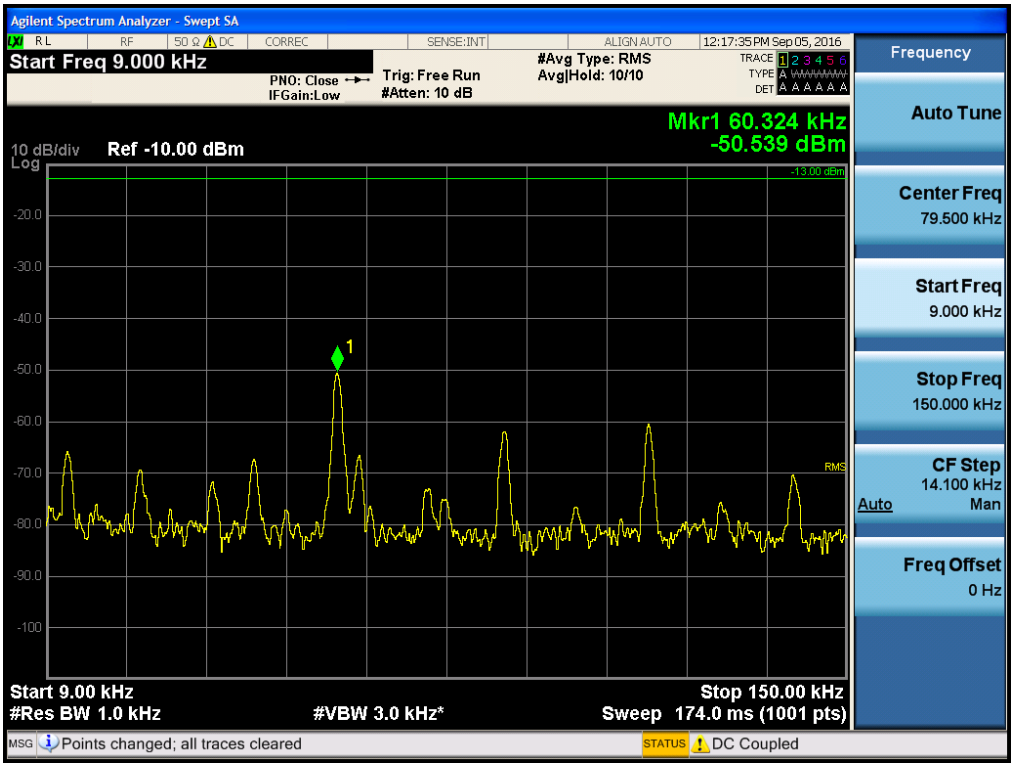
Single channel Enhancer Plots of Spurious Emission for 2300_WCS BAND LTE 10 MHz

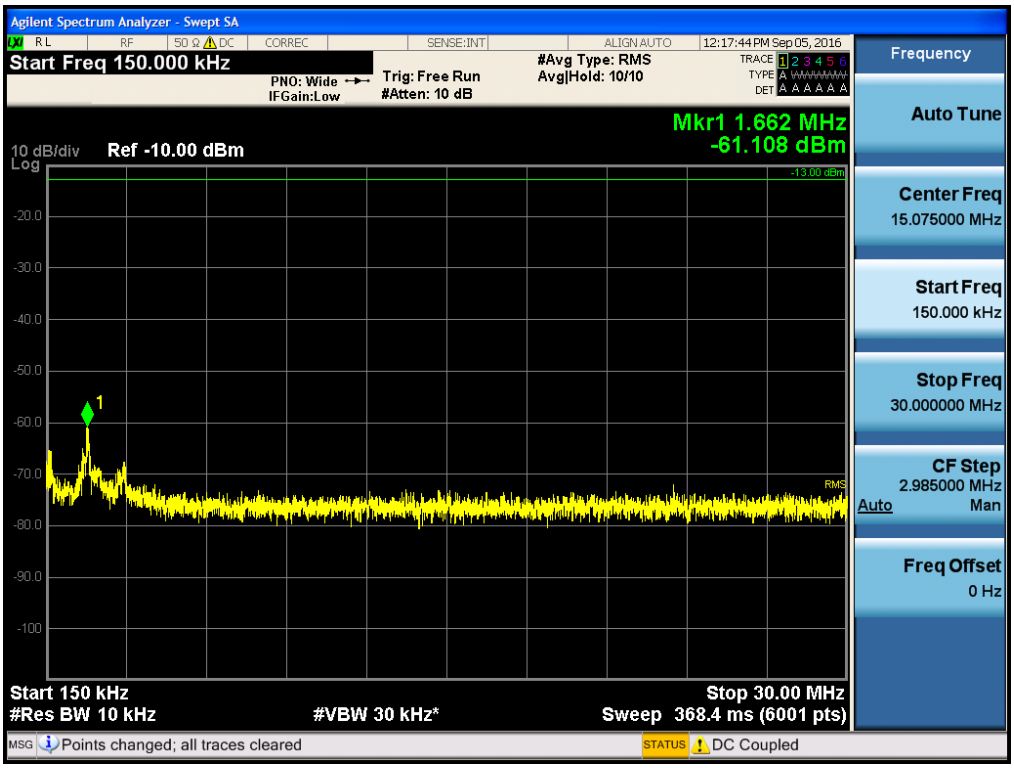
Conducted Spurious Emissions (9 kHz – 150 kHz)

[Downlink Middle]



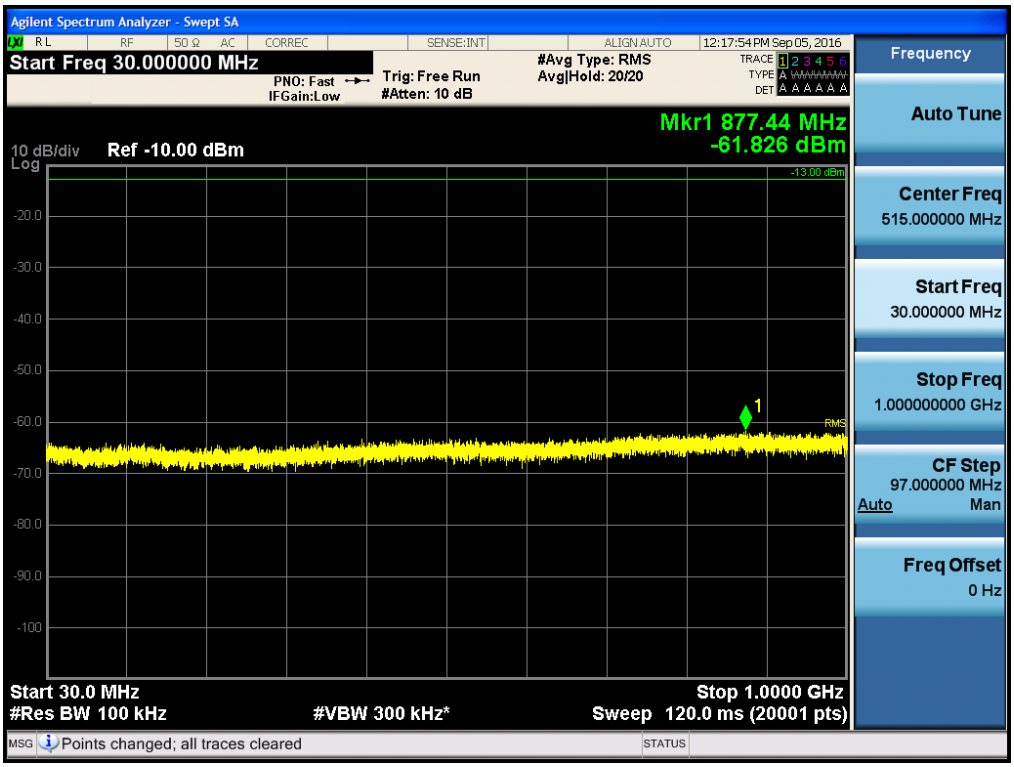
Conducted Spurious Emissions (150 kHz – 30 MHz)

[Downlink Middle]



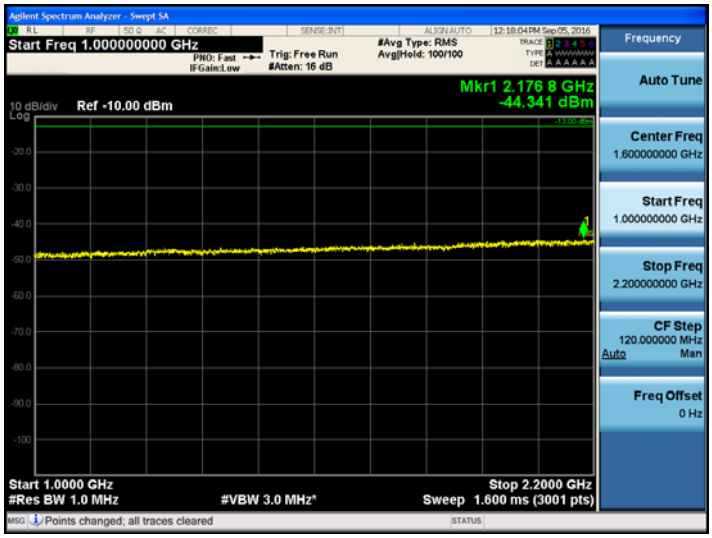
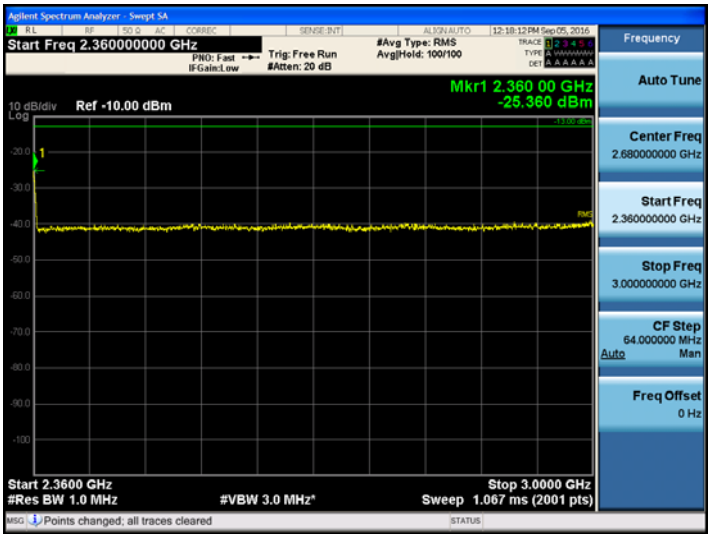
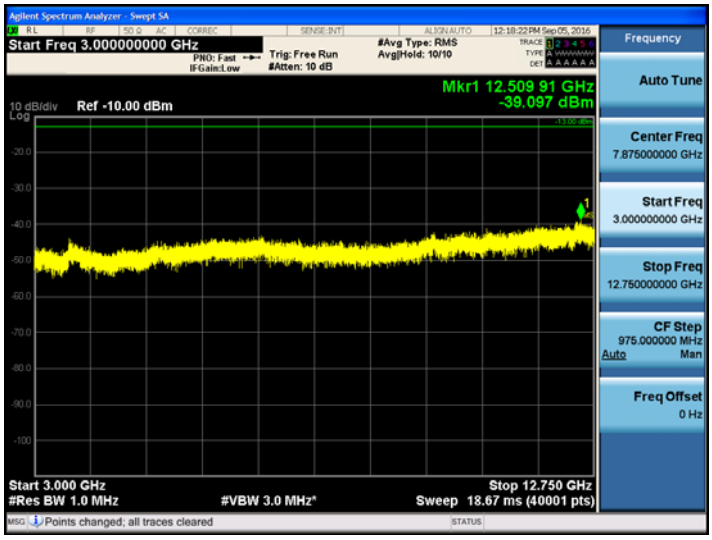
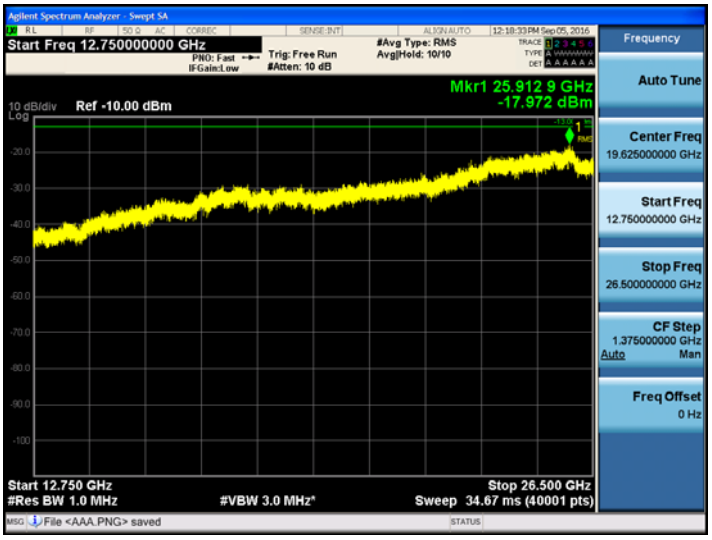
Conducted Spurious Emissions (30 MHz – 1 GHz)

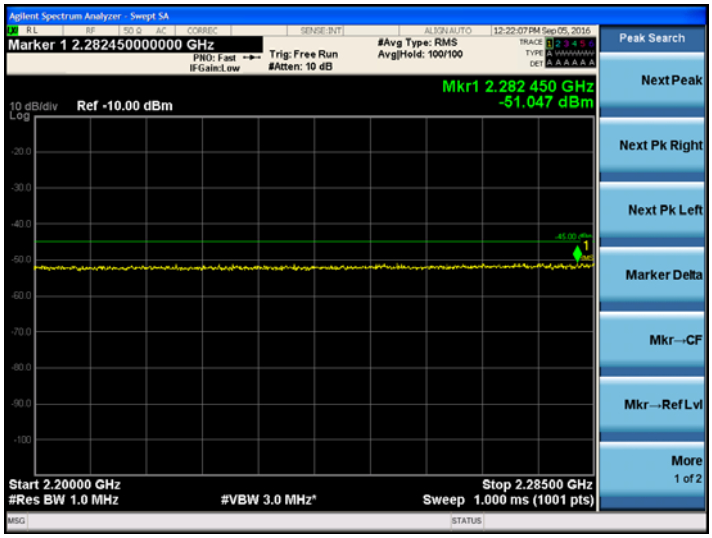
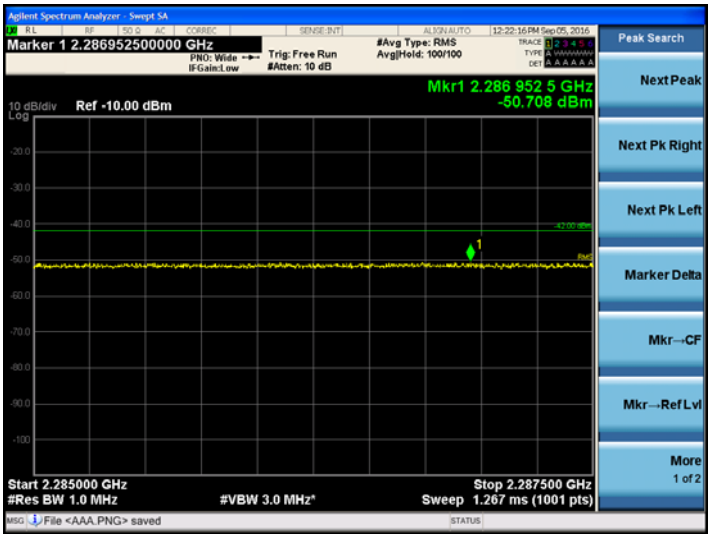
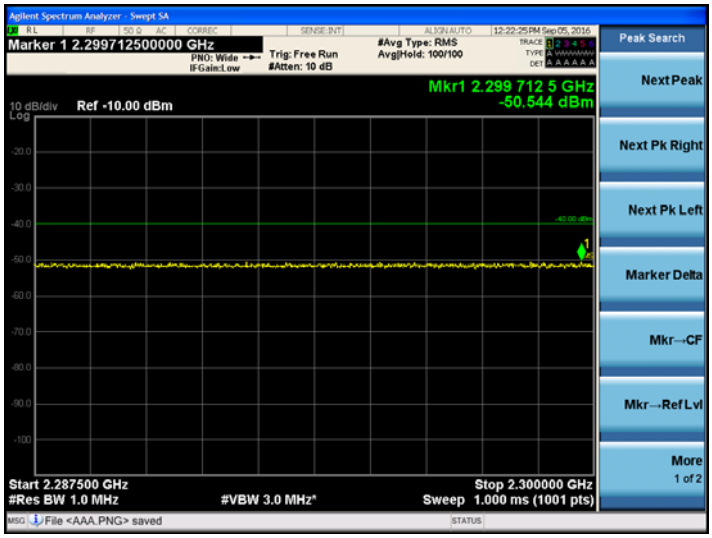
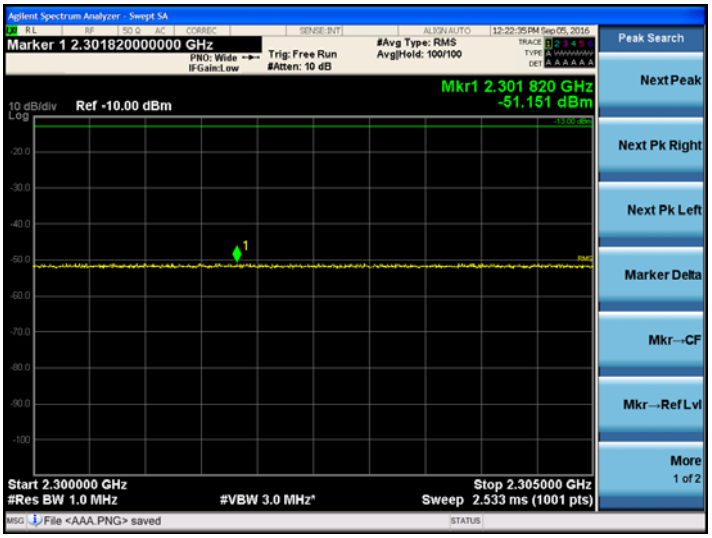
[Downlink Middle]

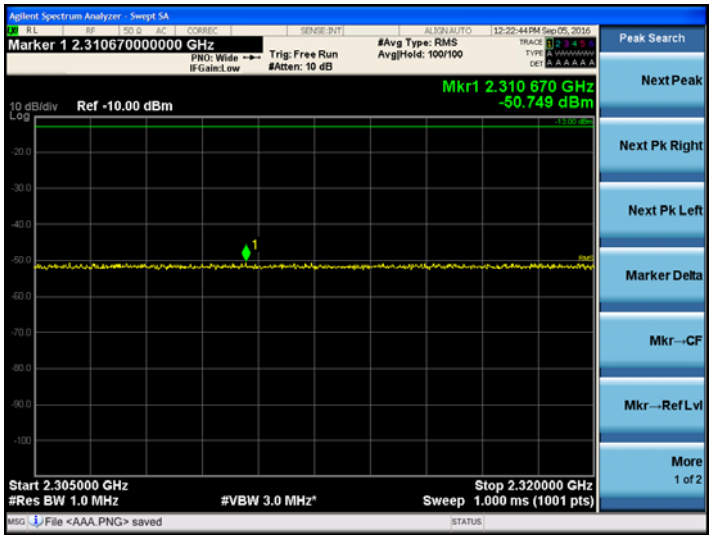
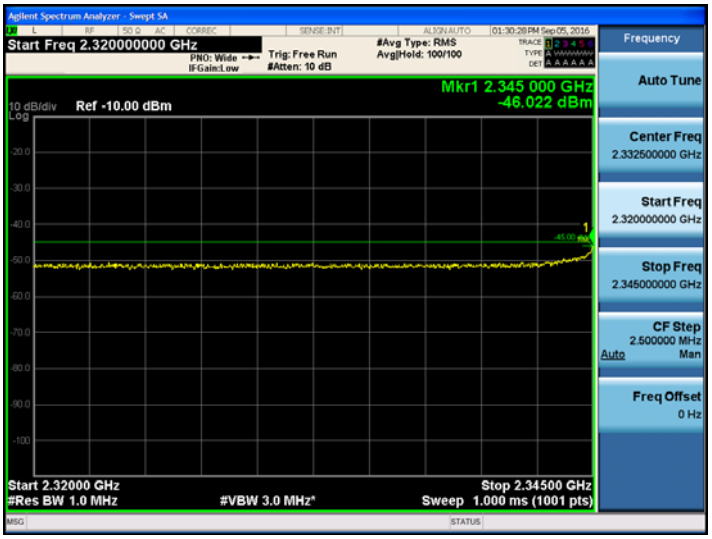
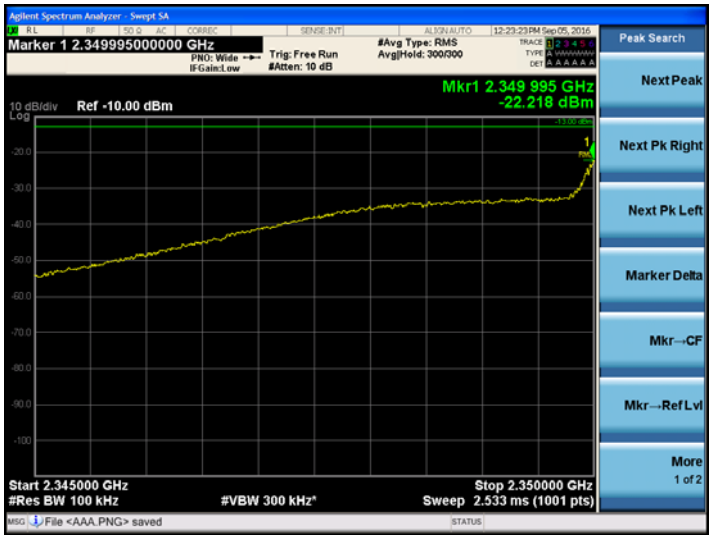
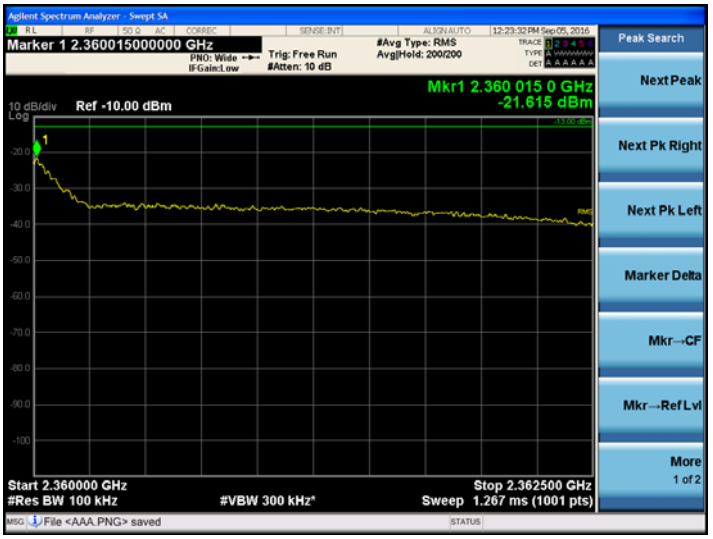


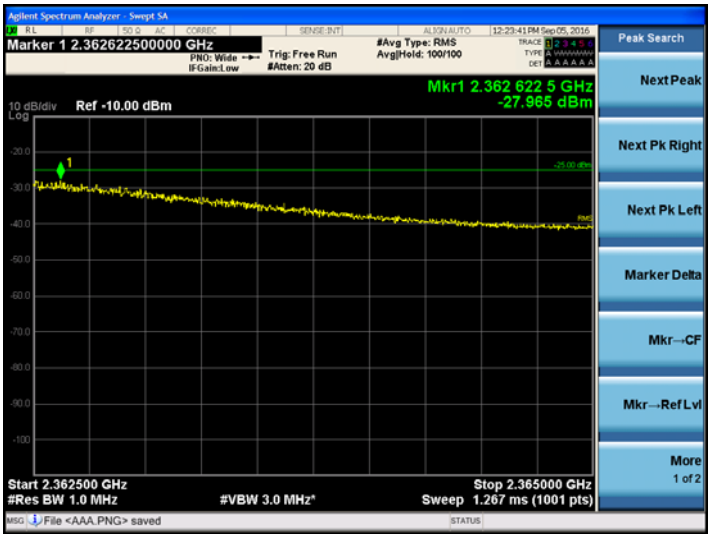
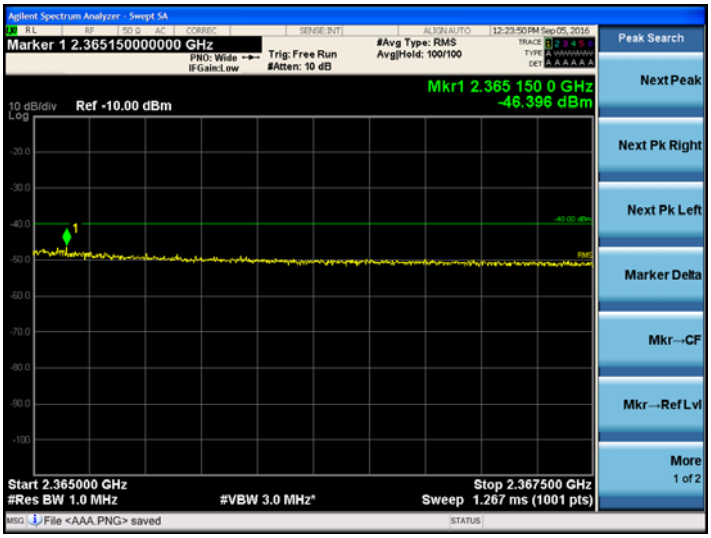
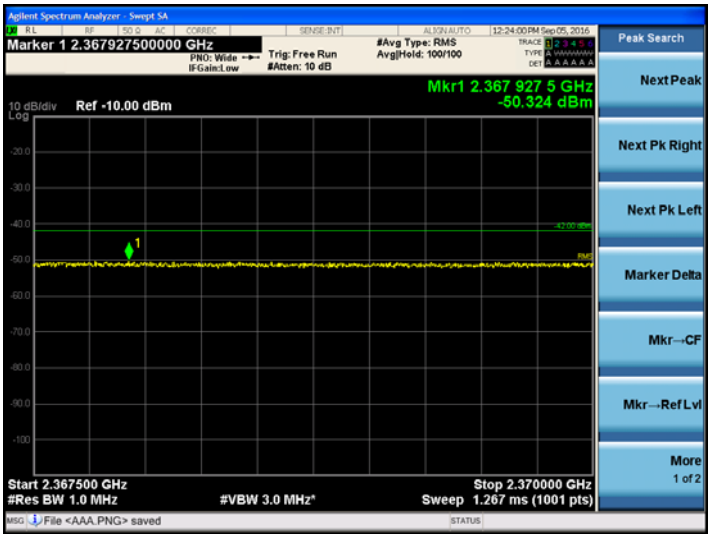
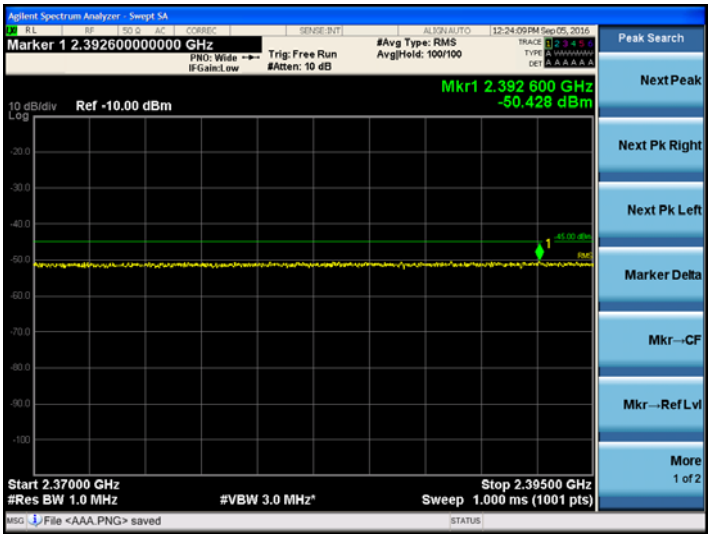
Conducted Spurious Emissions (1 GHz – 26.5 GHz)

[Downlink Middle]

1000 ㎒ ~ 2200 ㎒	2360 ㎒ ~ 3000 ㎒
	
3000 ㎒ ~ 12750 ㎒	**12750 ㎒ ~ 26500 ㎒**
	

2200 ㎒ ~ 2285 ㎒	2285 ㎒ ~ 2287.5 ㎒
	
2287.5 ㎒ ~ 2300 ㎒	**2300 ㎒ ~ 2305 ㎒**
	

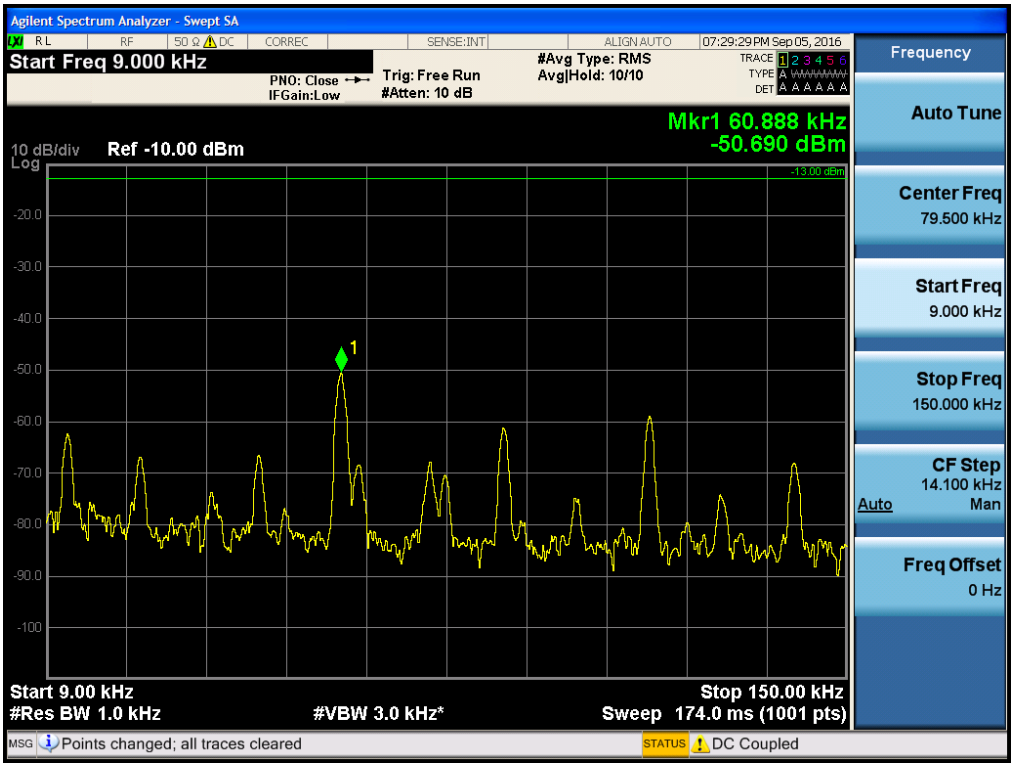
2305 ㎒ ~ 2320 ㎒	2320 ㎒ ~ 2345 ㎒
	
2345 ㎒ ~ 2350 ㎒	**2360 ㎒ ~ 2362.5 ㎒**
	

2362.5 ㎒ ~ 2365 ㎒	2365 ㎒ ~ 2367.5 ㎒
	
2367.5 ㎒ ~ 2370 ㎒	**2370 ㎒ ~ 2395 ㎒**
	

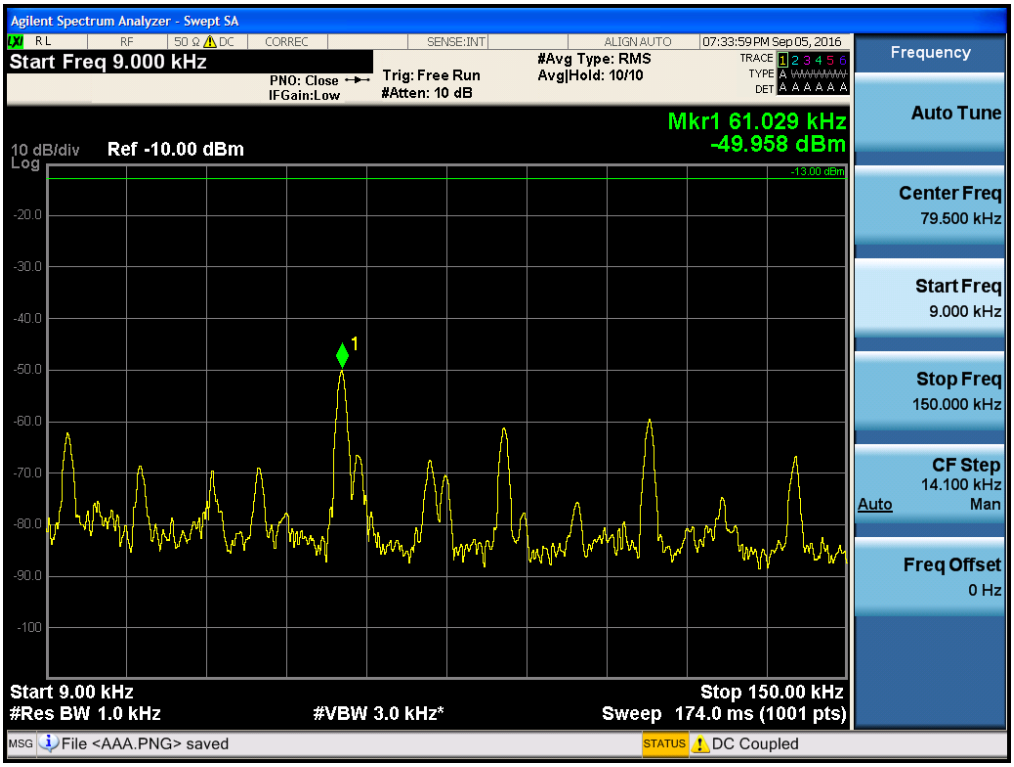
Multi channel Enhancer Plots of Spurious Emission for IC_2300_WCS BAND

Conducted Spurious Emissions (9 kHz – 150 kHz)

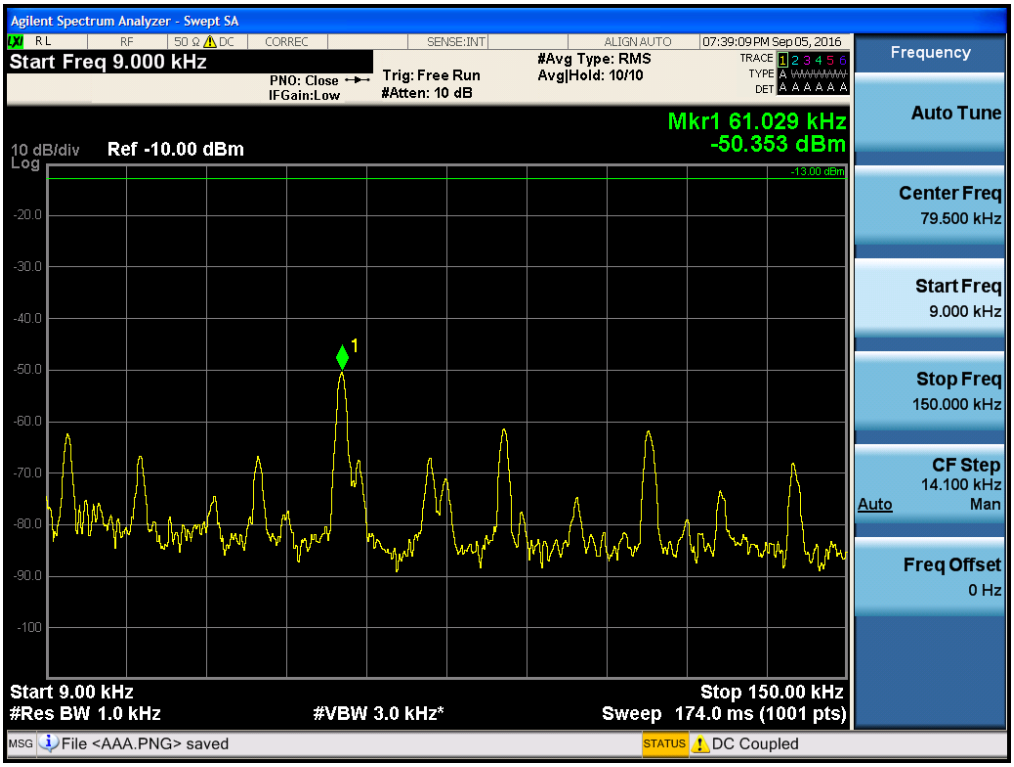
[Downlink Low]



[Downlink Middle]

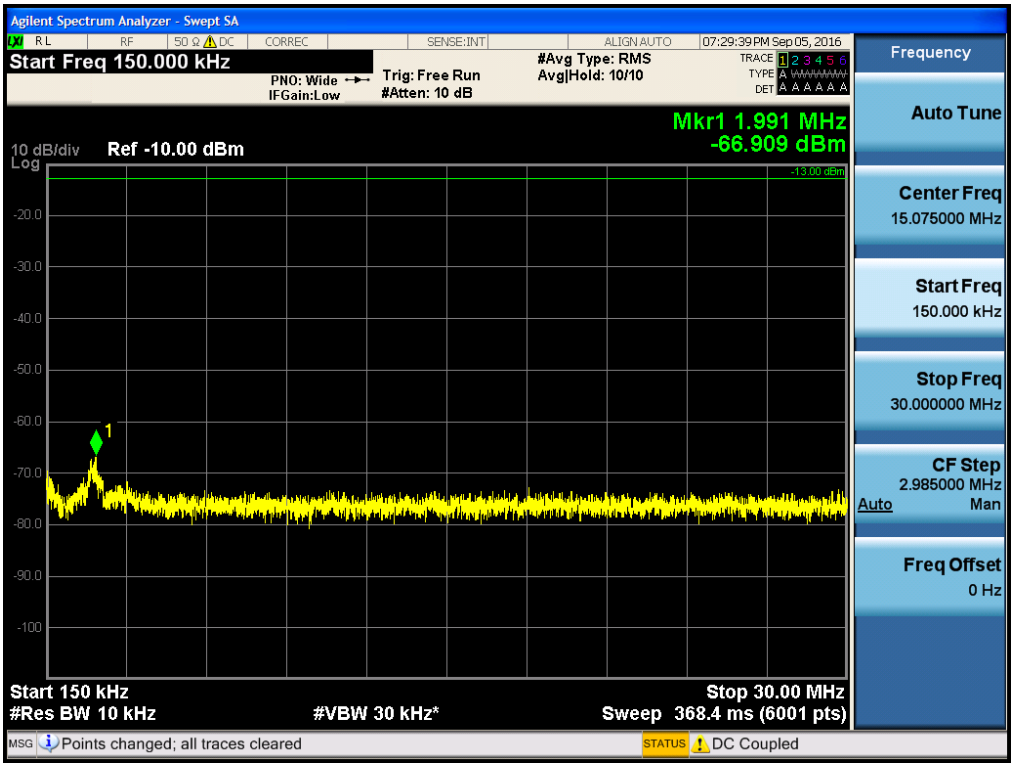


[Downlink High]

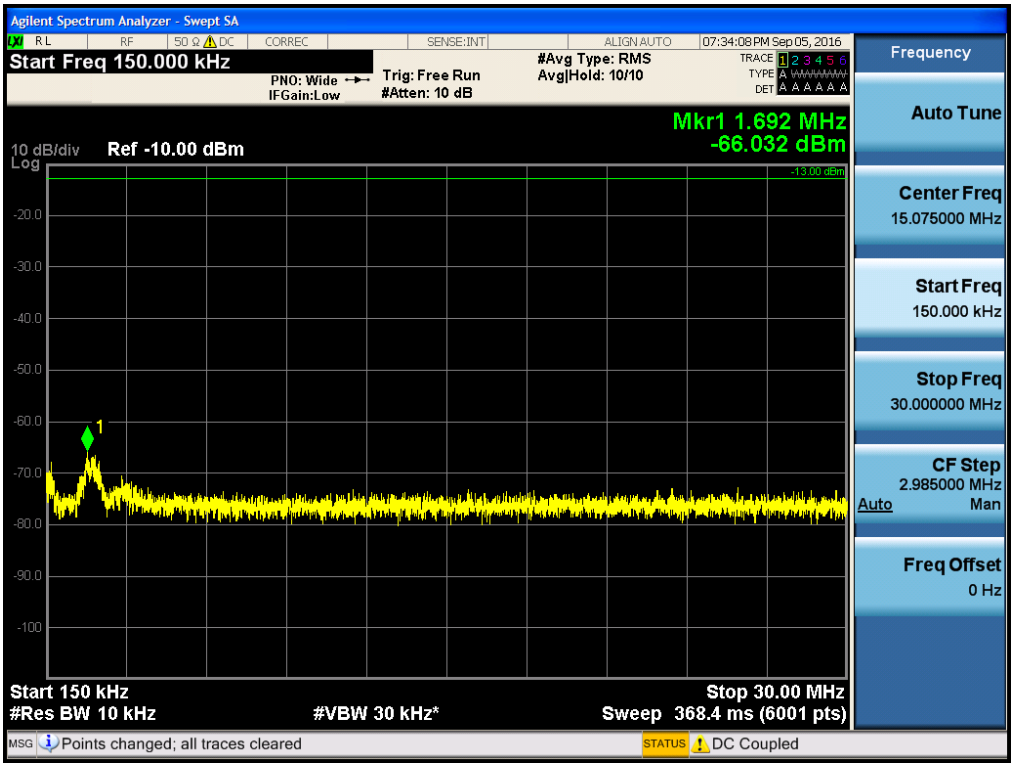


Conducted Spurious Emissions (150 kHz – 30 MHz)

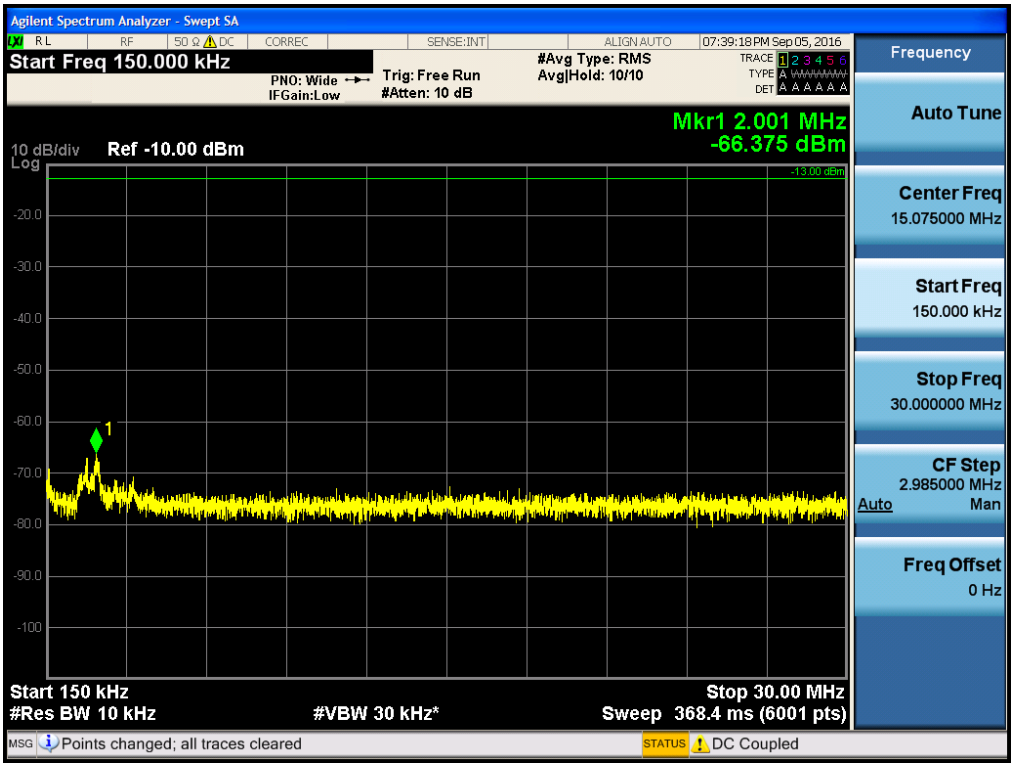
[Downlink Low]



[Downlink Middle]

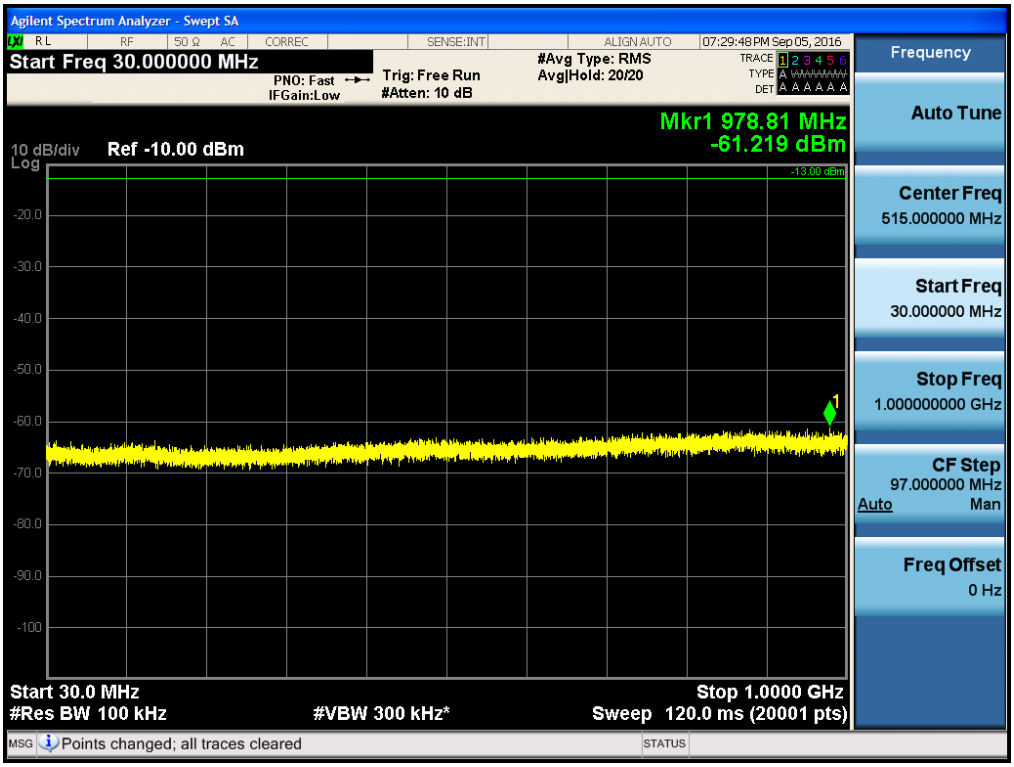


[Downlink High]

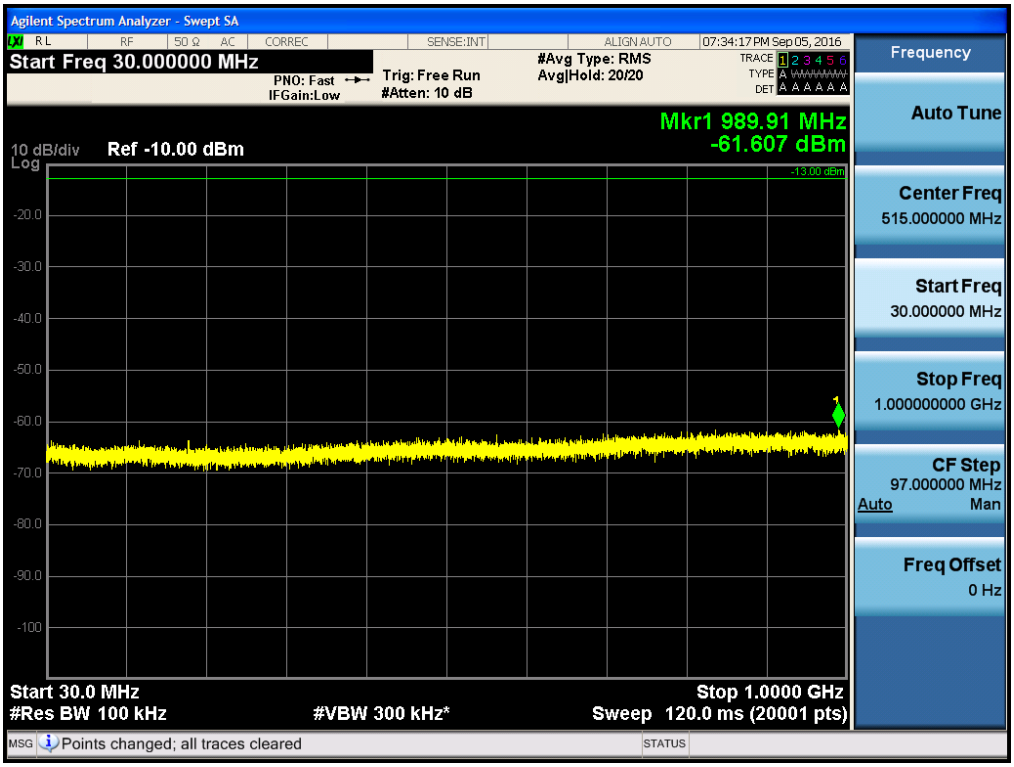


Conducted Spurious Emssions (30 MHz – 1 GHz)

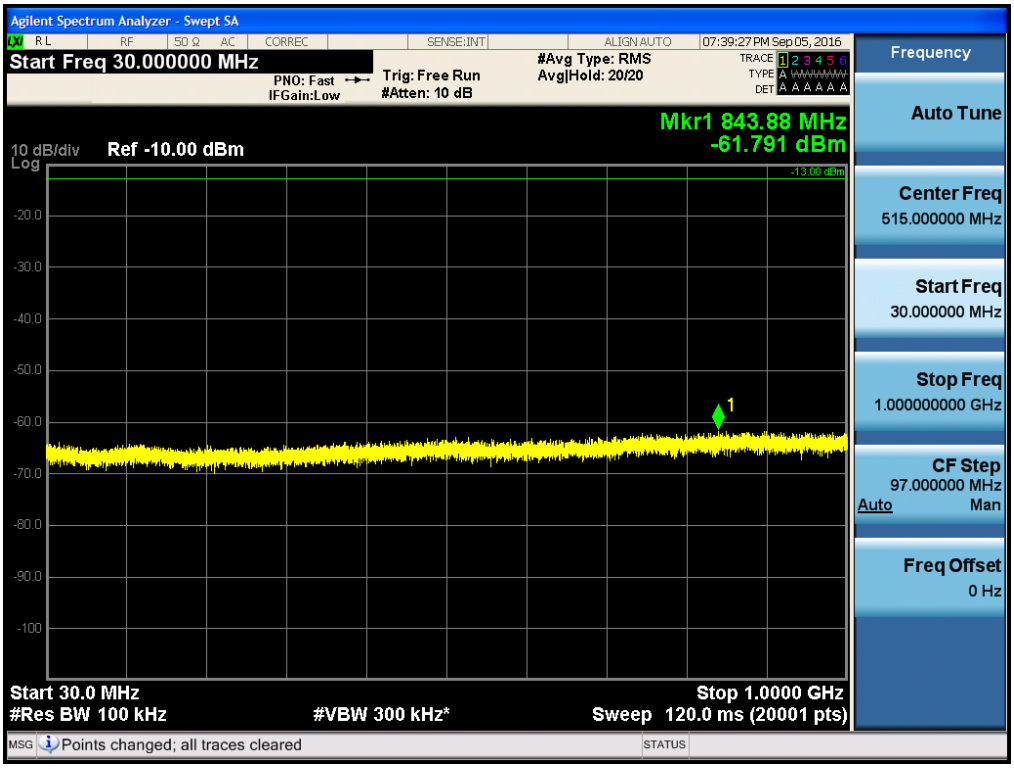
[Downlink Low]



[Downlink Middle]

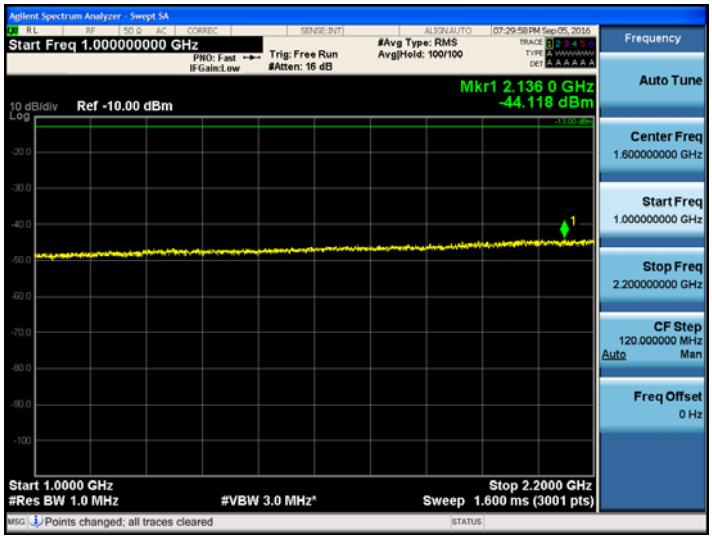
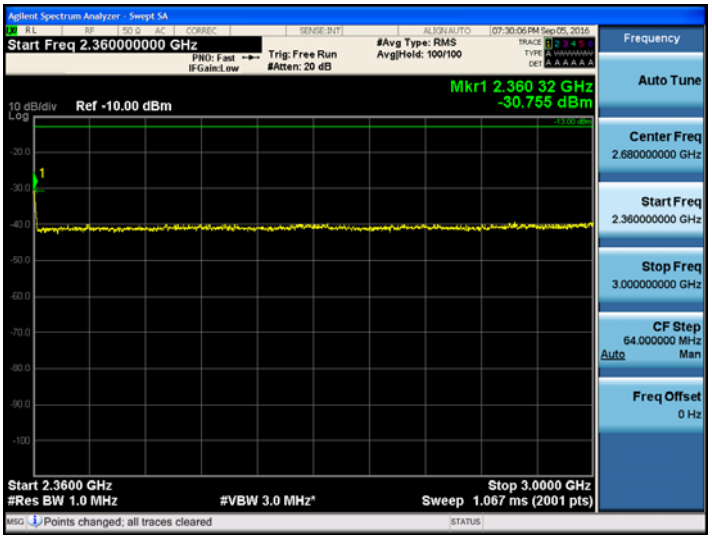
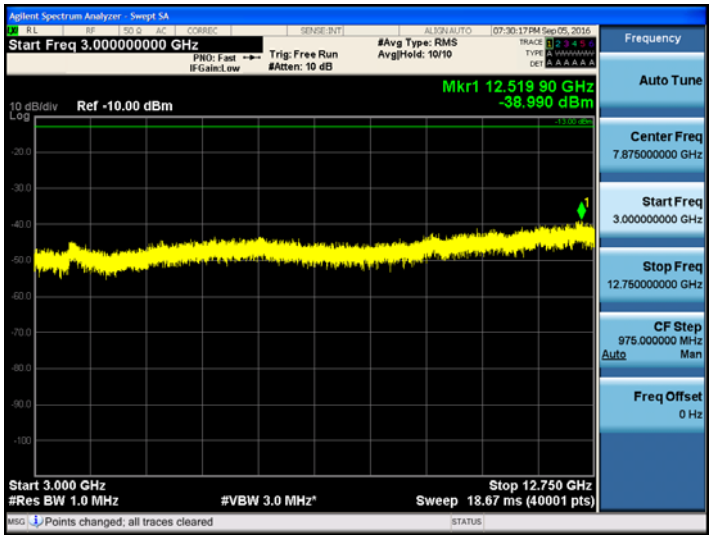
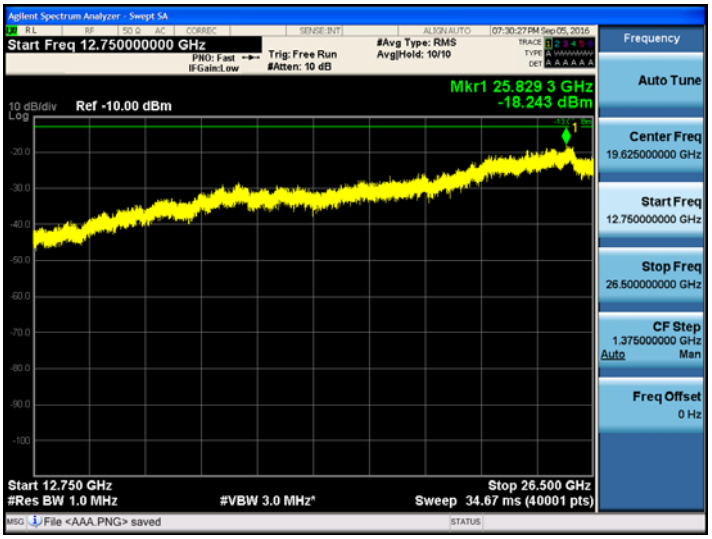


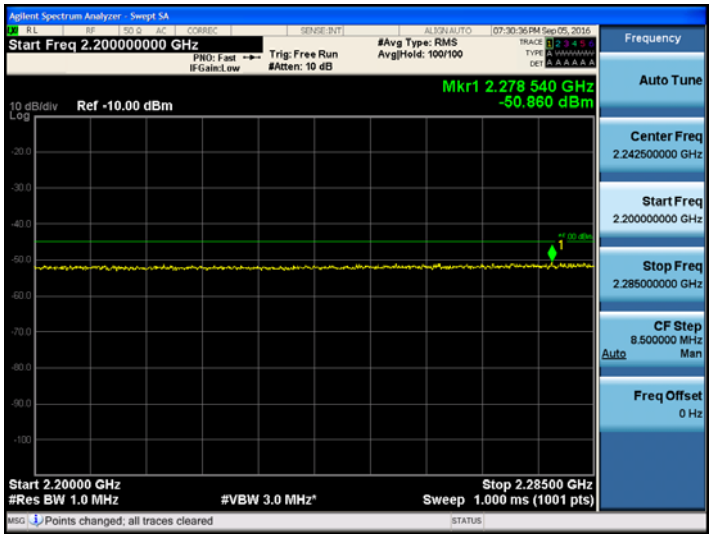
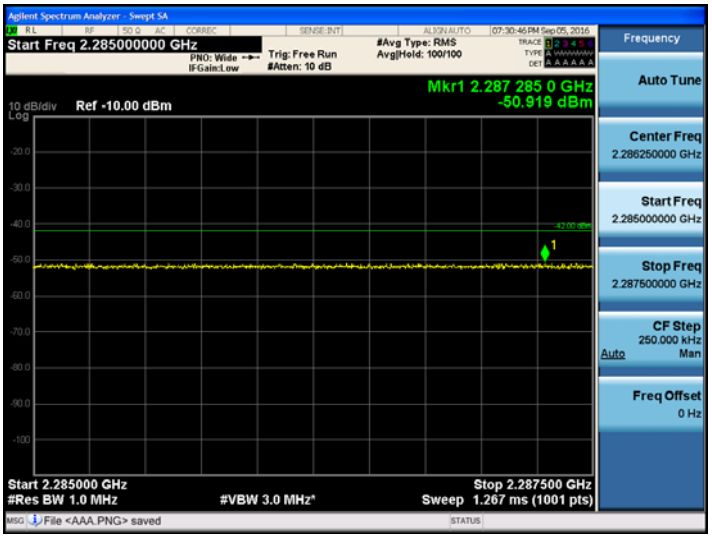
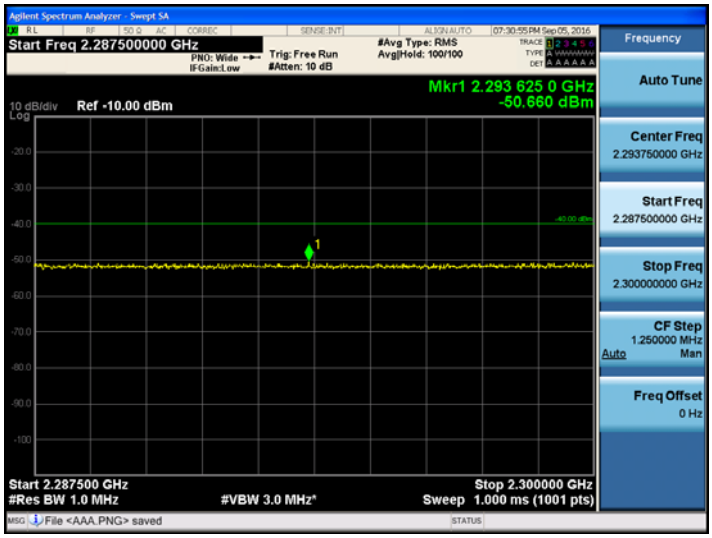
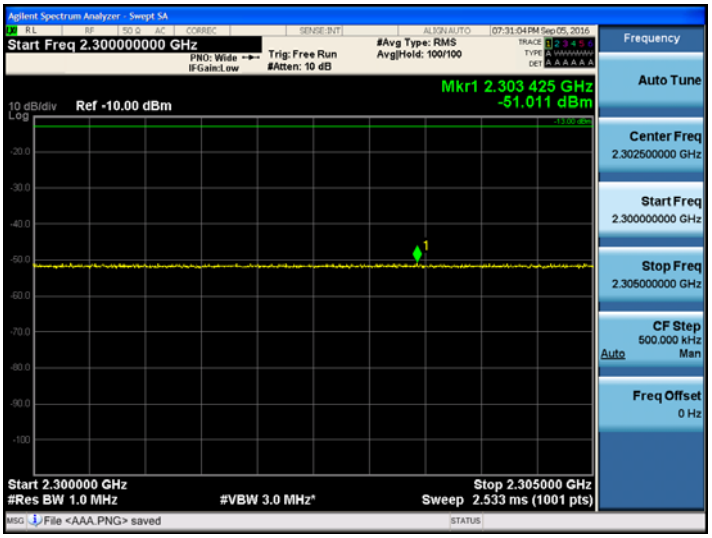
[Downlink High]

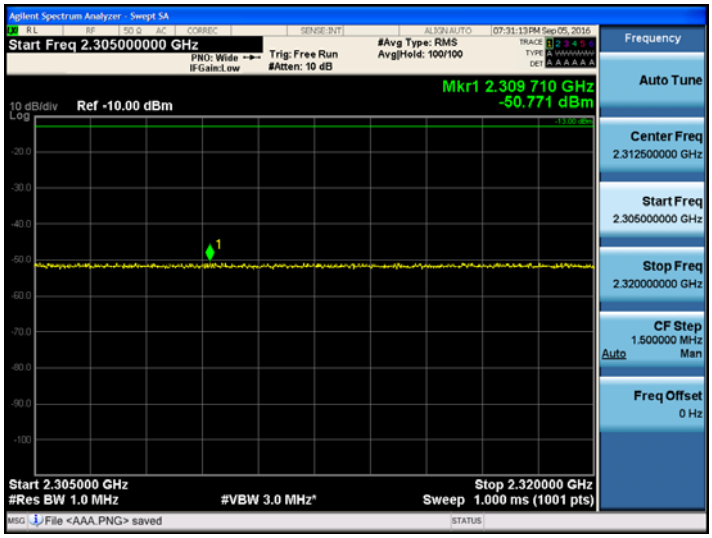
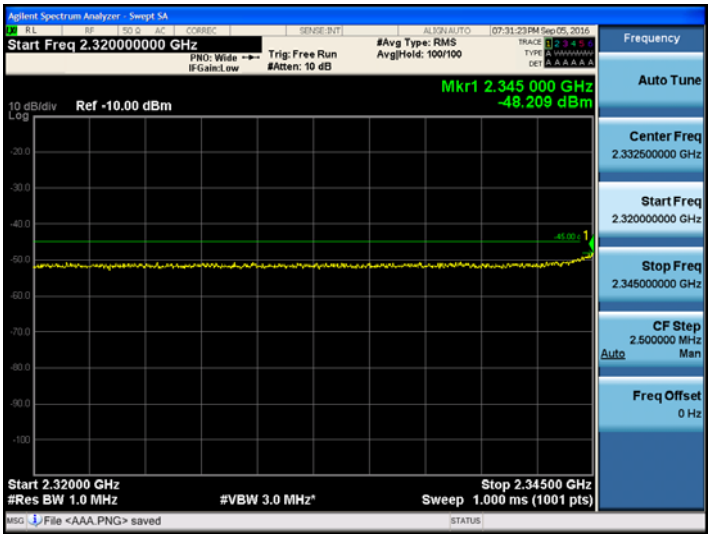
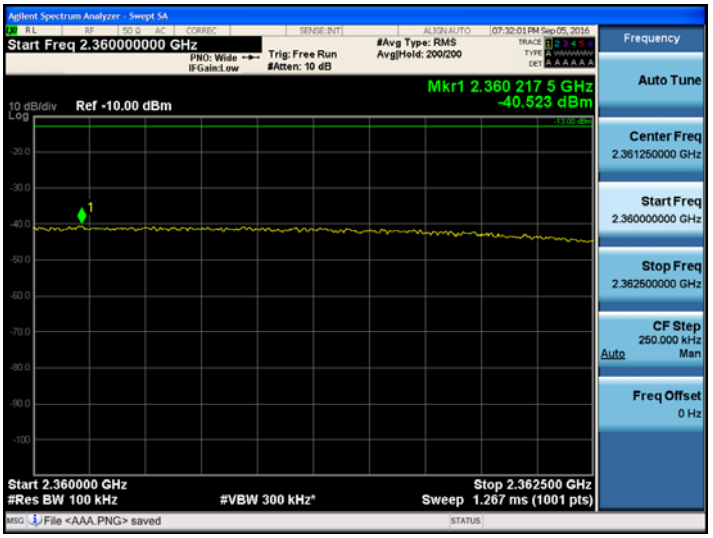


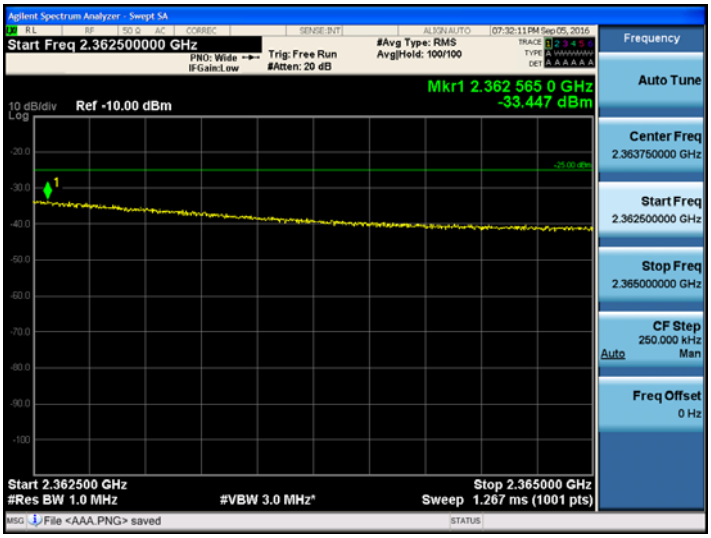
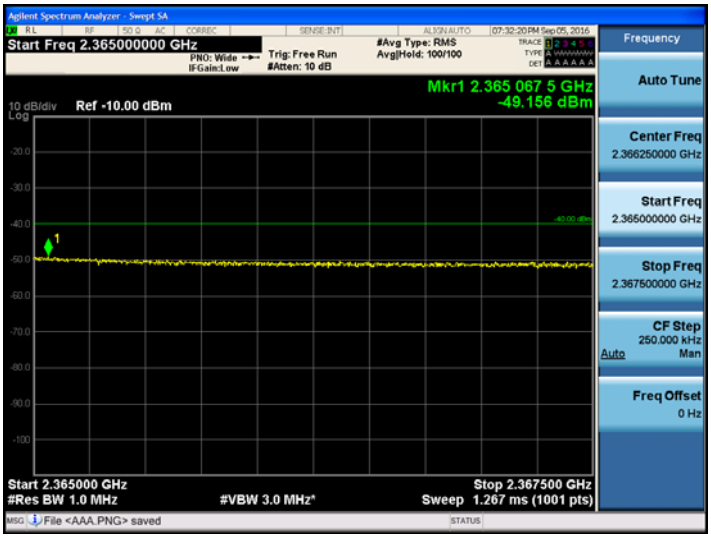
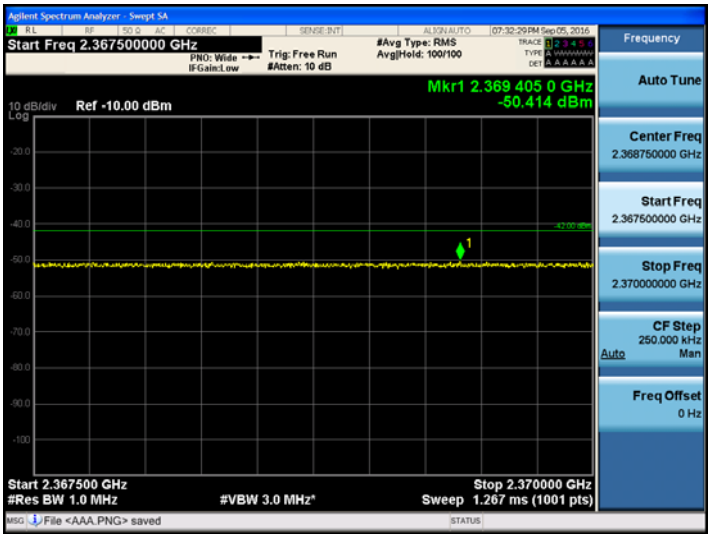
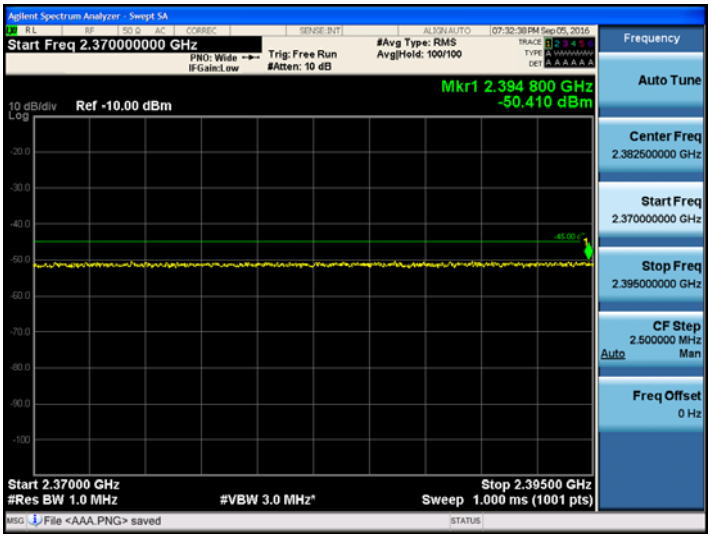
Conducted Spurious Emissions (1 GHz –26.5 GHz)

[Downlink Low]

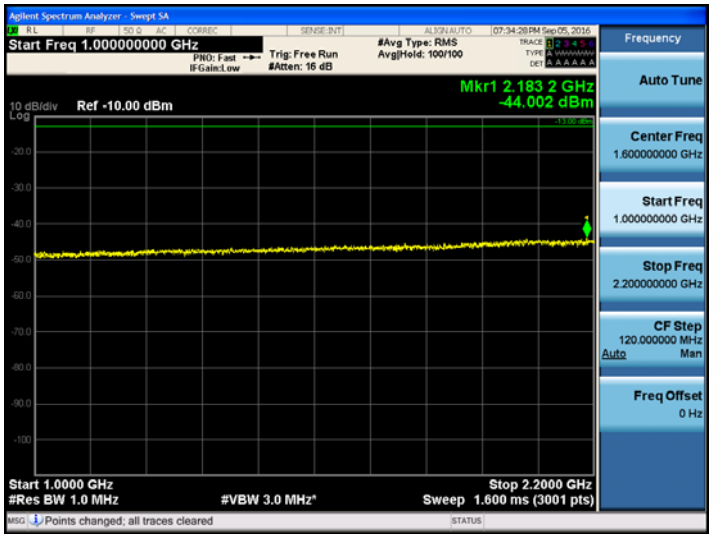
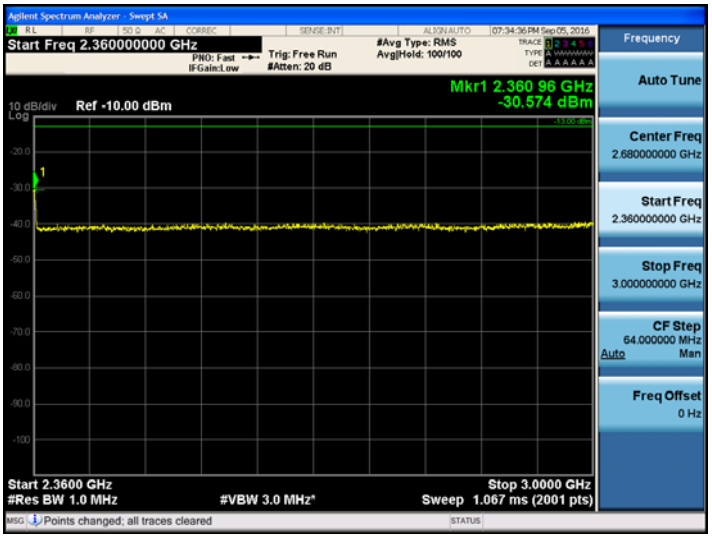
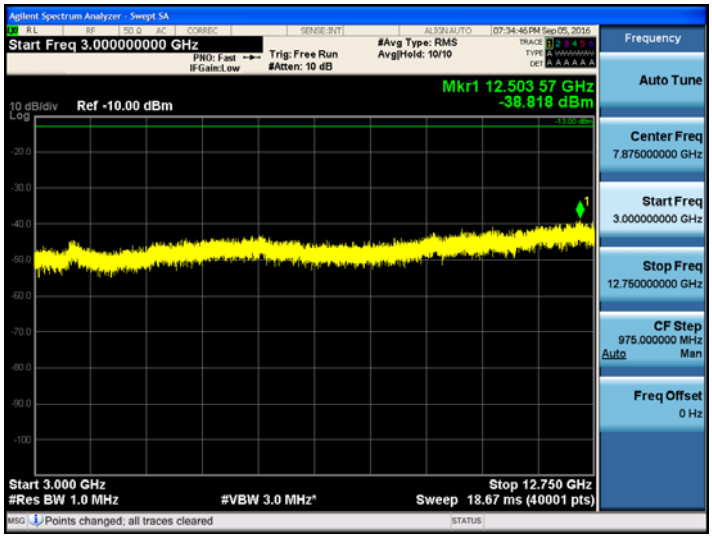
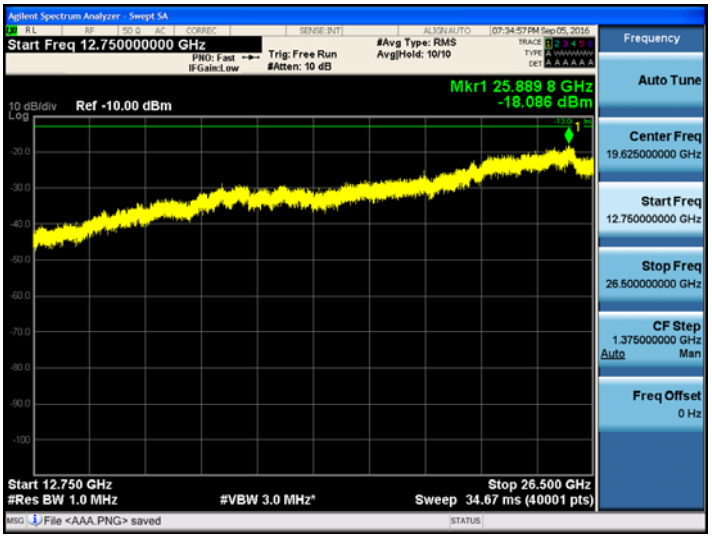
1000 ㎒ ~ 2200 ㎒	2360 ㎒ ~ 3000 ㎒
	
3000 ㎒ ~ 12750 ㎒	**12750 ㎒ ~ 26500 ㎒**
	

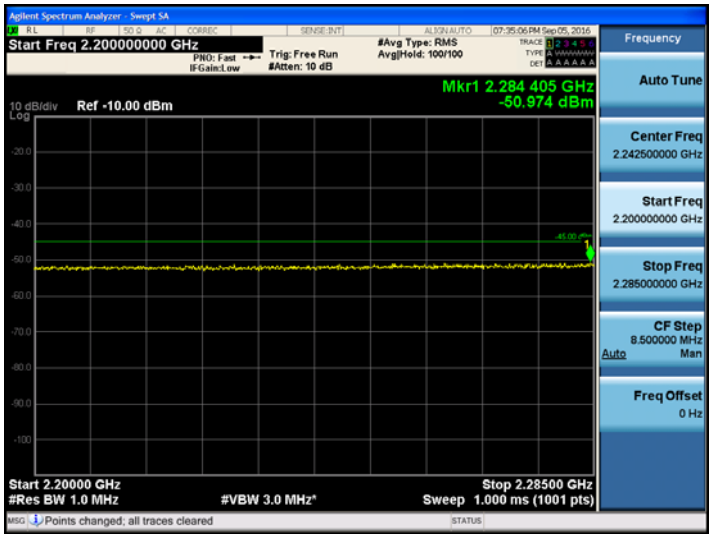
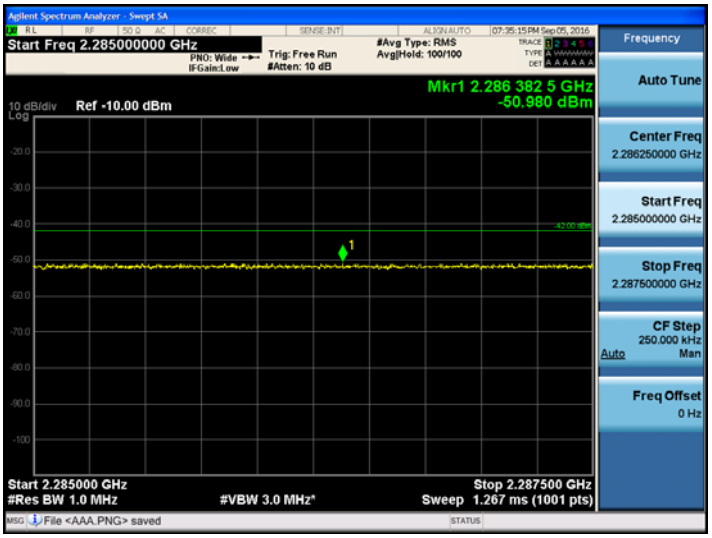
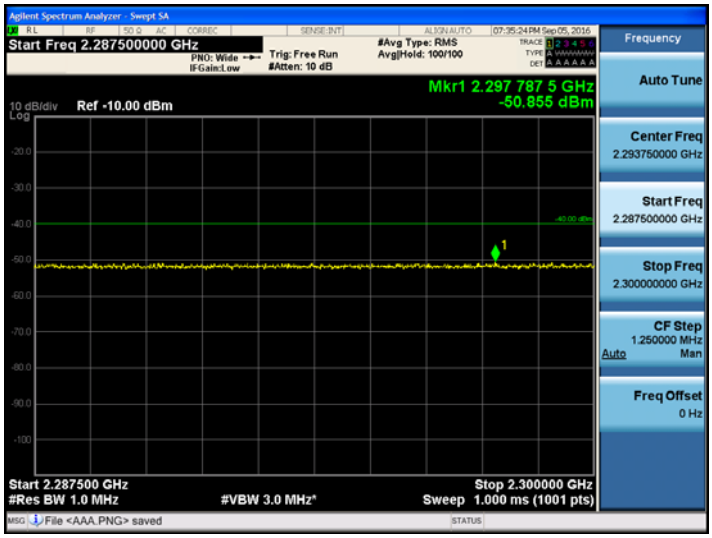
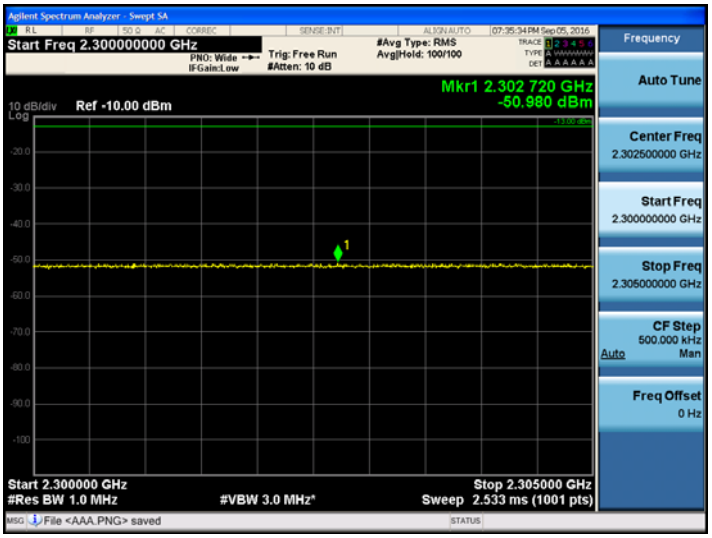
2200 ㎒ ~ 2285 ㎒	2285 ㎒ ~ 2287.5 ㎒
	
2287.5 ㎒ ~ 2300 ㎒	**2300 ㎒ ~ 2305 ㎒**
	

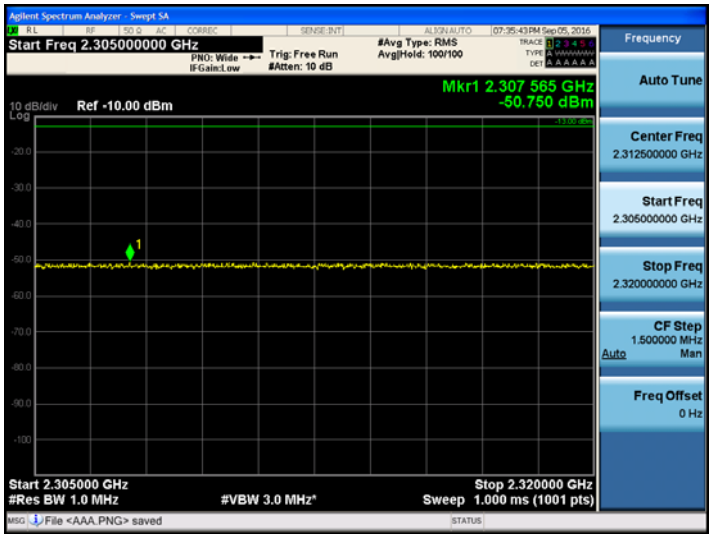
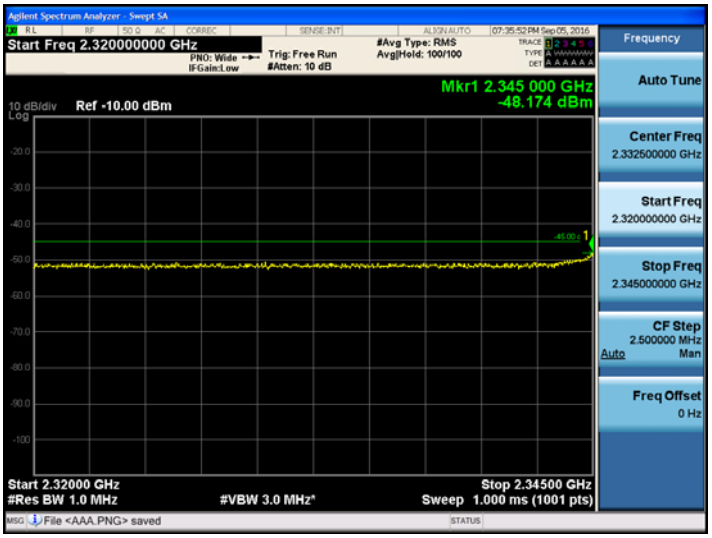
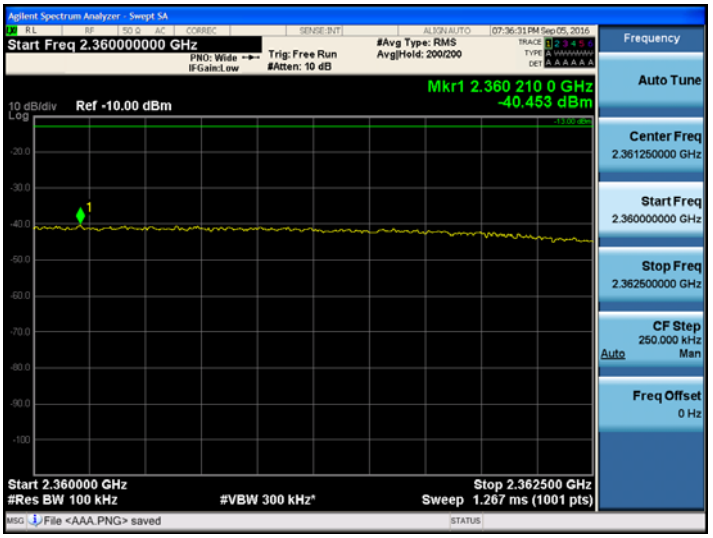
2305 ㎒ ~ 2320 ㎒	2320 ㎒ ~ 2345 ㎒
	
2345 ㎒ ~ 2350 ㎒	**2360 ㎒ ~ 2362.5 ㎒**
	

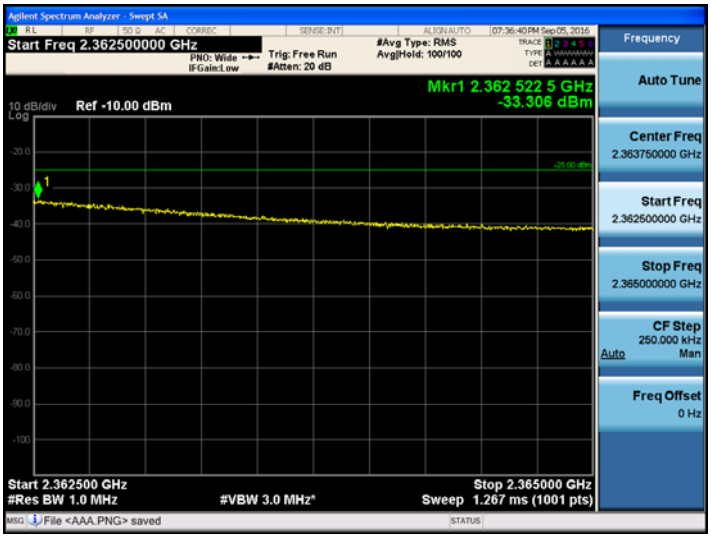
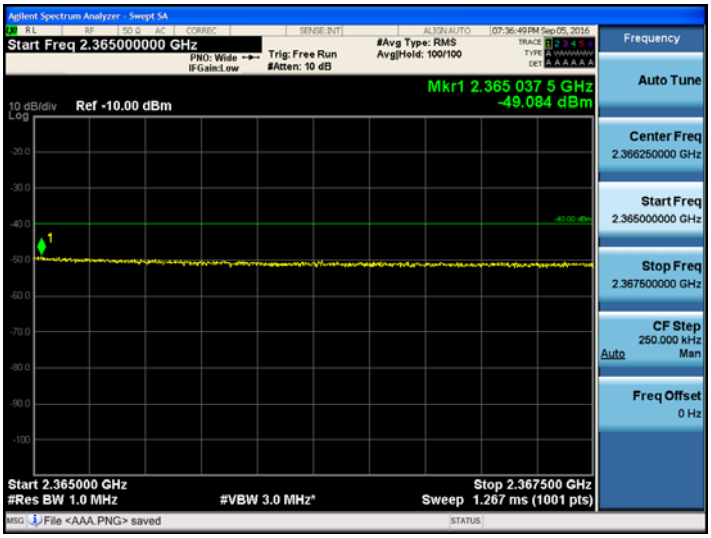
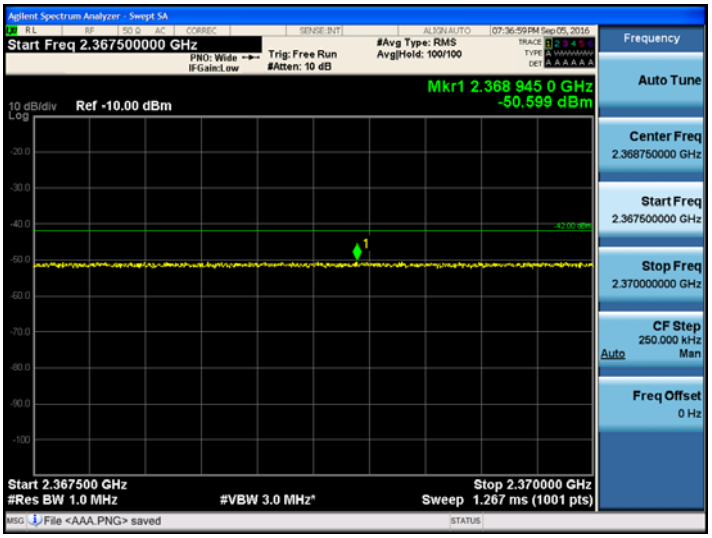
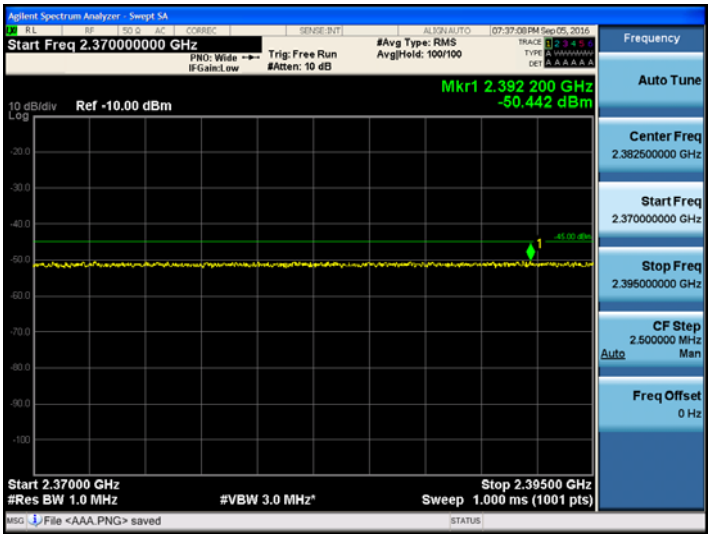
2362.5 ㎒ ~ 2365 ㎒	2365 ㎒ ~ 2367.5 ㎒
	
2367.5 ㎒ ~ 2370 ㎒	**2370 ㎒ ~ 2395 ㎒**
	

[Downlink Middle]

1000 ㎒ ~ 2200 ㎒	2360 ㎒ ~ 3000 ㎒
	
3000 ㎒ ~ 12750 ㎒	**12750 ㎒ ~ 26500 ㎒**
	

2200 ㎒ ~ 2285 ㎒	2285 ㎒ ~ 2287.5 ㎒
	
2287.5 ㎒ ~ 2300 ㎒	**2300 ㎒ ~ 2305 ㎒**
	

2305 ㎒ ~ 2320 ㎒	2320 ㎒ ~ 2345 ㎒
	
2345 ㎒ ~ 2350 ㎒	**2360 ㎒ ~ 2362.5 ㎒**
	

2362.5 ㎒ ~ 2365 ㎒	2365 ㎒ ~ 2367.5 ㎒
	
2367.5 ㎒ ~ 2370 ㎒	**2370 ㎒ ~ 2395 ㎒**
	

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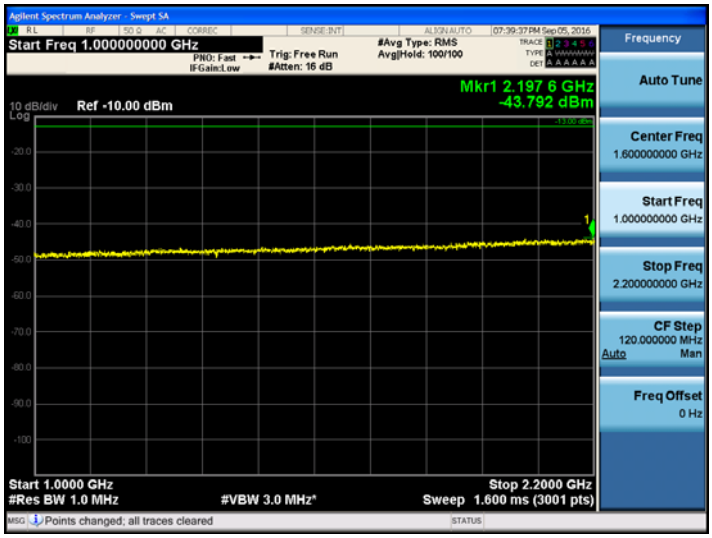
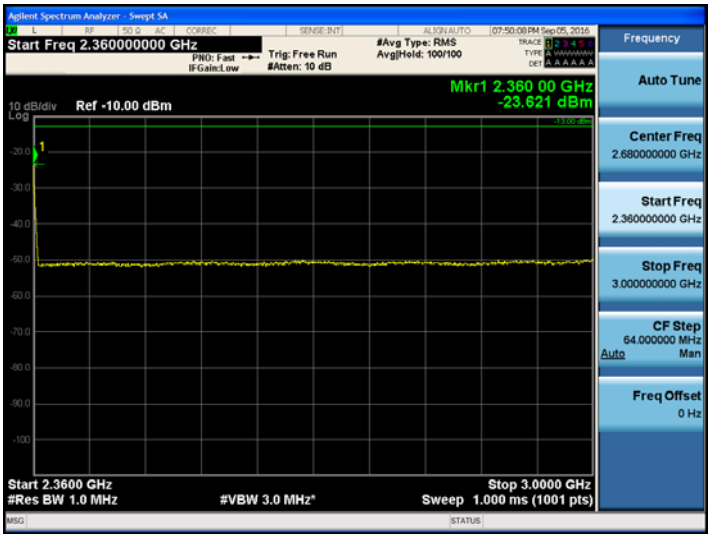
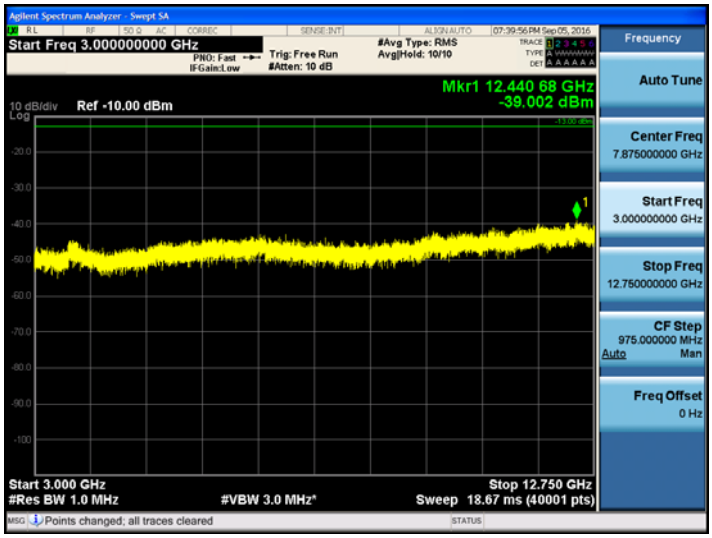
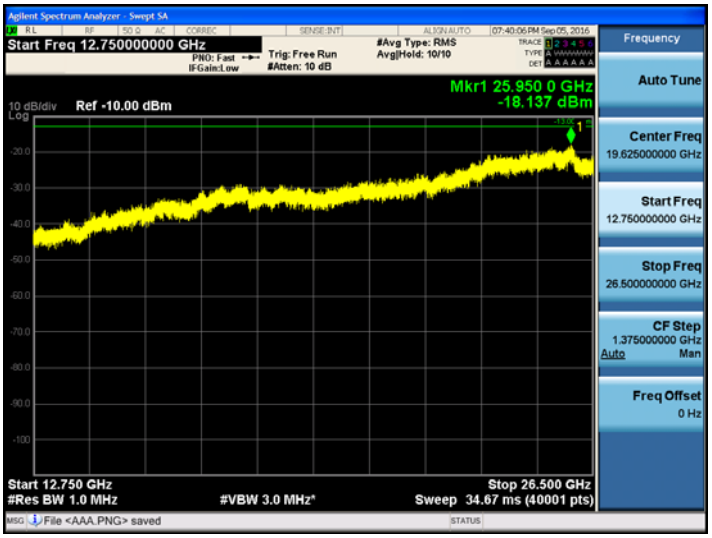
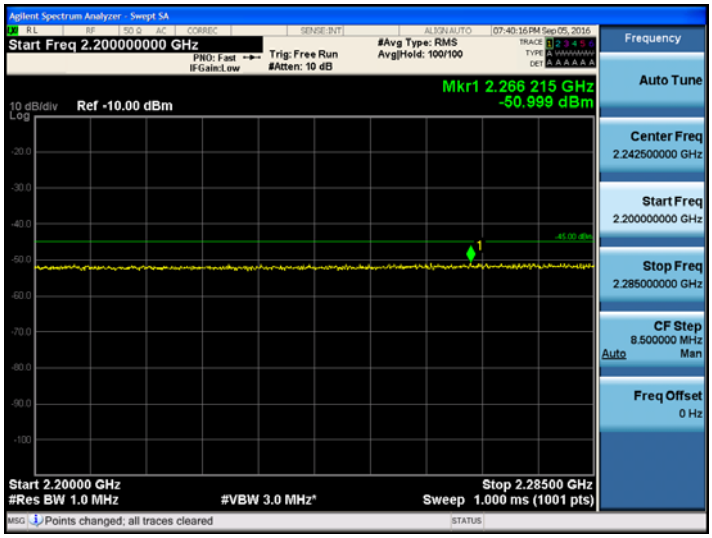
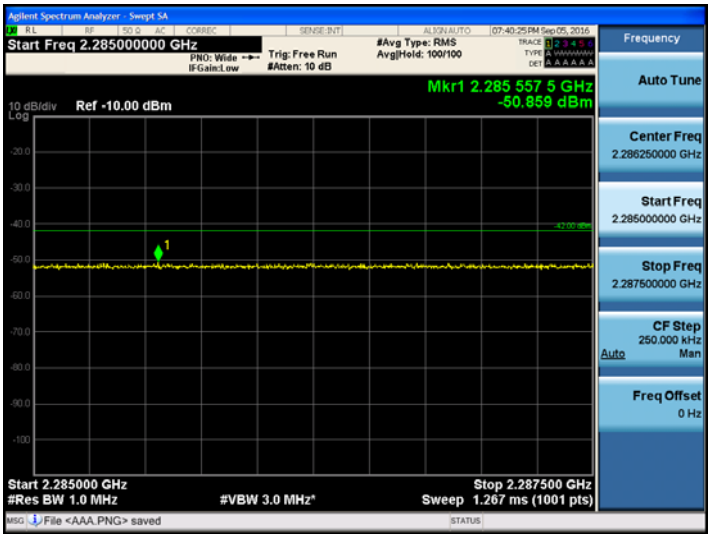
1000 ㎒ ~ 2200 ㎒	2360 ㎒ ~ 3000 ㎒
	
3000 ㎒ ~ 12750 ㎒	**12750 ㎒ ~ 26500 ㎒**
	

2200 ㎒ ~ 2285 ㎒	2285 ㎒ ~ 2287.5 ㎒
	
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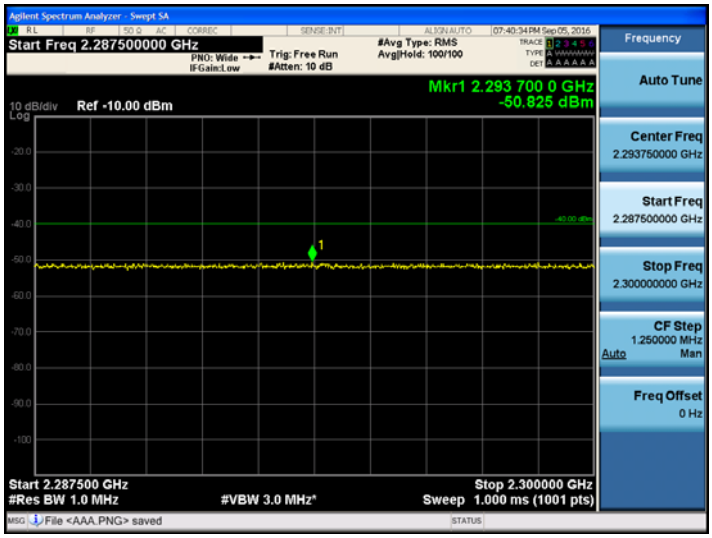
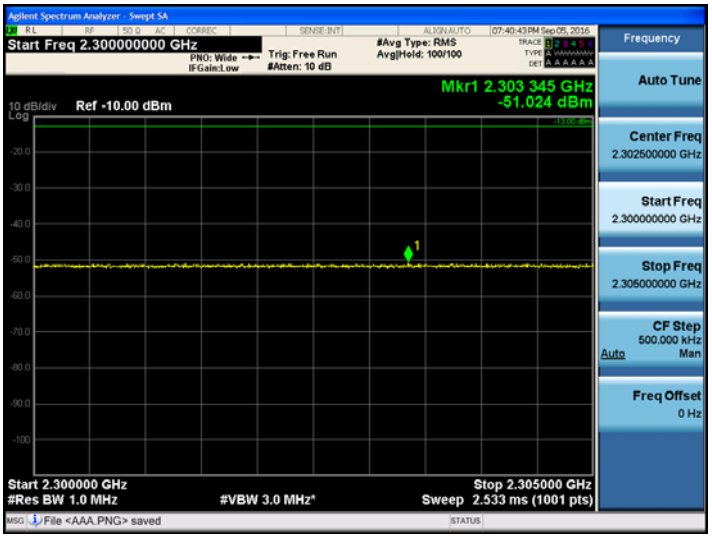
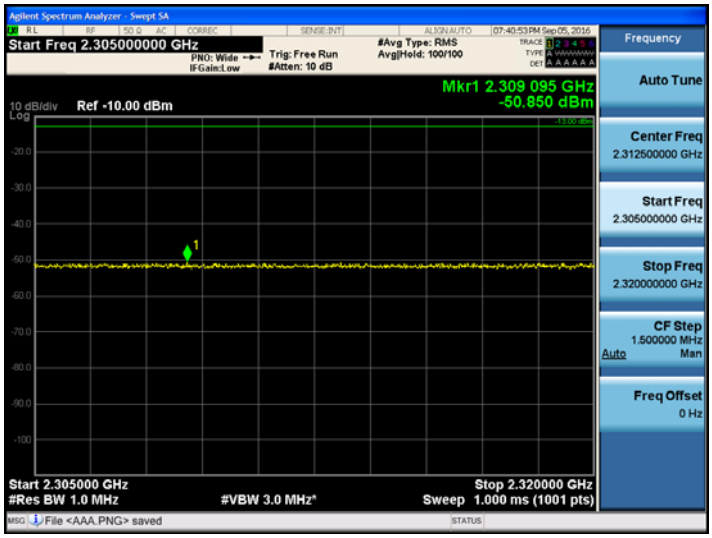
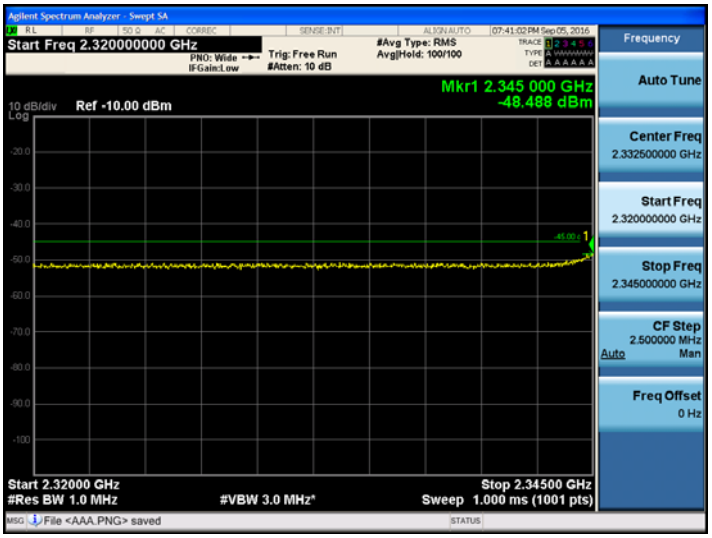
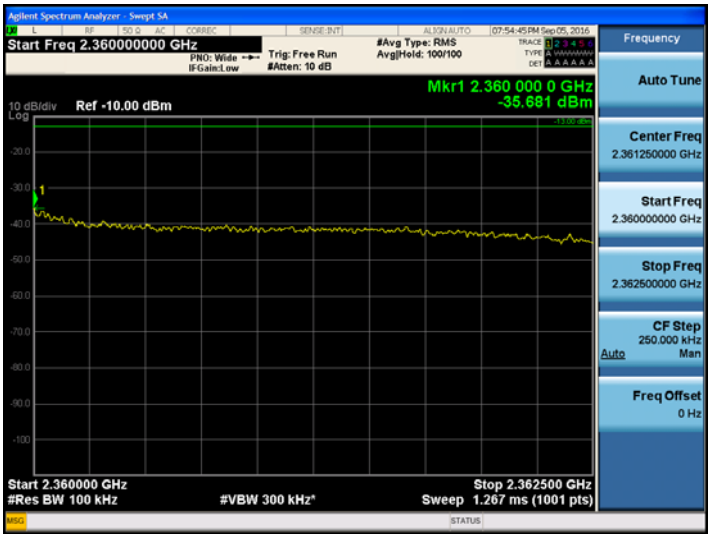
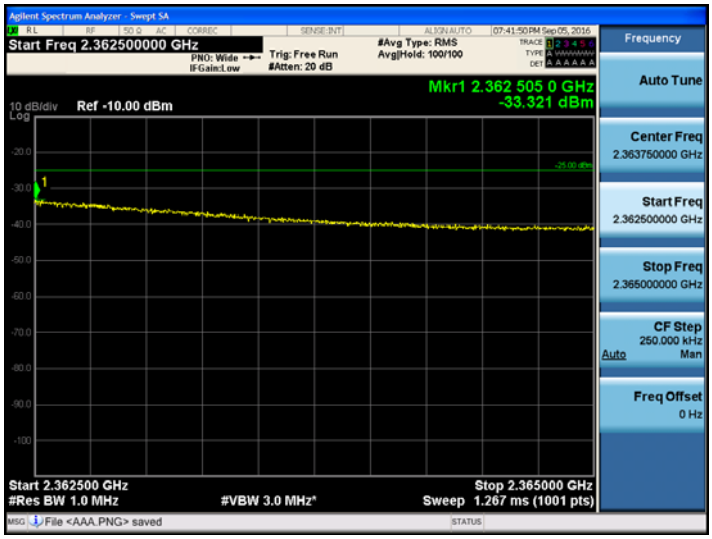
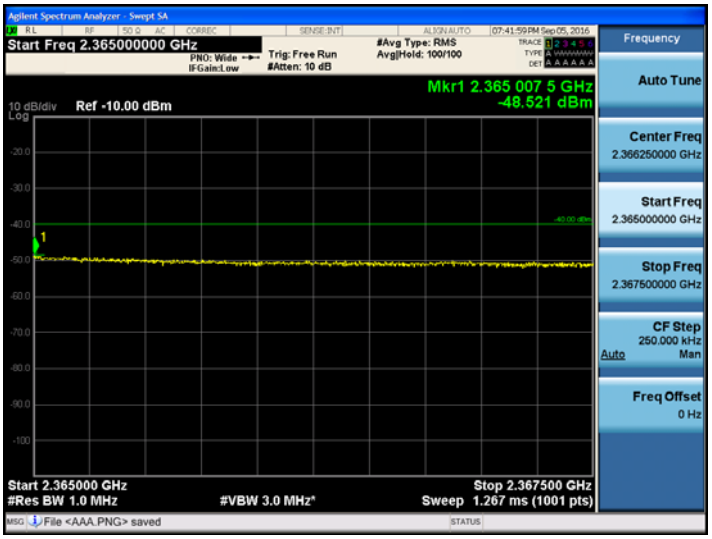
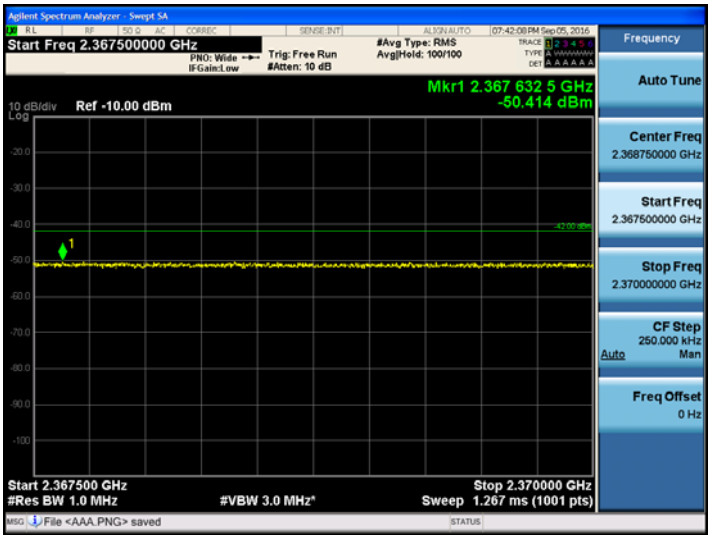
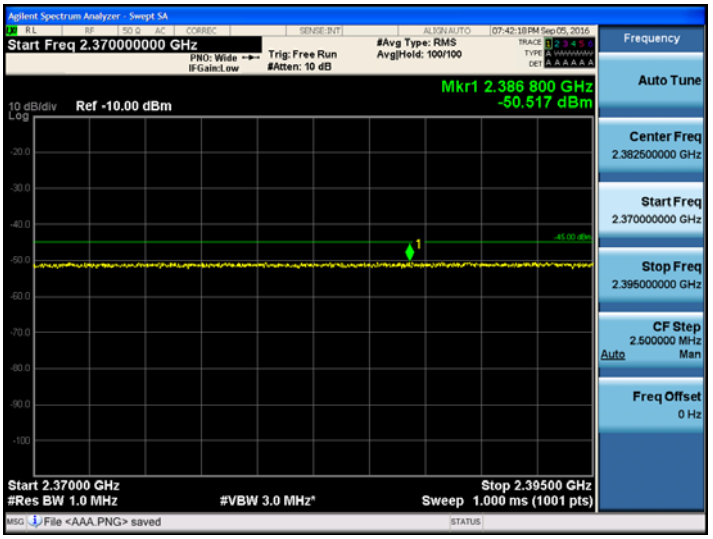
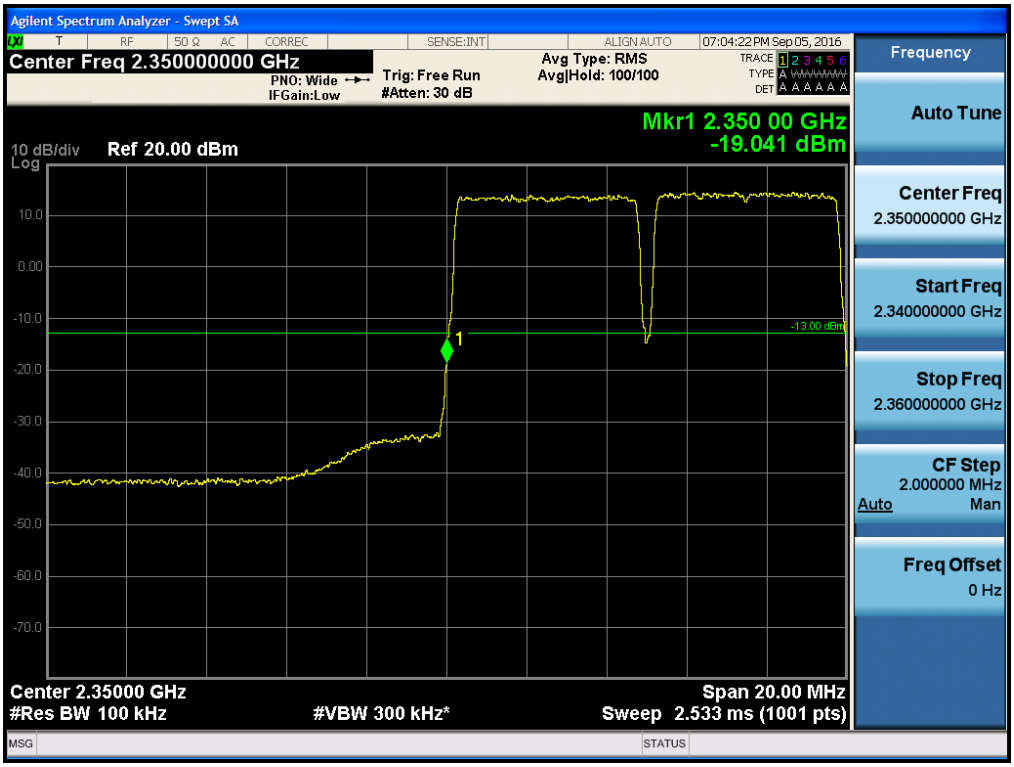
	

2305 ㎒ ~ 2320 ㎒	2320 ㎒ ~ 2345 ㎒
	
2345 ㎒ ~ 2350 ㎒	**2360 ㎒ ~ 2362.5 ㎒**
	

2362.5 ㎒ ~ 2365 ㎒	2365 ㎒ ~ 2367.5 ㎒
	
2367.5 ㎒ ~ 2370 ㎒	**2370 ㎒ ~ 2395 ㎒**
	

Intermodulation Spurious Emissions for FCC_2300_WCS BAND LTE 5 MHz

[Downlink Low]



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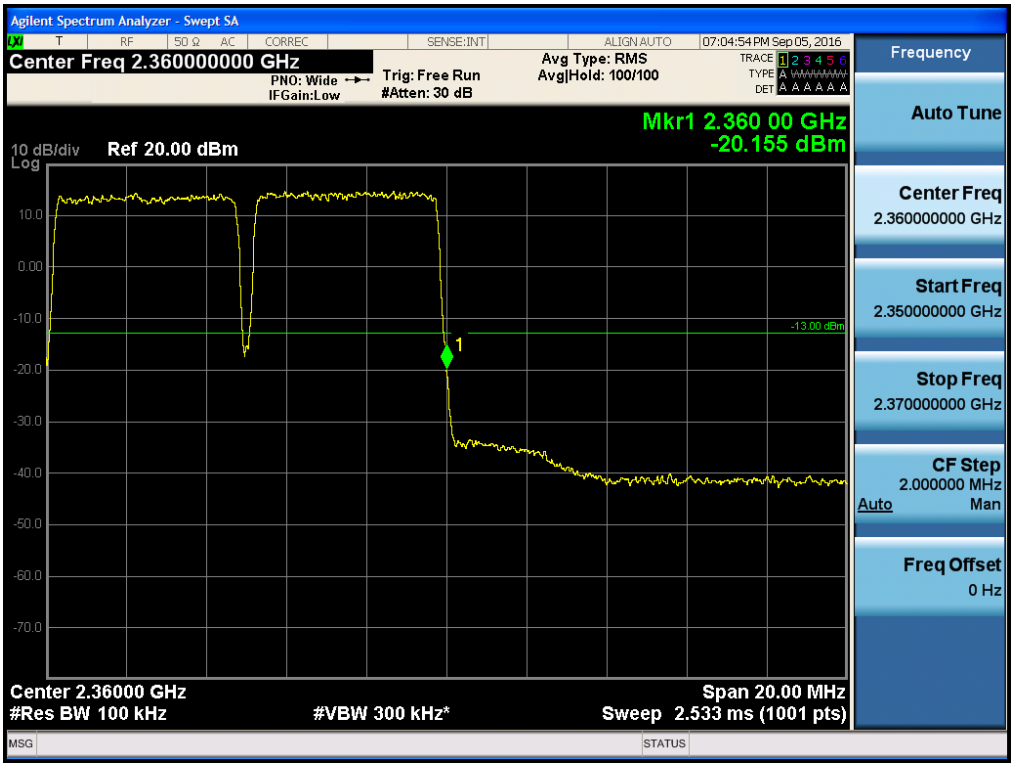

Single channel Enhancer Band Edge_2300_WCS BAND LTE 5 MHz

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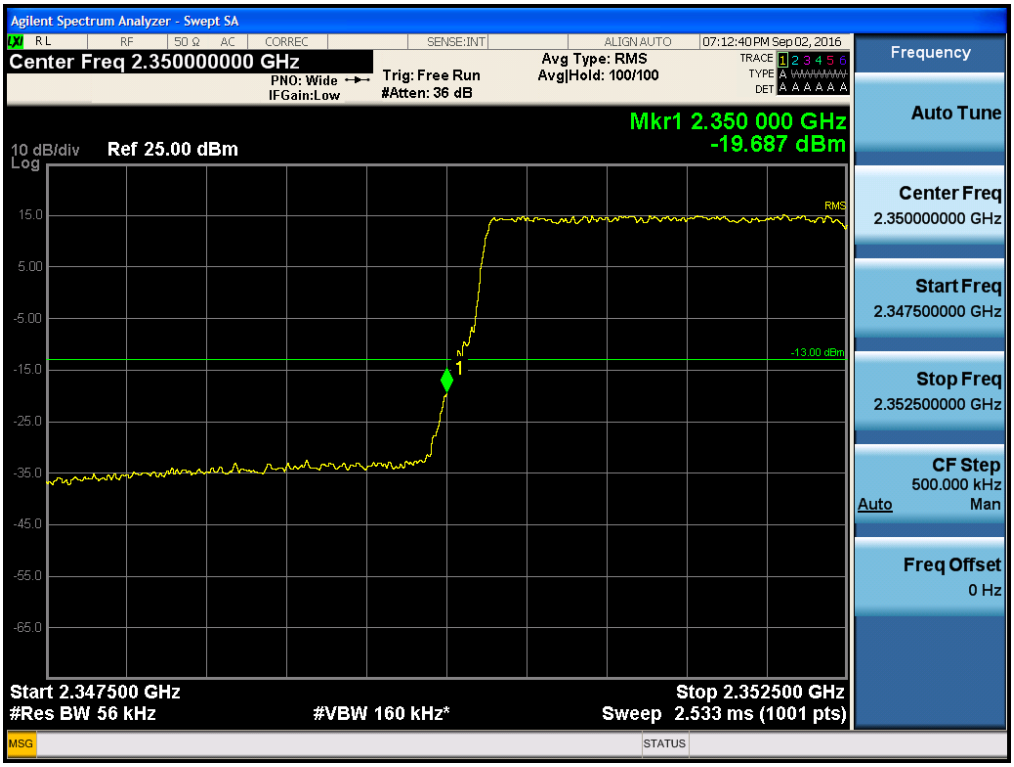
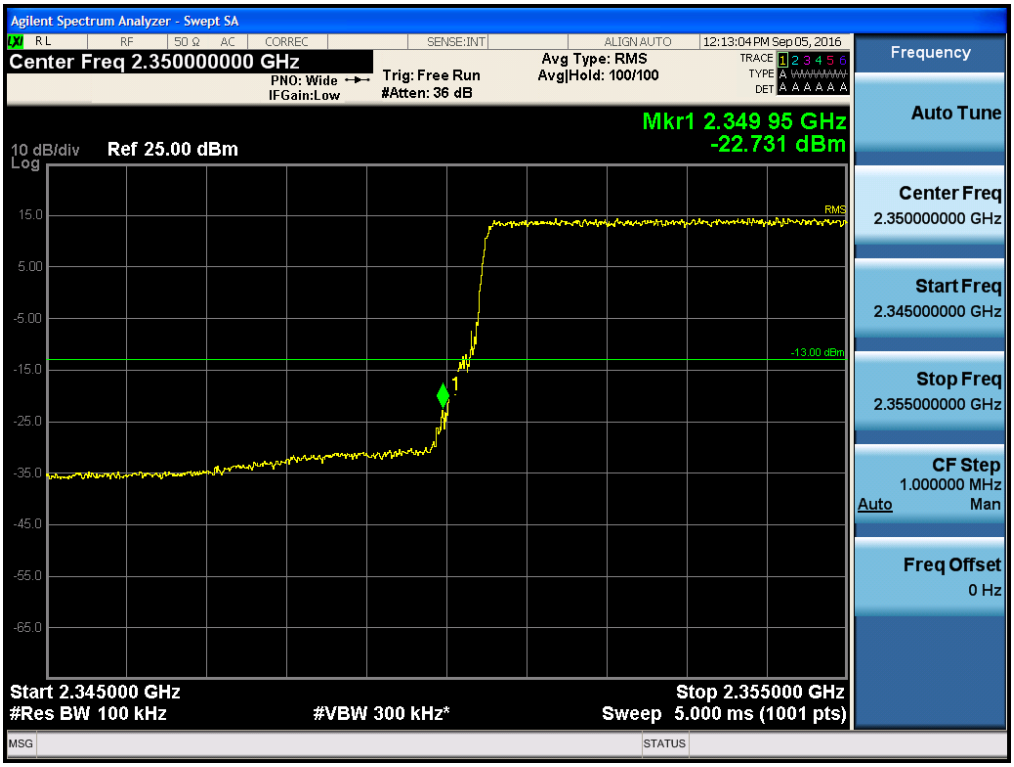


[Downlink High]

Single channel Enhancer Band Edge_2300_WCS BAND LTE 10 MHz

[Downlink Low]



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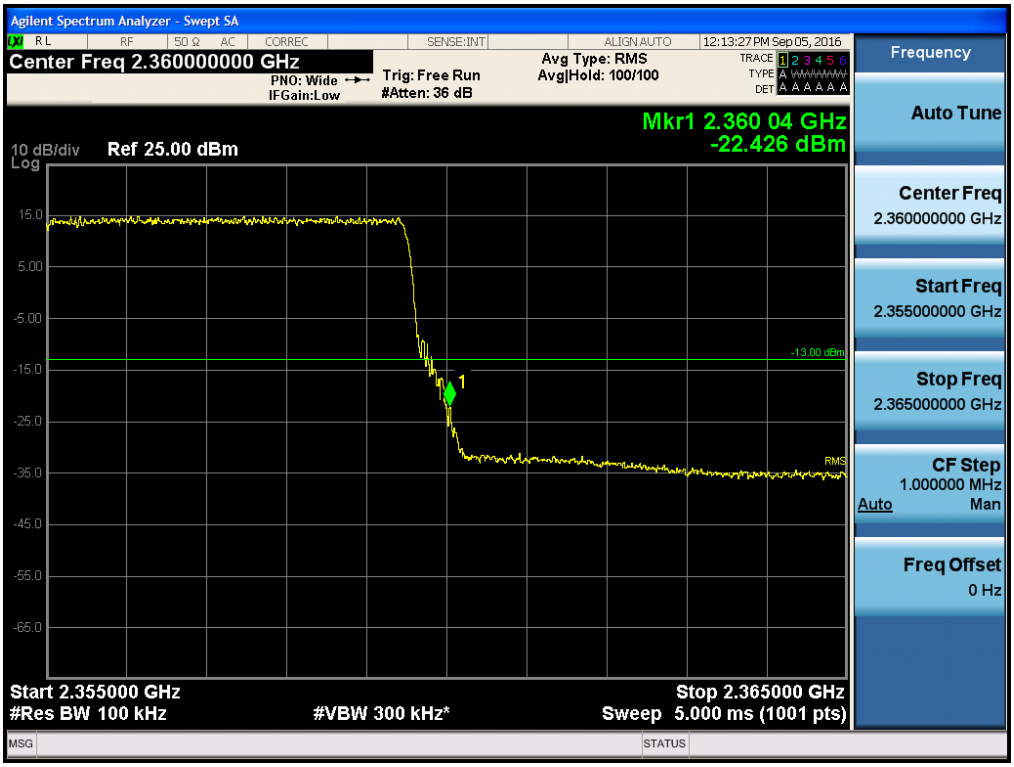
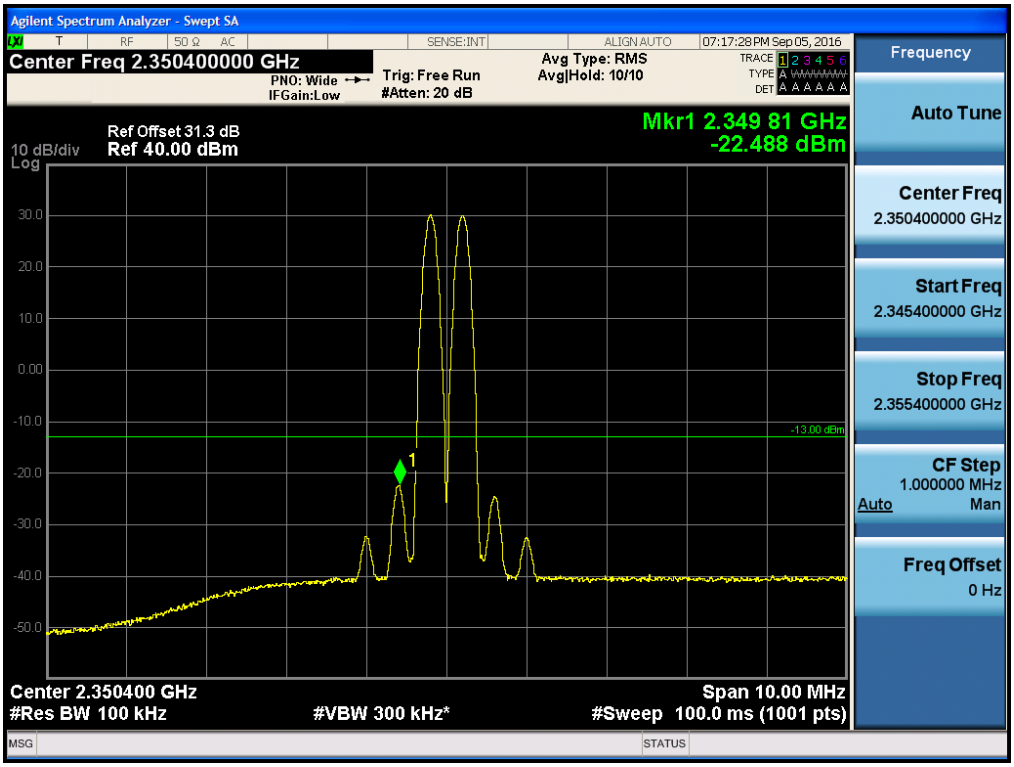
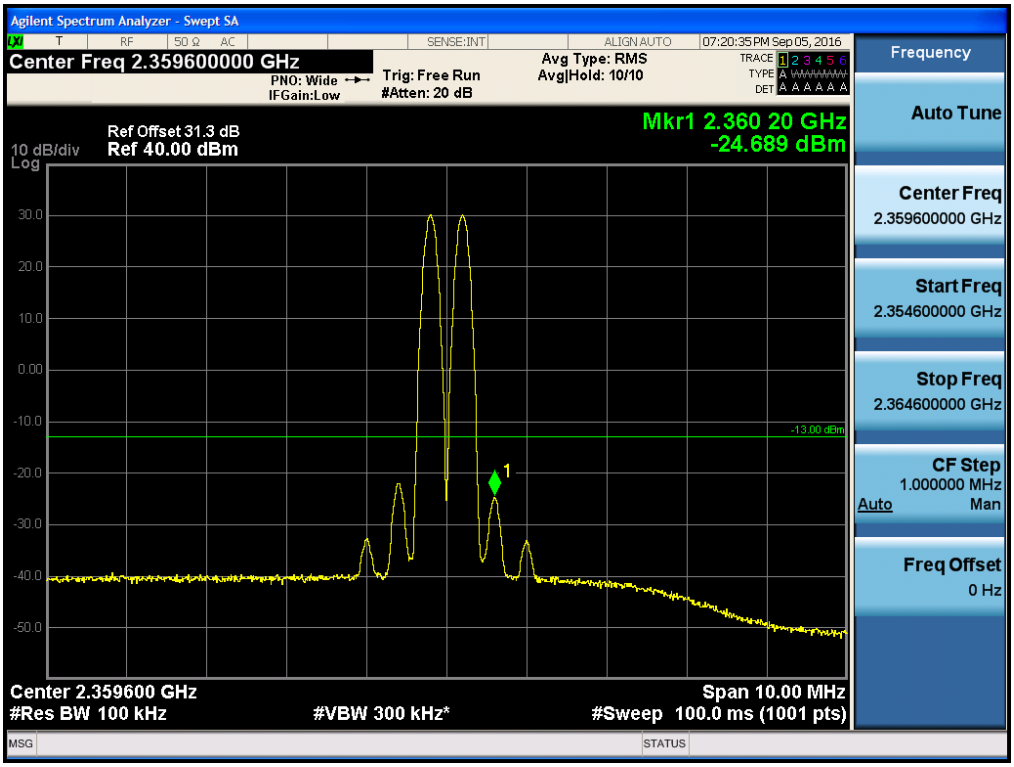


Multi channel Enhancer Band Edge for IC_ 2300_WCS BAND

[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.

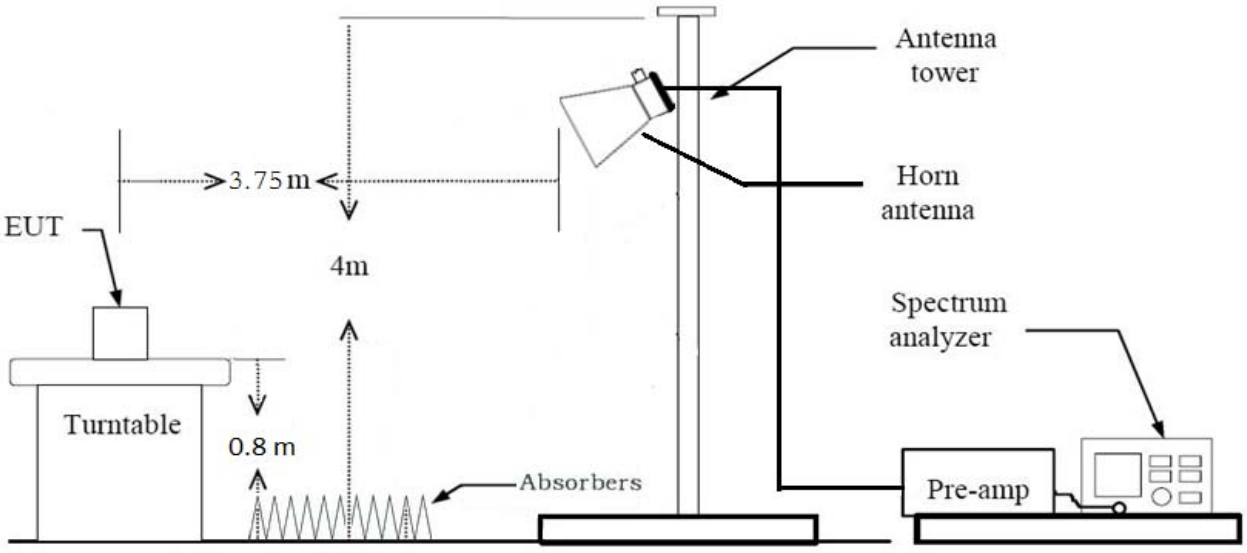
Test Procedures:

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:

2300_WCS Band

[LTE 5 MHz]

Voltage supplied to EUT	Freq.(MHz)	Measured Level [dBuV/m]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	H.P.F.. [dB]	D.F. [dB]	Pol.	Result [dBm]	dBuV/m @3m
120 Vac	4705.00	67.63	-27.57	31.332	4.51	44.66	-0.23	1.96	V	-34.658	60.542
	4710.00	67.36	-27.84	31.344	4.58	44.66	-0.24	1.96	V	-34.856	60.344
	4715.00	67.60	-27.60	31.356	4.50	44.57	-0.28	1.96	V	-34.629	60.571
	5209.50	71.94	-23.26	31.870	4.44	44.36	-0.50	1.96	V	-29.850	65.350

Voltage supplied to EUT	Freq.(MHz)	Measured Level [dBuV/m]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	H.P.F.. [dB]	D.F. [dB]	Pol.	Result [dBm]	dBuV/m @3m
-48 Vdc	4705.00	66.59	-28.61	31.332	4.51	44.66	-0.23	1.96	V	-35.698	59.502
	4710.00	66.73	-28.47	31.344	4.58	44.66	-0.24	1.96	V	-35.486	59.714
	4715.00	66.69	-28.51	31.356	4.50	44.57	-0.28	1.96	V	-35.539	59.661

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

[LTE 10 MHz]

Voltage supplied to EUT	Freq.(MHz)	Measured Level [dBuV/m]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	H.P.F.. [dB]	D.F. [dB]	Pol.	Result [dBm]	dBuV/m @3m
120 Vac	4710.00	63.74	-31.46	31.344	4.58	44.66	-0.24	1.96	V	-38.476	56.724
	5209.50	69.02	-26.18	31.870	4.44	44.36	-0.50	1.96	V	-29.850	62.430

Voltage supplied to EUT	Freq.(MHz)	Measured Level [dBuV/m]	Measured Power [dBm]	Ant. Factor [dB/m]	C.L [dB]	A.G. [dB]	H.P.F.. [dB]	D.F. [dB]	Pol.	Result [dBm]	dBuV/m @3m
-48 Vdc	4710.00	63.12	-32.08	31.344	4.58	44.66	-0.24	1.96	V	-39.096	56.104

* 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 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

§ 27.54 Frequency stability.

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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.

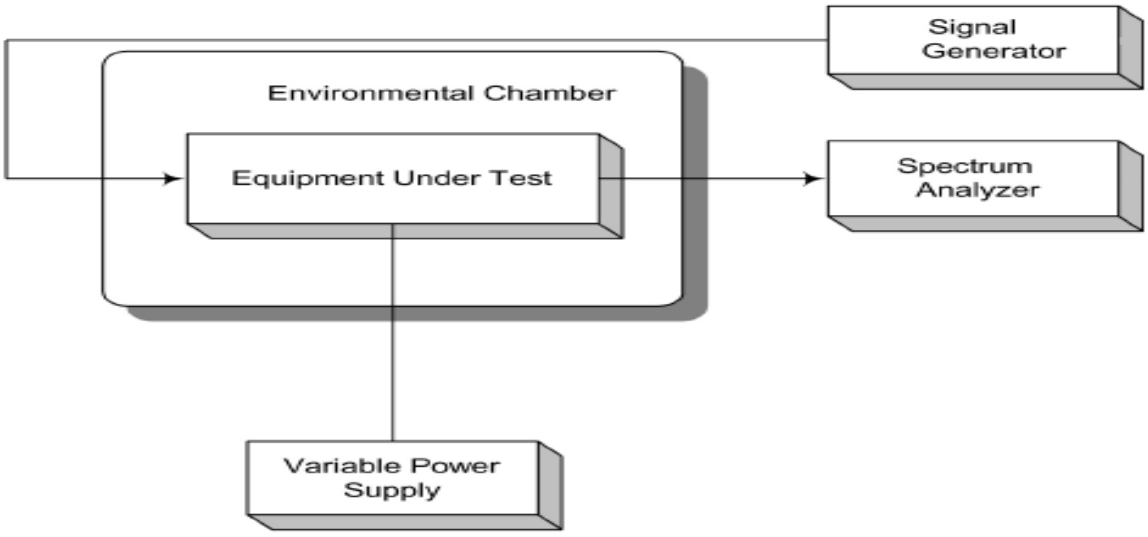
A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations.

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. Equipment Standard Specifications

6.5 Frequency Stability of Band Translators

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. Measurement Methods

4.5 Frequency Stability of Band Translators

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'srated-supply voltage; and
b. at +20°C temperature and ± 15% supply voltage variations.

Test Results:

The E.U.T was found in compliance for Frequency Stability and Voltage Test

Frequency Stability and Voltage Test Results

[2300_WCS BAND]

Reference: 120 Vac at 20°C **Freq.** = 2550.0 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	ppm
100%	+20(Ref)	2355 000 000	-0.003	0.00000
	-30	2355 000 000	-0.011	0.00000
	-20	2355 000 000	0.030	0.00001
	-10	2355 000 000	0.042	0.00002
	0	2355 000 000	0.055	0.00002
	+10	2355 000 000	-0.037	-0.00001
	+30	2355 000 000	-0.069	-0.00003
	+40	2355 000 000	0.210	0.00008
	+50	2355 000 000	0.098	0.00004
115%	+20	2355 000 000	0.005	0.00000
85%	+20	2355 000 000	0.026	0.00001