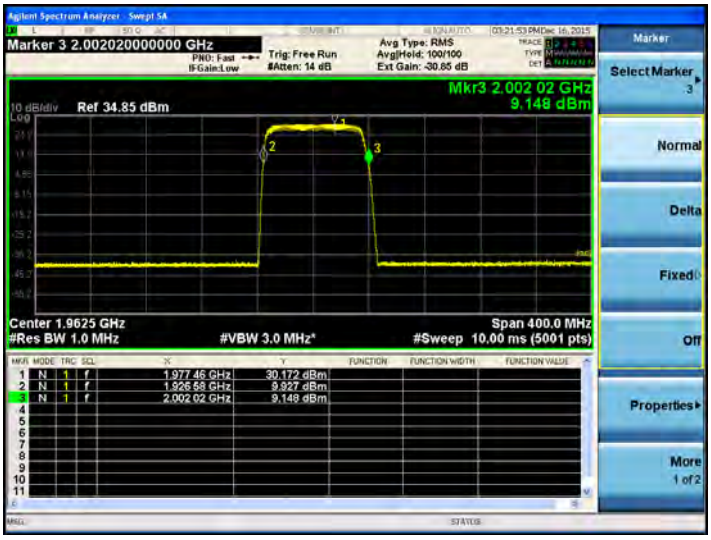
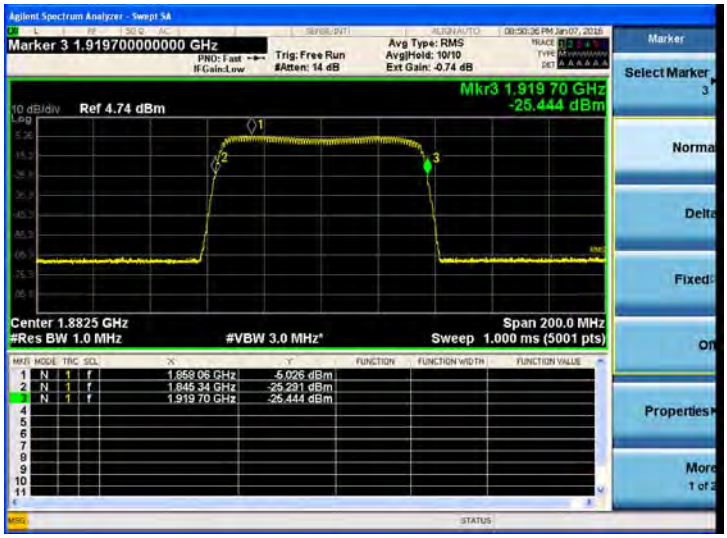
[BRS Band Downlink]	[BRS Band Uplink]

[PCS1900 Band Downlink]	[PCS1900 Band Band Uplink]
	
[WCS Band Downlink_]	**[WCS 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.

§ 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). 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.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

§ 24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). 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.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

§ 27.53 Emission limits

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(2) For digital base stations, the attenuation shall be not less than 43 +10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(ii) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located less than 1.5 km away, within 24 hours of receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 +10 log (P)−20 log (Dkm/1.5) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than −107 dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level, the complaining licensee must attenuate its base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its

base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOBE by at least 67 +10 log (P)−20 log (Dkm/1.5) measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than −107 dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(v) For all fixed digital user stations, the attenuation factor shall be not less than 43 +10 log (P) dB at the channel edge.

(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

(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 3.5.2 of KDB 935210 D05 v01.

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).

2. EUT out-of-band/block emissions conducted measurement

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

NOTE—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 the two-tone test.

b) Set the signal generator to produce two AWGN signals as previously described (e.g., 4.1 MHz OBW).

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 of interest.

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, 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.

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 emission bandwidth, 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 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 (i.e., 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 the procedure with the composite input power level set to 3 dB above the AGC threshold.

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

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. EUT spurious emissions conducted measurement

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 (e.g., 4.1 MHz OBW AWGN).

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).

g) Set the VBW ≥ 3 × RBW.

h) Set the Sweep time = auto-couple.

i) Set the analyzer start frequency to the lowest radio frequency 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.

NOTE—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.

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

k) Trace average at least 10 traces in power averaging (i.e., 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 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 analyzer stop frequency to 10 times the highest frequency of the fundamental emission (see §2.1057). Note that 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 (i.e., 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 and provide tabular data, if required.

p) Repeat the procedure with the input test signals tuned to a middle band/block frequency/channel and then a high band/block frequency/channel.

q) Repeat entire procedure with the narrowband test signal.

r) Repeat for all authorized frequency bands/blocks used by the EUT.

IC Rules

Test Requirement(s): RSS-132 5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

Test Requirement(s): SRSP-510 5.2

When the transmit antenna operates outdoors, the emission in any 1 MHz bandwidth between 1920.1 MHz and 1929.9 MHz shall not exceed -24 dBW e.i.r.p. Power measurement using a spectrum analyzer of smaller bandwidth and with numerical integration is also allowed.

5.2.2 Indoor Operation

When the transmit antenna operates indoors, the emission in any 1 MHz bandwidth between 1920.1 MHz and 1929.9 MHz shall not exceed -50 dBW e.i.r.p. Power measurement using a spectrum analyzer of smaller bandwidth and with numerical integration is also allowed

Test Requirement(s): RSS-139 6.6

i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, SRSP-513 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

Test Requirement(s): RSS-199 4.6

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth is allowed to be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1%/2% of the occupied bandwidth, as applicable.

Equipment shall comply with the following unwanted emissions limits:

a. For base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least 43 + 10 log10 p

Test Requirement(s): RSS-195 5.6

The transmitter unwanted emissions shall be measured with a resolution bandwidth of 1 MHz. A smaller resolution bandwidth is permitted provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz. However, in the 1 MHz bands immediately adjacent to the edges of the frequency range(s) in which the equipment is allowed to operate, a resolution bandwidth of as close as possible to, without being less than 1% of the occupied bandwidth, shall be employed provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz.

5.6.1 Base Station, Fixed Station and High-Power Fixed Subscriber Equipment

The power of any emission outside the frequency range(s) in which the equipment operates shall be attenuated below the transmitter power, P(dBW), by the amount indicated in Table 1 and graphically represented in Figure 1, where p is the transmitter output power measured in watts.

Table 1 — Unwanted Emissions for Base Station, Fixed Station and High-Power Fixed Subscriber Equipment	
Frequency (MHz)	**Attenuation (dB)**
<2200	43 + 10 $\log_{10}(p)$
2200 - 2285	75 + 10 $\log_{10}(p)$
2285 - 2287.5	72 + 10 $\log_{10}(p)$
2287.5 - 2300	70 + 10 $\log_{10}(p)$
2300 - 2305	43 + 10 $\log_{10}(p)$
2305 - 2320	43 + 10 $\log_{10}(p)$ Note
2320 - 2345	75 + 10 $\log_{10}(p)$
2345 - 2360	43 + 10 $\log_{10}(p)$ Note
2360 - 2362.5	43 + 10 $\log_{10}(p)$
2362.5 - 2365	55 + 10 $\log_{10}(p)$
2365 - 2367.5	70 + 10 $\log_{10}(p)$
2367.5 - 2370	72 + 10 $\log_{10}(p)$
2370 - 2395	75 + 10 $\log_{10}(p)$
>2395	43 + 10 $\log_{10}(p)$

Test Requirement(s): RSS-199 4.6

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth is allowed to be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1%/2% of the occupied bandwidth, as applicable.

Equipment shall comply with the following unwanted emissions limits:

a. For base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least 43 + 10 log10 p

Test Requirement(s): RSS-131 6.4

Spurious emissions of zone enhancers and translators shall be suppressed as much as possible.

Spurious emissions shall be attenuated below the rated power of the enhancer by at least: 43 + 10 Log10(Prated in watts), or 70 dB, whichever is less stringent.

Note: If the minimum standard is not met, check to see if the input signal generators have a high harmonic content.

Test Procedures: RSS-131 4.4

4.4.1 Multi-channel Enhancer

The spurious emissions of the equipment under test shall be measured using the two-tone method in section 4.3.1, with the two tones Po1 and Po2 set to the required levels.

Using a spectrum analyser with a resolution bandwidth set at 100 kHz, search for spurious emissions from 30 MHz to at least 5 times the highest RF passband frequency. The search may omit the band that contains the test tones and intermodulation products.

4.4.2 Single channel Enhancer

The enhancer shall be operated as described in section 4.3.2 during the search for spurious emissions.

Using a spectrum analyser with a resolution bandwidth set at 100 kHz, search for spurious emissions from 30 MHz to at least 5 times the highest RF passband frequency. The search may omit the band that contains the input signal.

Test Procedures: Measurements were in accordance with the test methods section 3.6 and 4.7 of KDB 935210 D05 v01.

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. EUT out-of-band/block emissions conducted measurement

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

NOTE—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 the two-tone test.

b) Set the signal generator to produce two AWGN signals as previously described (e.g., 4.1 MHz OBW).

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 of interest.

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, 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.

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 emission bandwidth, 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 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 (i.e., 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 the procedure with the composite input power level set to 3 dB above the AGC threshold.

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

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. EUT spurious emissions conducted measurement

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 (e.g., 4.1 MHz OBW AWGN).

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).

g) Set the VBW ≥ 3 × RBW.

h) Set the Sweep time = auto-couple.

i) Set the analyzer start frequency to the lowest radio frequency 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.

NOTE—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.

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

k) Trace average at least 10 traces in power averaging (i.e., 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 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 analyzer stop frequency to 10 times the highest frequency of the fundamental emission (see §2.1057). Note that 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 (i.e., 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 and provide tabular data, if required.

p) Repeat the procedure with the input test signals tuned to a middle band/block frequency/channel and then a high band/block frequency/channel.

q) Repeat entire procedure with the narrowband test signal.

r) Repeat for all authorized frequency bands/blocks used by the EUT.

4.7.2 EUT out-of-band/block emissions conducted measurement

Intermodulation products shall be measured while applying two CW tones spaced in frequency ±12.5 kHz relative to the center frequency (f0) as determined from 4.4.

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

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

b) Configure the two signal generators to produce CW tones on frequencies spaced at ± 12.5 kHz relative to f0 with amplitude levels set just below the AGC threshold (see 4.2).

c) Connect a spectrum analyzer to the EUT output.

d) Set the span to 100 kHz.

e) Set the resolution bandwidth to 300 Hz with a video bandwidth ≥ 3 × RBW.

f) Set the detector to power average (rms).

g) Place a marker on highest intermodulation product amplitude.

h) Capture the plot for inclusion in the test report.

i) Repeat the procedure with the composite input power level set to 3 dB above the AGC threshold.

j) Repeat steps b) to h) for all operational bands.

4.7.3 EUT spurious emissions conducted measurement

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

b) Configure the signal generator to produce a CW signal.

c) Set the frequency of the CW signal to the center channel of the pass band.

d) Set the output power level so that the resultant signal is just below the AGC threshold (see 4.2).

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

f) Set the RBW to 100 kHz.

g) Set the VBW = 3 × RBW.

h) Set the Sweep time = auto-couple.

i) Set the detector to PEAK.

j) Set the analyzer start frequency to 30 MHz (or the lowest radio frequency signal generated in the equipment, without going below 9 kHz if the EUT has internal clock frequencies) and the stop frequency to 10 × the highest allowable frequency of the pass band.

k) Select MAX HOLD and use the marker peak function to find the highest emission(s) outside the pass band. (This could be either at a frequency lesser or greater than the pass band.)

l) Capture a plot for inclusion in the test report.

m) Repeat steps c) to l) for each authorized frequency band/block of operation.

Test Results: The EUT complies with the requirements of this section. There were no Detectable Spurious emissions for this EUT.

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)

700 MHz band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	734.00	-39.29
	High	753.50	-37.88
LTE 10 MHz	Low	734.00	-38.06
	High	751.00	-37.10

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	731.50	-23.71
	Middle	742.50	-22.52
	High	753.50	-25.28
LTE 10 MHz	Low	734.00	-23.67
	Middle	741.00	-25.44
	High	751.00	-23.27

Additional Spurious emissions

	Channel	Frequency Range (MHz)	Emission Level (dBm)
LTE 5 MHz	High	763 - 775	-73.06
		793 - 805	-72.76
		1599 - 1610	-60.39
		1599 - 1610	-90.37
LTE 10 MHz	High	763 - 775	-72.86
		793 - 805	-72.69
		1599 - 1610	-59.99
		1599 - 1610	-90.72

700 MHz band_MIMO

[Downlink]

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	734.00	-36.28
	High	753.50	-34.87
LTE 10 MHz	Low	734.00	-35.05
	High	751.00	-34.09

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	731.50	-20.70
	Middle	742.50	-19.51
	High	753.50	-22.27
LTE 10 MHz	Low	734.00	-20.66
	Middle	741.00	-22.43
	High	751.00	-20.26

Additional Spurious emissions

	Channel	Frequency Range (MHz)	Emission Level (dBm)
LTE 5 MHz	High	763 - 775	-70.05
		793 - 805	-69.75
		1599 - 1610	-57.38
		1599 - 1610	-87.36
LTE 10 MHz	High	763 - 775	-69.85
		793 - 805	-69.68
		1599 - 1610	-56.98
		1599 - 1610	-87.71

SMR 800, Cellualr 800 MHz band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	864.50	-34.48
	High	891.50	-34.42
LTE 10 MHz	Low	874.00	-33.87
	High	889.00	-34.20
CDMA	Low	863.25	-41.49
	High	892.75	-40.99
GSM	Low	869.20	-20.94
	High	893.80	-21.23
UMTS	Low	871.50	-34.66
	High	891.50	-35.13

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	864.50	-26.82
	Middle	878.00	-24.30
	High	891.50	-27.74
LTE 10 MHz	Low	874.00	-26.89
	Middle	-	-
	High	889.00	-26.80
CDMA	Low	863.25	-25.76
	Middle	878.00	-27.09
	High	892.75	-26.13
GSM	Low	869.20	-26.32
	Middle	881.50	-25.55
	High	893.80	-24.86
UMTS	Low	871.50	-22.64
	Middle	881.50	-24.00
	High	891.50	-25.41

AWS2100 band

[Downlink]

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2112.50	-35.59
	High	2177.50	-34.72
LTE 10 MHz	Low	2115.00	-35.29
	High	2175.00	-34.63
LTE 15 MHz	Low	2117.50	-34.55
	High	2172.50	-33.51
LTE 20 MHz	Low	2120.00	-33.68
	High	2170.00	-33.56
UMTS	Low	2112.50	-36.07
	High	2112.50	-36.07

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2112.50	-21.04
	Middle	2145.00	-21.57
	High	2177.50	-21.83
LTE 10 MHz	Low	2115.00	-21.33
	Middle	2145.00	-21.54
	High	2175.00	-21.77
LTE 15 MHz	Low	2117.50	-21.87
	Middle	2145.00	-21.66
	High	2172.50	-21.59
LTE 20 MHz	Low	2120.00	-21.71
	Middle	2145.00	-21.57
	High	2170.00	-21.22
UMTS	Low	2112.50	-21.24
	Middle	2145.00	-21.22
	High	2177.50	-21.53

AWS2100 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Downlink]

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2112.50	-32.58
	High	2177.50	-31.71
LTE 10 MHz	Low	2115.00	-32.28
	High	2175.00	-31.62
LTE 15 MHz	Low	2117.50	-31.54
	High	2172.50	-30.50
LTE 20 MHz	Low	2120.00	-30.67
	High	2170.00	-30.55
UMTS	Low	2112.50	-33.06
	High	2112.50	-33.06

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2112.50	-18.03
	Middle	2145.00	-18.56
	High	2177.50	-18.82
LTE 10 MHz	Low	2115.00	-18.32
	Middle	2145.00	-18.53
	High	2175.00	-18.76
LTE 15 MHz	Low	2117.50	-18.86
	Middle	2145.00	-18.65
	High	2172.50	-18.58
LTE 20 MHz	Low	2120.00	-18.70
	Middle	2145.00	-18.56
	High	2170.00	-18.21
UMTS	Low	2112.50	-18.23
	Middle	2145.00	-18.21
	High	2177.50	-18.52

BRS band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2506.00	-31.22
	High	2680.00	-30.71

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2506.00	-21.33
	Middle	2593.00	-21.47
	High	2680.00	-21.82

BRS band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2506.00	-28.21
	High	2680.00	-27.70

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	2506.00	-18.32
	Middle	2593.00	-18.46
	High	2680.00	-18.81

PCS 1900 band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1932.50	-33.48
	High	1992.50	-33.92
LTE 10 MHz	Low	1935.00	-34.44
	High	1990.00	-32.61
CDMA	Low	1931.25	-40.24
	High	1993.75	-39.56
GSM	Low	1930.20	-18.53
	High	1994.80	-18.75
UMTS	Low	1932.50	-34.19
	High	1992.50	-34.56

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1932.50	-21.35
	Middle	1962.50	-21.52
	High	1992.50	-21.15
LTE 10 MHz	Low	1935.00	-21.30
	Middle	1960.00	-20.64
	High	1990.00	-21.72
CDMA	Low	1931.25	-21.55
	Middle	1962.50	-21.55
	High	1993.75	-21.73
GSM	Low	1930.20	-21.36
	Middle	1963.50	-21.58
	High	1994.80	-21.41
UMTS	Low	1932.50	-21.54
	Middle	1962.50	-21.46
	High	1992.50	-21.55

PCS 1900 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1932.50	-30.47
	High	1992.50	-30.91
LTE 10 MHz	Low	1935.00	-31.43
	High	1990.00	-29.60
CDMA	Low	1931.25	-37.23
	High	1993.75	-36.55
GSM	Low	1930.20	-15.52
	High	1994.80	-15.74
UMTS	Low	1932.50	-33.77
	High	1992.50	-34.44

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1932.50	-18.34
	Middle	1962.50	-18.51
	High	1992.50	-18.14
LTE 10 MHz	Low	1935.00	-18.29
	Middle	1960.00	-17.63
	High	1990.00	-18.71
CDMA	Low	1931.25	-18.54
	Middle	1962.50	-18.54
	High	1993.75	-18.72
GSM	Low	1930.20	-18.35
	Middle	1963.50	-18.57
	High	1994.80	-18.40
UMTS	Low	1932.50	-18.53
	Middle	1962.50	-18.45
	High	1992.50	-18.54

WCS band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 10 MHz	Low	2355.00	-31.76
	High	2355.00	-32.92

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 10 MHz	Low	-	-
	Middle	2355.00	-19.75
	High	-	-

Note. Emission level is the worst measurement value

Additional spurious emission is shown on corresponding plots on the 507 ~ 511 page

700 MHz band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	700.50	-66.68
	High	713.50	-69.46
LTE 10 MHz	Low	782.00	-73.04
	High	782.00	-73.51

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	700.50	-55.67
	Middle	707.00	-56.53
	High	713.50	-56.63
LTE 10 MHz	Low	-	-
	Middle	782.00	-54.90
	High	-	-

Additional Spurious emissions

	Channel	Frequency Range (MHz)	Emission Level (dBm)
LTE 10 MHz	Middle	763 - 775	-100.17
		793 - 805	-100.45
		1599 - 1610	-81.21
		1599 - 1610	-111.04

700 MHz band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	700.50	-63.67
	High	713.50	-66.45
LTE 10 MHz	Low	782.00	-70.03
	High	782.00	-70.50

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	700.50	-52.66
	Middle	707.00	-53.52
	High	713.50	-53.62
LTE 10 MHz	Low	-	-
	Middle	782.00	-51.89
	High	-	-

Additional Spurious emissions

	Channel	Frequency Range (MHz)	Emission Level (dBm)
LTE 10 MHz	Middle	763 - 775	-97.16
		793 - 805	-97.44
		1599 - 1610	-78.20
		1599 - 1610	-108.03

SMR 800, Cellualr 800 MHz band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	819.50	-67.67
	High	846.50	-72.73
LTE 10 MHz	Low	829.00	-72.55
	High	844.00	-72.61
CDMA	Low	818.25	-76.72
	High	847.75	-81.35
GSM	Low	824.20	-53.63
	High	848.80	-53.82
UMTS	Low	826.50	-70.75
	High	846.50	-73.90

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	819.50	-57.05
	Middle	833.00	-56.04
	High	846.50	-55.64
LTE 10 MHz	Low	829.00	-56.14
	Middle	-	-
	High	844.00	-56.49
CDMA	Low	818.25	-56.71
	Middle	833.00	-56.63
	High	847.75	-54.58
GSM	Low	824.20	-54.37
	Middle	836.50	-56.01
	High	848.80	-56.24
UMTS	Low	826.50	-56.91
	Middle	836.50	-56.59
	High	846.50	-56.14

AWS2100 band

[Uplink]

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1712.50	-66.37
	High	1777.50	-72.06
LTE 10 MHz	Low	1715.00	-68.03
	High	1775.00	-71.53
LTE 15 MHz	Low	1717.50	-67.28
	High	1772.50	-70.94
LTE 20 MHz	Low	1720.00	-67.89
	High	1770.00	-70.96
UMTS	Low	1712.50	-67.31
	High	1777.50	-70.49

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1712.50	-56.89
	Middle	1745.00	-55.71
	High	1777.50	-55.71
LTE 10 MHz	Low	1715.00	-56.13
	Middle	1745.00	-56.14
	High	1775.00	-55.95
LTE 15 MHz	Low	1717.50	-55.37
	Middle	1745.00	-54.20
	High	1772.50	-56.77
LTE 20 MHz	Low	1720.00	-55.70
	Middle	1745.00	-57.49
	High	1770.00	-55.21
UMTS	Low	1712.50	-56.23
	Middle	1745.00	-57.90
	High	1777.50	-56.90

AWS2100 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1712.50	-63.36
	High	1777.50	-69.05
LTE 10 MHz	Low	1715.00	-65.02
	High	1775.00	-68.52
LTE 15 MHz	Low	1717.50	-64.27
	High	1772.50	-67.93
LTE 20 MHz	Low	1720.00	-64.88
	High	1770.00	-67.95
UMTS	Low	1712.50	-64.30
	High	1777.50	-67.48

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1712.50	-53.88
	Middle	1745.00	-52.70
	High	1777.50	-52.70
LTE 10 MHz	Low	1715.00	-53.12
	Middle	1745.00	-53.13
	High	1775.00	-52.94
LTE 15 MHz	Low	1717.50	-52.36
	Middle	1745.00	-51.19
	High	1772.50	-53.76
LTE 20 MHz	Low	1720.00	-52.69
	Middle	1745.00	-54.48
	High	1770.00	-52.20
UMTS	Low	1712.50	-53.22
	Middle	1745.00	-54.89
	High	1777.50	-53.89

BRS band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 20 MHz	Low	2506.00	-65.22
	High	2680.00	-64.55

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 20 MHz	Low	2506.00	-56.81
	Middle	2593.00	-55.80
	High	2680.00	-55.46

BRS band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 20 MHz	Low	2506.00	-62.21
	High	2680.00	-61.54

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 20 MHz	Low	2506.00	-53.80
	Middle	2593.00	-52.79
	High	2680.00	-52.45

PCS 1900 band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1852.50	-68.39
	High	1912.50	-67.19
LTE 10 MHz	Low	1855.00	-68.75
	High	1910.00	-68.07
CDMA	Low	1851.25	-72.43
	High	1913.75	-74.02
GSM	Low	1850.20	-53.33
	High	1914.80	-53.62
UMTS	Low	1852.50	-68.09
	High	1912.50	-67.76

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1852.50	-54.21
	Middle	1882.50	-55.66
	High	1912.50	-54.56
LTE 10 MHz	Low	1855.00	-54.96
	Middle	1882.50	-55.18
	High	1910.00	-54.25
CDMA	Low	1851.25	-55.67
	Middle	1882.50	-55.39
	High	1913.75	-54.36
GSM	Low	1850.20	-54.77
	Middle	1882.50	-55.81
	High	1914.80	-54.88
UMTS	Low	1852.50	-54.22
	Middle	1882.50	-55.19
	High	1912.50	-55.24

PCS 1900 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1852.50	-65.38
	ighH	1912.50	-64.18
LTE 10 MHz	Low	1855.00	-65.74
	High	1910.00	-65.06
CDMA	Low	1851.25	-69.42
	High	1913.75	-71.01
GSM	Low	1850.20	-50.32
	High	1914.80	-50.61
UMTS	Low	1852.50	-65.08
	High	1912.50	-64.75

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 5 MHz	Low	1852.50	-51.20
	Middle	1882.50	-52.65
	High	1912.50	-51.55
LTE 10 MHz	Low	1855.00	-51.95
	Middle	1882.50	-52.17
	High	1910.00	-51.24
CDMA	Low	1851.25	-52.66
	Middle	1882.50	-52.38
	High	1913.75	-51.35
GSM	Low	1850.20	-51.76
	Middle	1882.50	-52.80
	High	1914.80	-51.87
UMTS	Low	1852.50	-51.21
	Middle	1882.50	-52.18
	High	1912.50	-52.23

WCS band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 10 MHz	Low	2310.00	-58.91
	High	2310.00	-61.17

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
LTE 10 MHz	Low	-	-
	Middle	2310.00	-23.51
	High	-	-

Note. Emission level is the worst measurement value

Additional spurious emission is shown on corresponding plots on the 582 ~ 586 page

IC

700 MHz band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	728.40	-25.41
	High	755.60	-25.41

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	742.50	-25.55
	Middle	755.60	-27.32
	High	755.60	-25.77

700 MHz band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	728.40	-22.40
	High	755.60	-22.40

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	742.50	-22.54
	Middle	755.60	-24.31
	High	755.60	-22.76

SMR 800, Cellualr 850 MHz band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	862.40	-24.32
	High	893.60	-23.61

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	862.40	-24.40
	Middle	878.00	-25.53
	High	893.60	-23.76

AWS2100 band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2110.40	-24.49
	High	2179.60	-24.79

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2110.40	-20.81
	Middle	2145.00	-21.17
	High	2179.60	-20.97

AWS2100 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2110.40	-21.48
	High	2179.60	-21.78

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2110.40	-17.80
	Middle	2145.00	-18.16
	High	2179.60	-17.96

BRS band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2496.40	-22.04
	High	2689.60	-23.09

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2496.40	-21.39
	Middle	2593.00	-21.36
	High	2689.60	-21.97

BRS band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2496.40	-19.03
	High	2689.60	-20.08

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2496.40	-18.38
	Middle	2593.00	-18.35
	High	2689.60	-18.96

PCS 1900 band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1930.40	-22.45
	High	1994.60	-22.55

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1930.40	-18.26
	Middle	1962.50	-20.94
	High	1994.60	-19.17

PCS 1900 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1930.40	-19.44
	High	1994.60	-19.54

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1930.40	-15.25
	Middle	1962.50	-17.93
	High	1994.60	-16.16

WCS band

[Downlink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2350.40	-21.90
	High	2359.60	-21.93

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2350.40	-21.39
	Middle	2355.00	-21.77
	High	2359.60	-21.73

Note. Emission level is the worst measurement value

Additional spurious emission is shown on corresponding plots on the 622 ~ 636 page

700 MHz band_5MHz

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	698.40	-58.01
	High	715.60	-57.75

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	698.40	-54.71
	Middle	707.00	-56.76
	High	715.60	-55.02

700 MHz band_5MHz_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	698.40	-55.00
	High	715.60	-54.74

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	698.40	-51.70
	Middle	707.00	-53.75
	High	715.60	-52.01

700 MHz band_10MHz

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	777.40	-66.19
	High	755.60	-68.14

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	777.40	-56.12
	Middle	782.00	-54.39
	High	786.60	-55.74

700 MHz band_10MHz_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	777.40	-63.18
	High	755.60	-65.13

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	777.40	-53.11
	Middle	782.00	-51.38
	High	786.60	-52.73

SMR 800, Cellualr 850 MHz band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	817.40	-59.27
	High	848.60	-68.25

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	817.40	-54.73
	Middle	833.00	-56.31
	High	848.60	-56.87

AWS2100 band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1710.40	-58.35
	High	1779.60	-61.71

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1710.40	-56.28
	Middle	1745.00	-58.06
	High	1779.60	-56.61

AWS2100 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1710.40	-55.34
	High	1779.60	-58.70

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1710.40	-53.27
	Middle	1745.00	-55.05
	High	1779.60	-53.60

BRS band

[Uplink]

No test

Note. Because BRS Band is TDD System (the uplink and downlink transmissions usually share the same frequency), worst case (downlink) is tested

PCS 1900 band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1850.40	-53.79
	High	1914.60	-55.60

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1850.40	-51.71
	Middle	1882.50	-53.26
	High	1914.60	-51.67

PCS 1900 band_MIMO

Note. The Out-of-Band and Spurious Emission level were calculated, as described in FCC KDB 662911D01v02r01 section E)3)a)iii)

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1850.40	-50.78
	High	1914.60	-52.59

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	1850.40	-48.70
	Middle	1882.50	-50.25
	High	1914.60	-48.66

WCS band

[Uplink]

Band Edge

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2305.40	-54.10
	High	2314.60	-60.09

Spurious emissions

	Channel	Frequency (MHz)	Emission Level (dBm)
Unmodulation	Low	2305.40	-45.31
	Middle	2310.00	-45.21
	High	2314.60	-45.38

Note. Emission level is the worst measurement value

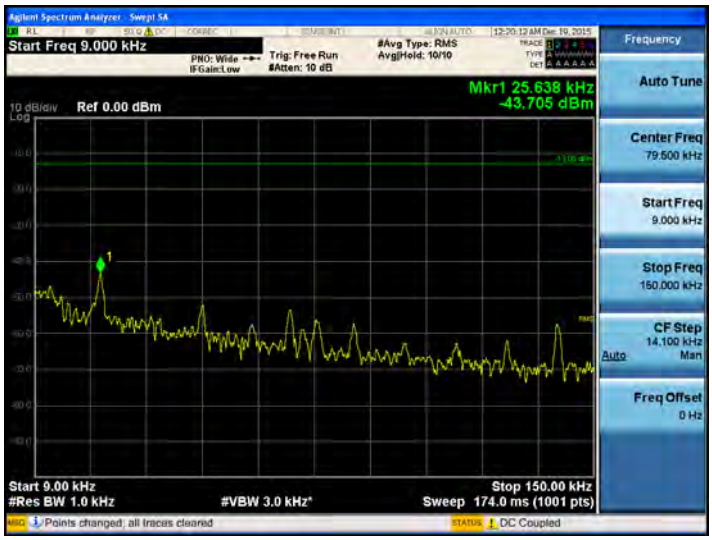
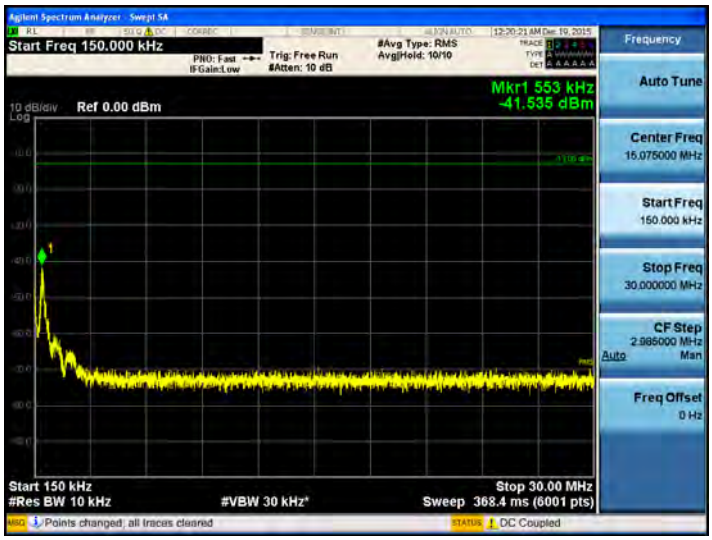
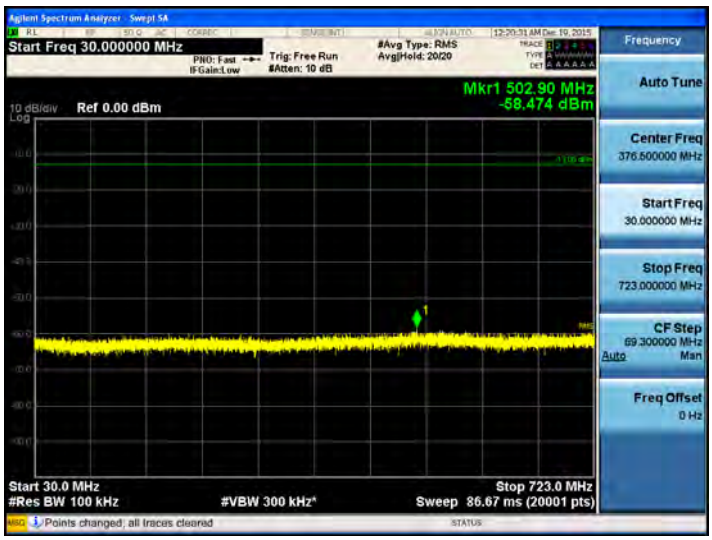
Additional spurious emission is shown on corresponding plots on the 655 ~ 697 page

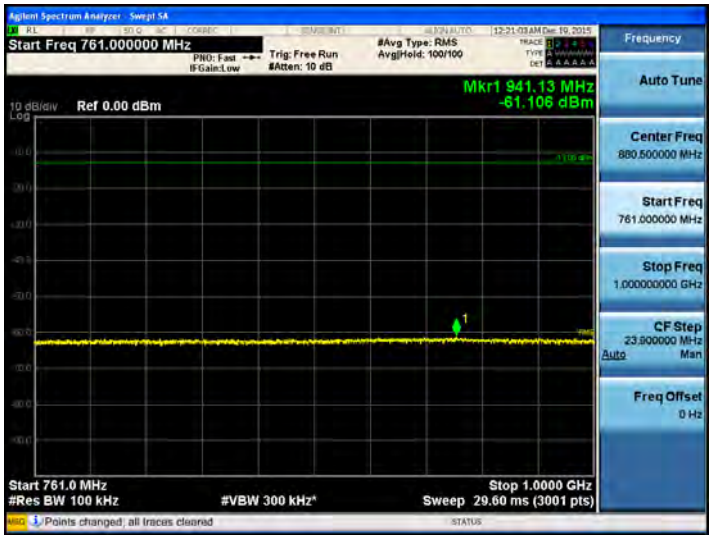
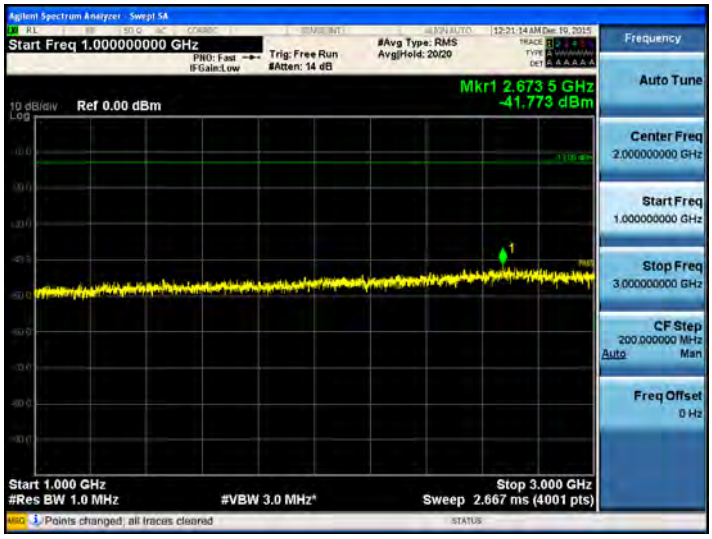
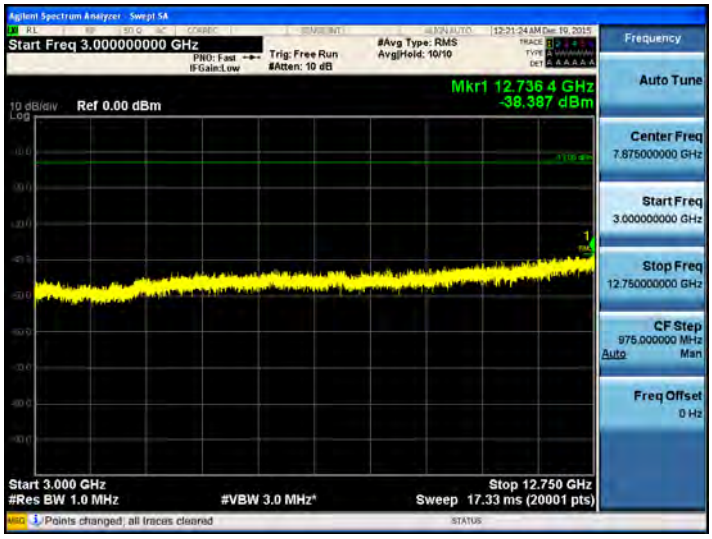
Single channel Enhancer Plots of Spurious Emission

Downlink

700 MHz Band LTE

[700MHz _LTE 5 MHz Downlink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

[700MHz _LTE 5 MHz Downlink Mid]

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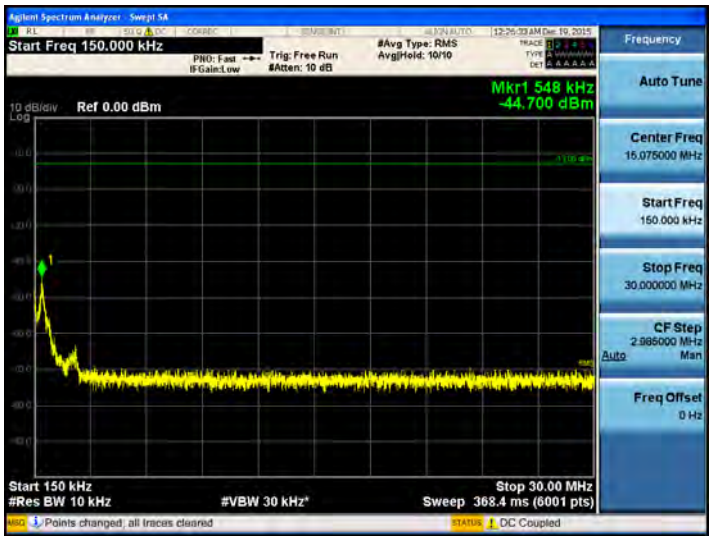
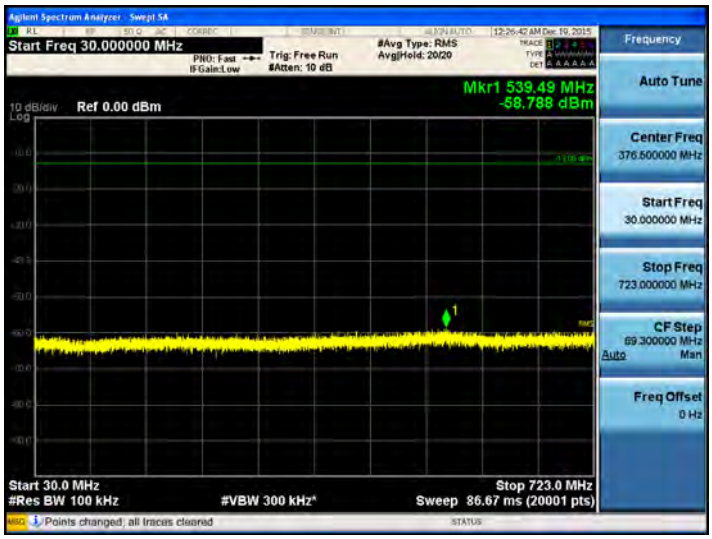
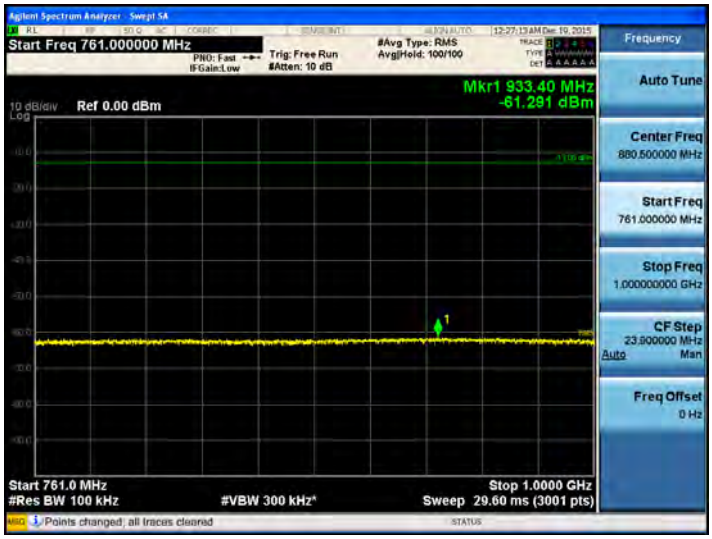
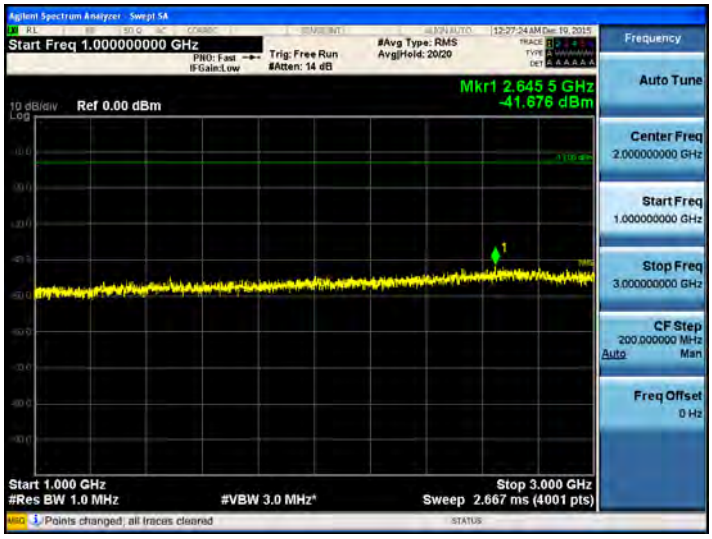
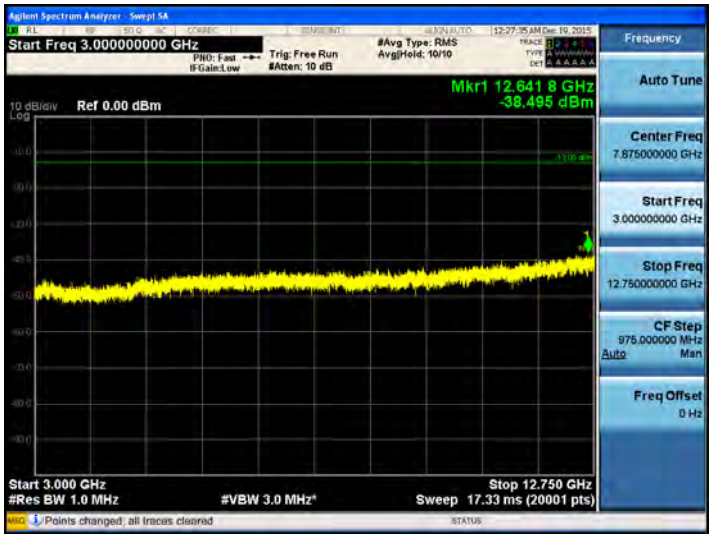
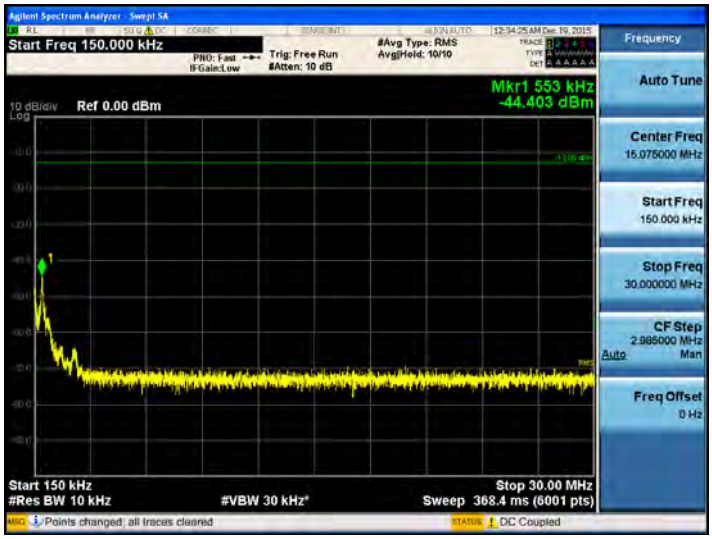
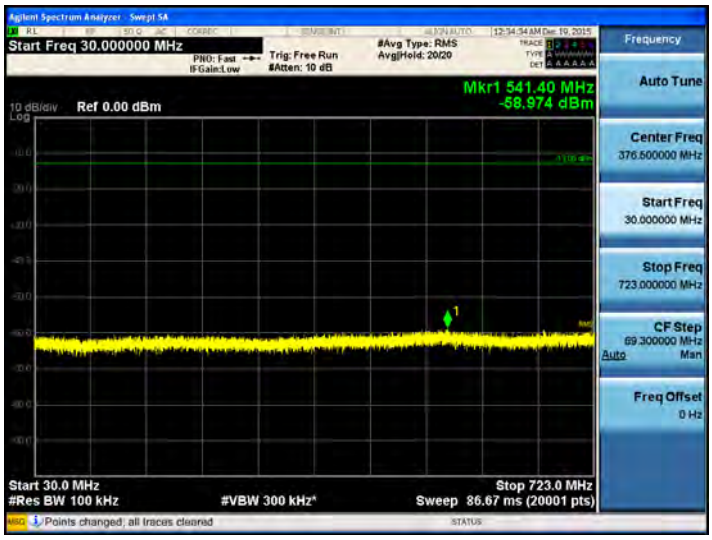
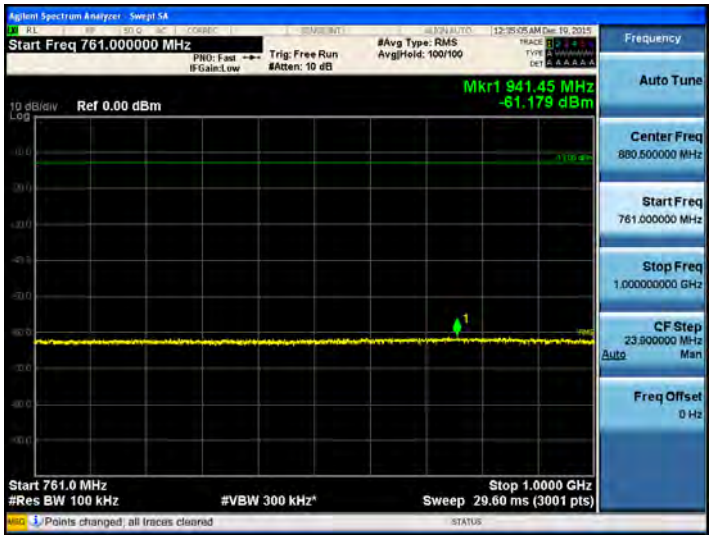
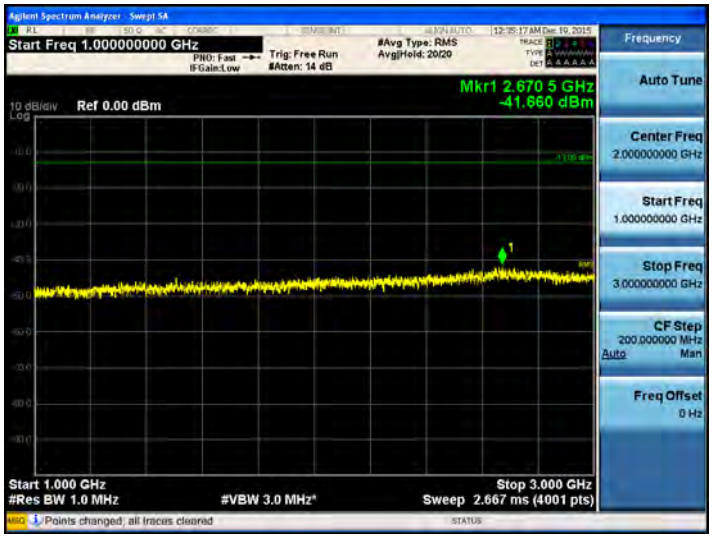
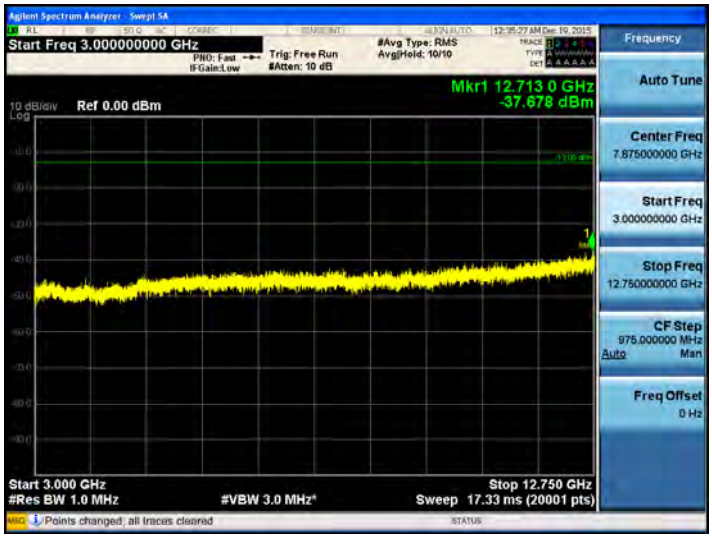
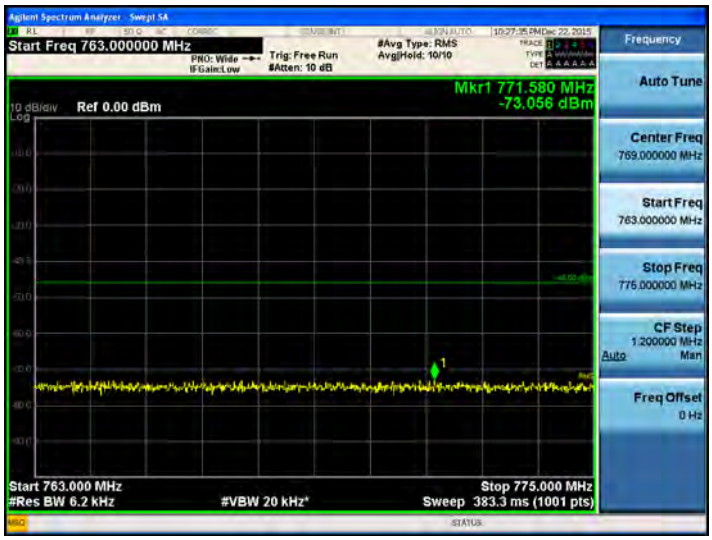
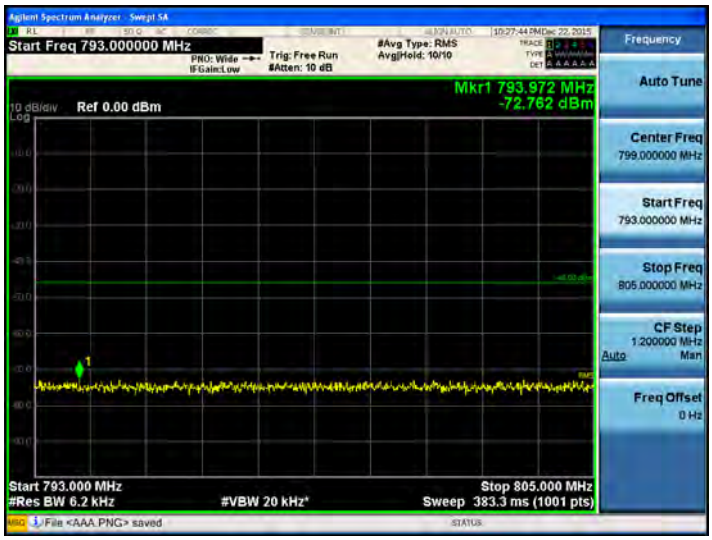
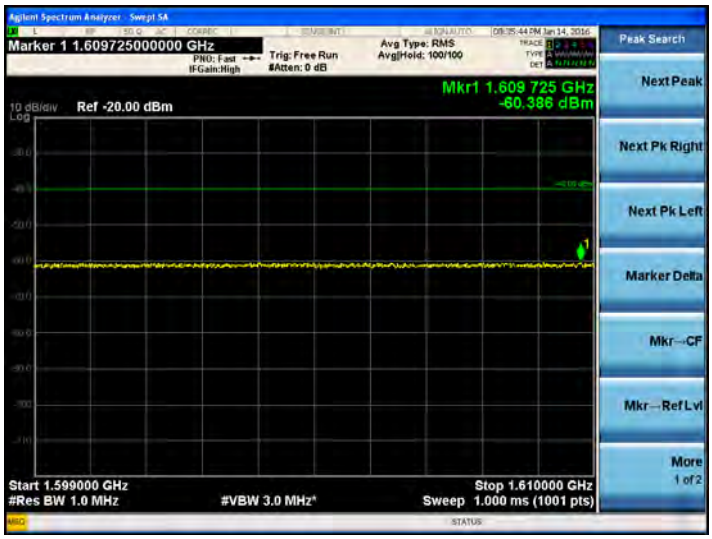
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

[700MHz _LTE 5 MHz Downlink High]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

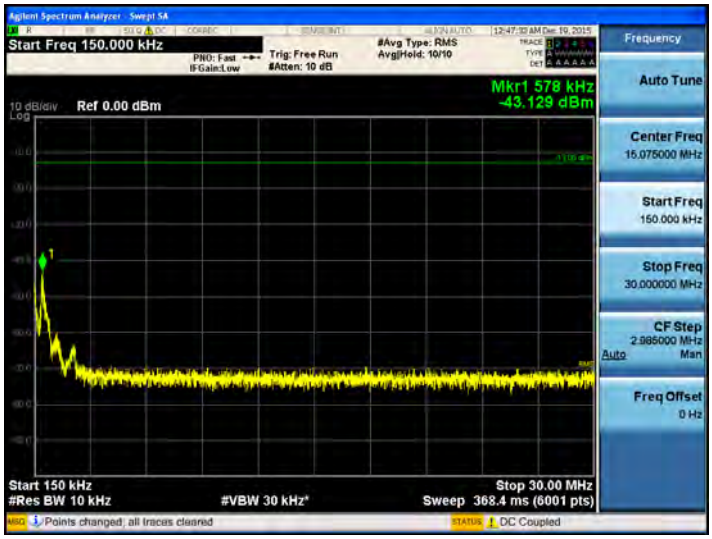
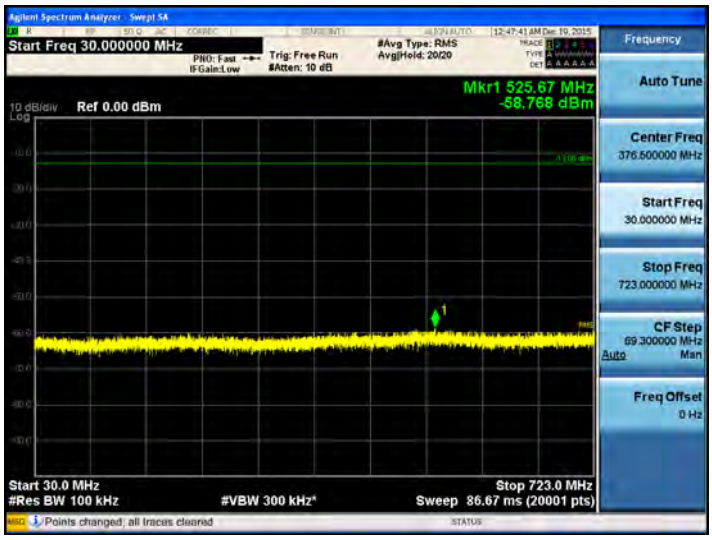
30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

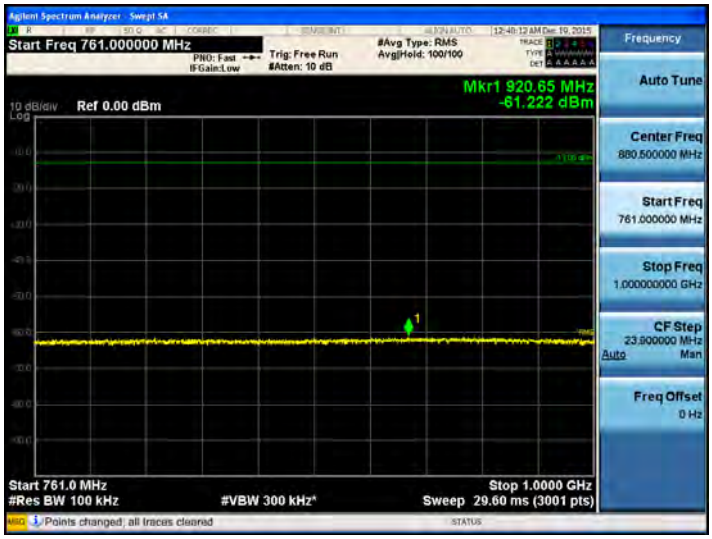
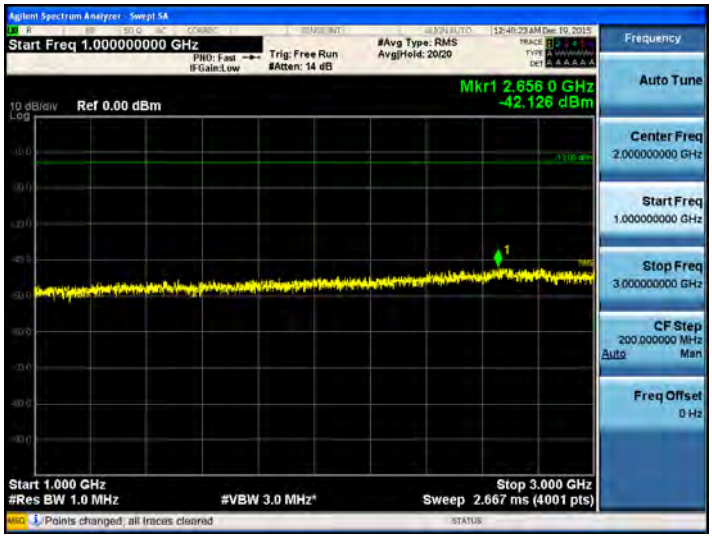
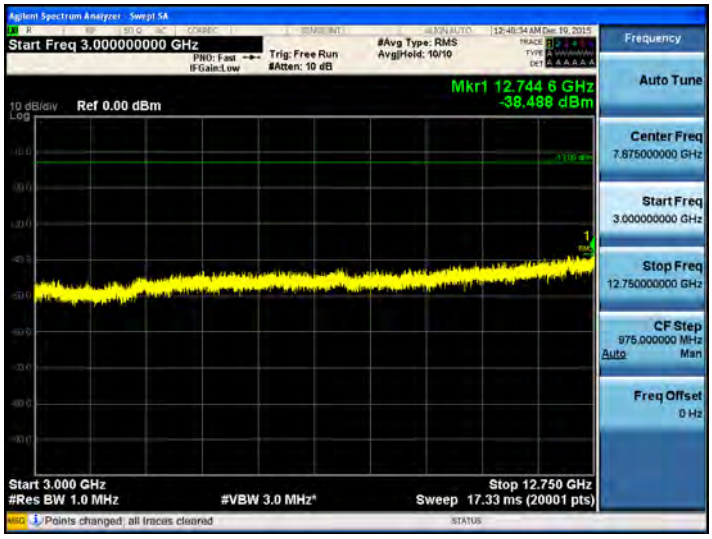
763㎒ ~ 775㎒	793㎒ ~ 805㎒
	
1559㎒ ~ 1610㎒	**1559㎒ ~ 1610㎒**
	

Band Edge_LTE 5MHz Downlink Low	Band Edge_LTE 5MHz Downlink High

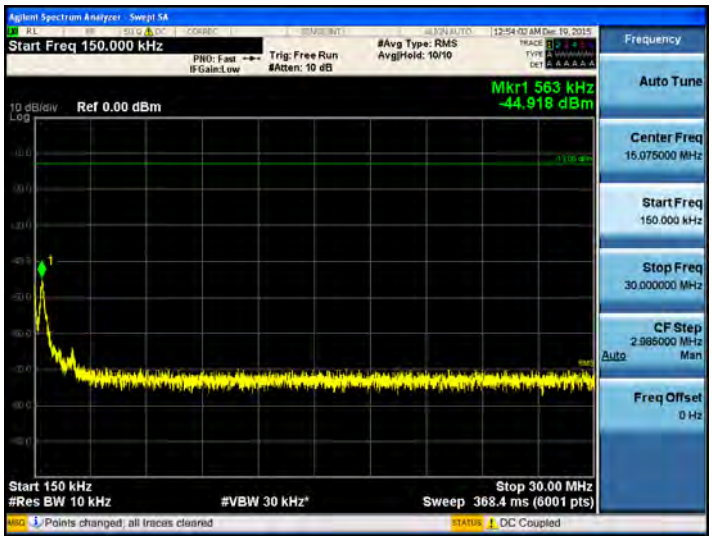
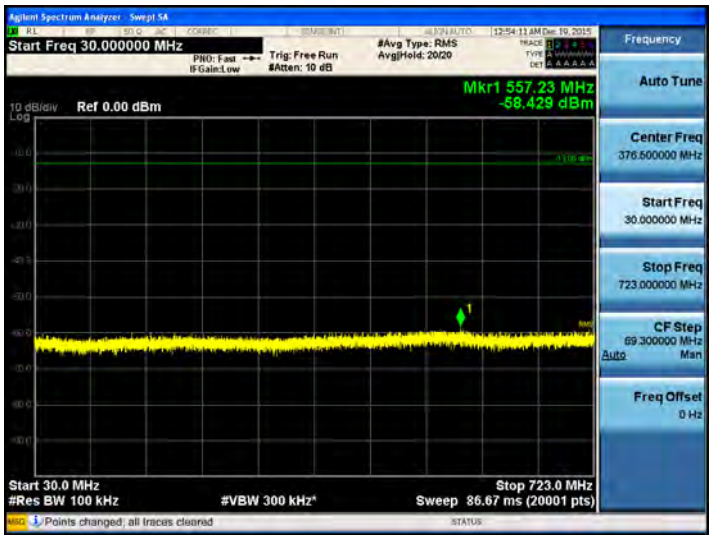
700 MHz Band LTE_10 MHz

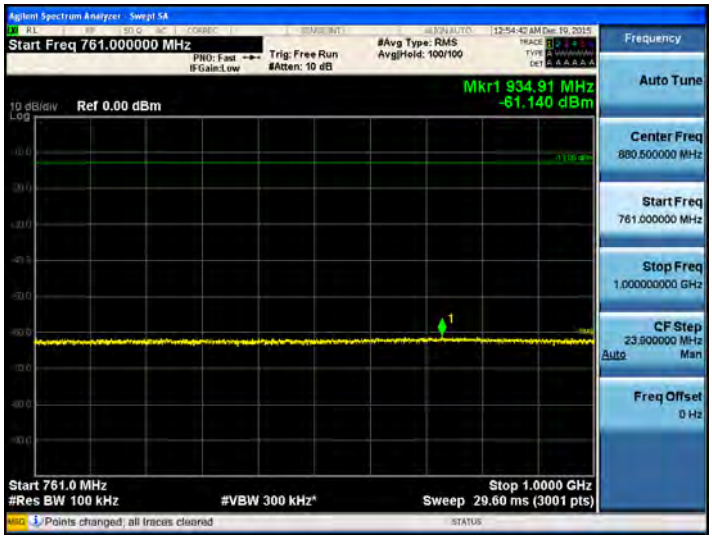
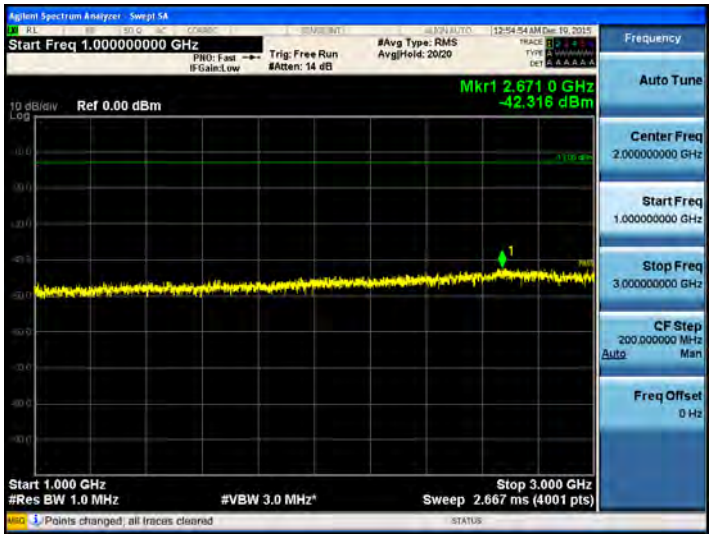
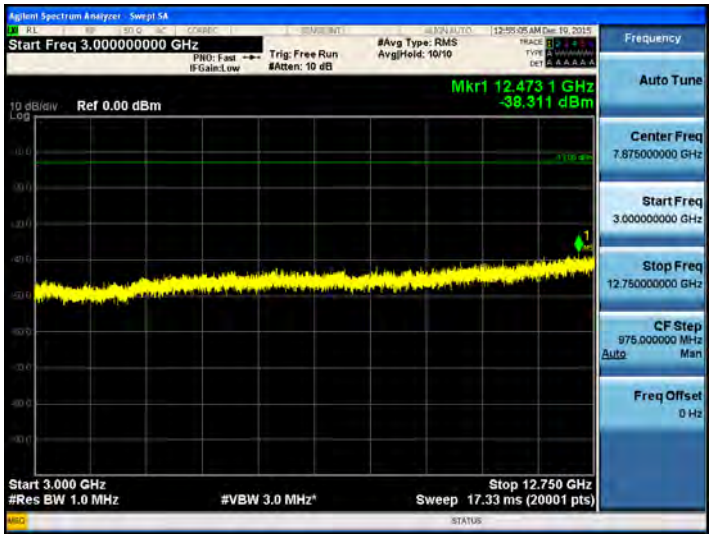
[700MHz _LTE 10 MHz Downlink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

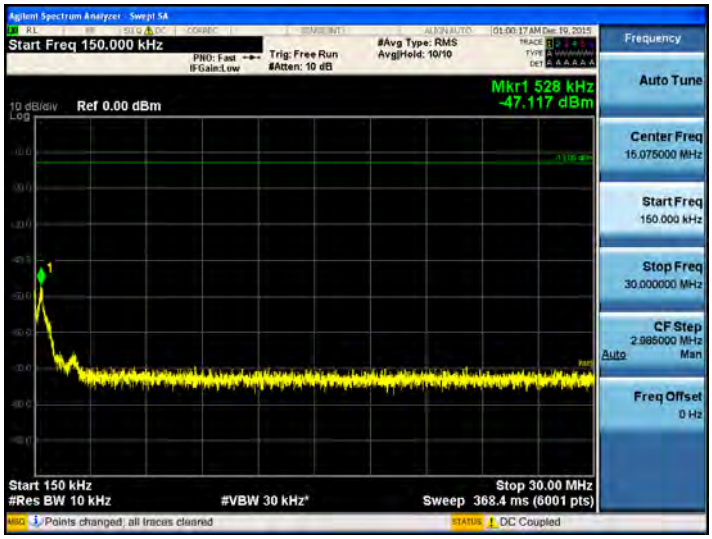
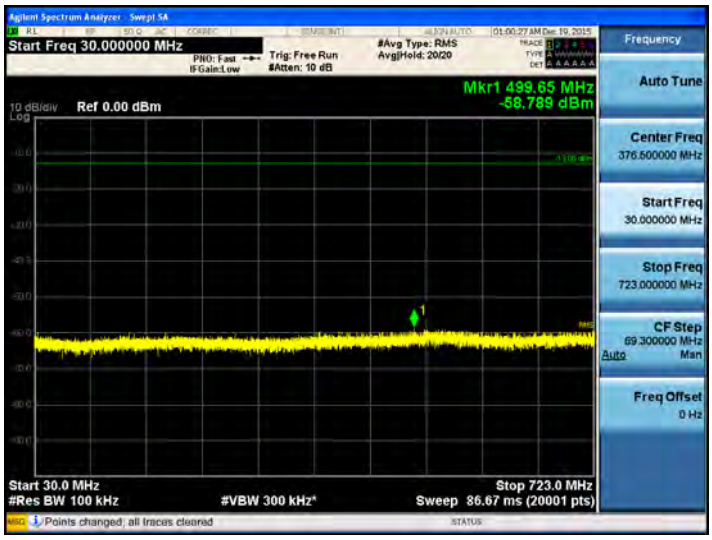
30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

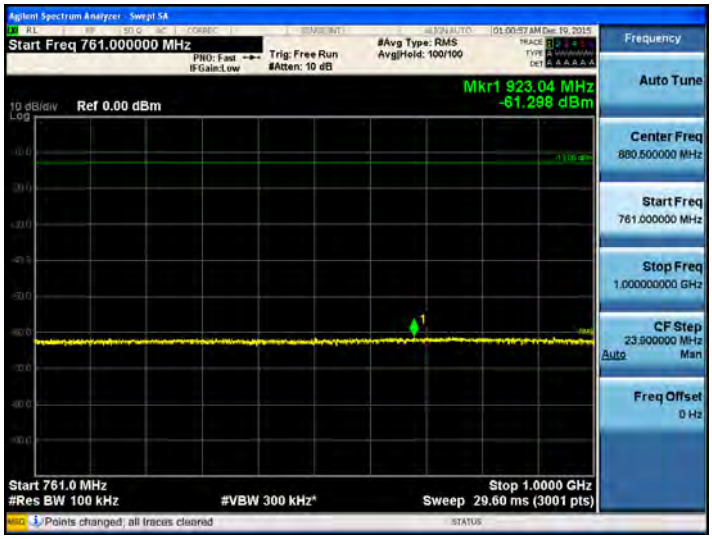
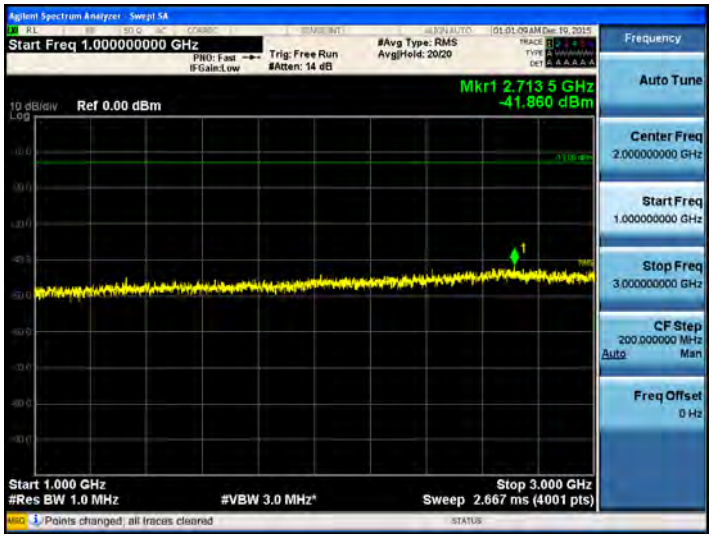
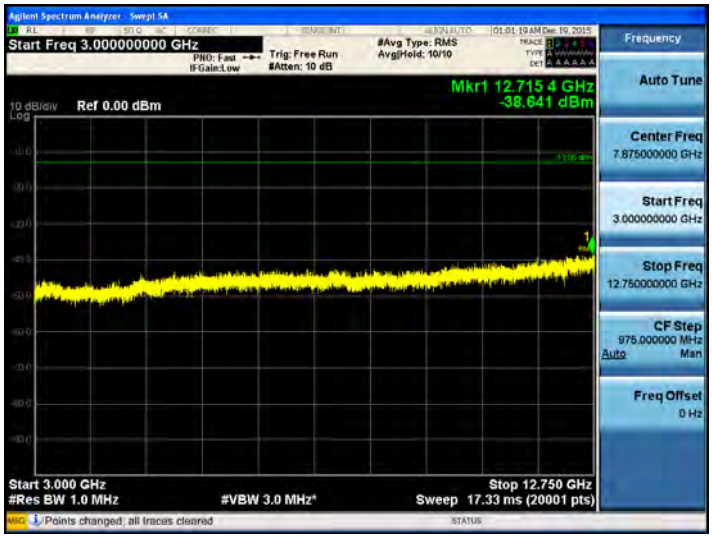
[700MHz _LTE 10 MHz Downlink Mid]

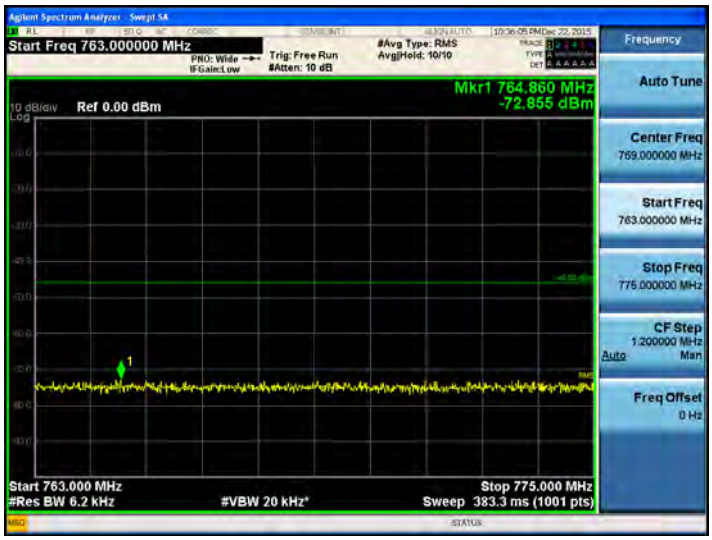
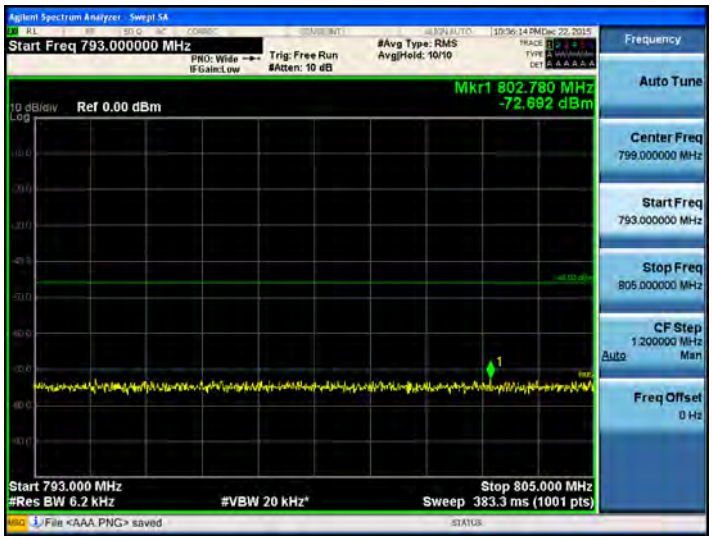
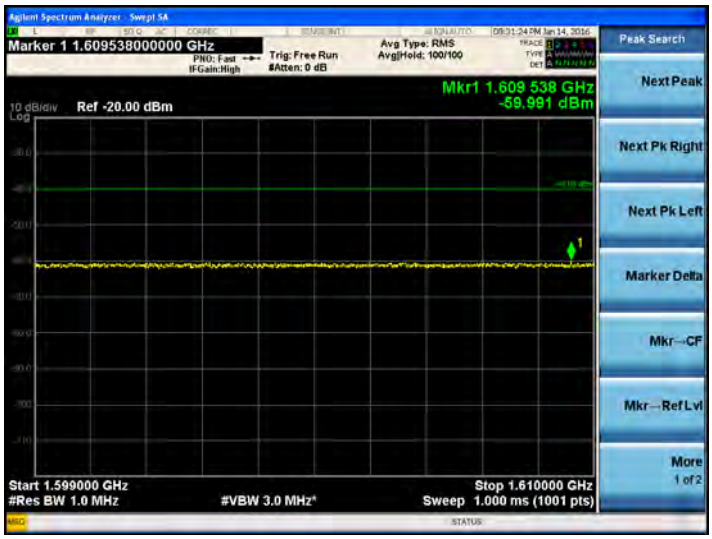
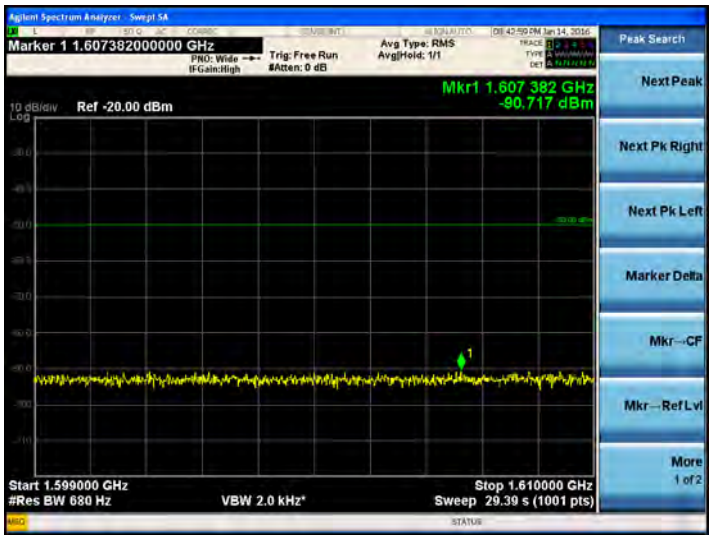
9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

[700MHz _LTE 10 MHz Downlink High]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

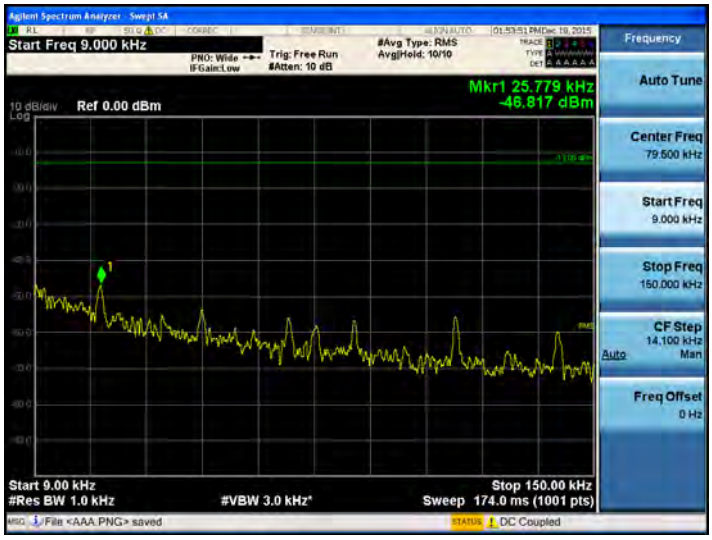
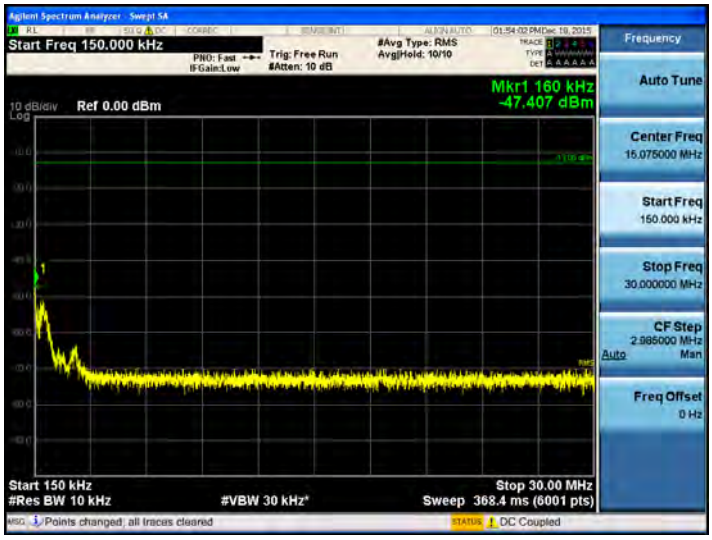
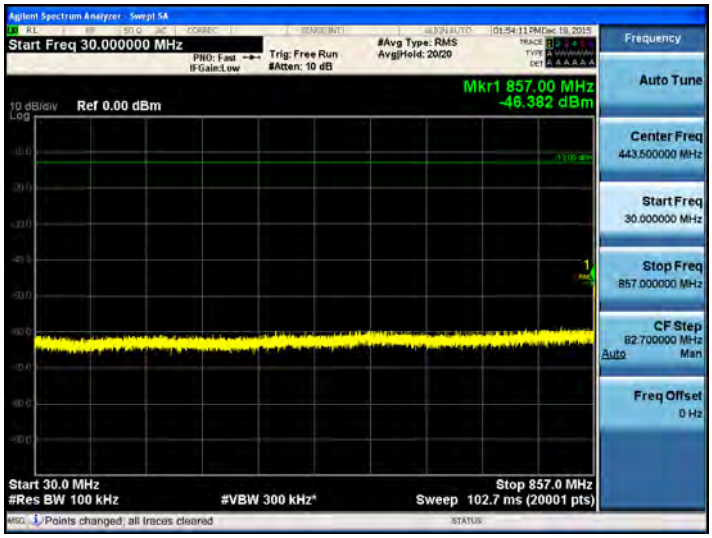
30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

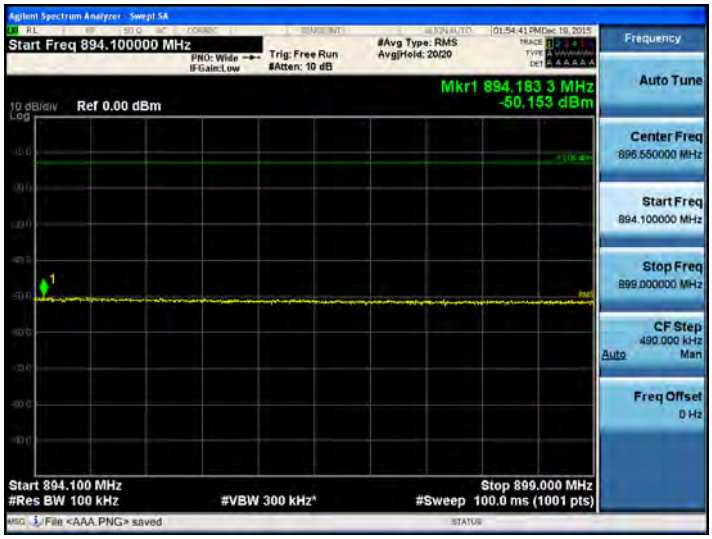
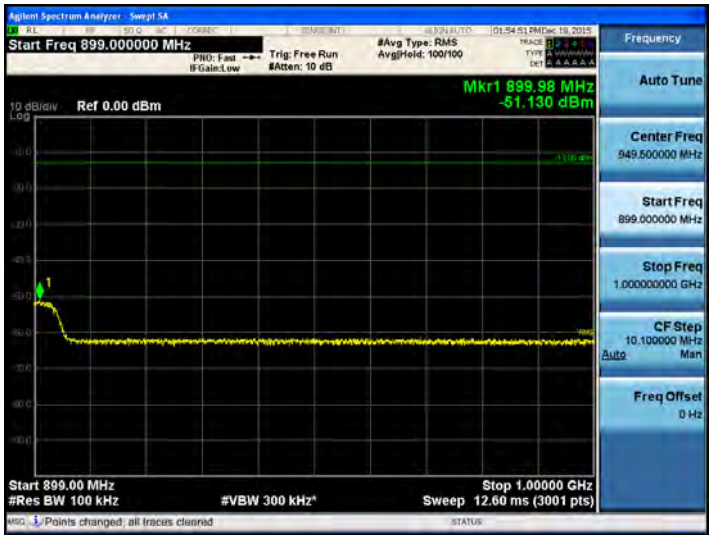
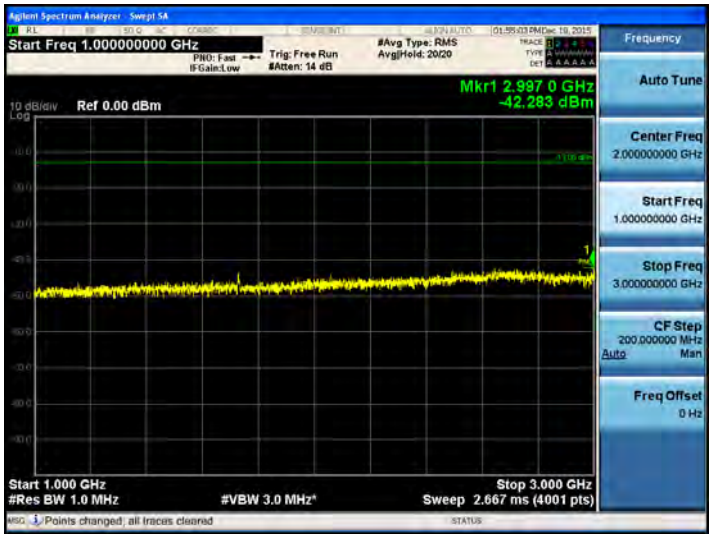
763㎒ ~ 775㎒	793㎒ ~ 805㎒
	
1559㎒ ~ 1610㎒	**1559㎒ ~ 1610㎒**
	

Band Edge_LTE 10MHz Downlink Low	Band Edge_LTE 10MHz Downlink High

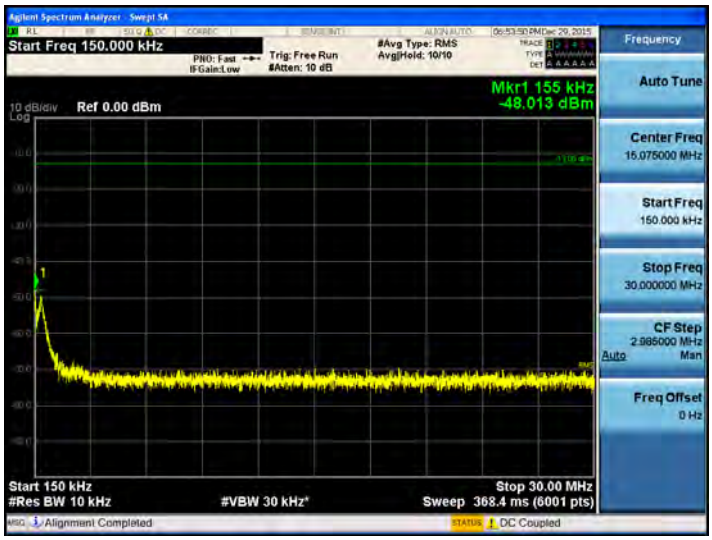
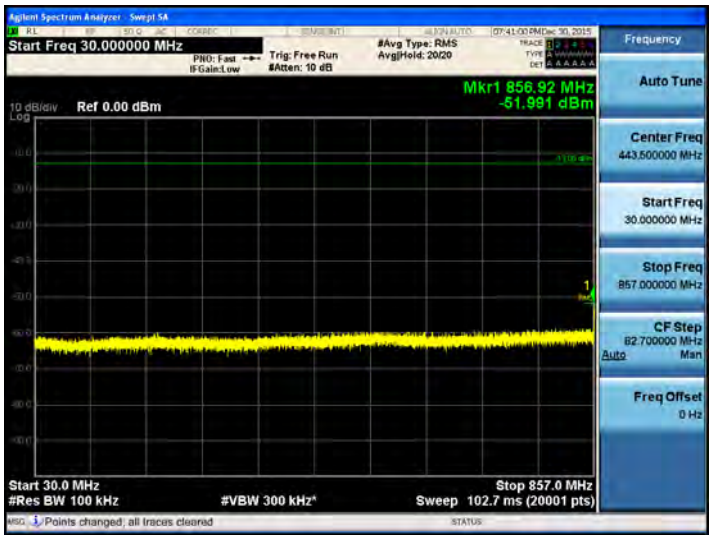
SMR800, 850Cellualr Band LTE

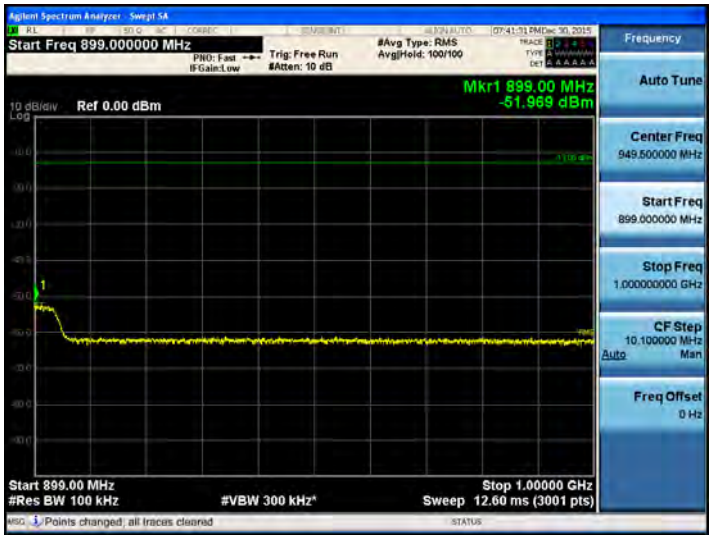
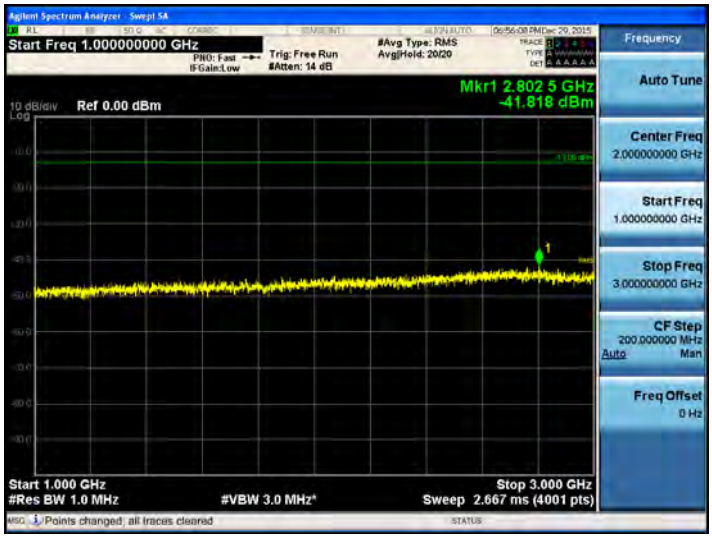
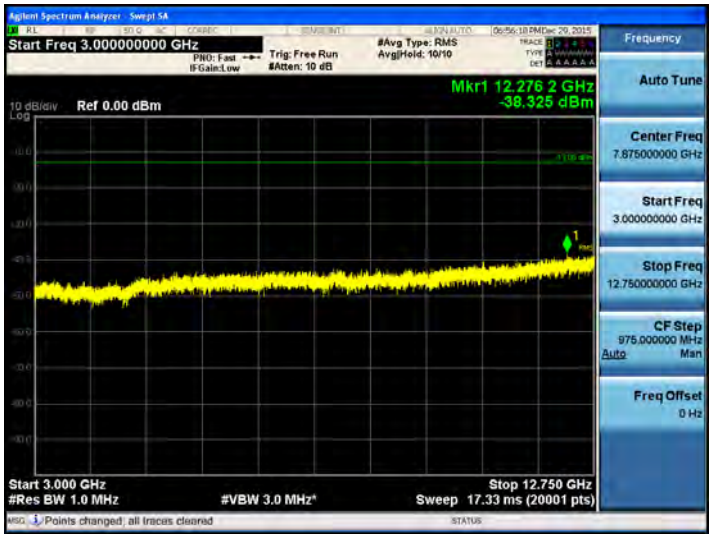
[SMR800, 850Cellualr Band LTE 5 MHz Downlink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

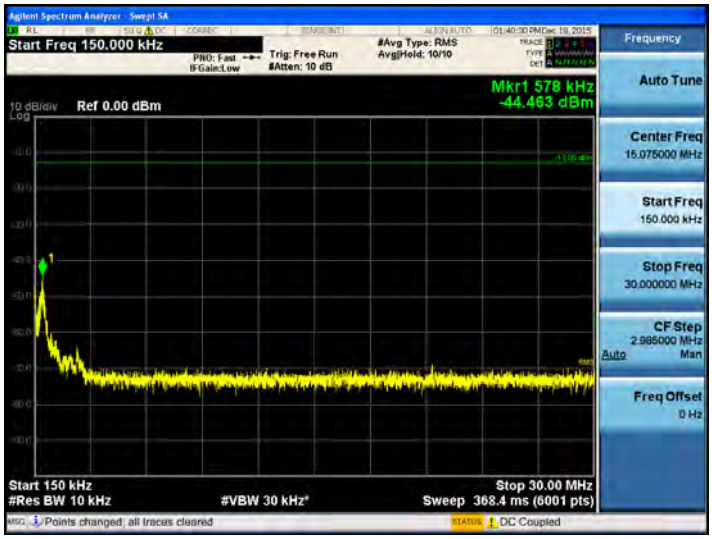
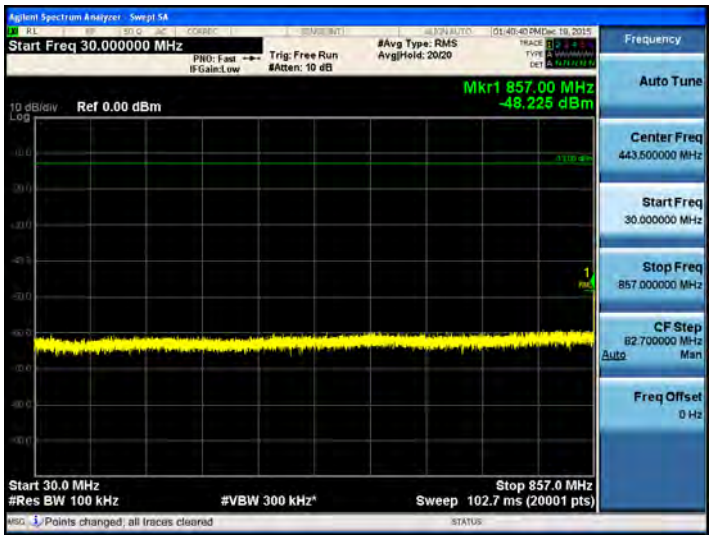
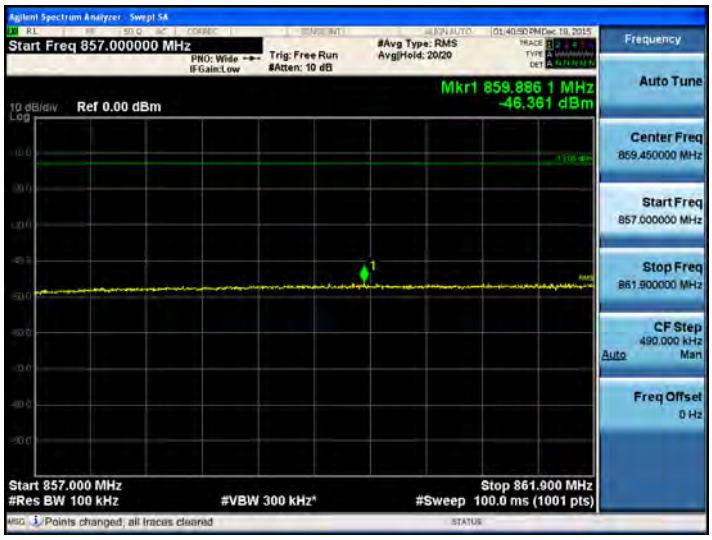
30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

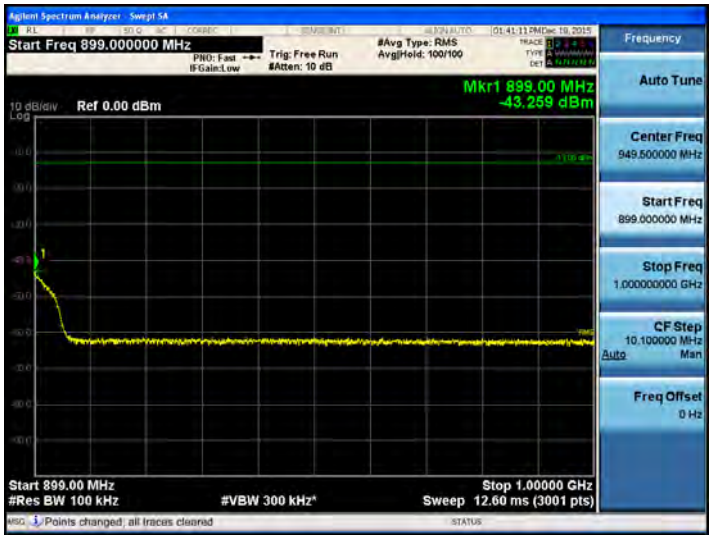
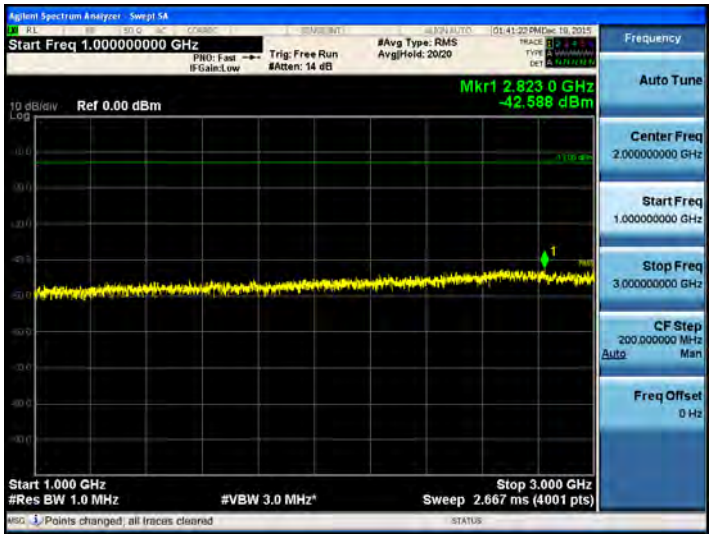
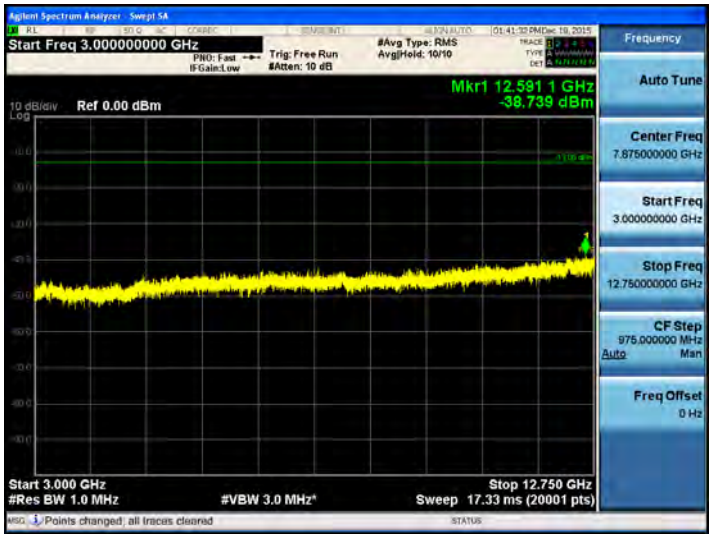
[SMR800, 850Cellualr Band _LTE 5 MHz Downlink Mid]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

[SMR800, 850Cellualr Band _LTE 5 MHz Downlink High]

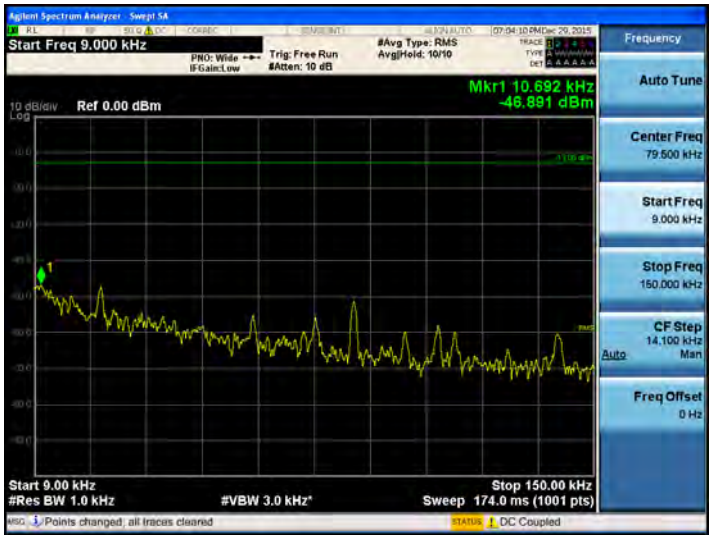
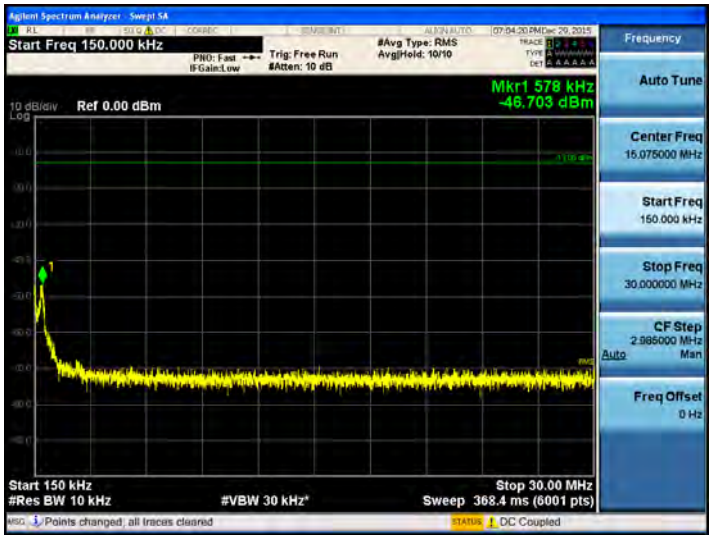
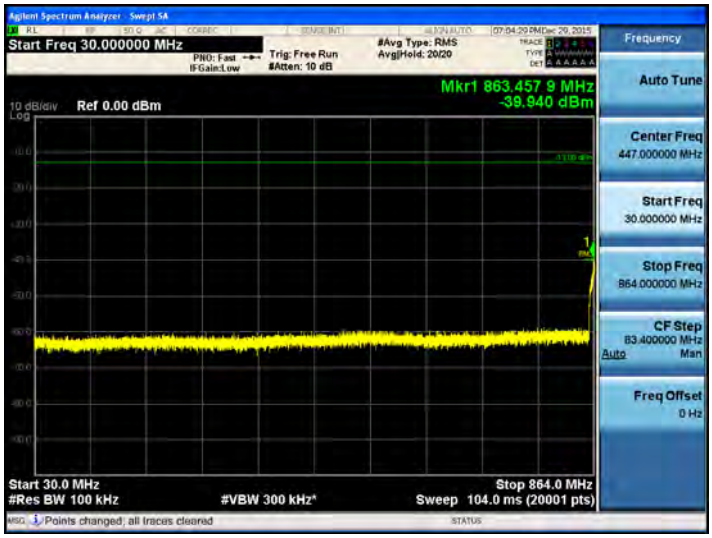
9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

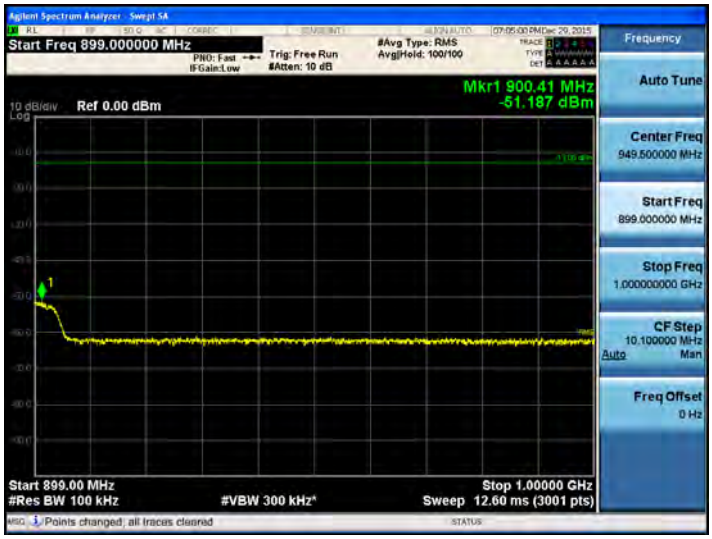
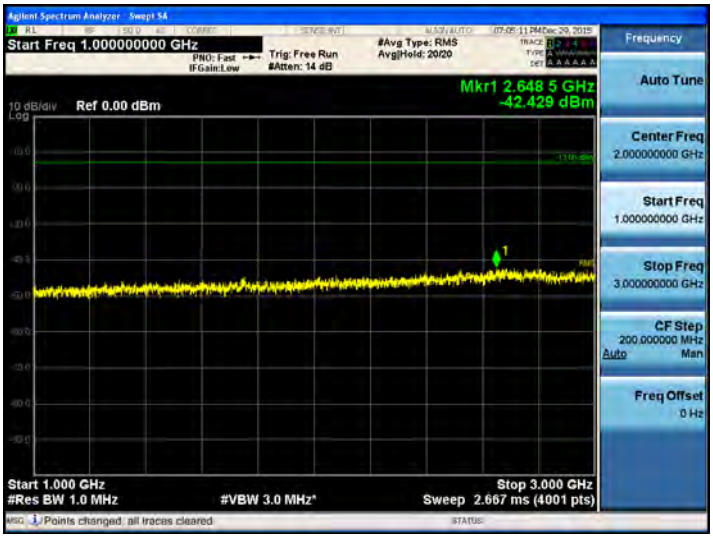
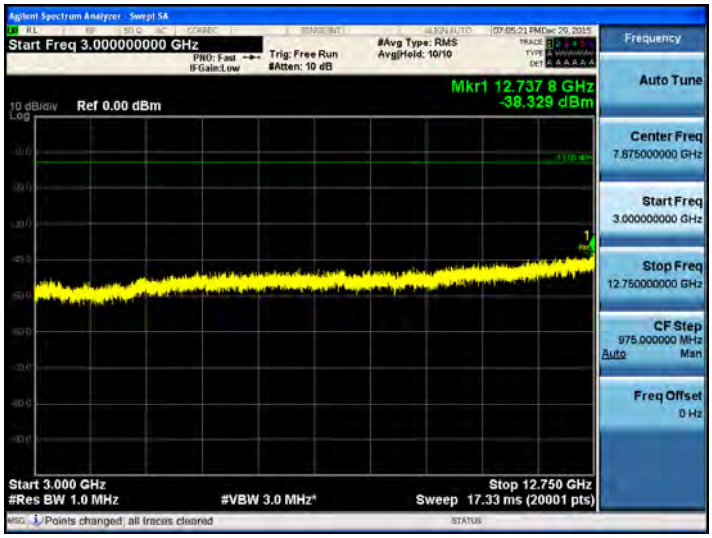
30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

Band Edge_LTE 5MHz Downlink Low	Band Edge_LTE 5MHz Downlink High

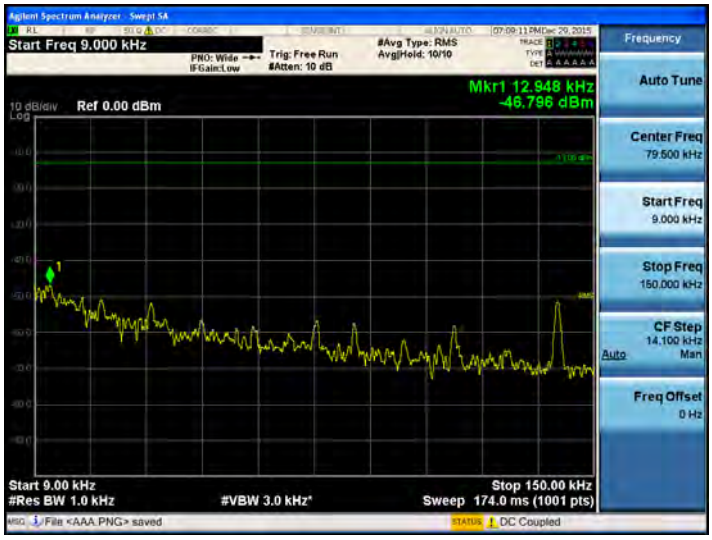
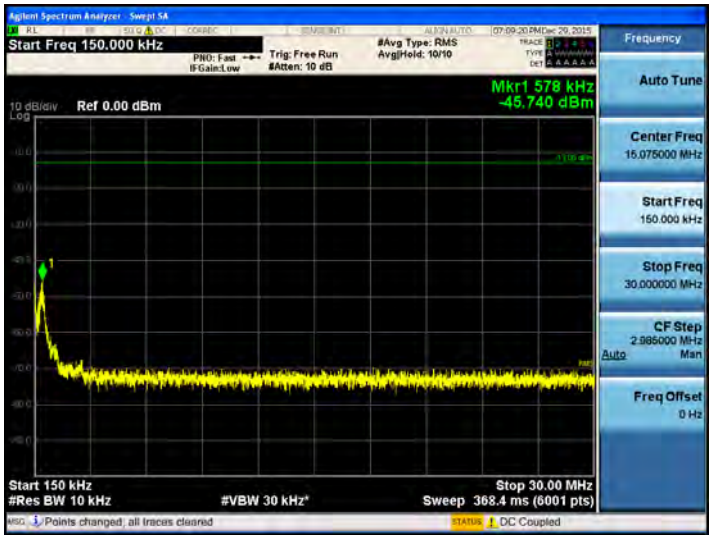
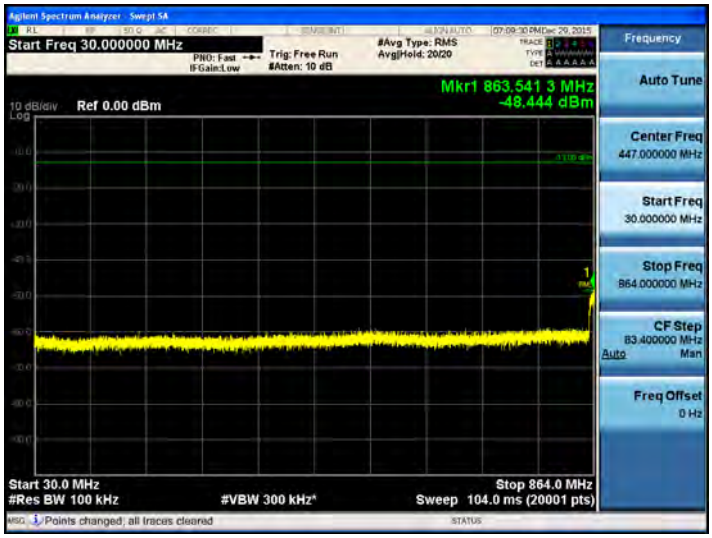
SMR800, 850Cellualr Band LTE_10 MHz

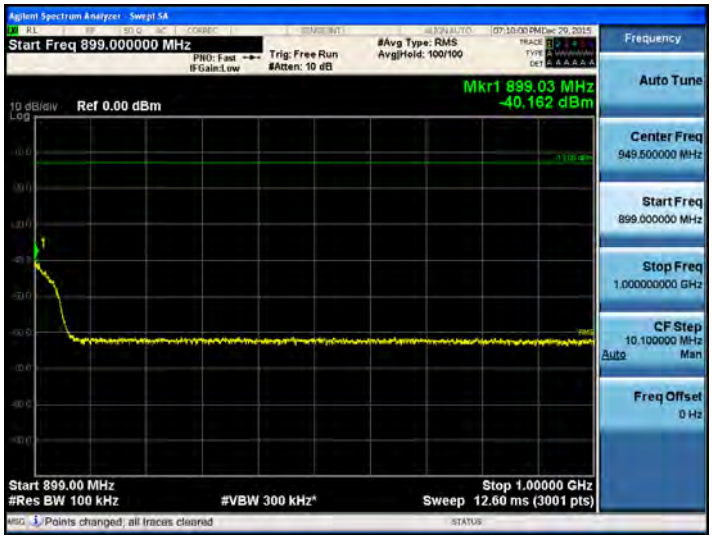
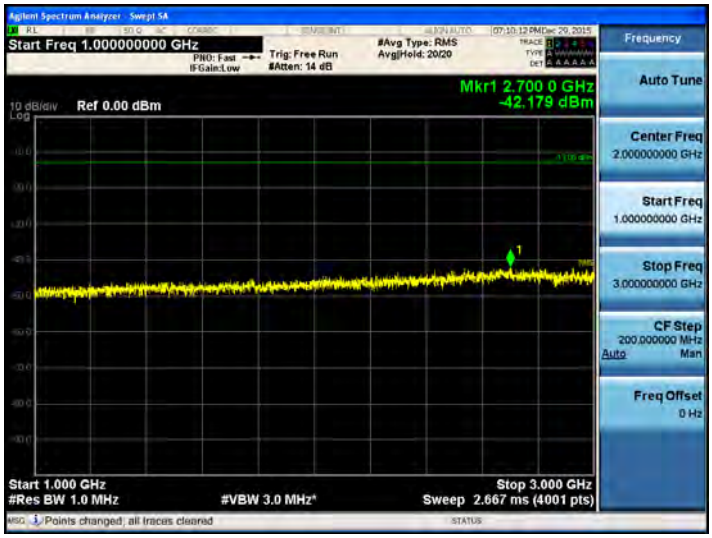
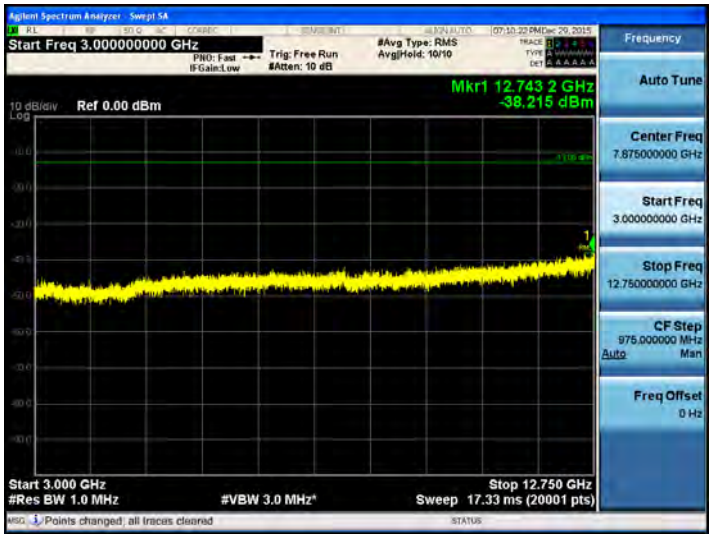
[SMR800, 850Cellualr _LTE 10 MHz Downlink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

[SMR800, 850Cellualr Band _LTE 10 MHz Downlink High]

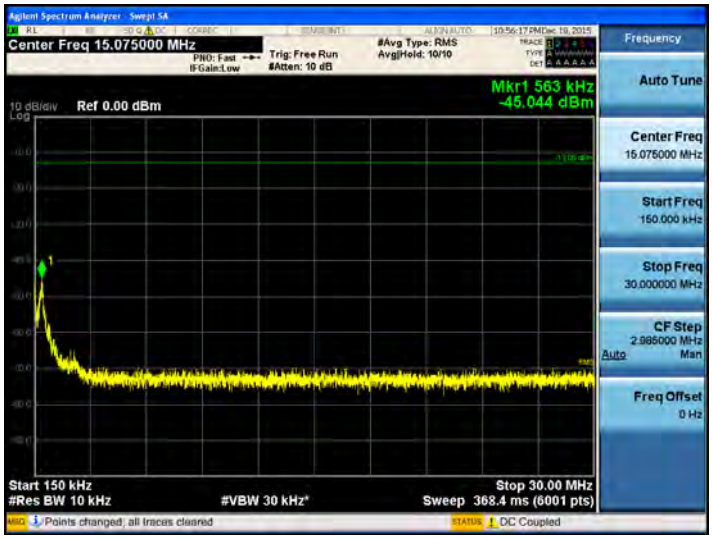
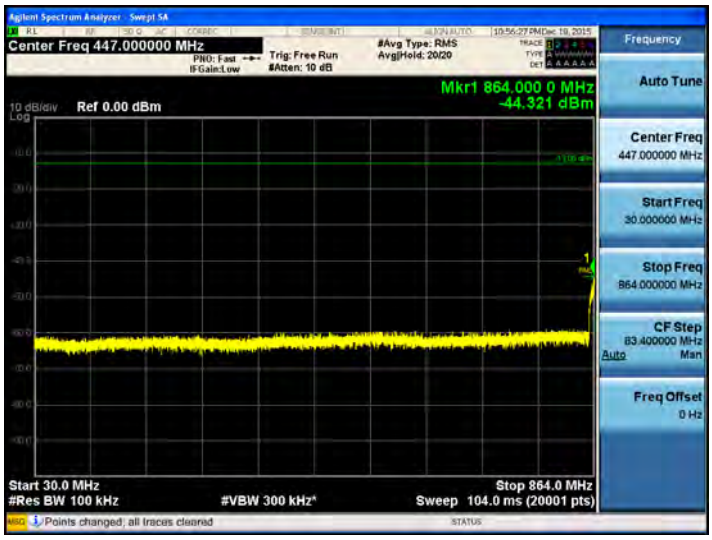
9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

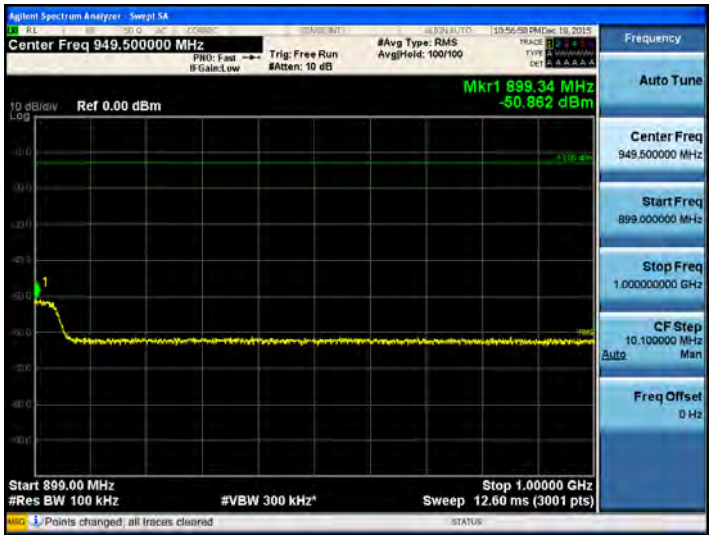
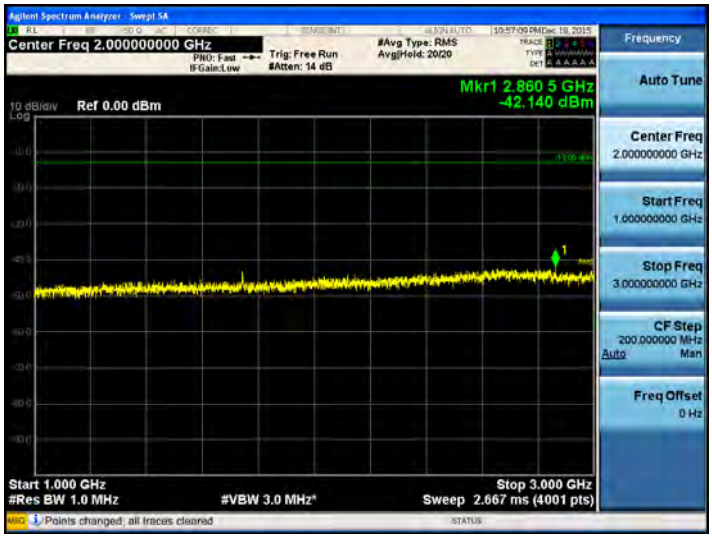
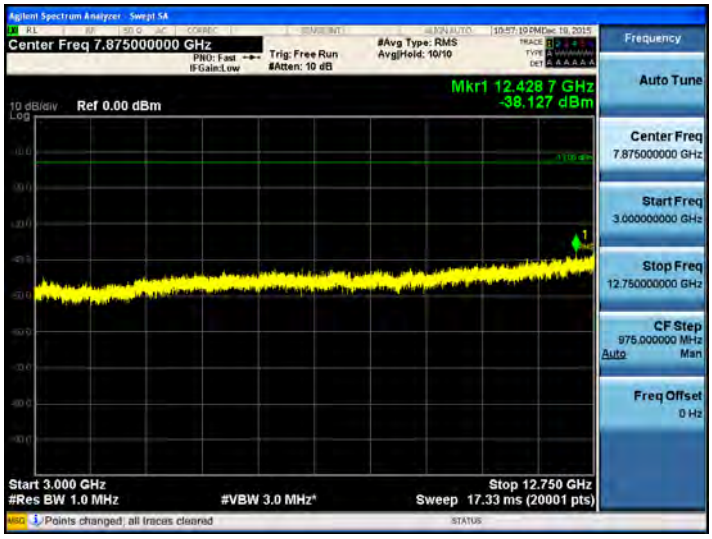
30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

Band Edge_LTE 10MHz Downlink Low	Band Edge_LTE 10MHz Downlink High

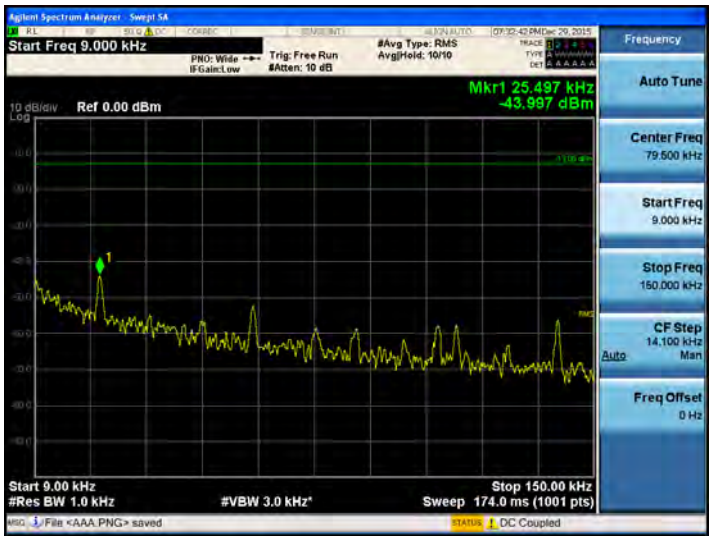
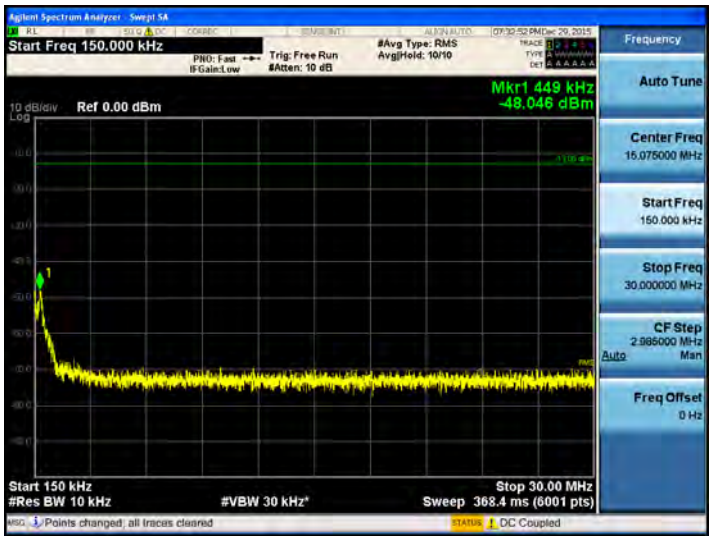
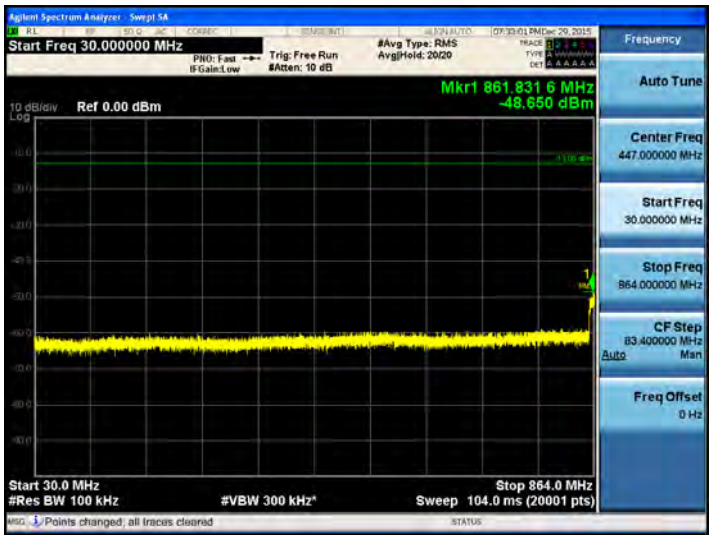
SMR800, 850Cellualr Band UMTS

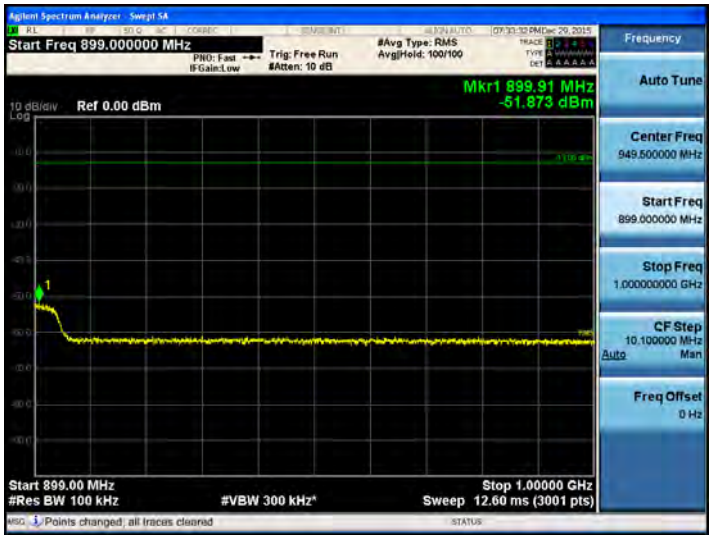
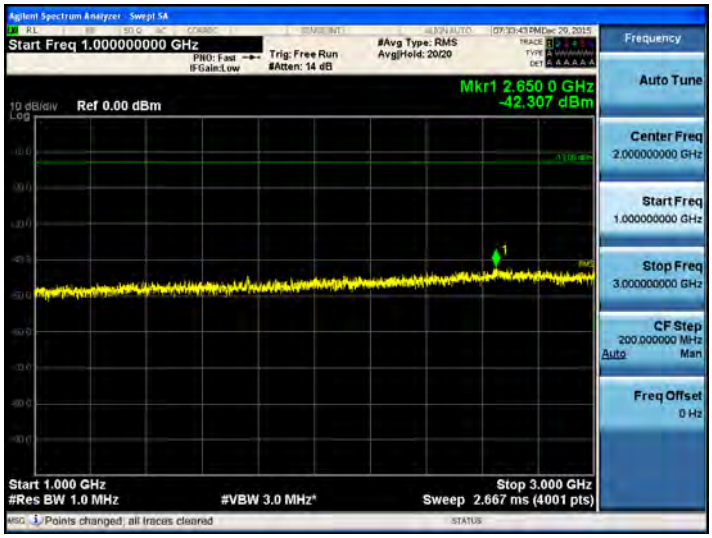
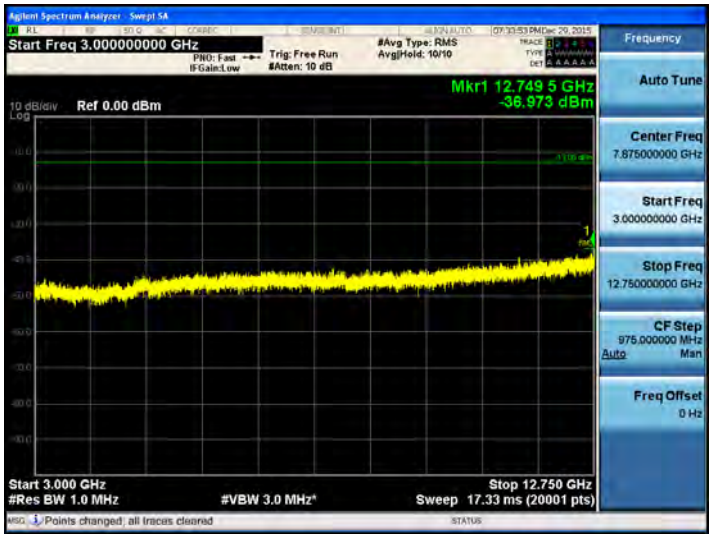
[SMR800, 850Cellualr Band UMTS Downlink Low]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

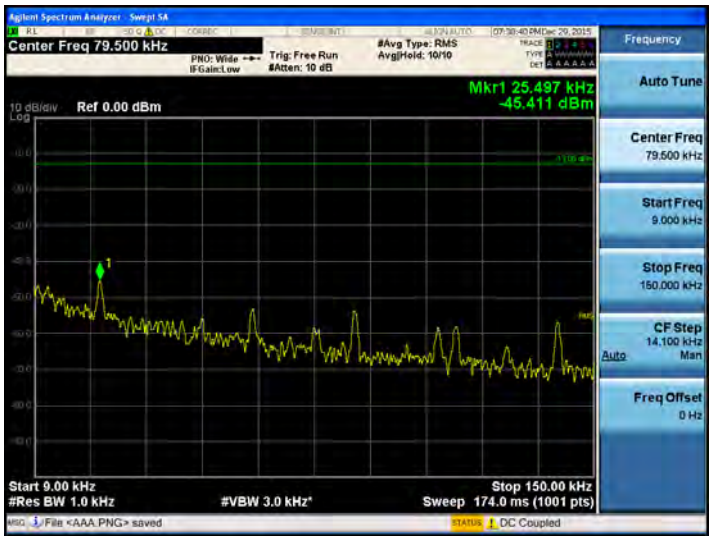
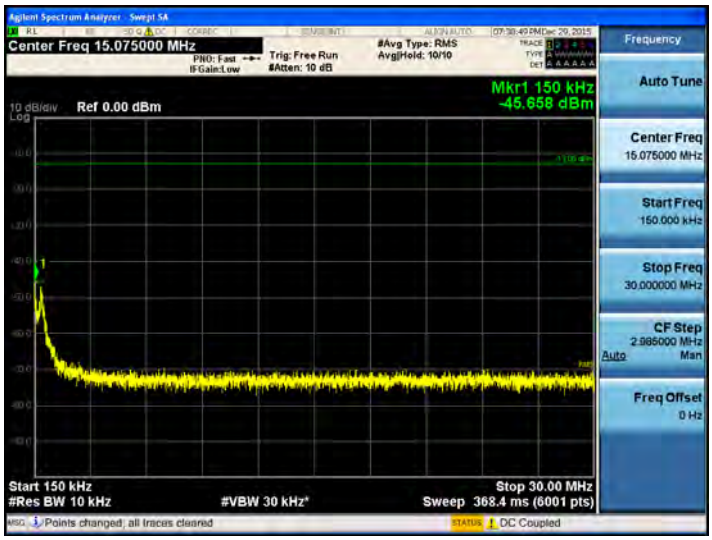
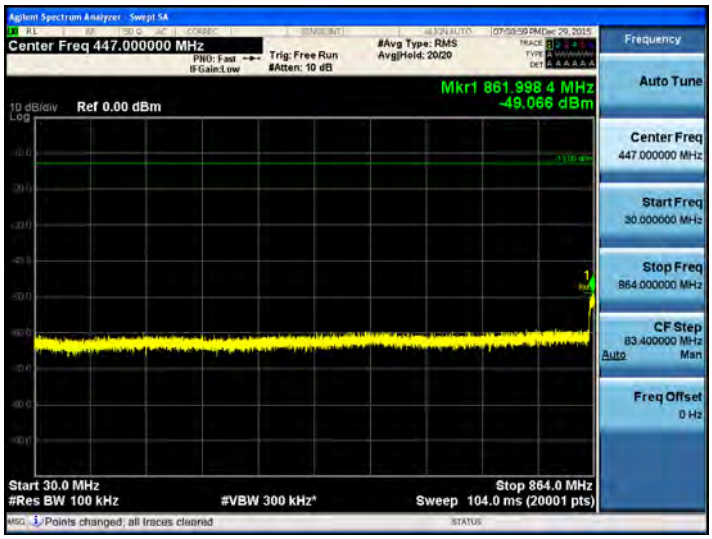
30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

[SMR800, 850Cellualr Band _UMTS Downlink Mid]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**
	

30MHz ~ 1GHz-3	30MHz ~ 1GHz-4
	
1GHz ~ 3GHz	**3GHz ~ 12.75GHz**
	

[SMR800, 850Cellualr Band UMTS Downlink High]

9㎑ ~ 150㎑	150㎑ ~ 30㎒
	
30㎒ ~ 1㎓-1	**30㎒ ~ 1㎓-2**