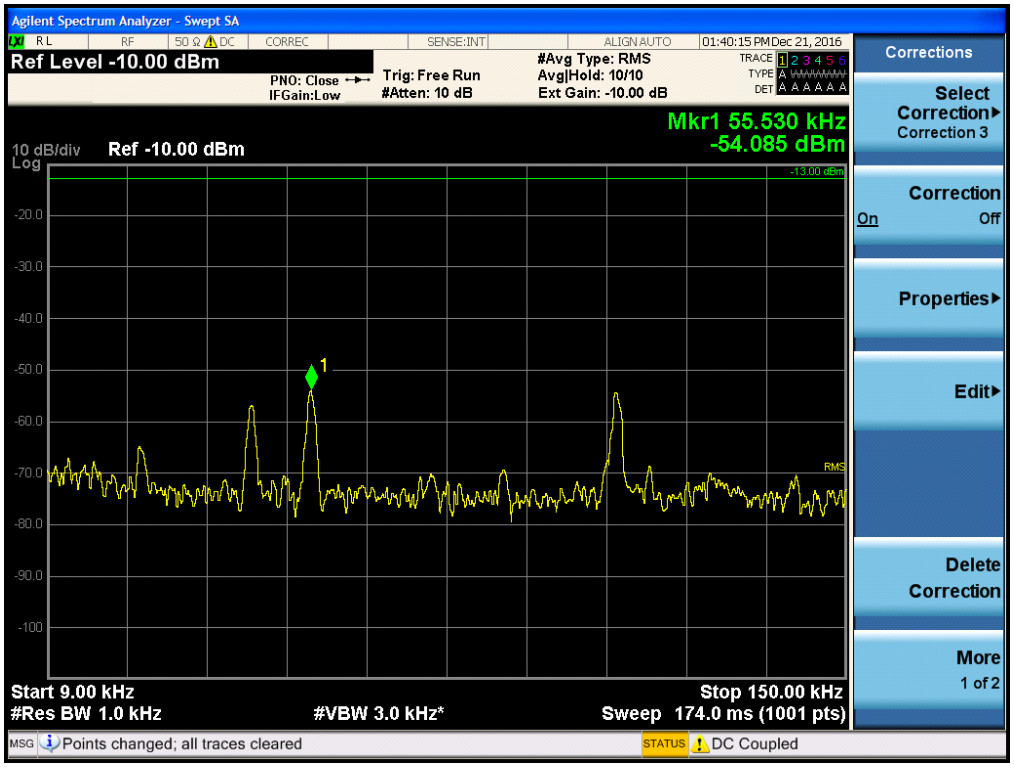


**[Downlink High]**

## Multi channel Enhancer Plots of Spurious Emission for IC_AWS BAND

### Conducted Spurious Emissions (9 kHz – 150 kHz)

**[Downlink Low]**

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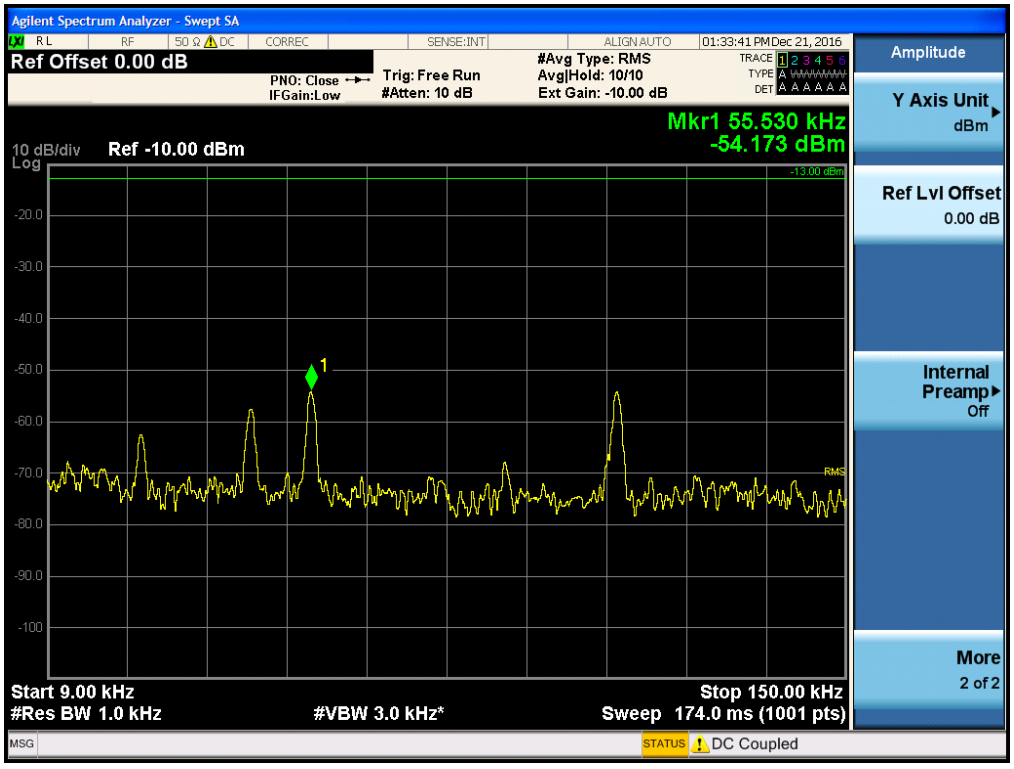

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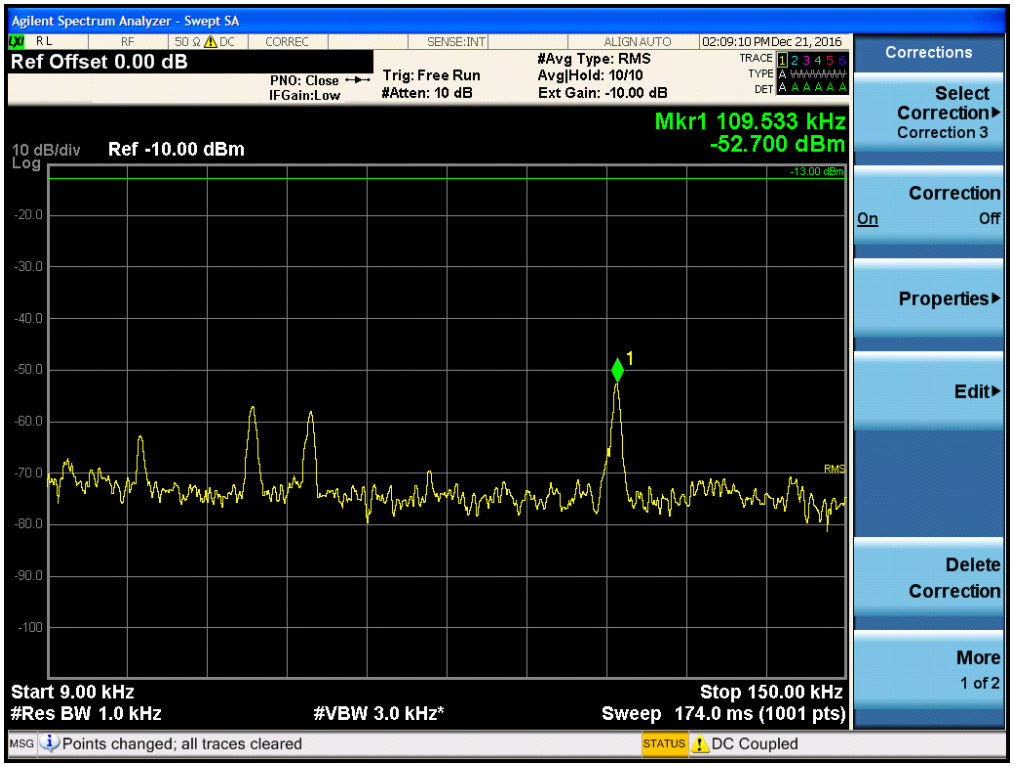
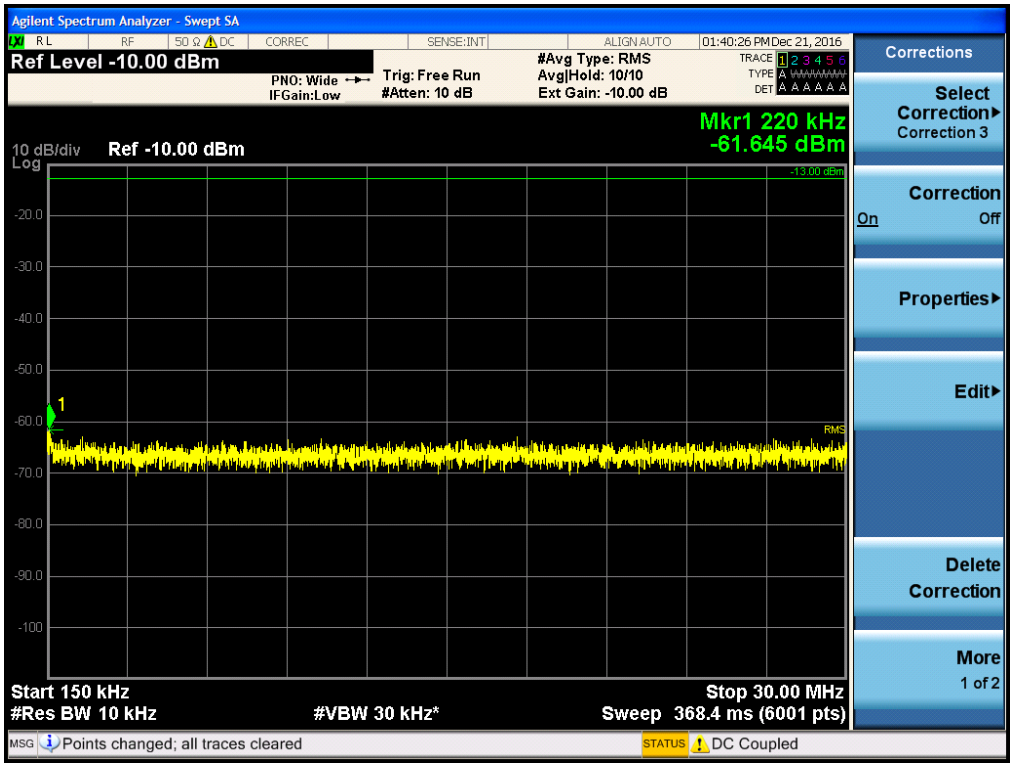


## Conducted Spurious Emissions (150 kHz – 30 MHz)

**[Downlink Low]**

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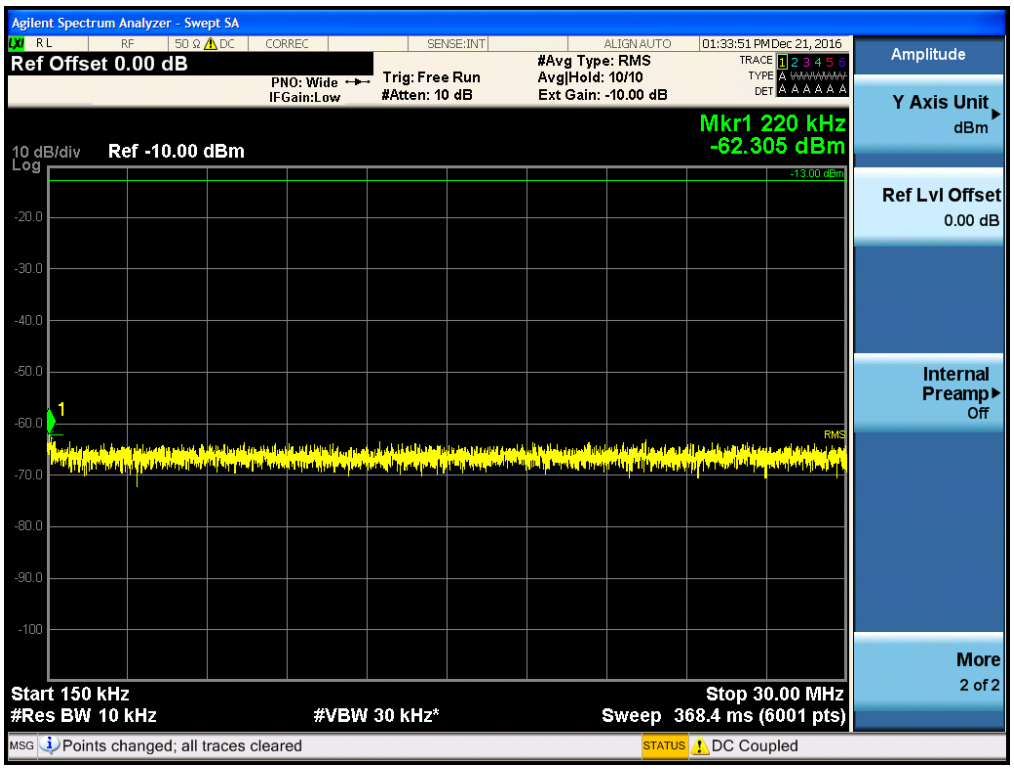

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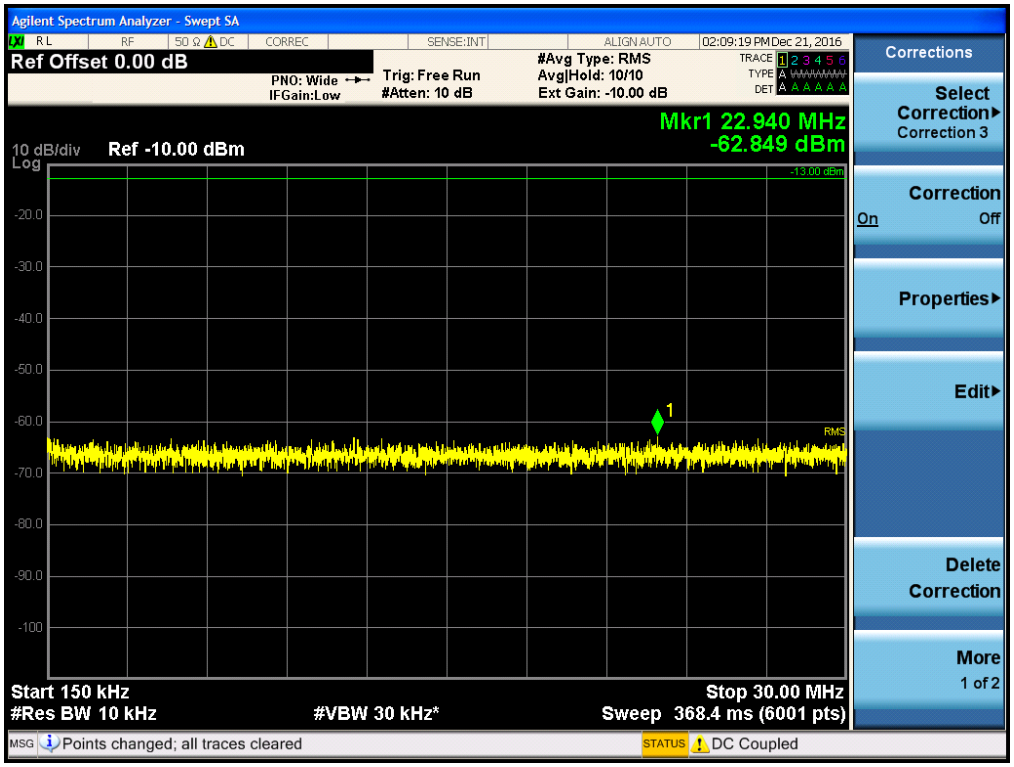
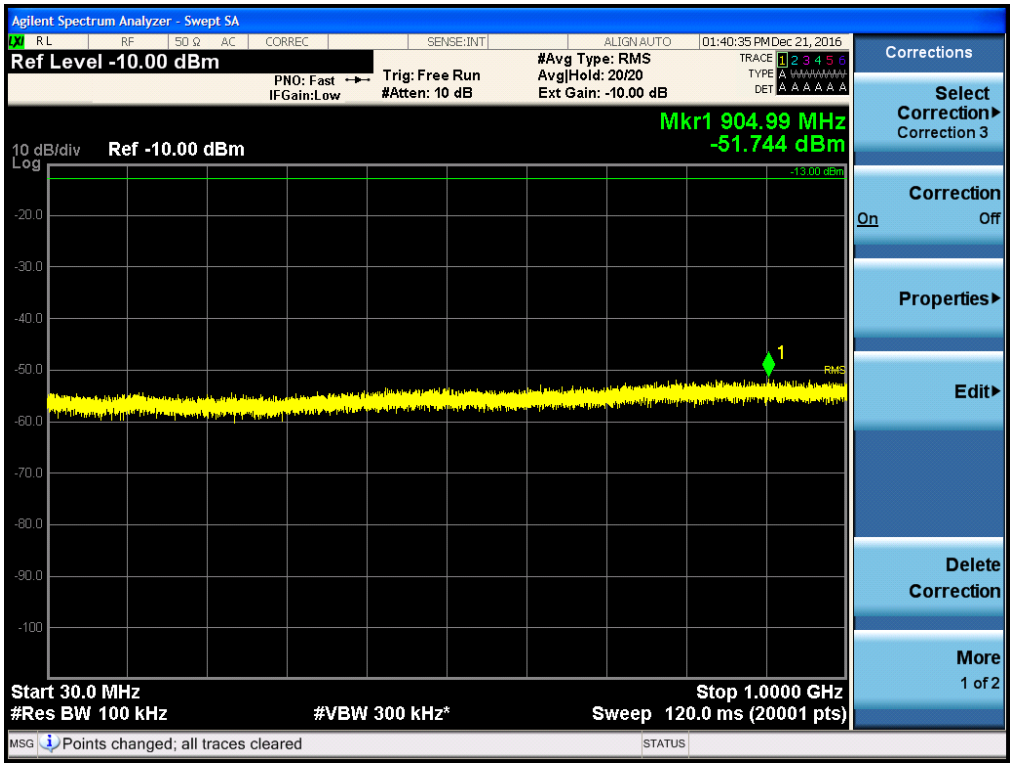
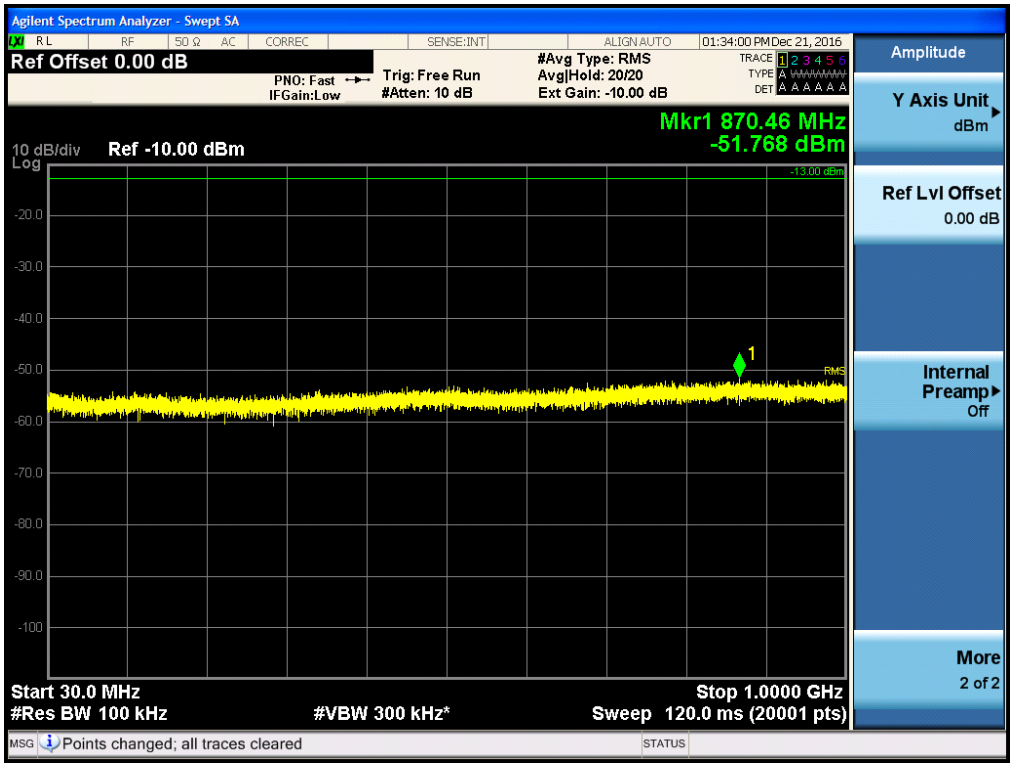


**Conducted Spurious Emissions (30 MHz – 1 GHz)**

**[Downlink Low]**




**[Downlink Middle]**



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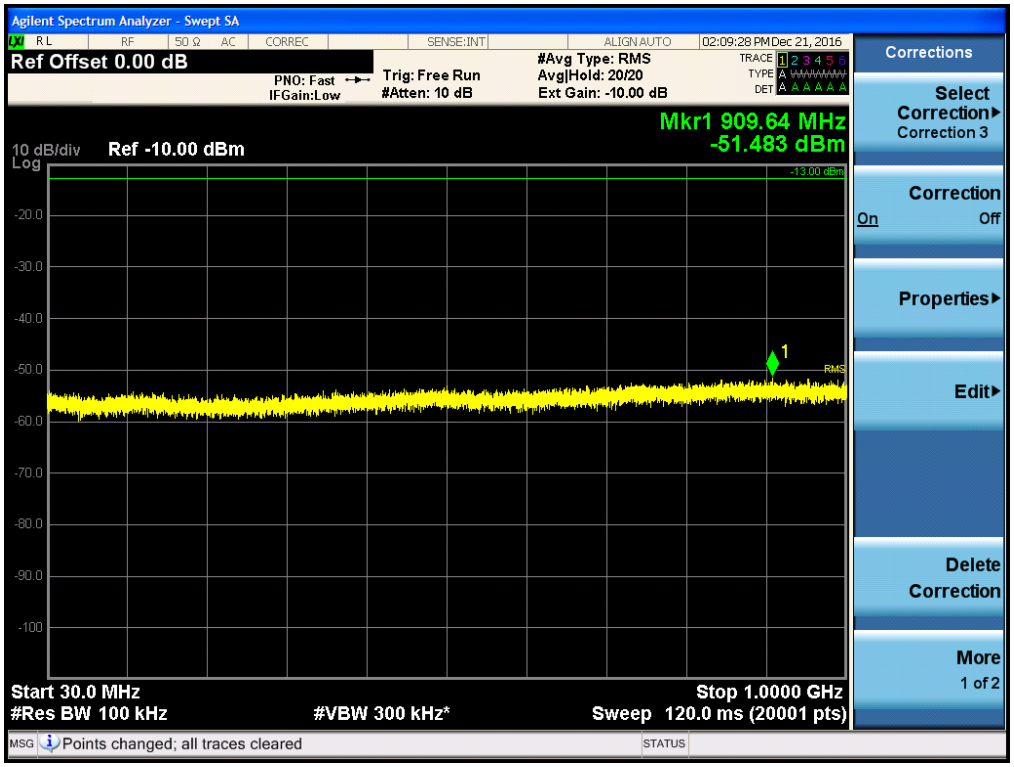
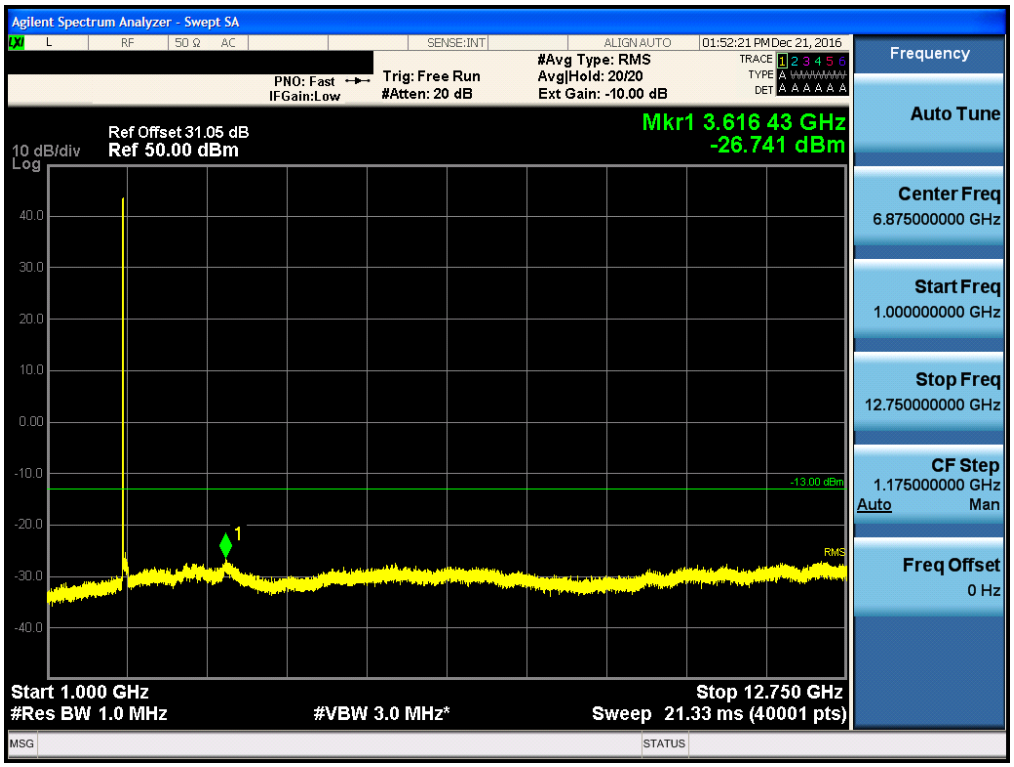
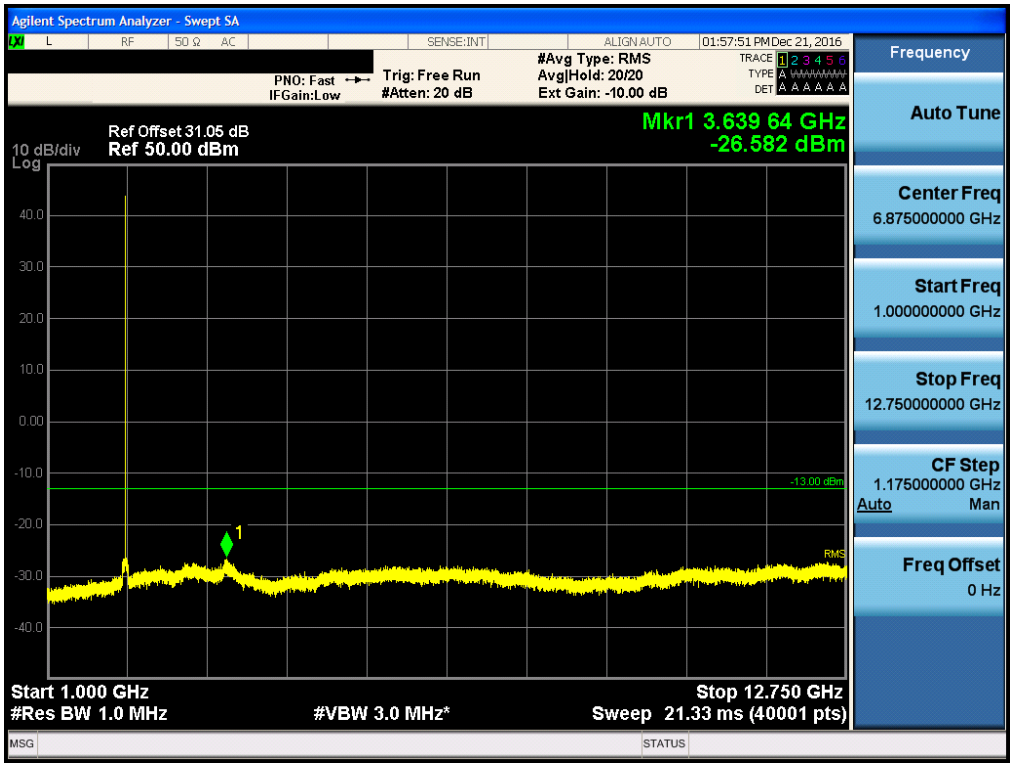


**Conducted Spurious Emissions (1 GHz – 12.75 GHz)**

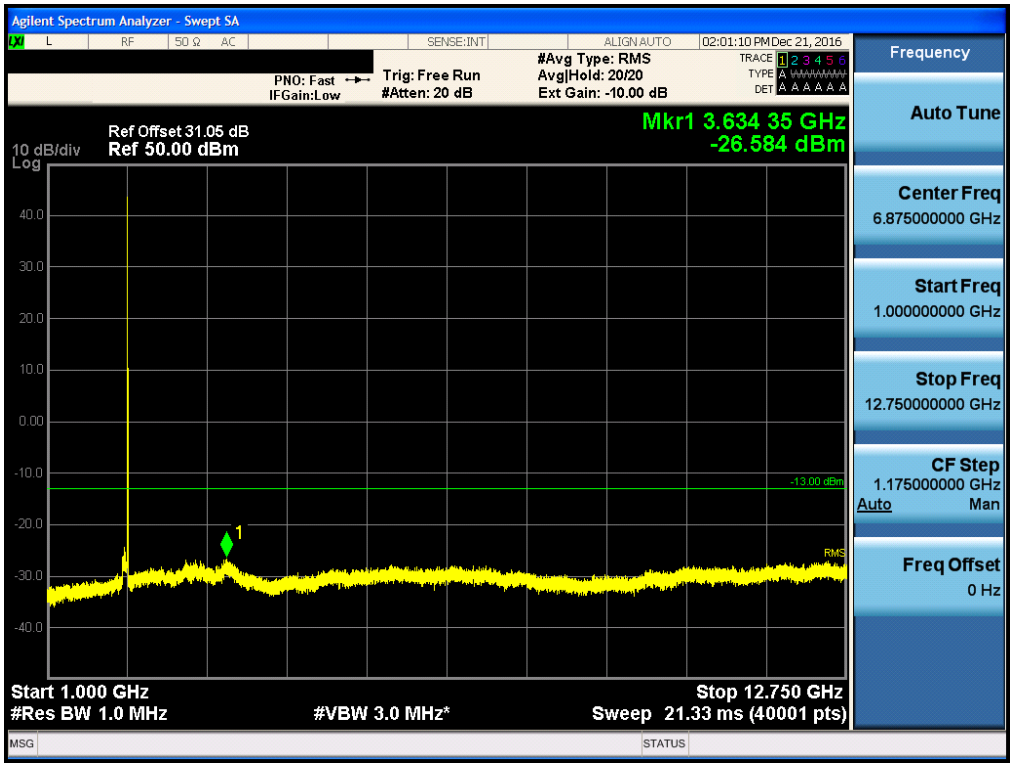
**[Downlink Low]**




**[Downlink Middle]**



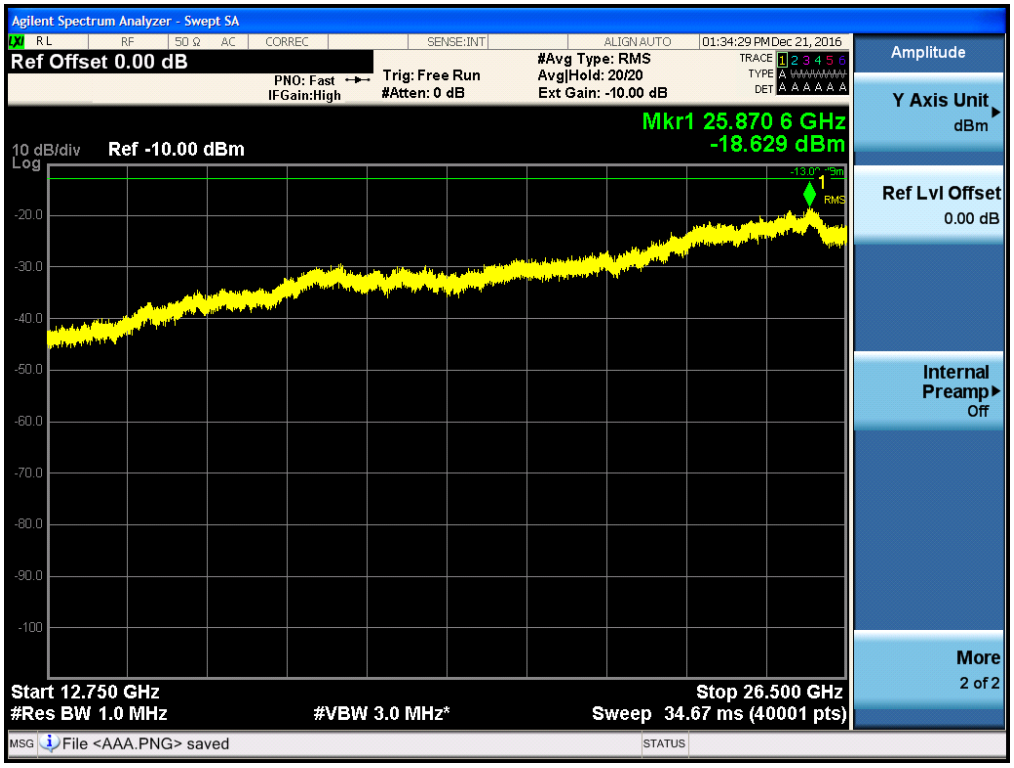
**[Downlink High]**



**Conducted Spurious Emissions (12.75 GHz – 26.5 GHz)**

**[Downlink Low]**

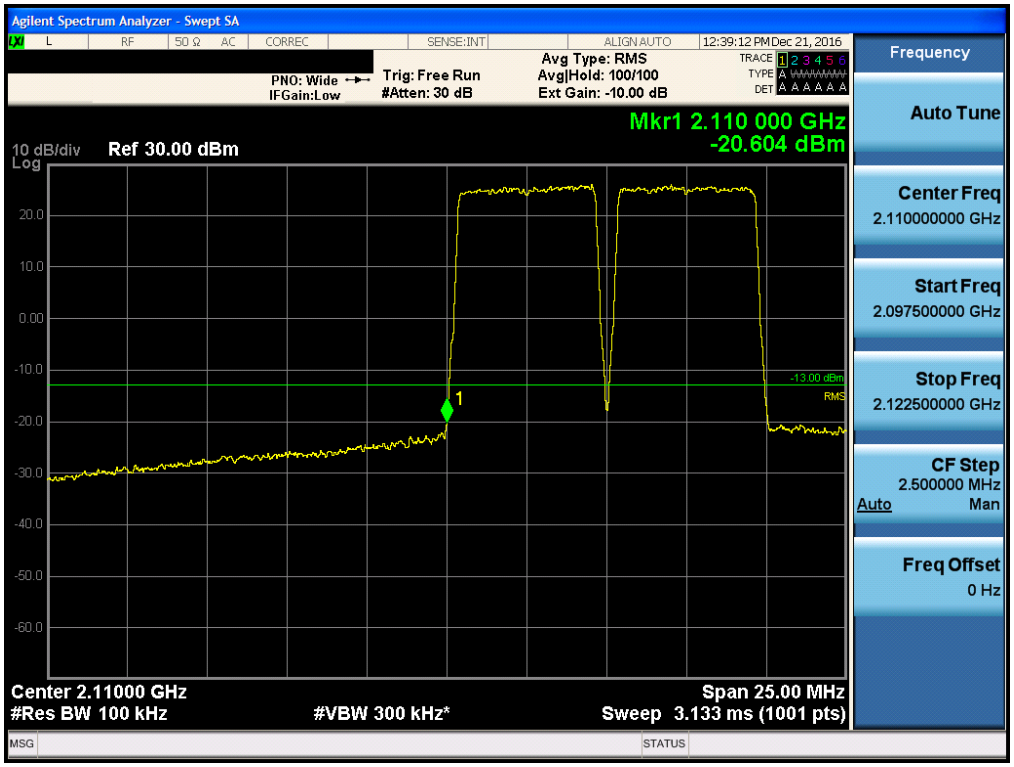

**[Downlink Middle]**



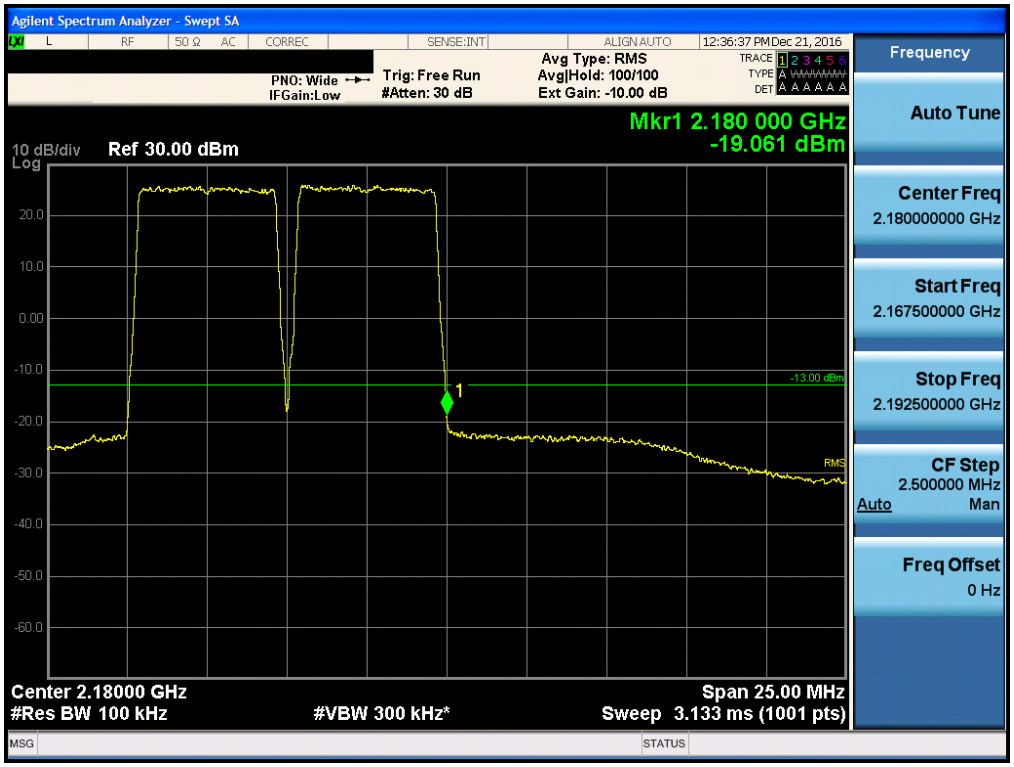
**[Downlink High]**

## Intermodulation Spurious Emissions for FCC_AWSBAND LTE 5MHz

### [Downlink Low]

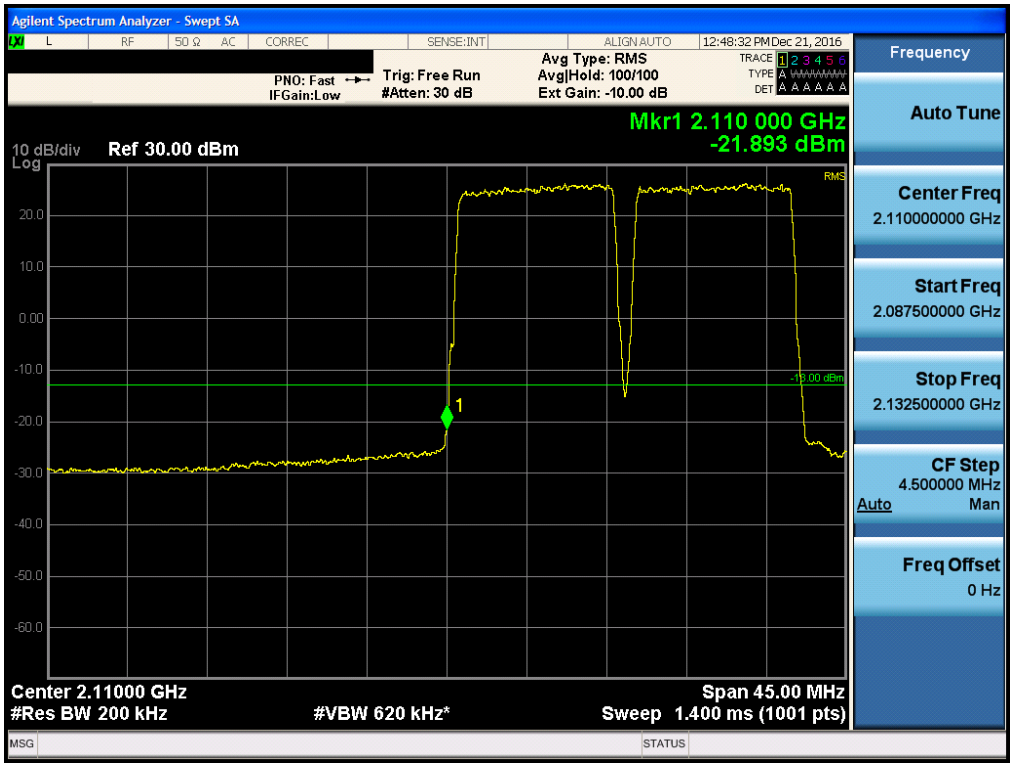



### [Downlink High]



## Intermodulation Spurious Emissions for FCC_AWS BAND LTE 10MHz

### [Downlink Low]

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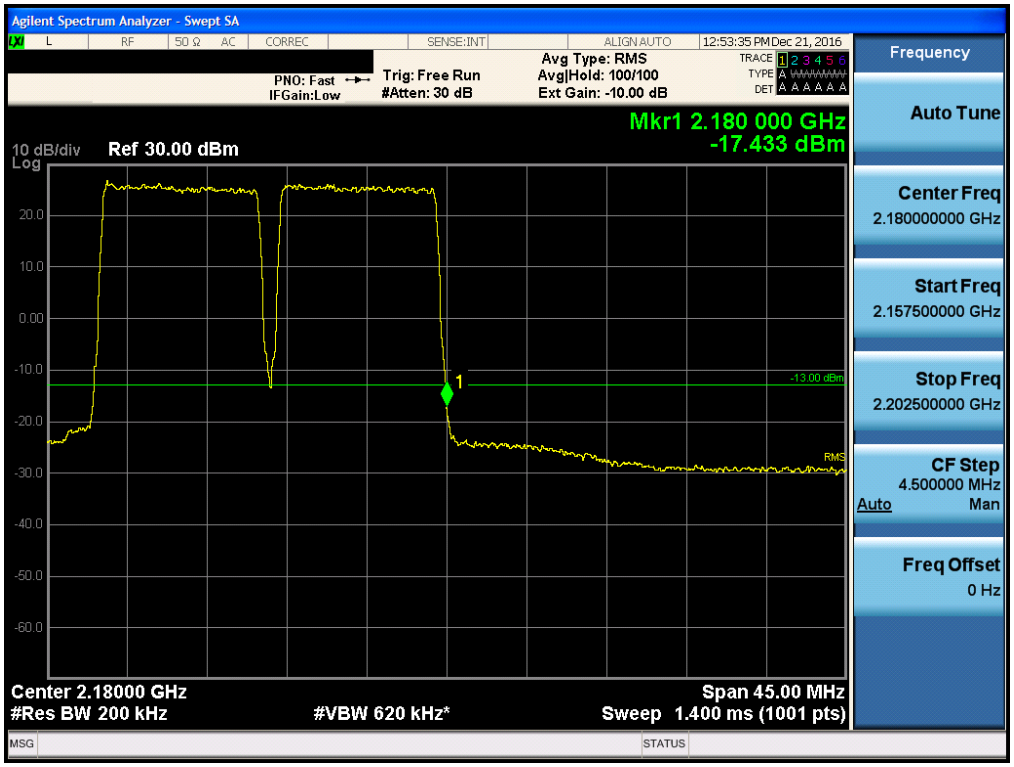

## Intermodulation Spurious Emissions for FCC_AWS CDMA

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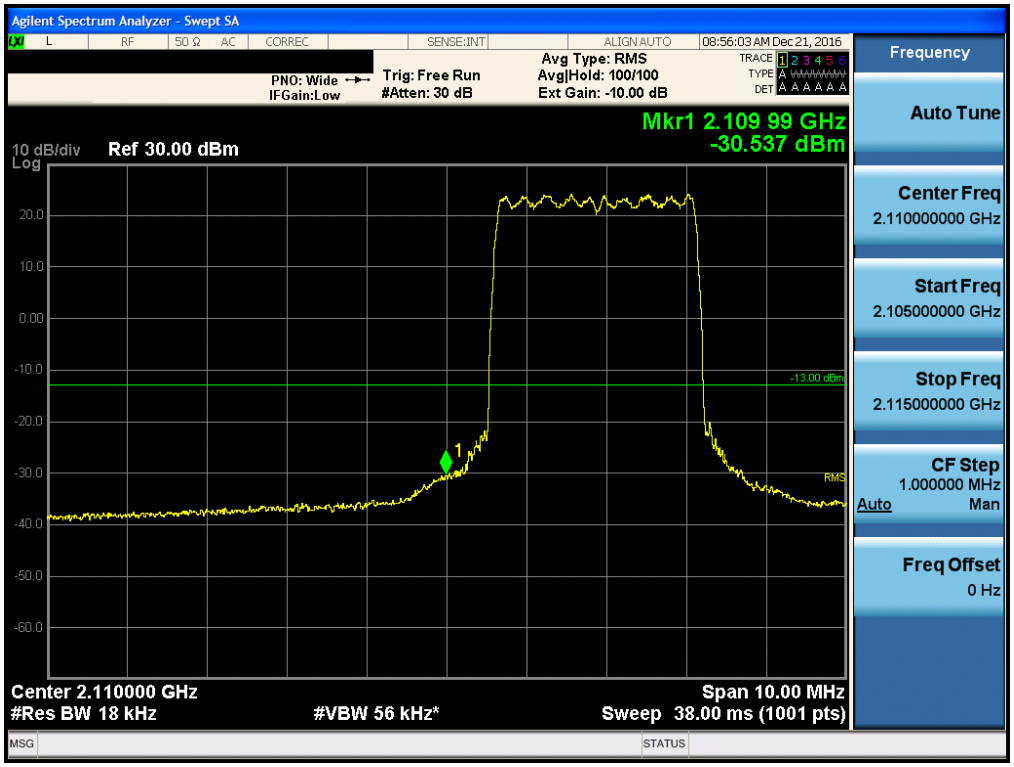


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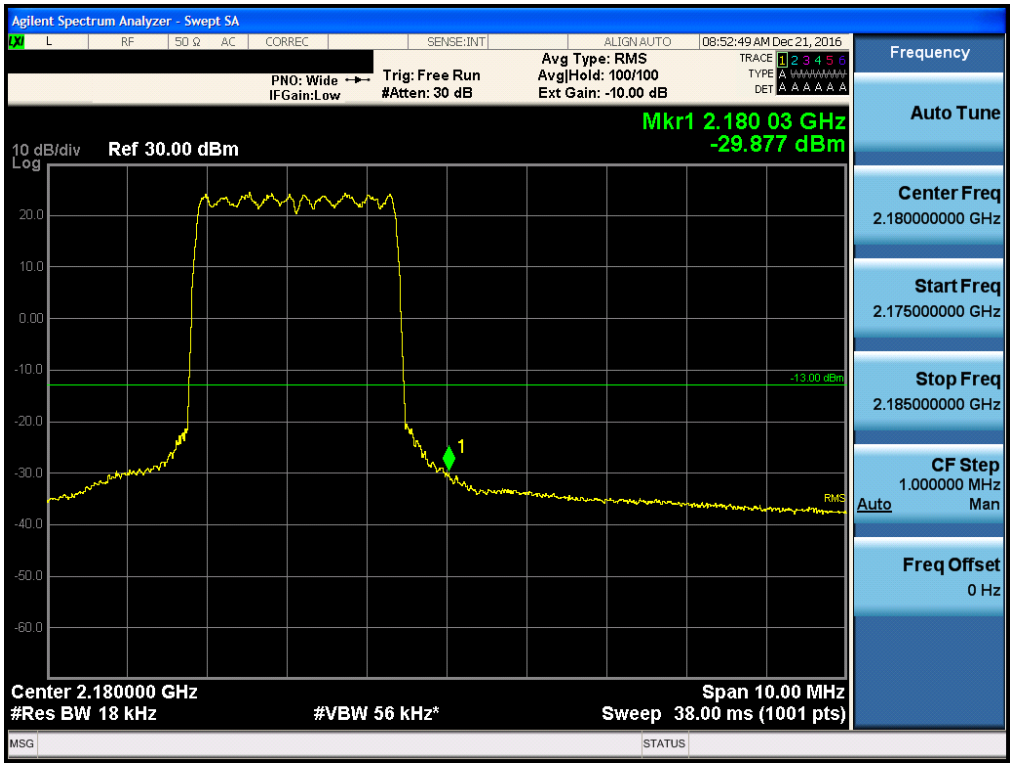

## Intermodulation Spurious Emissions for FCC_AWS BAND WCDMA

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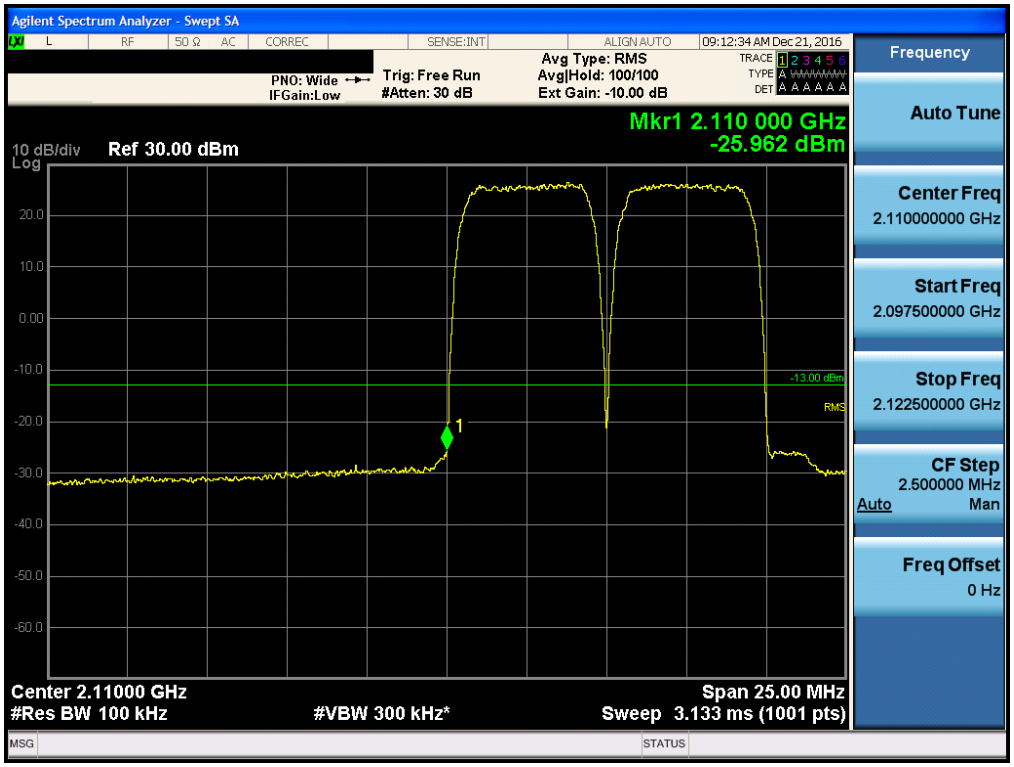
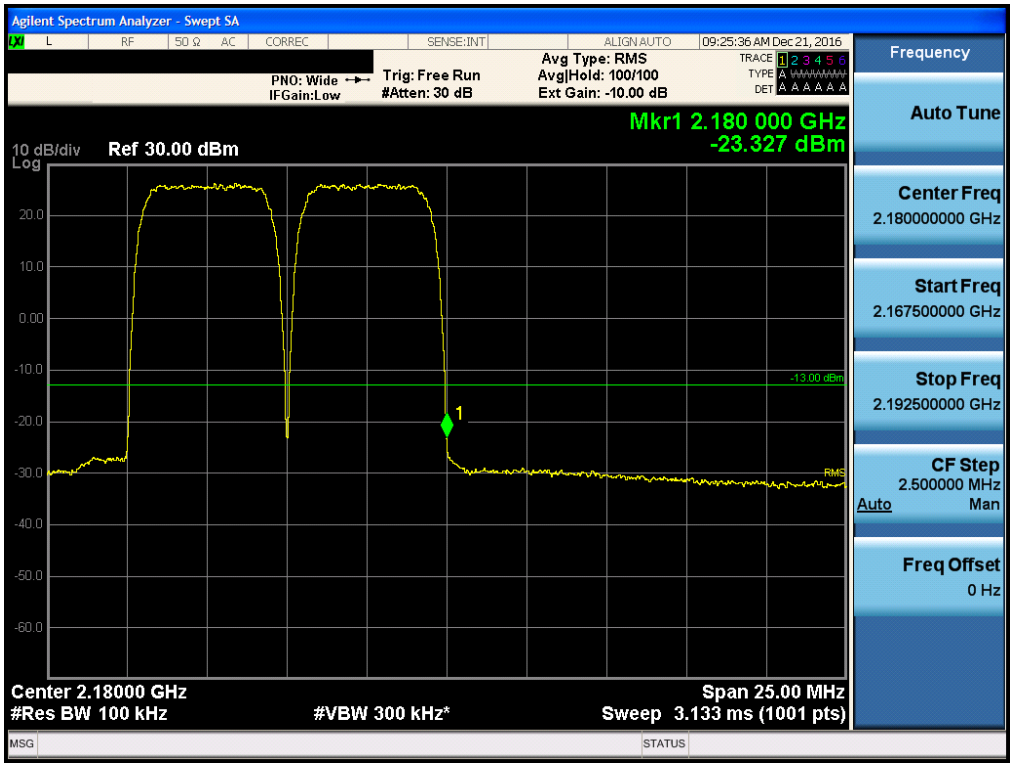



### [Downlink High]



## Single channel Enhancer Band Edge_AWS13 BAND LTE 5MHz

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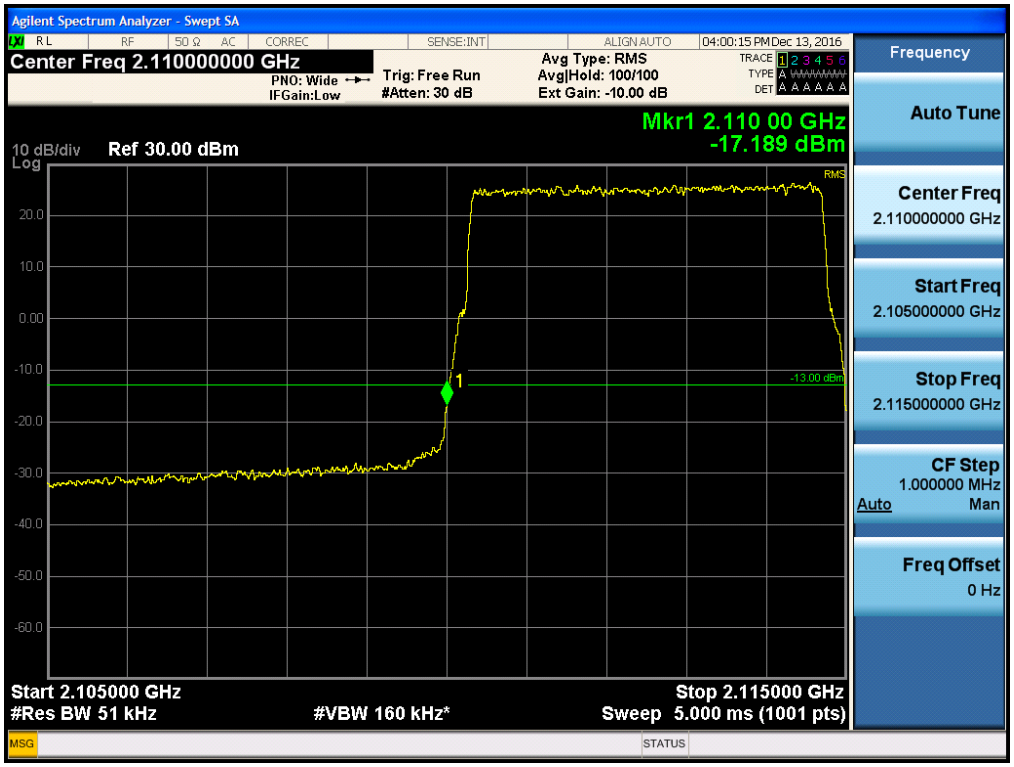


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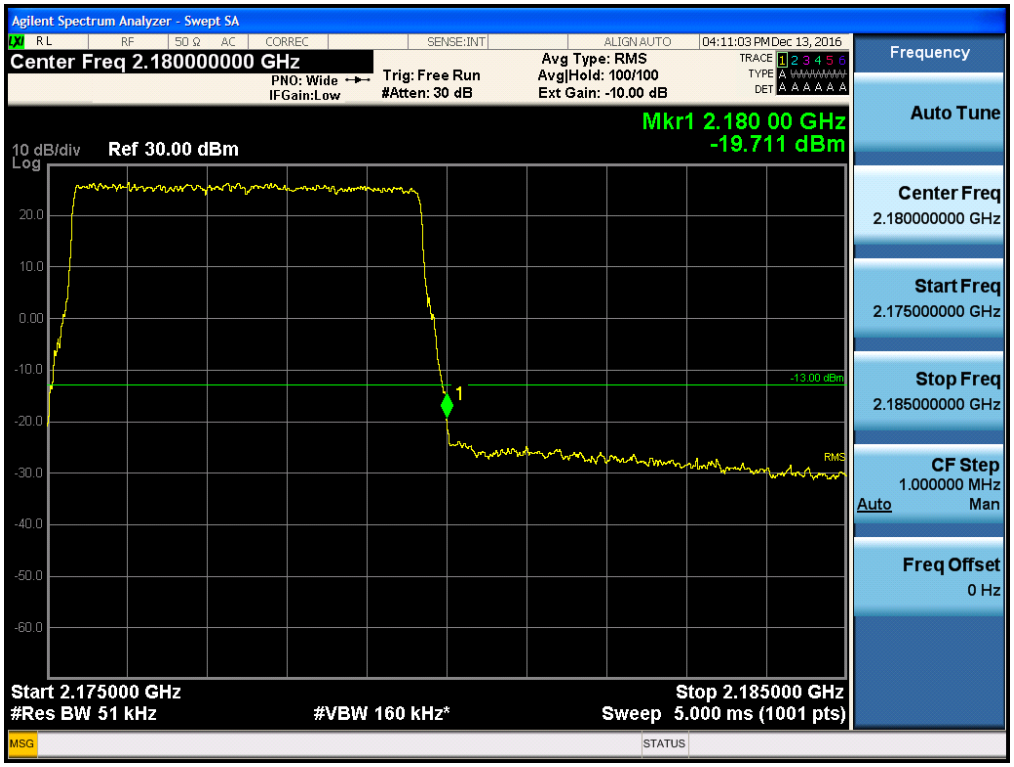
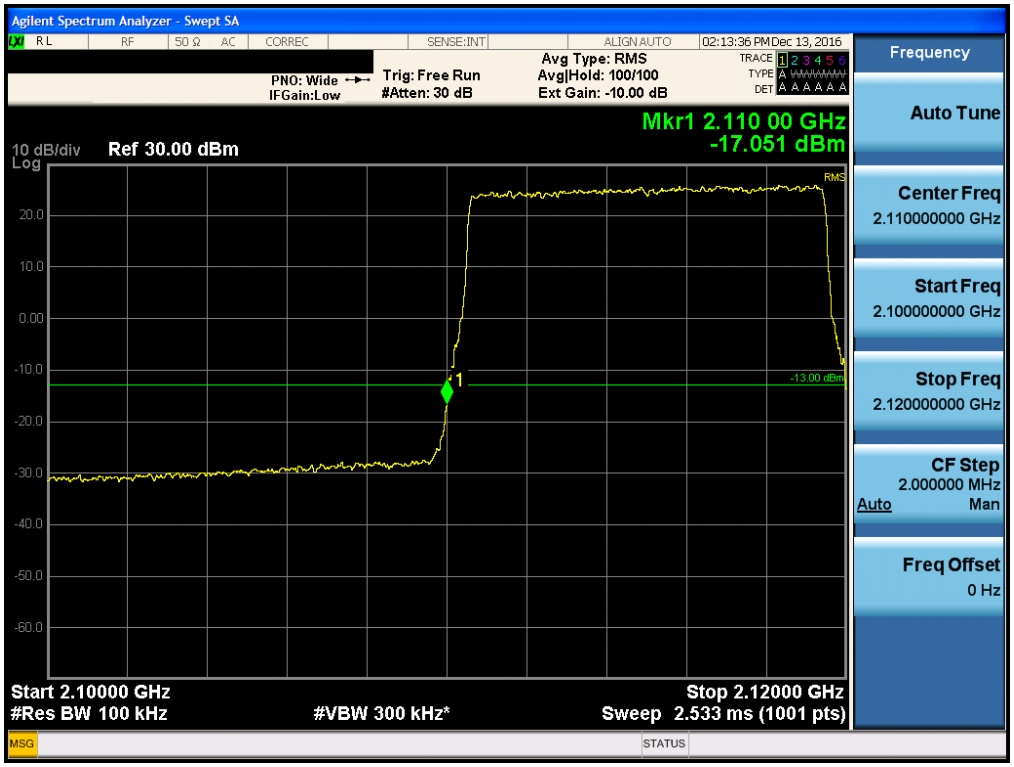


## Single channel Enhancer Band Edge_AWS13 BAND LTE 10MHz

### [Downlink Low]




### [Downlink High]

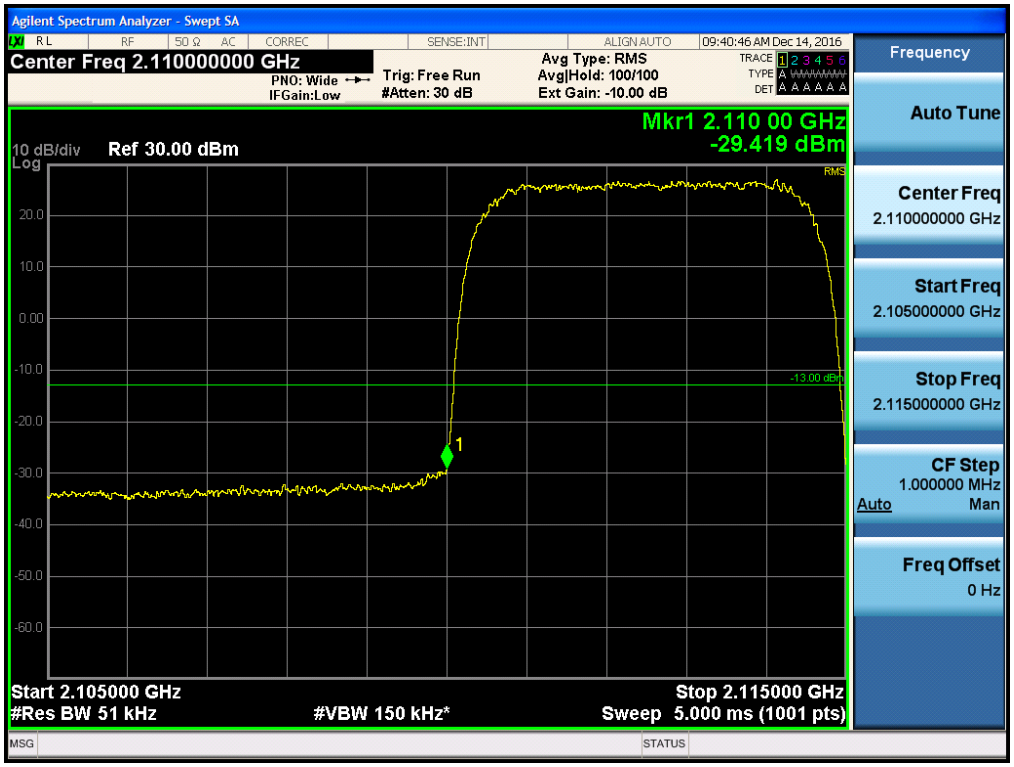
## Single channel Enhancer Band Edge_AWS BAND CDMA

### [Downlink Low]


### [Downlink High]

## Single channel Enhancer Band Edge_AWS BAND WCDMA

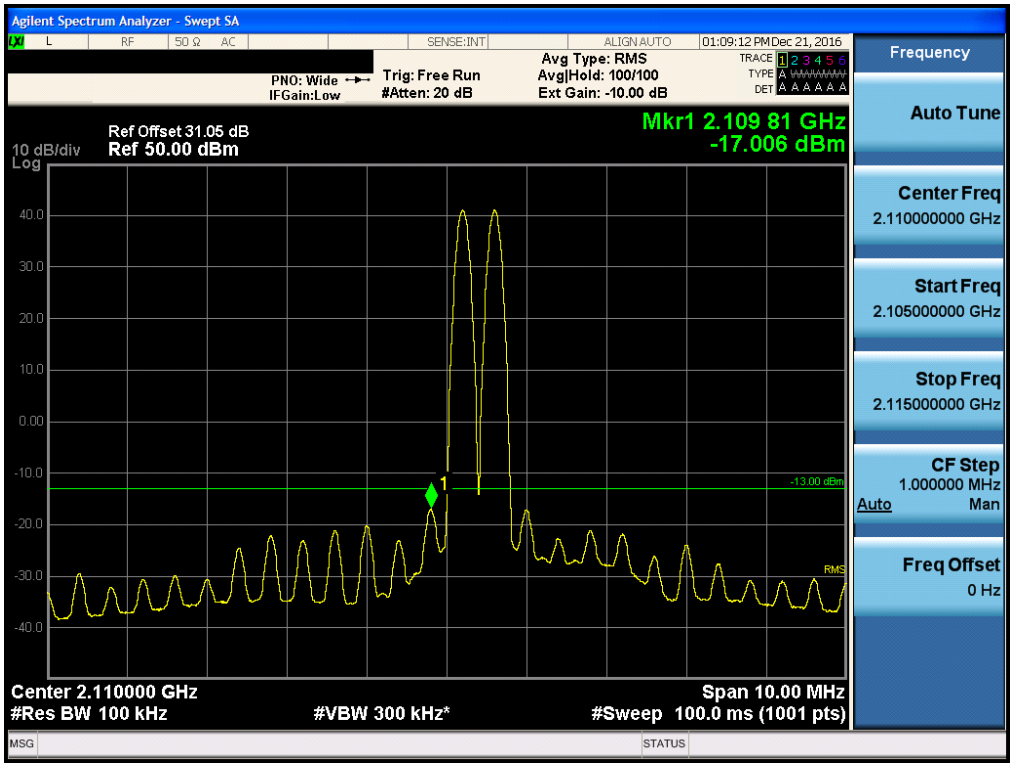
### [Downlink Low]



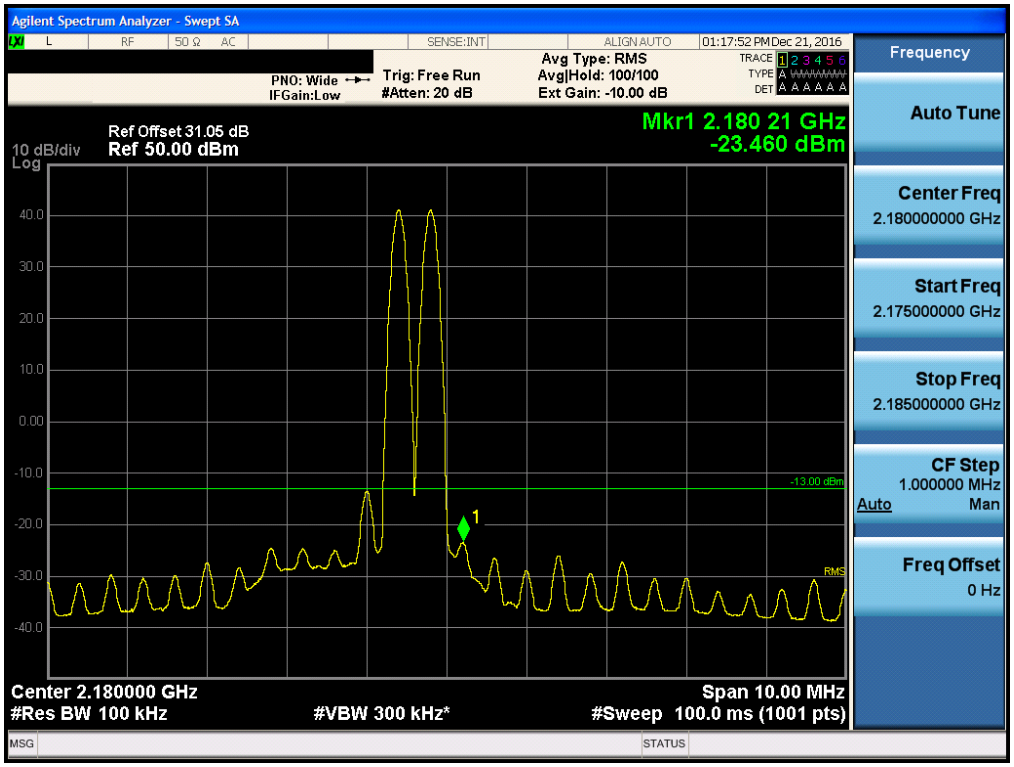

### [Downlink High]

**Multi channel Enhancer Band Edge for IC_ AWS BAND**

**[Downlink Low]**




**[Downlink High]**



# 10. RADIATED SPURIOUS EMISSIONS

**Test Requirement(s):**

**§ 2.1053 Measurements required: Field strength of spurious radiation.**

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

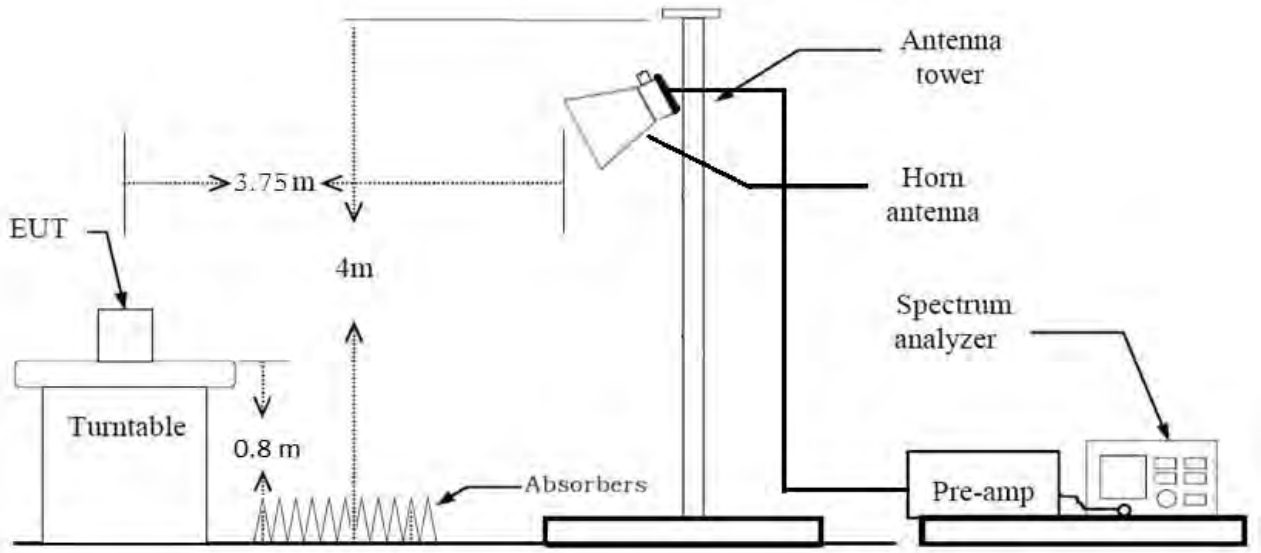
**Test Procedures:**

As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of ANSI/TIA-603-C-2004 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360and the receiving antenna scanned from 1-3m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried. out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

## Radiated Spurious Emissions Test Setup




**Note :**

1. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor( reference distance : 3 m).
2. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

**Test Result:**

## AWS

**[LTE 5 MHz]**

| Ch. | Freq.(MHz) | Measured Level [dBuV/m] | Ant. Factor [dB/m] | C.L [dB] | A.G. [dB] | H.P.F.. [dB] | D.F. [dB] | Pol. | Measured Power [dBm] | Result [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|
| Low | 4,225.00 | 61.00 | 30.100 | 4.14 | 44.92 | -0.81 | 1.96 | H | -34.20 | -43.735 |
| Mid. | 4,290.00 | 60.51 | 30.280 | 3.53 | 44.56 | -0.17 | 1.96 | H | -34.69 | -43.650 |
| High | 4,355.00 | 59.28 | 30.360 | 4.62 | 44.59 | -0.36 | 1.96 | H | -35.92 | -43.930 |

* C.L.: Cable Loss / A.G.: Ant. Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

**[LTE 10 MHz]**

| Ch. | Freq.(MHz) | Measured Level [dBuV/m] | Ant. Factor [dB/m] | C.L [dB] | A.G. [dB] | H.P.F.. [dB] | D.F. [dB] | Pol. | Measured Power [dBm] | Result [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|
| Low | 4,230.00 | 59.29 | 30.100 | 4.10 | 44.93 | -0.79 | 1.96 | H | -35.91 | -45.470 |
| Mid. | 4,290.00 | 59.29 | 30.280 | 3.53 | 44.56 | -0.17 | 1.96 | H | -35.91 | -44.870 |
| High | 4,350.00 | 56.16 | 30.340 | 4.61 | 44.56 | -0.36 | 1.96 | H | -39.04 | -47.050 |

* C.L.: Cable Loss / A.G.: Ant. Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

**[CDMA]**

| Ch. | Freq.(MHz) | Measured Level [dBuV/m] | Ant. Factor [dB/m] | C.L [dB] | A.G. [dB] | H.P.F.. [dB] | D.F. [dB] | Pol. | Measured Power [dBm] | Result [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|
| Low | 4,222.50 | 63.96 | 30.100 | 4.15 | 44.91 | -0.82 | 1.96 | H | -31.24 | -40.760 |
| Mid. | 4,290.00 | 62.94 | 30.280 | 3.53 | 44.56 | -0.17 | 1.96 | H | -32.26 | -41.220 |
| High | 4,357.50 | 61.07 | 30.370 | 4.62 | 44.61 | -0.36 | 1.96 | H | -34.13 | -42.150 |

* C.L.: Cable Loss / A.G.: Ant. Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

**[WCDMA]**

| Ch. | Freq.(MHz) | Measured Level [dBuV/m] | Ant. Factor [dB/m] | C.L [dB] | A.G. [dB] | H.P.F.. [dB] | D.F. [dB] | Pol. | Measured Power [dBm] | Result [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|
| Low | 4,225.00 | 60.56 | 30.100 | 4.14 | 44.96 | -0.81 | 1.96 | H | -34.64 | -44.215 |
| Mid. | 4,290.00 | 59.35 | 30.280 | 3.53 | 44.56 | -0.17 | 1.96 | H | -35.85 | -44.810 |
| High | 4,355.00 | 57.98 | 30.360 | 4.62 | 44.59 | -0.36 | 1.96 | H | -37.22 | -45.230 |

* C.L.: Cable Loss / A.G.: Ant. Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

**[Non-modulation]**

| Ch. | Freq.(MHz) | Measured Level [dBuV/m] | Ant. Factor [dB/m] | C.L [dB] | A.G. [dB] | H.P.F.. [dB] | D.F. [dB] | Pol. | Measured Power [dBm] | Result [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|
| Low | 4,220.40 | 60.35 | 30.060 | 4.17 | 44.90 | -0.83 | 1.96 | V | -34.85 | -44.390 |
| Mid. | 4,290.00 | 59.91 | 30.280 | 3.53 | 44.56 | -0.17 | 1.96 | V | -35.29 | -44.250 |
| High | 4,359.60 | 59.43 | 30.380 | 4.62 | 44.62 | -0.36 | 1.96 | V | -35.77 | -43.790 |

* C.L.: Cable Loss / A.G.: Ant. Gain / H.P.F.: High Pass Filter / D.F.: Distance Factor (3.75 m)

# 11. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS

**FCC Rules**

**Test Requirement(s):** §2.1055(a)(1), § 27.54

**Test Procedures:**

As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Spectrum Analyzer.

The EUT was placed in the Environmental Chamber.

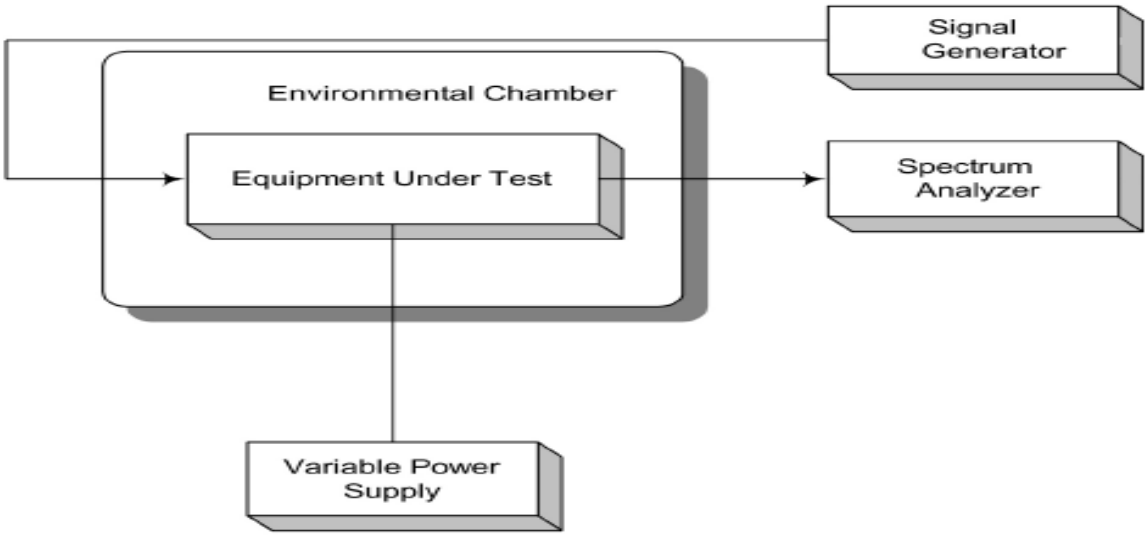
A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations.

The frequency drift was investigated for every 10 °C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30 to 50 °C.

Voltage supplied to EUT is 110 Vac reference temperature was done at 20°C.

The voltage was varied by ± 15 % of nominal

**Test Setup:**



**IC Rules**

**Test Requirement(s): RSS-131 6.5**

A band translator is essentially a repeater station and should introduce as little frequency error as possible. The frequency stability should therefore meet the objectives of the overall land mobile or cellular service for which it serves. Better frequency stability than the minimum standard cited below will therefore be required in some cases.

The frequency stability shall be within 1.5 parts per million (0.00015%).

**Test Procedures: RSS-131 4.5**

In addition, the local oscillator frequency stability of the band translator shall be reported.

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The following temperature and supply voltage ranges apply:

(a) at 10 degree intervals of temperatures between -30 °C and +50 °C, and at the manufacturer's rated-supply voltage; and

(b) at +20 °C temperature and 15% supply voltage variations.

## Frequency Stability and Voltage Test Results

## [AWS BAND]

**Reference:** 120 Vac at 20°C **Freq.** = 2145.00 MHz

| Voltage (%) | Temp. (℃) | Frequency (Hz) | Frequency Error (Hz) | ppm |
|---|---|---|---|---|
| 100% | +20(Ref) | 2145 000 000 | -0.03 | 0.0000 |
| | -30 | 2145 000 000 | -0.01 | 0.0000 |
| | -20 | 2145 000 000 | -0.05 | 0.0000 |
| | -10 | 2145 000 000 | -0.13 | -0.0001 |
| | 0 | 2145 000 000 | -0.01 | 0.0000 |
| | +10 | 2145 000 000 | 0.08 | 0.0000 |
| | +30 | 2145 000 000 | -0.15 | -0.0001 |
| | +40 | 2145 000 000 | 0.02 | 0.0000 |
| | +50 | 2145 000 000 | -0.08 | 0.0000 |
| 115% | +20 | 2145 000 000 | -0.12 | -0.0001 |
| 85% | +20 | 2145 000 000 | -0.03 | 0.0000 |