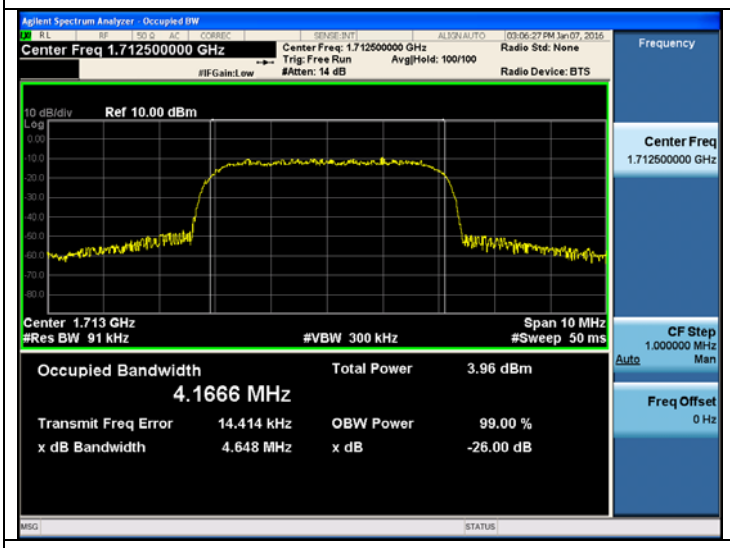
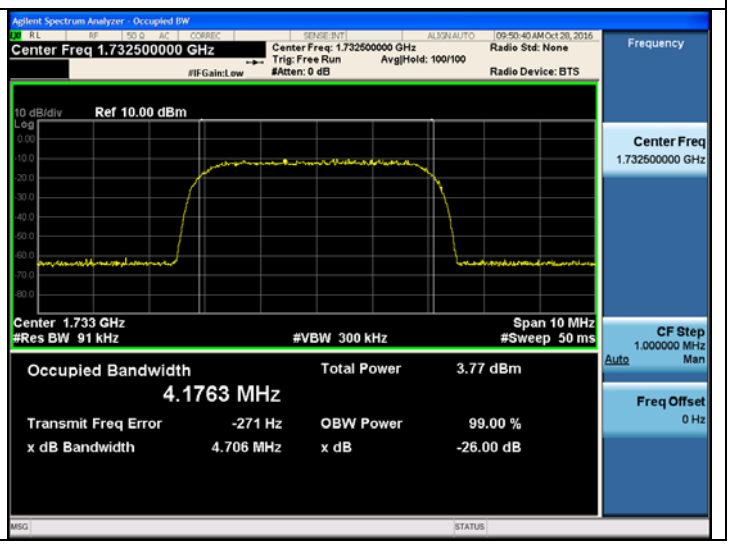
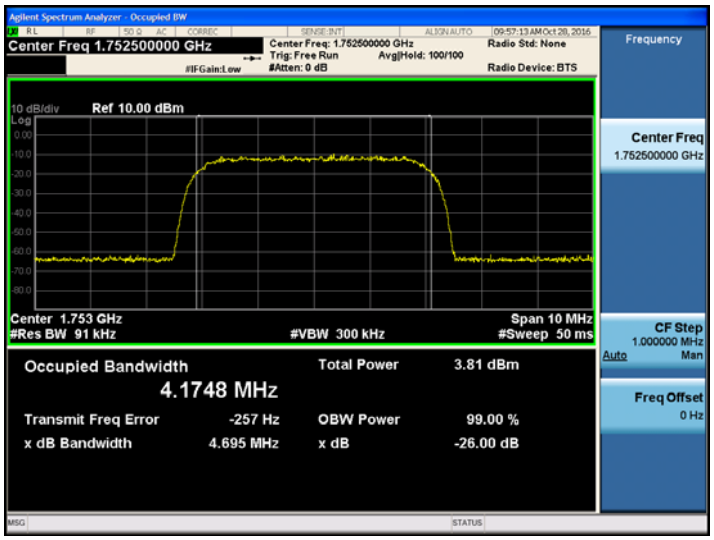
[AWS2100 +3dBm above the AGC threshold Uplink Output UMTS Low]



[AWS2100 +3dBm above the AGC threshold Uplink Output UMTS Mid]

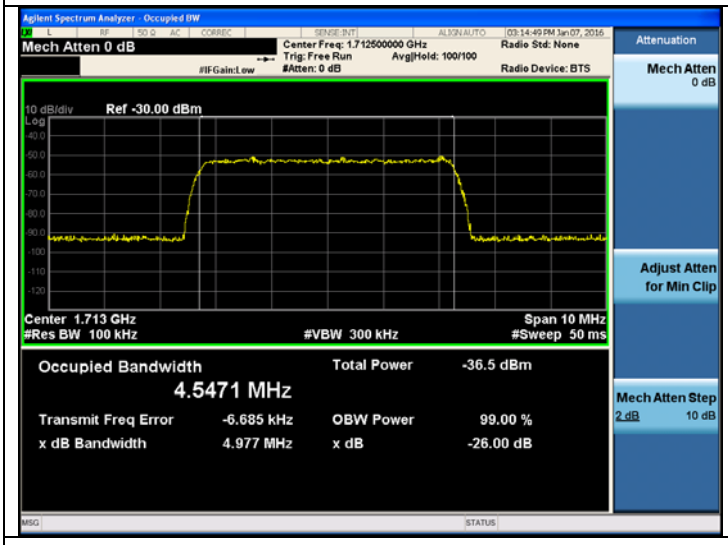


[AWS2100 +3dBm above the AGC threshold Uplink Output UMTS High]

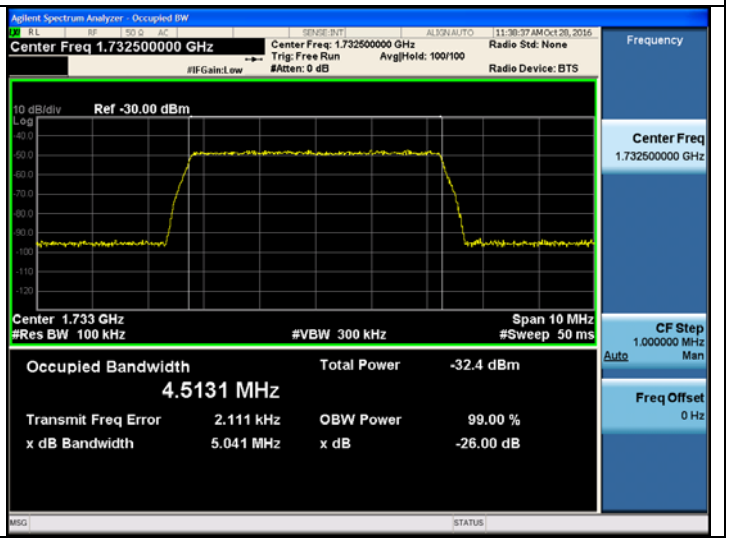


AWS 2100_LTE 5MHz UL_Input

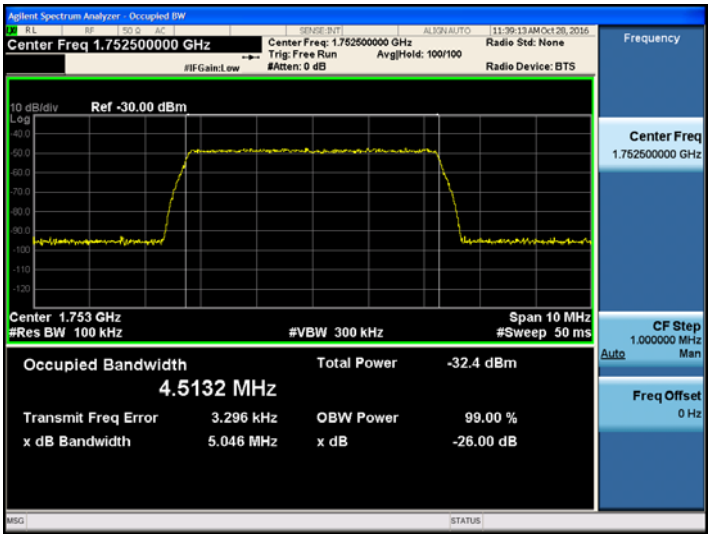
[AWS2100 AGC threshold Uplink Input LTE 5MHz Low]



[AWS2100 AGC threshold Uplink Input LTE 5MHz Mid]

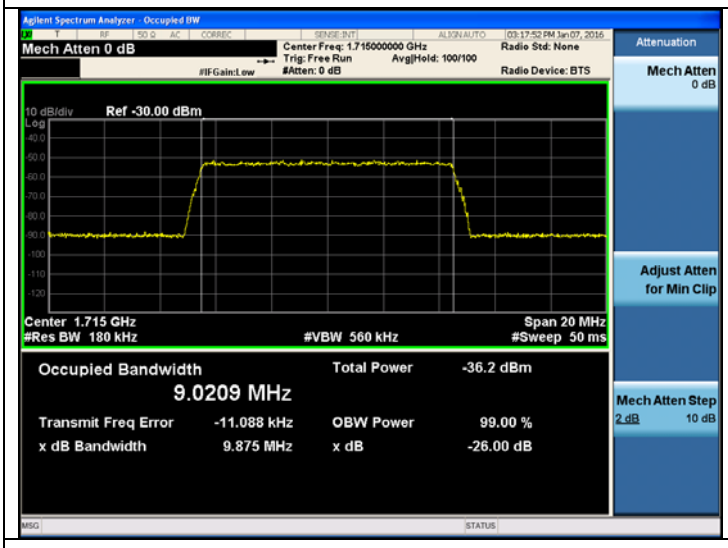


[AWS2100 AGC threshold Uplink Input LTE 5MHz High]

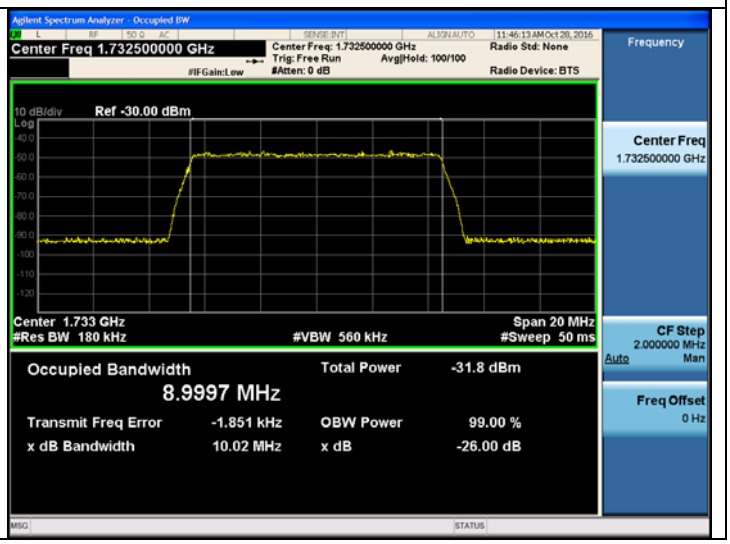


AWS 2100_LTE 10MHz UL_Input

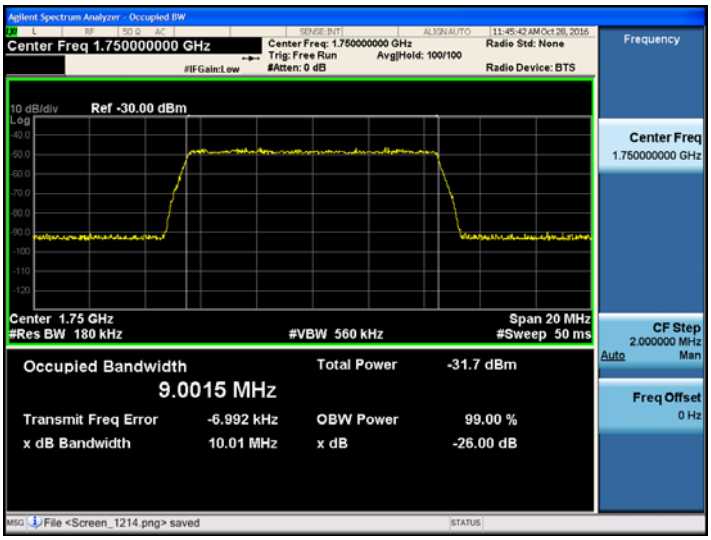
[AWS2100 AGC threshold Uplink Input LTE 10MHz Low]



[AWS2100 AGC threshold Uplink Input LTE 10MHz Mid]

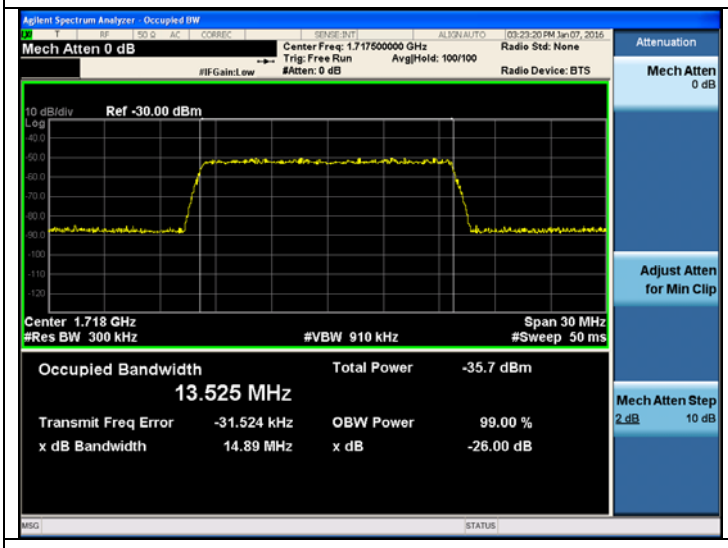


[AWS2100 AGC threshold Uplink Input LTE 10MHz High]

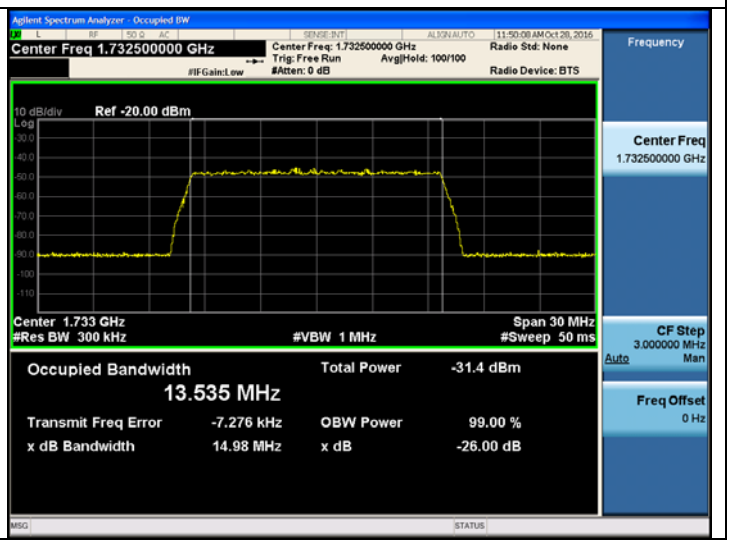


AWS 2100_LTE 15 MHz UL_Input

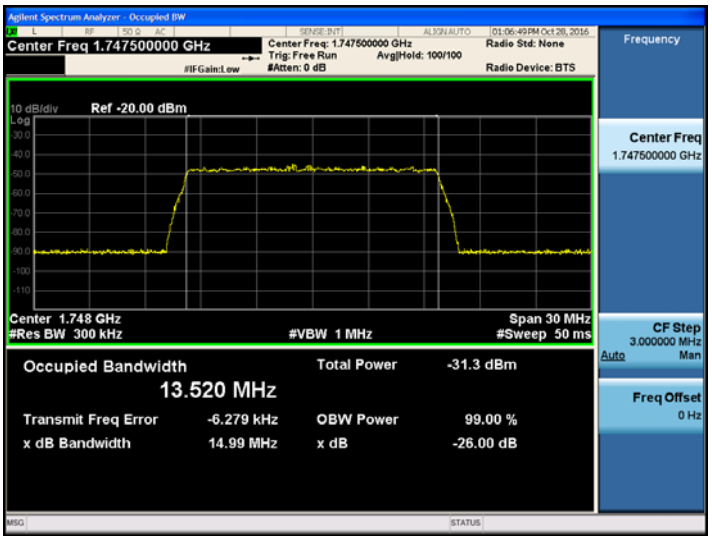
[AWS2100 AGC threshold Uplink Input LTE 15MHz Low]



[AWS2100 AGC threshold Uplink Input LTE 15MHz Mid]

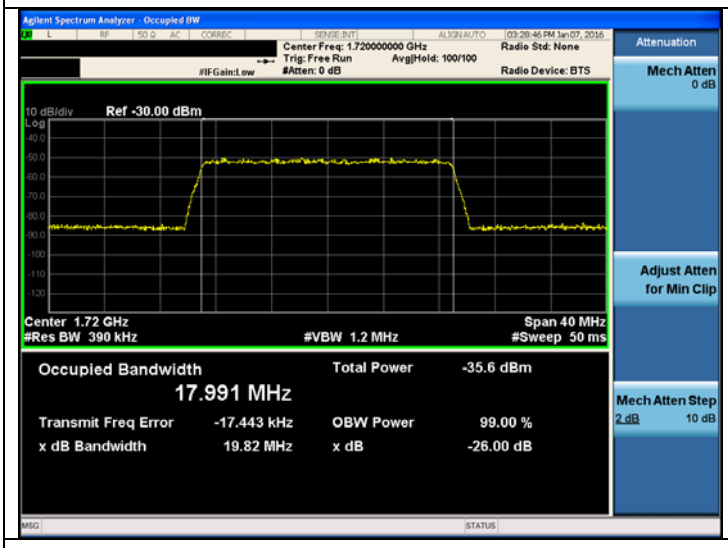


[AWS2100 AGC threshold Uplink Input LTE 15MHz High]

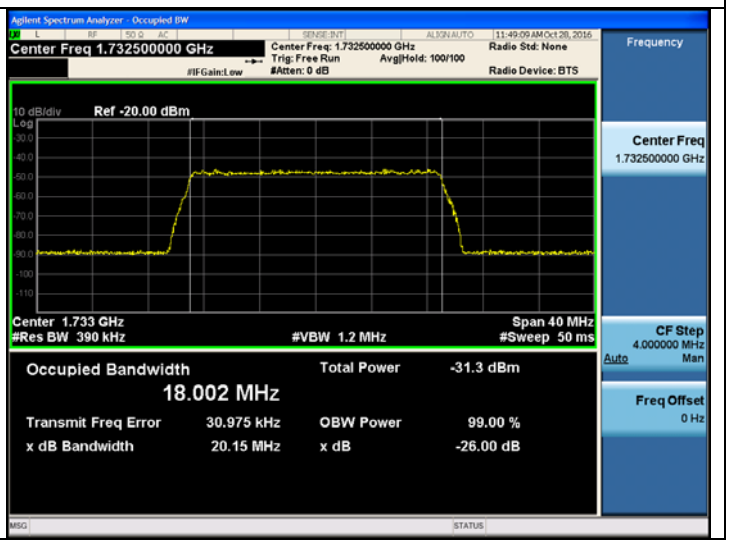


AWS 2100_LTE 20 MHz UL_Input

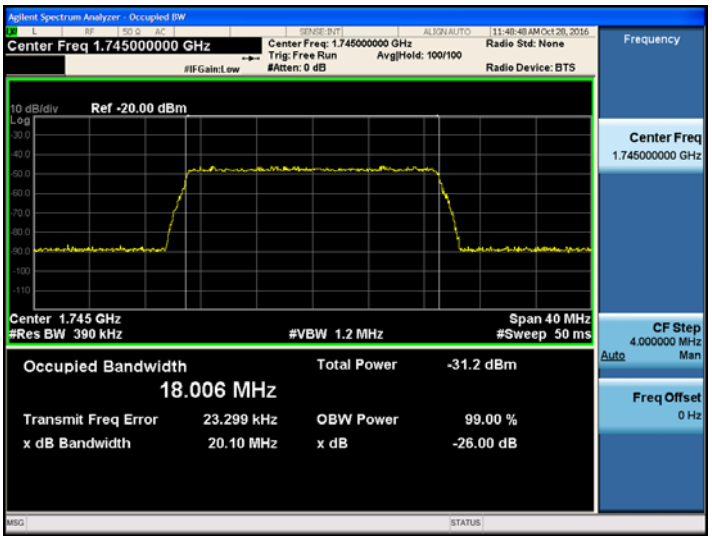
[AWS2100 AGC threshold Uplink Input LTE 20MHz Low]



[AWS2100 AGC threshold Uplink Input LTE 20MHz Mid]

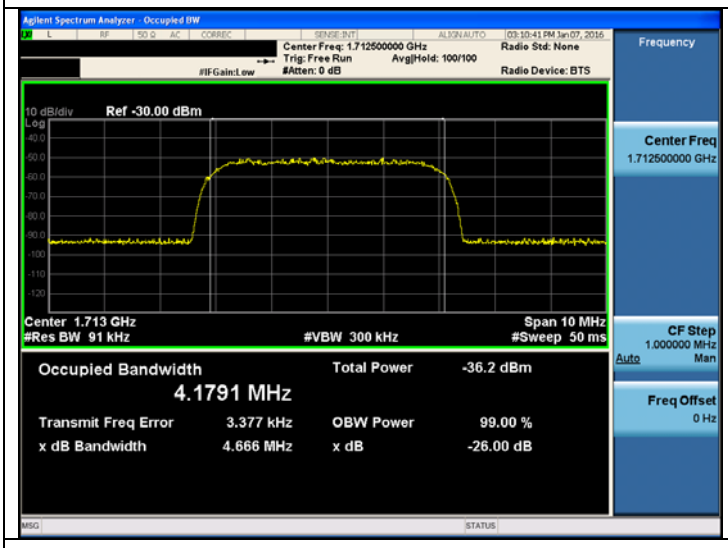


[AWS2100 AGC threshold Uplink Input LTE 20MHz High]

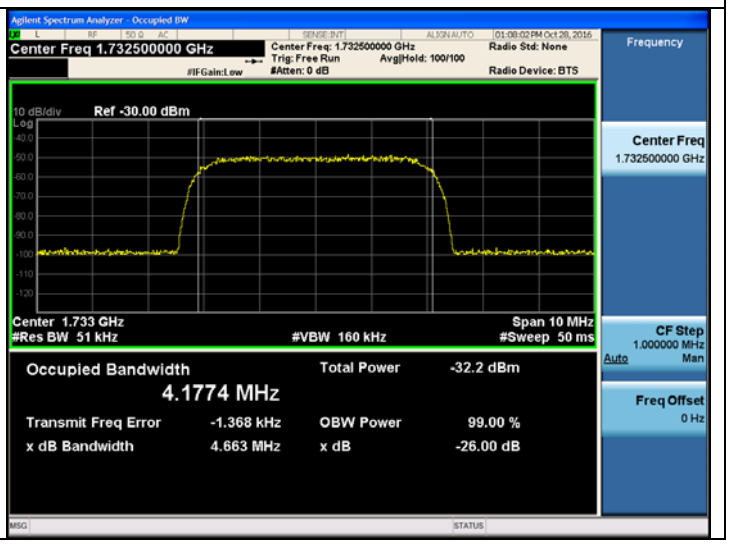


AWS 2100_UMTS UL_Input

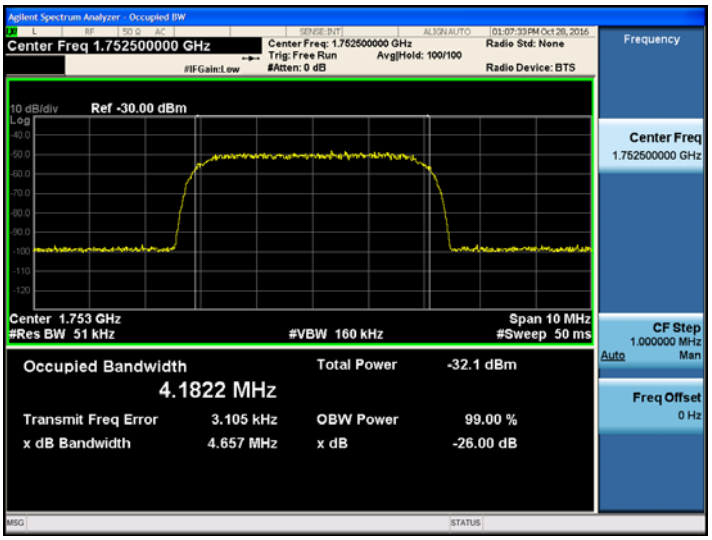
[AWS2100 AGC threshold Uplink Input UMTS Low]



[AWS2100 AGC threshold Uplink Input UMTS Mid]



[AWS2100 AGC threshold Uplink Input UMTS High]



8. OUT OF BAND REJECTION

FCC Rules

Test Requirement(s):

KDB 935210 D05 v01r01

Out of Band Rejection – Test for rejection of out of band signals. Filter freq. response plots are acceptable.

Test Procedures:

Measurements were in accordance with the test methods section 3.3, 4.3 of KDB 935210 D05 v01r01.

3.3 Out-of-band rejection

a) Connect a signal generator to the input of the EUT.

b) Configure a swept CW signal with the following parameters:

1) Frequency range = ± 250 % of the passband, for each applicable CMRS band.

2) Level = a sufficient level to affirm that the out-of-band rejection is > 20 dB above the noise floor and will not engage the AGC during the entire sweep.

3) Dwell time = approximately 10 ms.

4) Number of points = SPAN/(RBW/2).

c) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

d) Set the span of the spectrum analyzer to the same as the frequency range of the signal generator.

e) Set the resolution bandwidth (RBW) of the spectrum analyzer to be 1 % to 5 % of the EUT passband, and the video bandwidth (VBW) shall be set to ≥ 3 × RBW.

f) Set the detector to Peak Max-Hold and wait for the spectrum analyzer's spectral display to fill.

g) Place a marker to the peak of the frequency response and record this frequency as f0.

h) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the −20 dB down amplitude, to determine the 20 dB bandwidth.

i) Capture the frequency response of the EUT.

j) Repeat for all frequency bands applicable for use by the EUT.

4.3 Out-of-band rejection

Adjust the internal gain control of the EUT to the maximum gain for which equipment certification is sought.

a) Connect a signal generator to the input of the EUT.

b) Configure a swept CW signal with the following parameters:

1) Frequency range = ± 250 % of the manufacturer's specified pass band.

2) The CW amplitude shall be 3 dB below the AGC threshold (see 4.2), and shall not activate the AGC threshold throughout the test.

3) Dwell time = approximately 10 ms.

4) Frequency step = 50 kHz.

c) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

d) Set the RBW of the spectrum analyzer to between 1 % and 5 % of the manufacturer's rated passband, and VBW = 3 × RBW.

e) Set the detector to Peak and the trace to Max-Hold.

f) After the trace is completely filled, place a marker at the peak amplitude, which is designated as f0, and with two additional markers (use the marker-delta method) at the 20 dB bandwidth (i.e., at the points where the level has fallen by 20 dB).

g) Capture the frequency response plot for inclusion in the test report.

Test Results: The EUT complies with the requirements of this section.

Input Signal	Input Level (dBm)	Maximum Amp Gain
AWS 2100	DL : -15 dBm UL : -45 dBm	DL : 45 dB UL : 40 dB

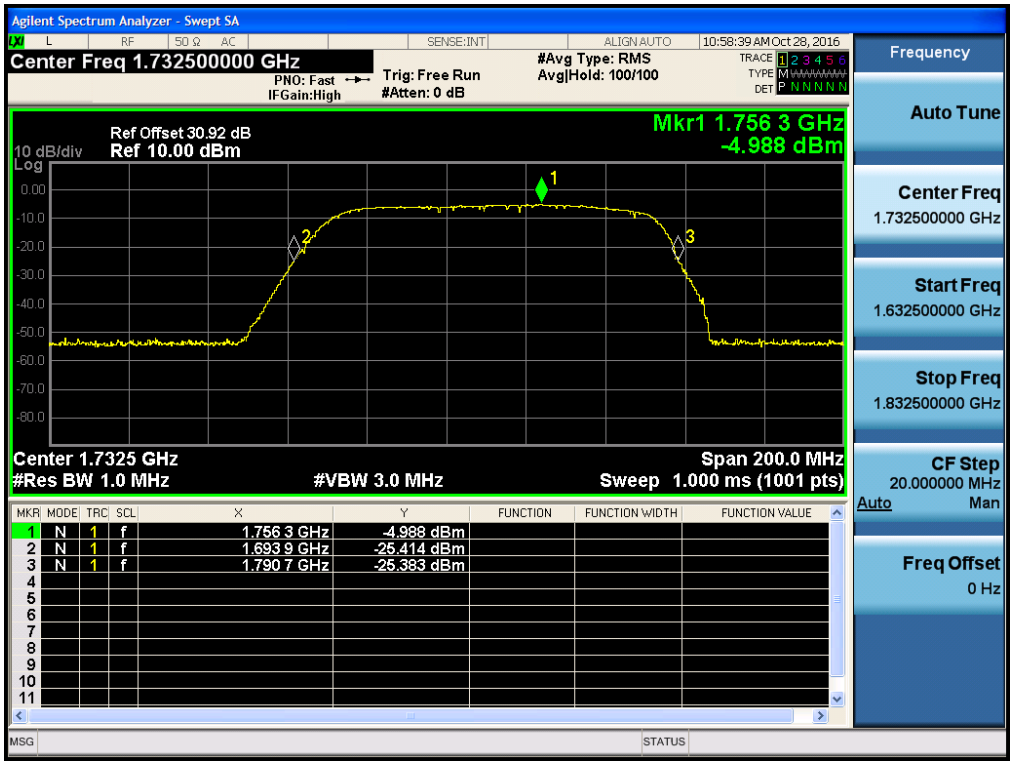
AWS2100 Band

[Upnlink]

20 dB point frequency (MHz)	Output power (dBm)	Gain (dB)
1693.90 ~ 1790.70	-4.988	40.012

Plots of Passband Gain and Bandwidth & Out of Band Rejection

[AWS2100 Band Uplink]



9. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

FCC Rules

Test Requirement(s):

§ 2.1051 Measurements required: Spurious emissions at antenna terminals:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 27.53 Emission limits

(h) *AWS emission limits*—(1) *General protection levels.* Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}$ (P) dB.

(3) *Measurement procedure.* (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test Procedures:

Measurements were in accordance with the test methods section 3.6 and 4.7 of KDB 935210 D05 v01r01.

3.6.1. General

Spurious emissions shall be measured using a single test signal sequentially tuned to the low, middle and high channels or frequencies within each authorized frequency band of operation. Out-of-band/block emissions (including intermodulation products) shall be measured under each of the following two stimulus conditions:

a) two adjacent test signals sequentially tuned to the lower and upper frequency band/block edges;

b) a single test signal, sequentially tuned to the lowest and highest frequencies or channels within the frequency band/block under examination.

NOTE—Single channel boosters that cannot accommodate two simultaneous signals within the passband, can be excluded from the test stipulated in step a).

3.6.2. Out-of-band/out-of-block emissions conducted measurements

a) Connect a signal generator to the input of the EUT.

If the signal generator is not capable of generating two modulated carriers simultaneously, then two discrete signal generators can be connected with an appropriate combining network to support this two-signal test.

b) Set the signal generator to produce two AWGN signals as previously described.

c) Set the center frequencies such that the AWGN signals occupy adjacent channels, as defined by industry standards such as 3GPP or 3GPP2, at the upper edge of the frequency band or block under test.

d) Set the composite power levels such that the input signal is just below the AGC threshold (see 3.2), but not more than 0.5 dB below. The composite power can be measured using the procedures provided in KDB Publication 971168 [R8], but it will be necessary to expand the power integration bandwidth so as to include both of the transmit channels. Alternatively, the composite power can be measured using an average power meter as described in KDB Publication 971168 [R8].

e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.

f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band (typically 1 % of the EBW or 100 kHz or 1 MHz)

g) Set the VBW = 3 × RBW.

h) Set the detector to power averaging (rms) detector.

i) Set the Sweep time = auto-couple.

j) Set the spectrum analyzer start frequency to the upper block edge frequency, and the stop

frequency to the upper block edge frequency plus 300 kHz or 3 MHz, for frequencies below and above 1 GHz, respectively.

k) Trace average at least 100 traces in power averaging (rms) mode.

l) Use the marker function to find the maximum power level.

m) Capture the spectrum analyzer trace of the power level for inclusion in the test report.

n) Repeat steps k) to m) with the composite input power level set to 3 dB above the AGC threshold.

o) Reset the frequencies of the input signals to the lower edge of the frequency block or band under test.

p) Reset the spectrum analyzer start frequency to the lower block edge frequency minus 300 kHz or 3 MHz, for frequencies below and above 1 GHz, respectively, and the stop frequency to the lower band or block edge frequency.

q) Repeat steps k) to n).

r) Repeat steps a) to q) with the signal generator configured for a single test signal tuned as close as possible to the block edges.

s) Repeat steps a) to r) with the narrowband test signal.

t) Repeat steps a) to s) for all authorized frequency bands or blocks used by the EUT.

3.6.3. Spurious emissions conducted measurements

a) Connect a signal generator to the input of the EUT.

b) Set the signal generator to produce the broadband test signal as previously described.

c) Set the center frequency of the test signal to the lowest available channel within the frequency band or block.

d) Set the EUT input power to a level that is just below the AGC threshold (see 3.2), but not more than 0.5 dB below.

e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.

f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band of operation (e.g., reference bandwidth is typically 100 kHz or 1 MHz).

935210 D05 Indus Booster Basic Meas v01r01 Page 8

g) Set the VBW ≥ 3 × RBW.

h) Set the Sweep time = auto-couple.

i) Set the spectrum analyzer start frequency to the lowest RF signal generated in the equipment, without going below 9 kHz, and the stop frequency to the lower band/block edge frequency minus 100 kHz or 1 MHz, as specified in the applicable rule part.

The number of measurement points in each sweep must be ≥ (2 × span/RBW), which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the

spectrum analyzer.2

j) Select the power averaging (rms) detector function.

k) Trace average at least 10 traces in power averaging (rms) mode.

l) Use the peak marker function to identify the highest amplitude level over each measured frequency range. Record the frequency and amplitude and capture a plot for inclusion in the test report.

m) Reset the spectrum analyzer start frequency to the upper band/block edge frequency plus 100 kHz or 1 MHz, as specified in the applicable rule part, and the spectrum analyzer stop frequency to 10 times the highest frequency of the fundamental emission (see § 2.1057). The number of measurement points in each sweep must be ≥ (2 × span/RBW), which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the spectrum analyzer.

n) Trace average at least 10 traces in power averaging (rms) mode.

o) Use the peak marker function to identify the highest amplitude level over each of the measured frequency ranges. Record the frequency and amplitude and capture a plot for inclusion in the test report; also provide tabular data, if required.

Notes:

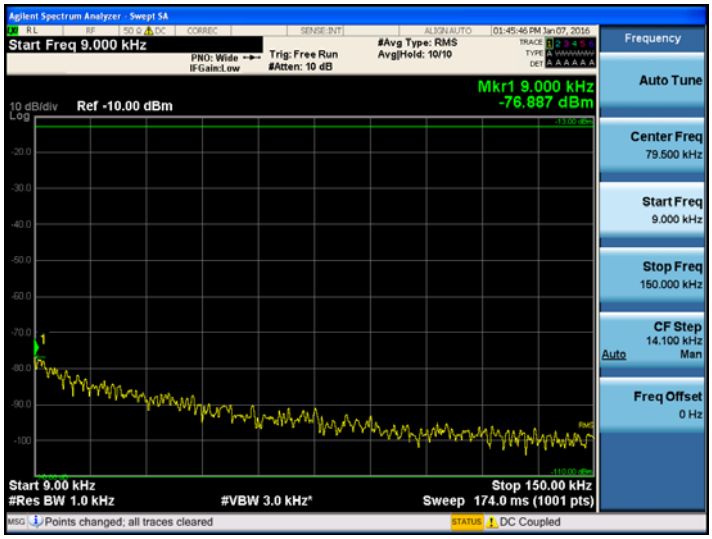
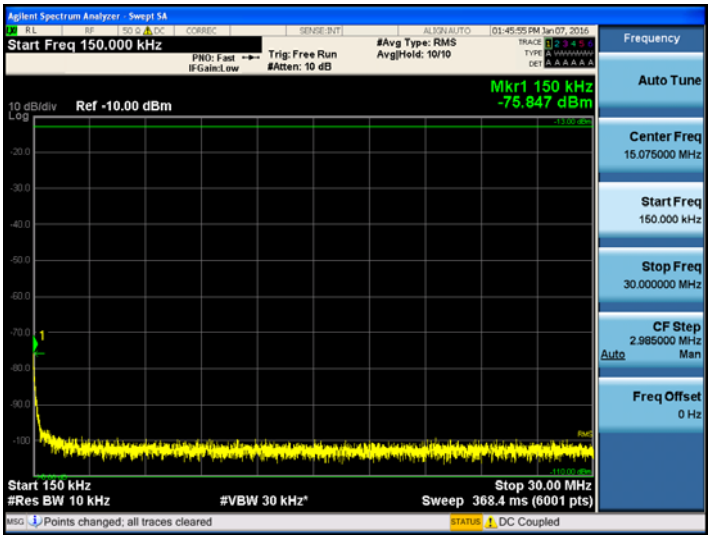
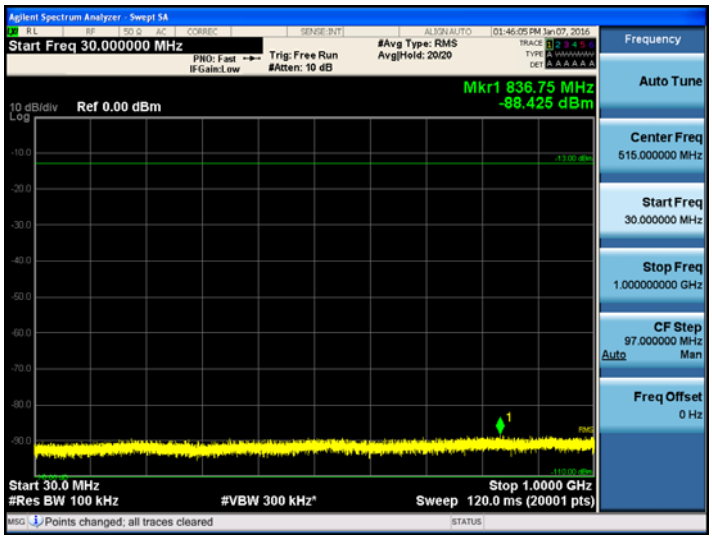
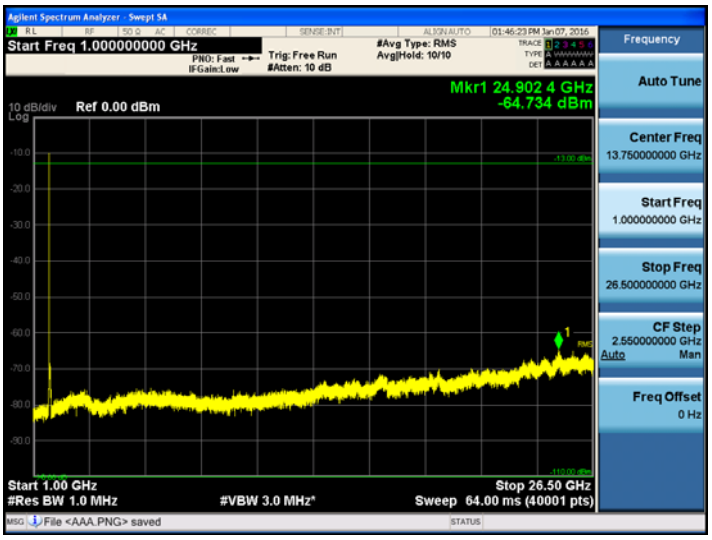
In 9 KHz-150 KHz and 150 KHz-30 MHz bands, RBW was reduced to 1% and 10% of the reference bandwidth for measuring unwanted emission level(typically, 100KHz if the authorized frequency band is below 1GHz) and power was integrated. (1% = +20 dB, 10% = +10 dB)

Single channel Enhancer Plots of Spurious Emission

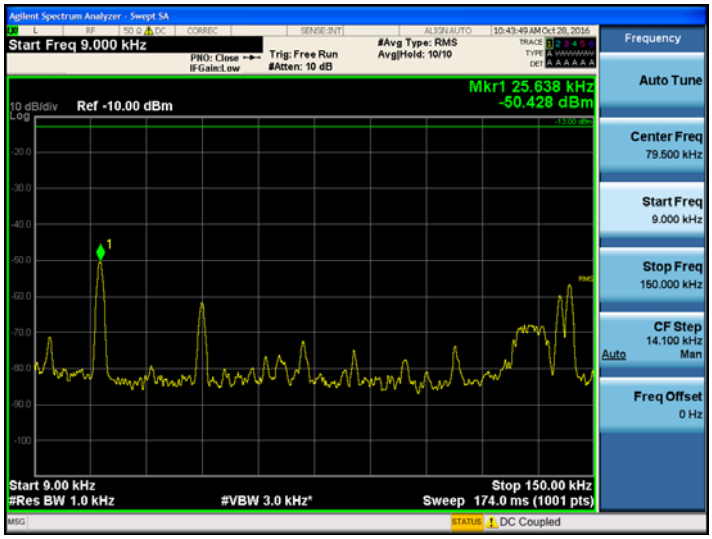
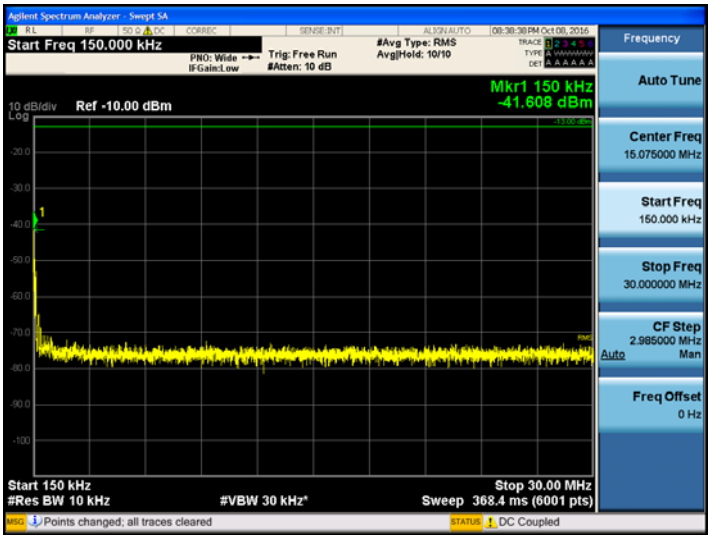
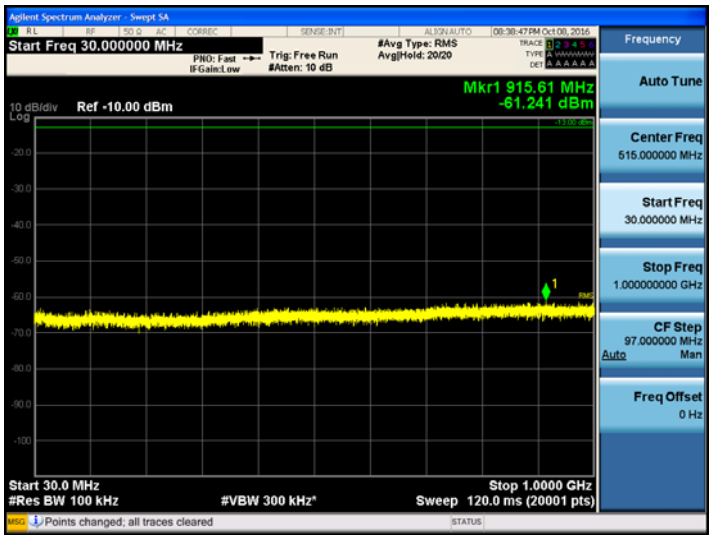
Uplink

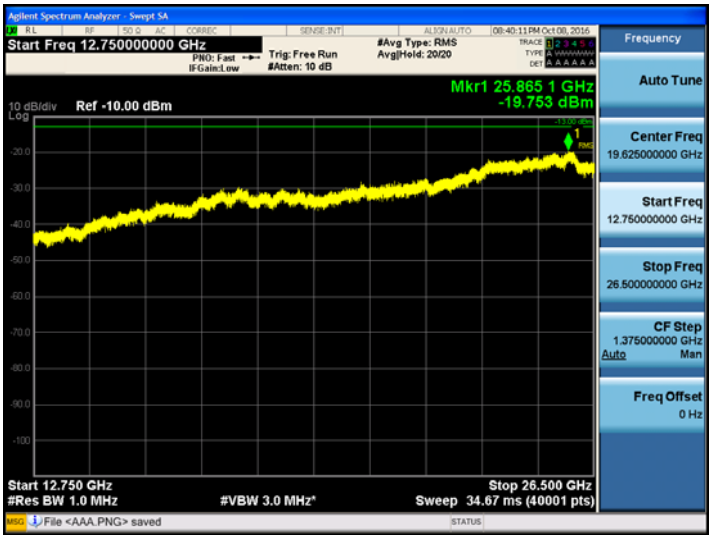
AWS2100 Band LTE 5MHz

[AWS2100 Band LTE 5MHz Uplink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 26.5㎓**
	

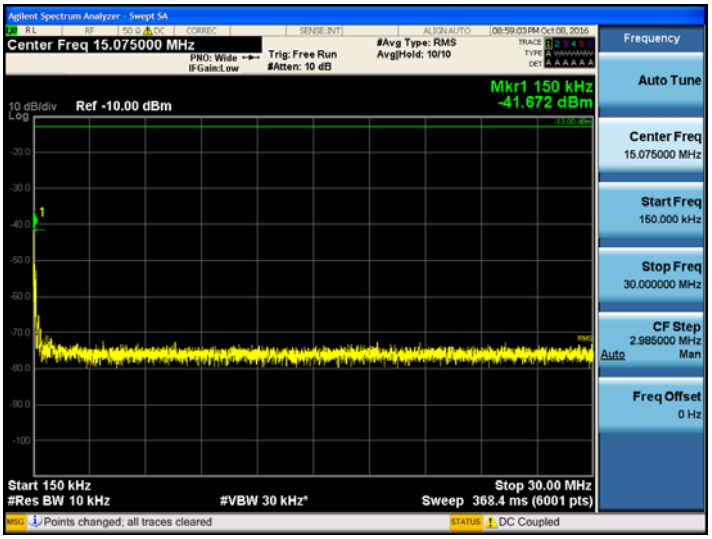
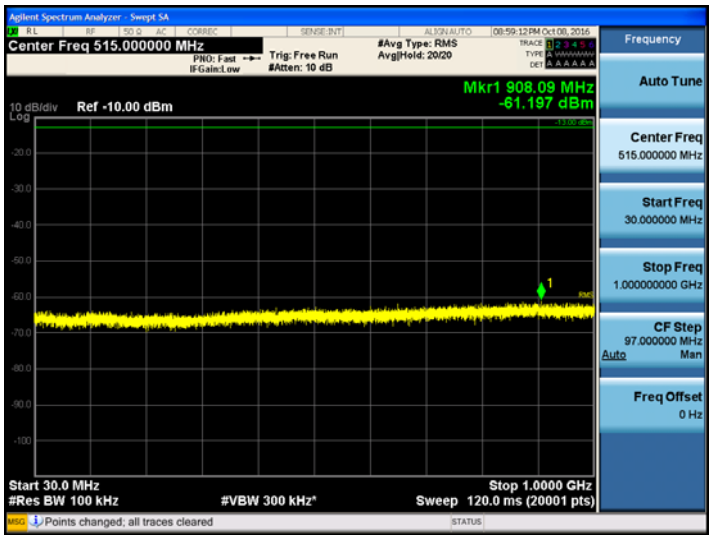
[AWS2100 Band _LTE 5MHz Uplink Mid]

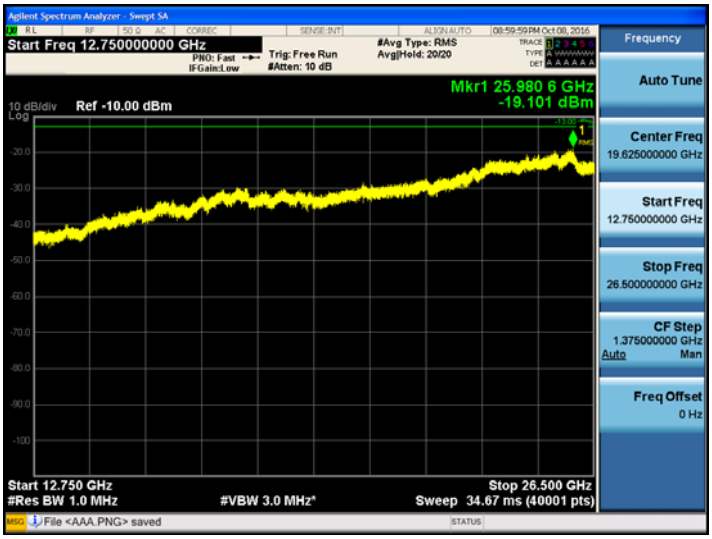
9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 12.75㎓**
	

12.75㎓ ~ 26.5㎓


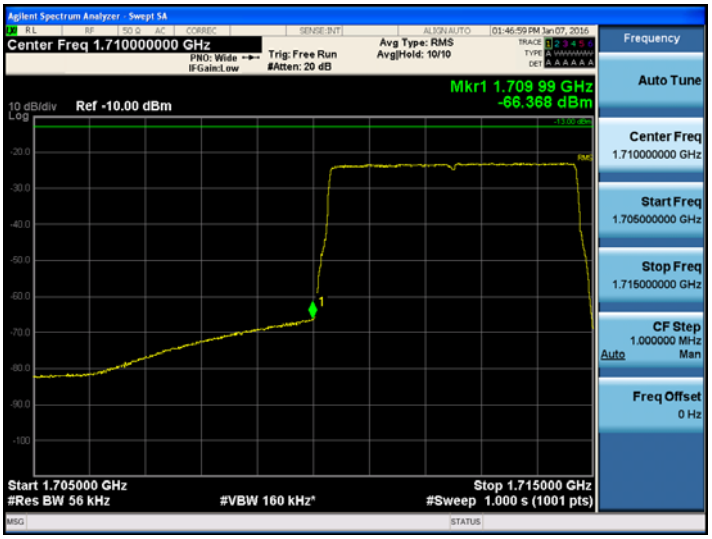
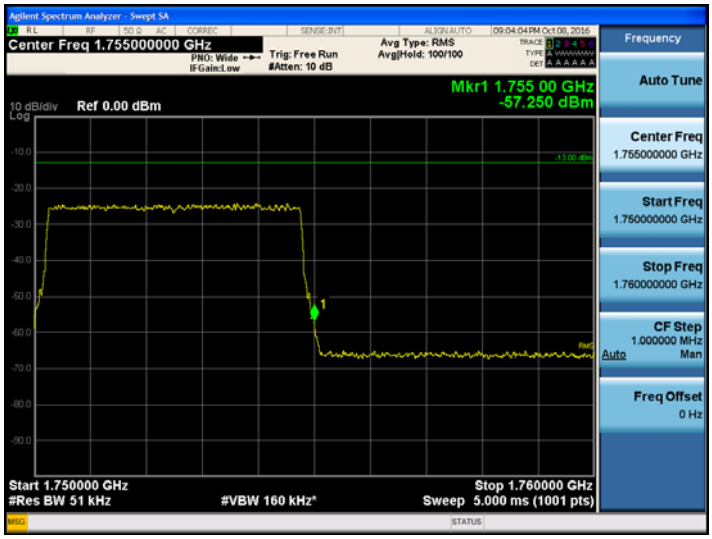
Agilent Spectrum Analyzer - Swept SA
Start Freq 12.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 20/20
Mkr1 25.865 1 GHz
-19.753 dBm
10 dB/div
Log
Ref -10.00 dBm
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.500 GHz
Sweep 34.67 ms (40001 pts)
File <AAA.PNG> saved
Frequency
Auto Tune
Center Freq
19.625000000 GHz
Start Freq
12.750000000 GHz
Stop Freq
26.500000000 GHz
CF Step
1.375000000 GHz
Auto
Man
Freq Offset
0 Hz

[AWS2100 Band LTE 5MHz Uplink High]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 12.75㎓**
	

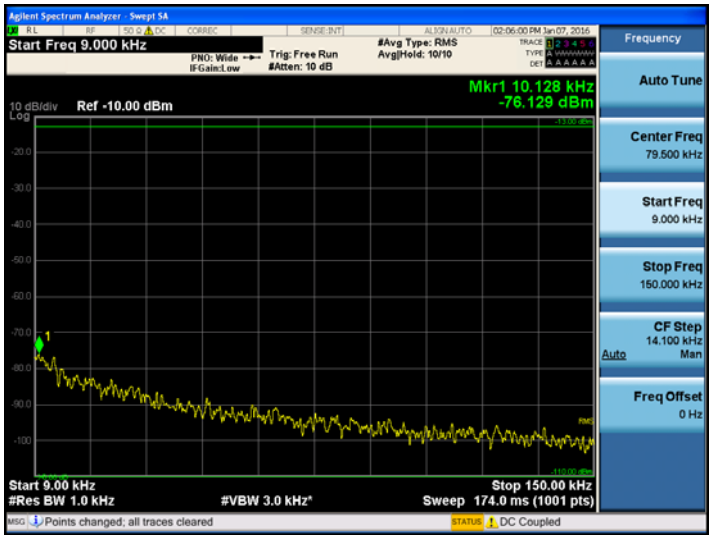
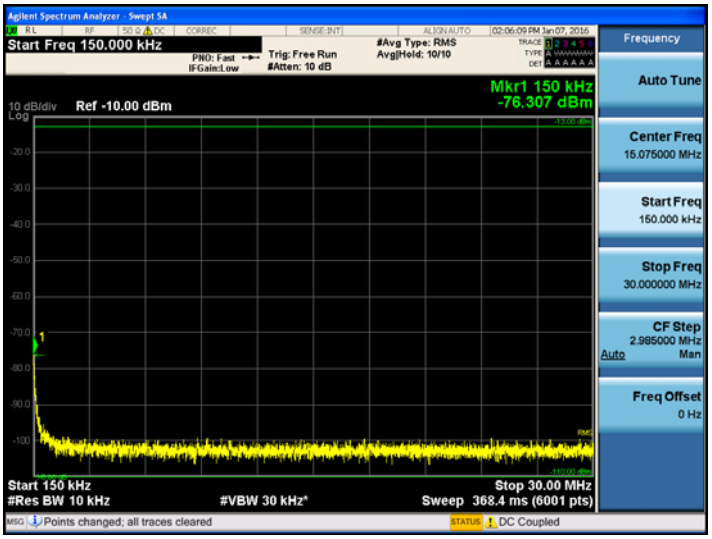
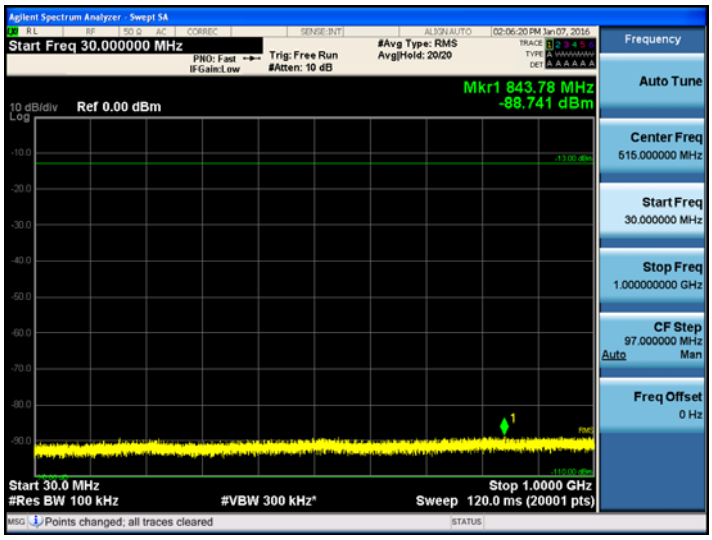
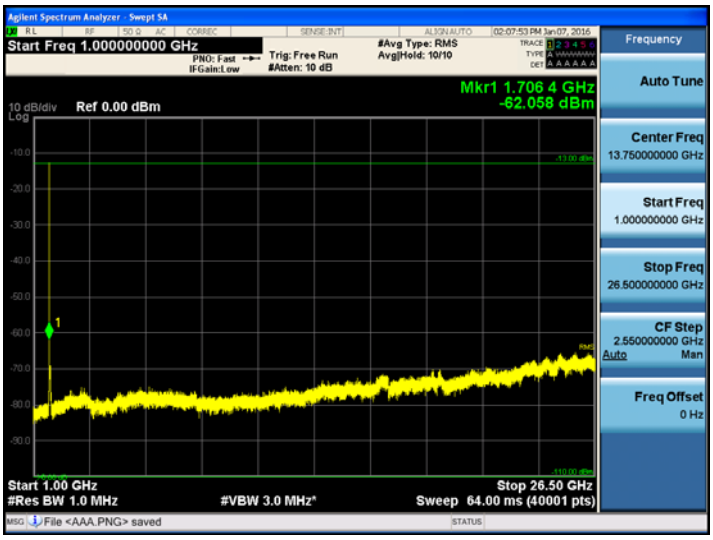
12.75㎓ ~ 26.5㎓


Agilent Spectrum Analyzer - Swept SA
Start Freq 12.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 20/20
Mkr1 25.980 6 GHz
-19.101 dBm
10 dB/div
Log
Ref -10.00 dBm
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.500 GHz
Sweep 34.67 ms (40001 pts)
File <AAA.PNG> saved
Frequency
Auto Tune
Center Freq
19.625000000 GHz
Start Freq
12.750000000 GHz
Stop Freq
26.500000000 GHz
CF Step
1.375000000 GHz
Auto
Man
Freq Offset
0 Hz

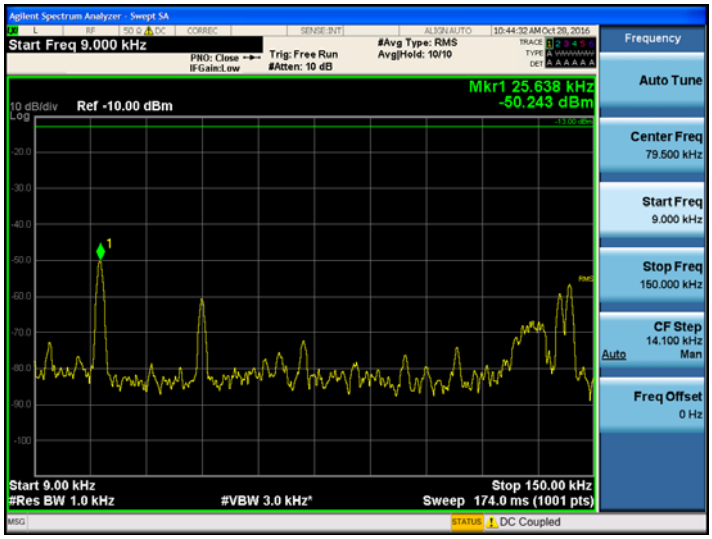
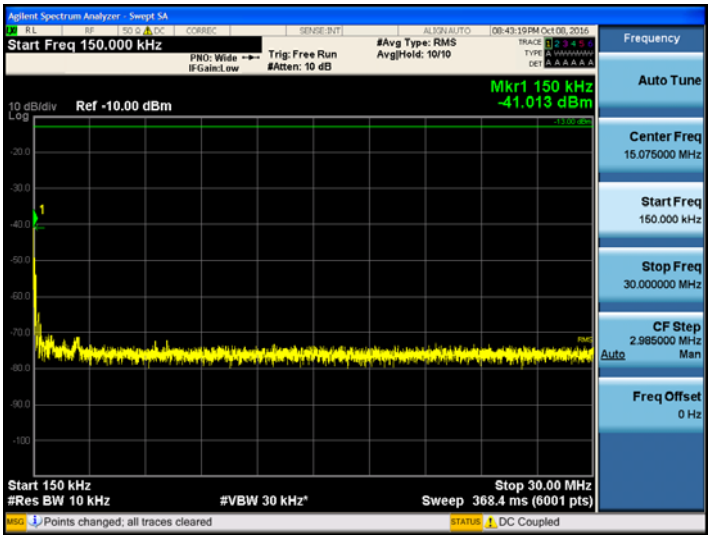
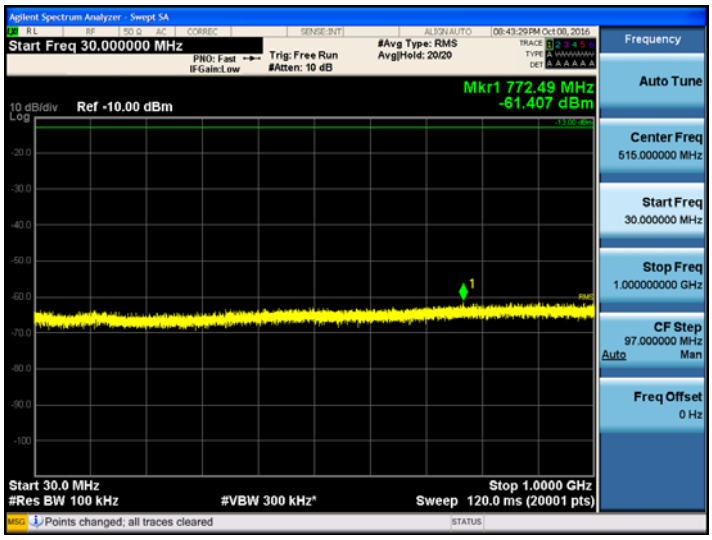
Band Edge_LTE 5MHz Uplink Low	Band Edge_LTE 5MHz Uplink High
	

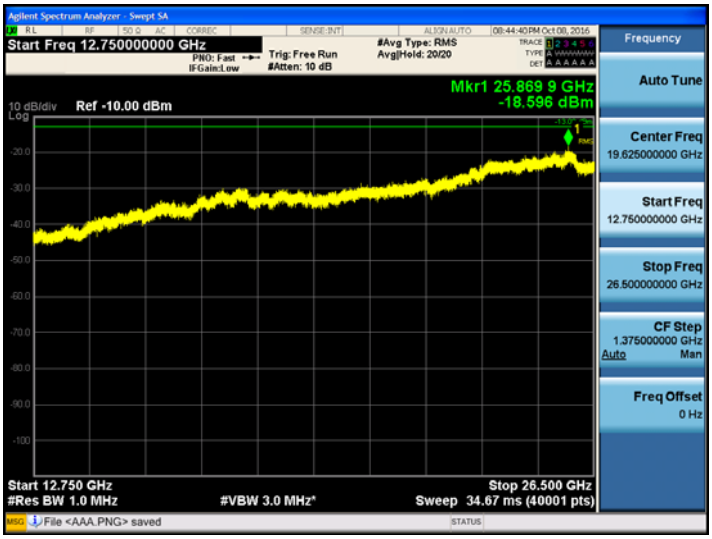
AWS2100 Band LTE 10MHz

[AWS2100 Band LTE 10MHz Uplink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 26.5㎓**
	

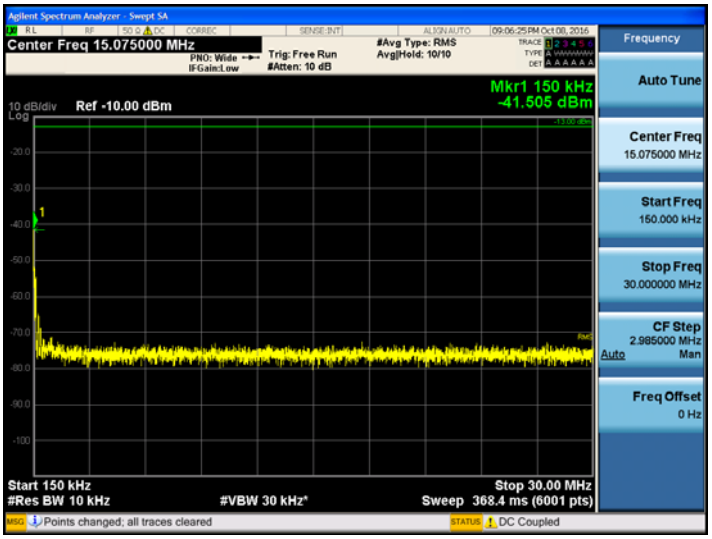
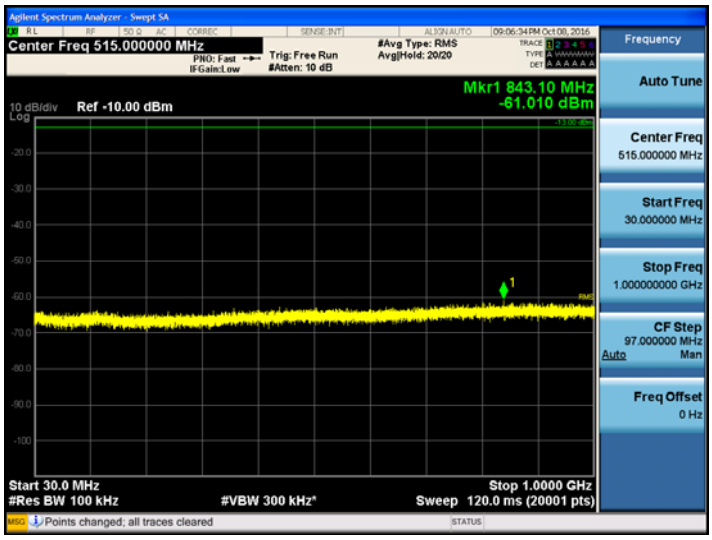
[AWS2100 Band _LTE 10MHz Uplink Mid]

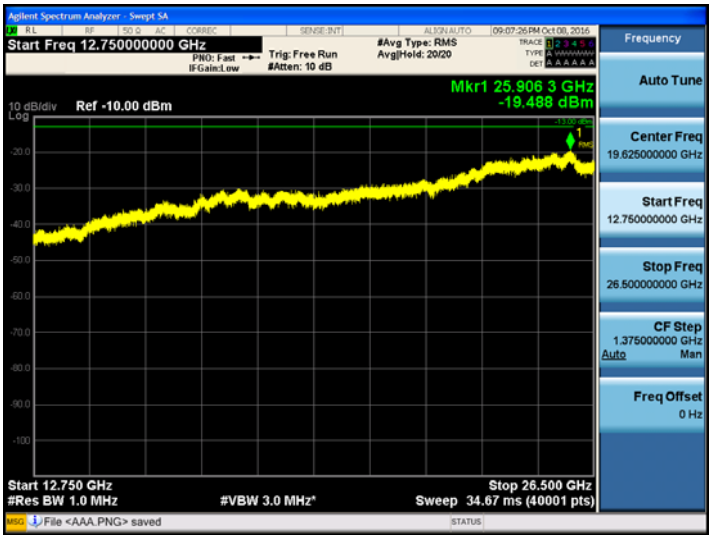
9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 12.75㎓**
	

12.75㎓ ~ 26.5㎓


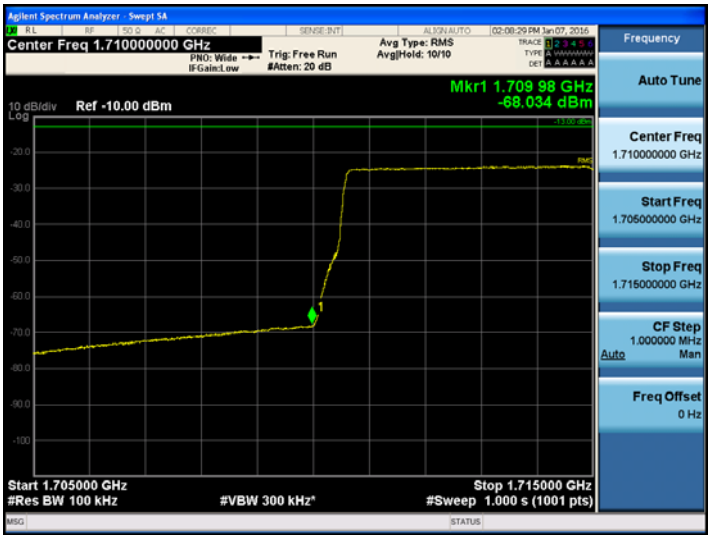
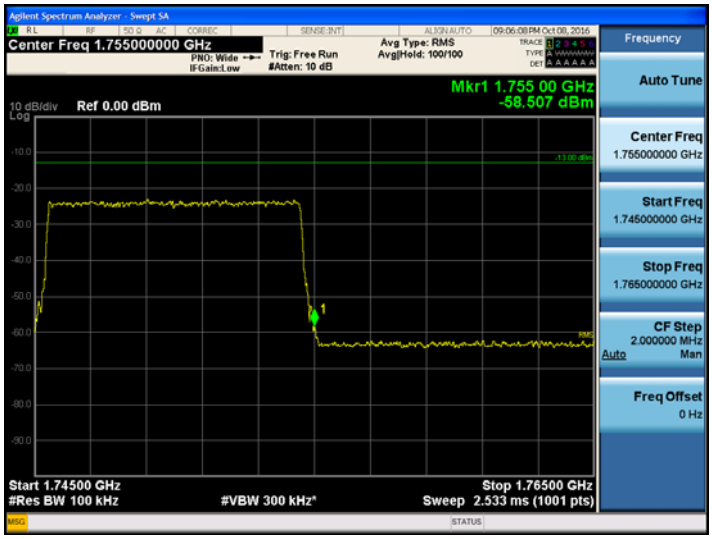
Agilent Spectrum Analyzer - Swept SA
Start Freq 12.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 20/20
Mkr1 25.869 9 GHz
-18.596 dBm
10 dB/div
Log
Ref -10.00 dBm
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.500 GHz
Sweep 34.67 ms (40001 pts)
File <AAA.PNG> saved
Frequency
Auto Tune
Center Freq
19.625000000 GHz
Start Freq
12.750000000 GHz
Stop Freq
26.500000000 GHz
CF Step
1.375000000 GHz
Auto
Man
Freq Offset
0 Hz

[AWS2100 Band _LTE 10MHz Uplink High]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 12.75㎓**
	

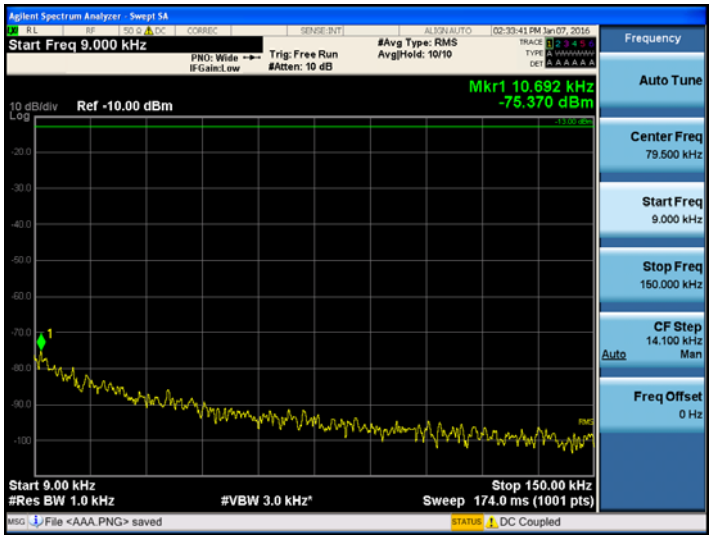
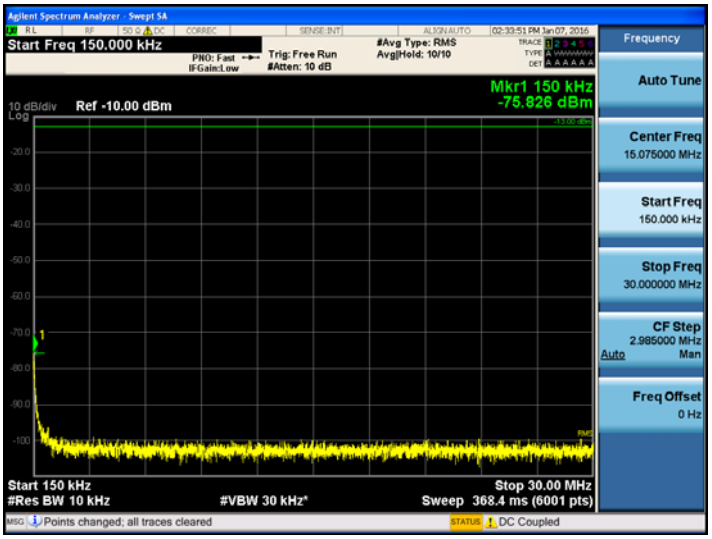
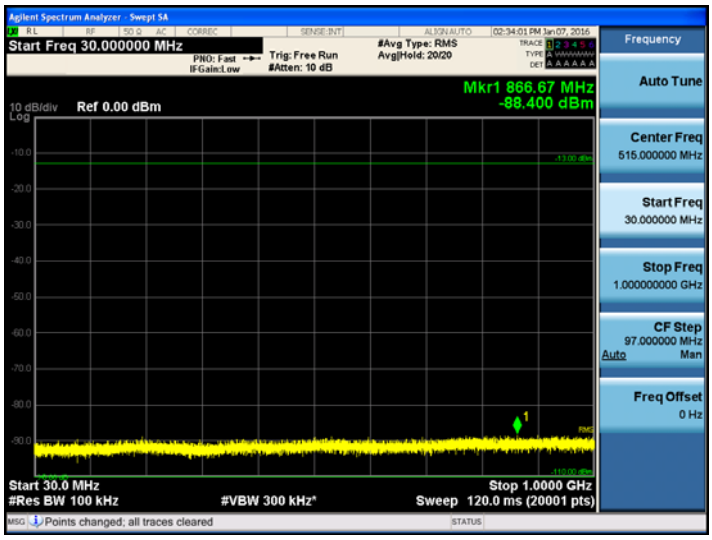
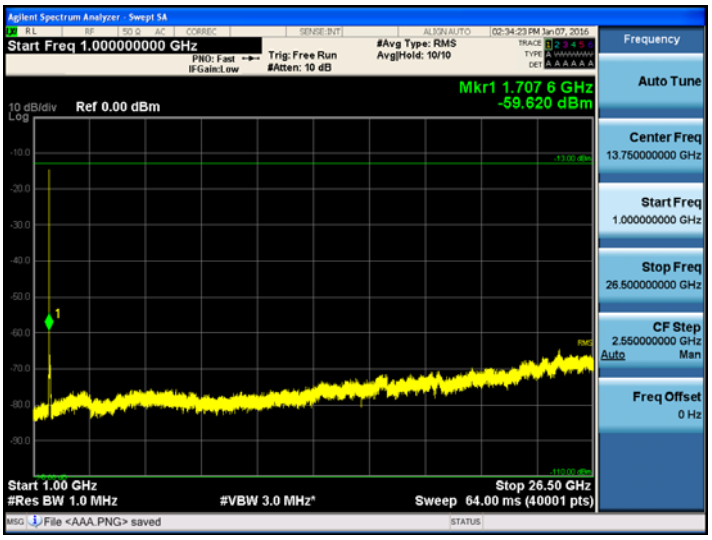
12.75㎓ ~ 26.5㎓


Agilent Spectrum Analyzer - Swept SA
Start Freq 12.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 20/20
Mkr1 25.906 3 GHz
-19.488 dBm
10 dB/div
Log
Ref -10.00 dBm
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.500 GHz
Sweep 34.67 ms (40001 pts)
File <AAA.PNG> saved
Frequency
Auto Tune
Center Freq
19.625000000 GHz
Start Freq
12.750000000 GHz
Stop Freq
26.500000000 GHz
CF Step
1.375000000 GHz
Auto
Man
Freq Offset
0 Hz

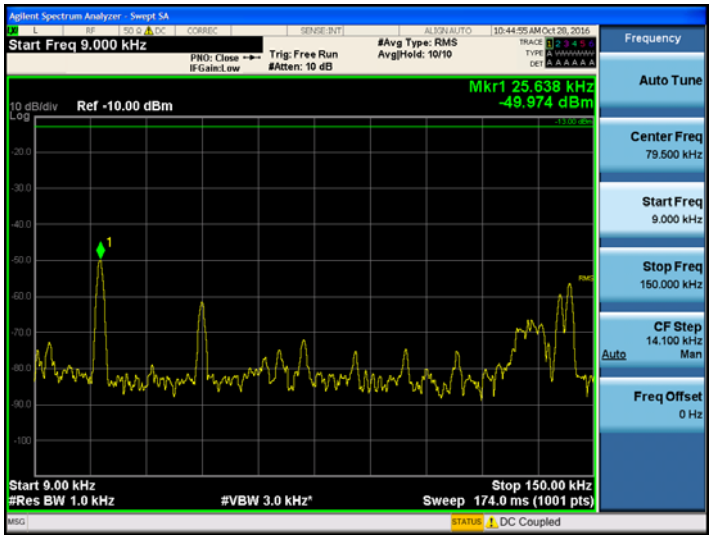
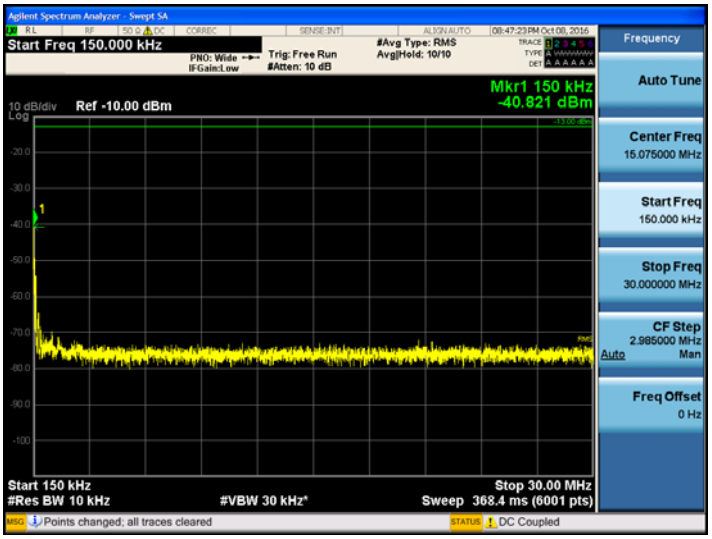
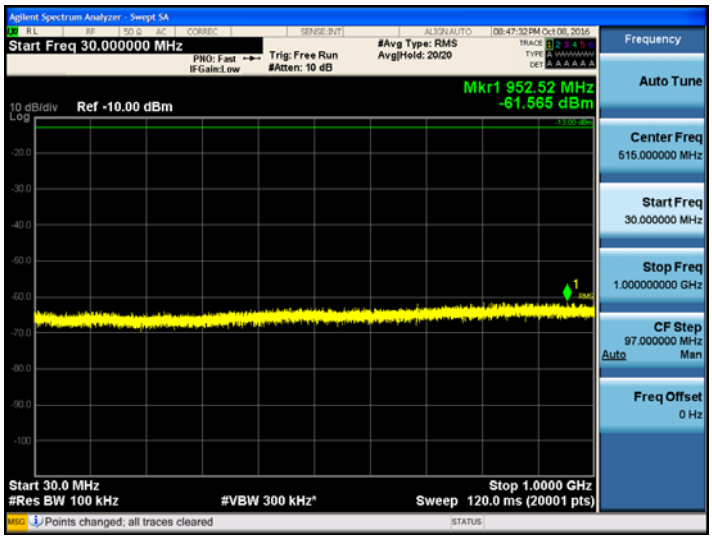
Band Edge_LTE 10MHz Uplink Low	Band Edge_LTE 10MHz Uplink High
	

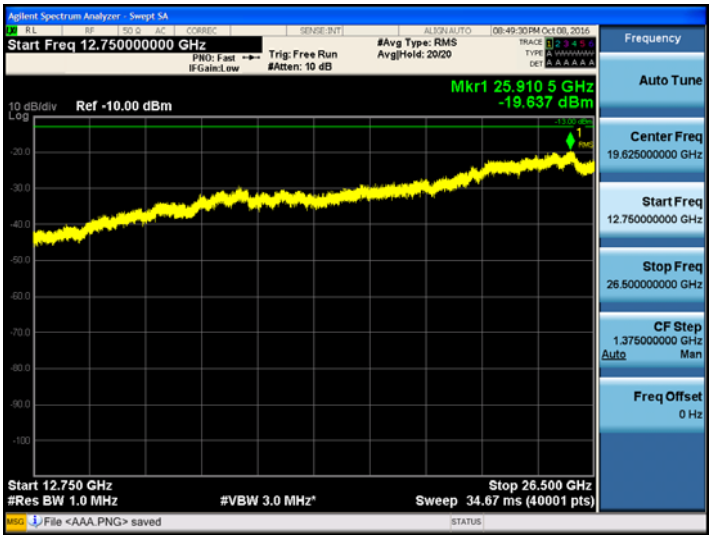
AWS2100 Band LTE 15MHz

[AWS2100 Band LTE 15MHz Uplink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 26.5㎓**
	

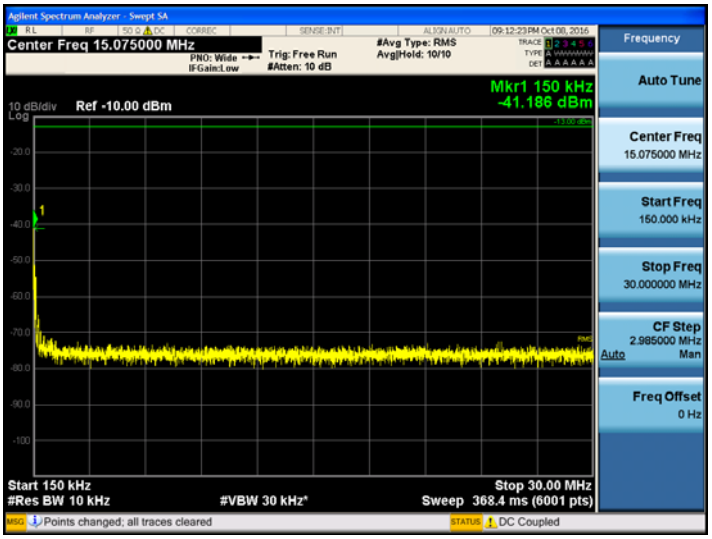
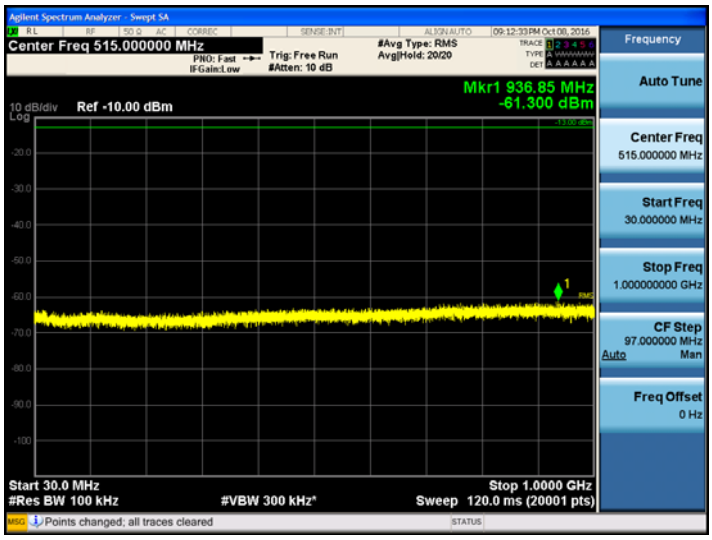
[AWS2100 Band _LTE 15MHz Uplink Mid]

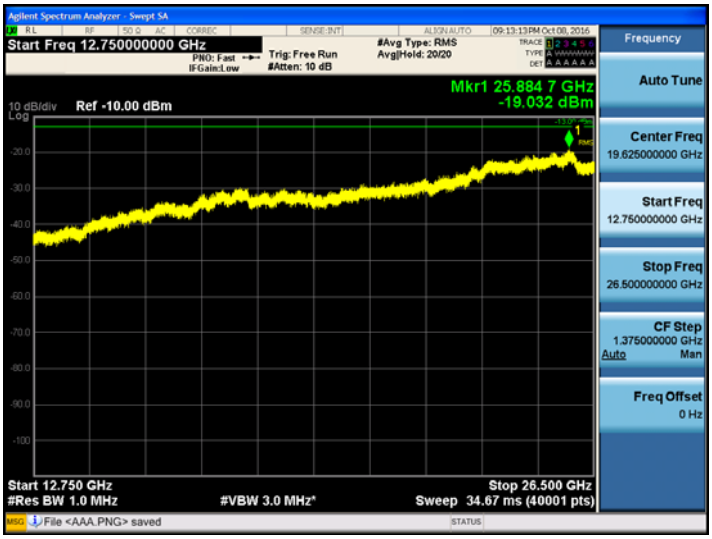
9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 12.75㎓**
	

12.75㎓ ~ 26.5㎓


Agilent Spectrum Analyzer - Swept SA
Start Freq 12.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 20/20
Mkr1 25.910 5 GHz
-19.637 dBm
10 dB/div
Log
Ref -10.00 dBm
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.500 GHz
Sweep 34.67 ms (40001 pts)
File <AAA.PNG> saved
Frequency
Auto Tune
Center Freq
19.625000000 GHz
Start Freq
12.750000000 GHz
Stop Freq
26.500000000 GHz
CF Step
1.375000000 GHz
Auto
Man
Freq Offset
0 Hz

[AWS2100 Band LTE 15MHz Uplink High]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓	**1㎓ ~ 12.75㎓**
	

12.75㎓ ~ 26.5㎓


Agilent Spectrum Analyzer - Swept SA
Start Freq 12.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 20/20
09:13:13 PM Oct 08, 2016
Frequency
Mkr1 25.884 7 GHz
-19.032 dBm
10 dB/div
Log
Ref -10.00 dBm
Auto Tune
Center Freq
19.625000000 GHz
Start Freq
12.750000000 GHz
Stop Freq
26.500000000 GHz
CF Step
1.375000000 GHz
Auto
Man
Freq Offset
0 Hz
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 26.500 GHz
Sweep 34.67 ms (40001 pts)
File <AAA.PNG> saved

Band Edge_LTE 15MHz Uplink Low	Band Edge_LTE 15MHz Uplink High