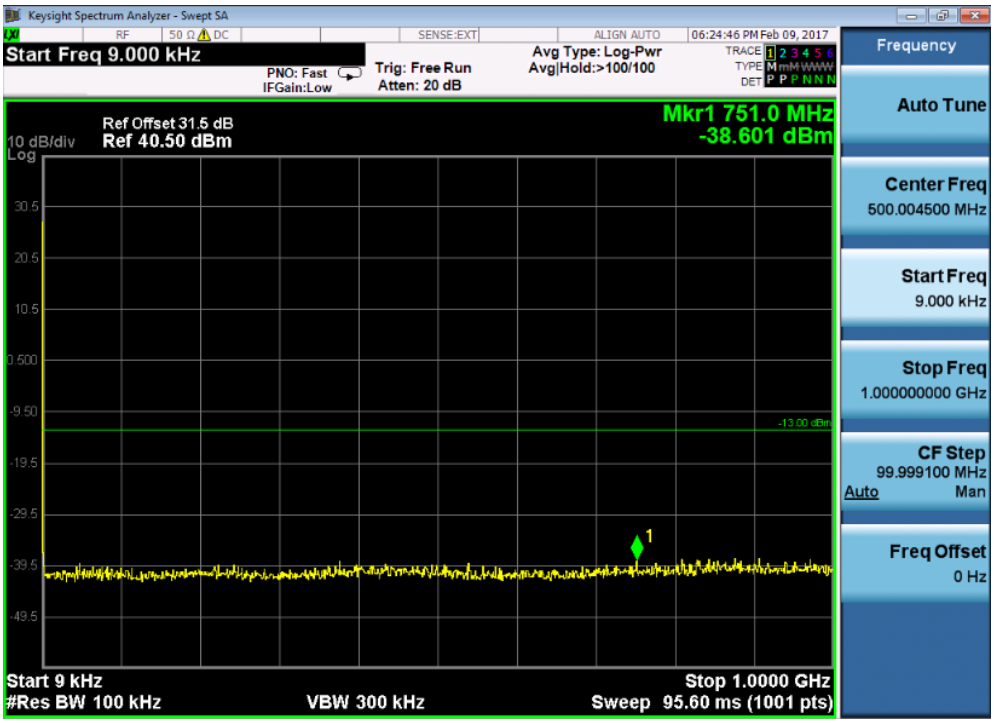
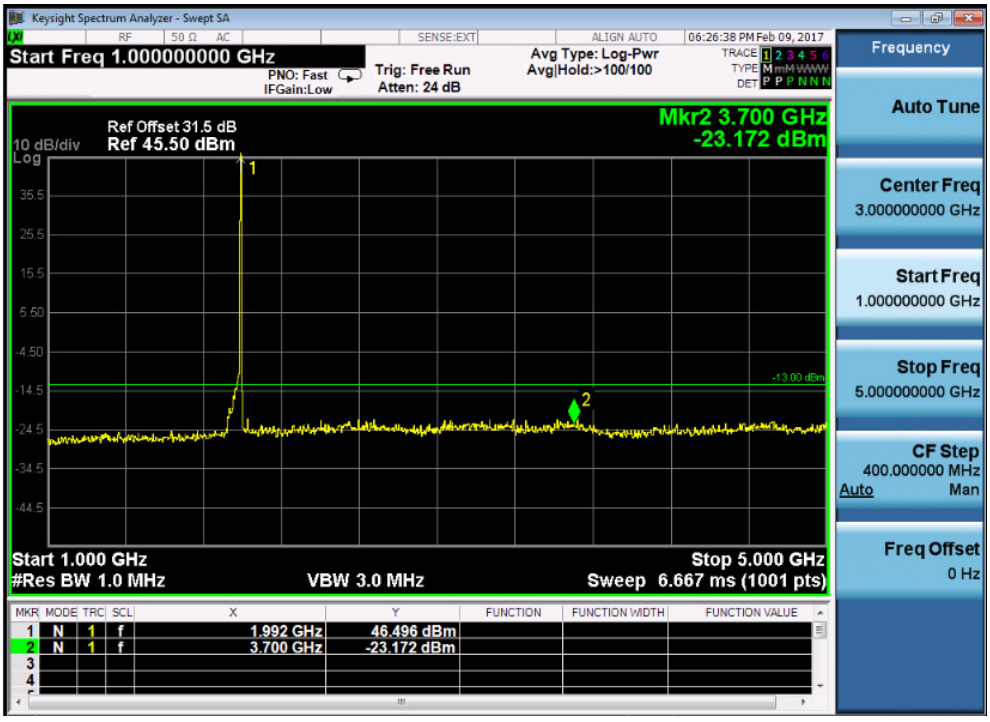
15GHz to 20GHz

**2.3 highest frequency**

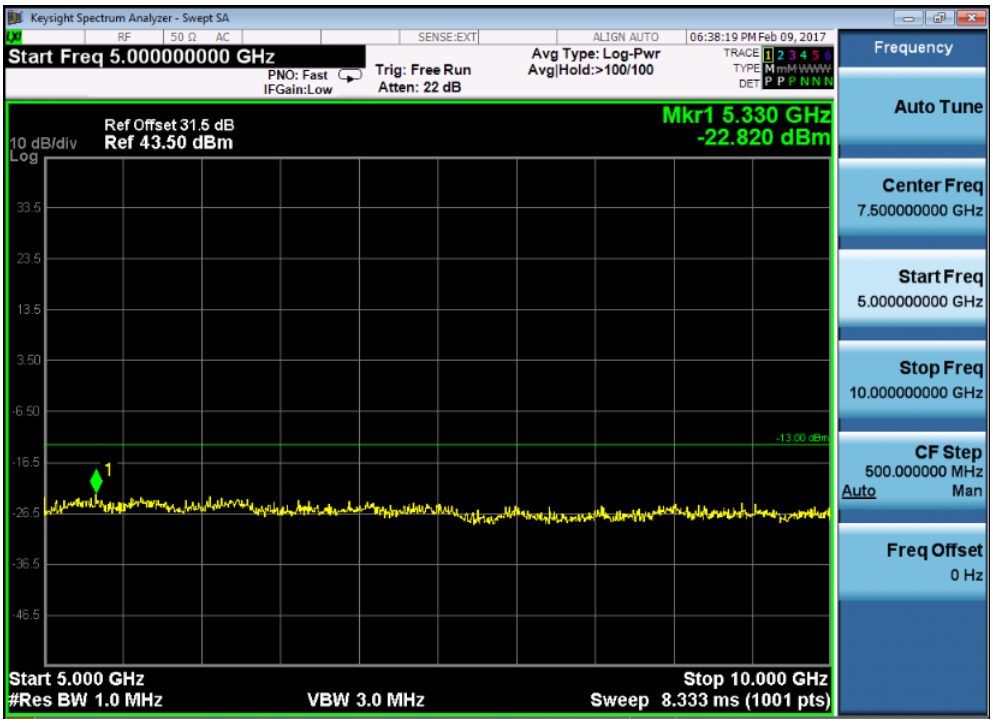
9KHz to 1GHz



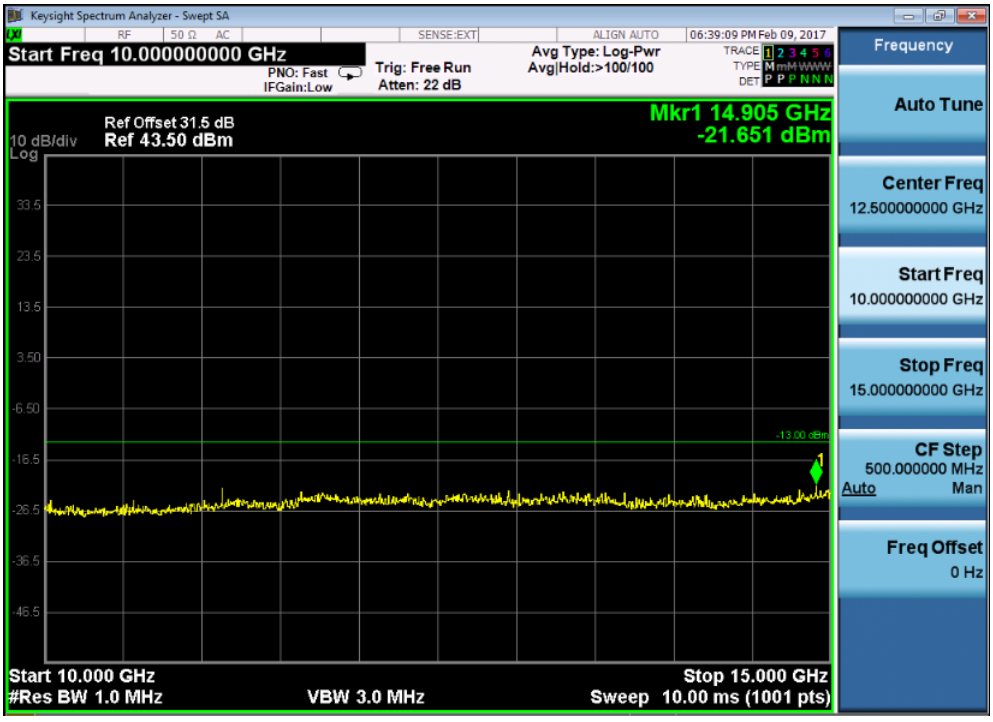

1GHz to 5GHz



5GHz to 10GHz




10GHz to 15GHz

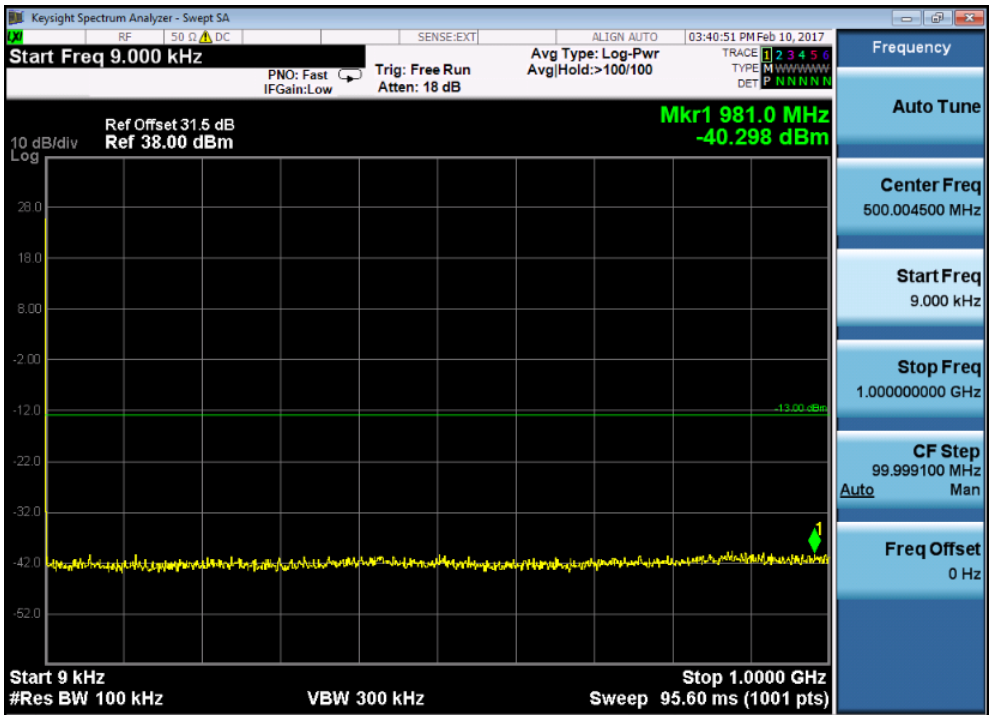


15GHz to 20GHz

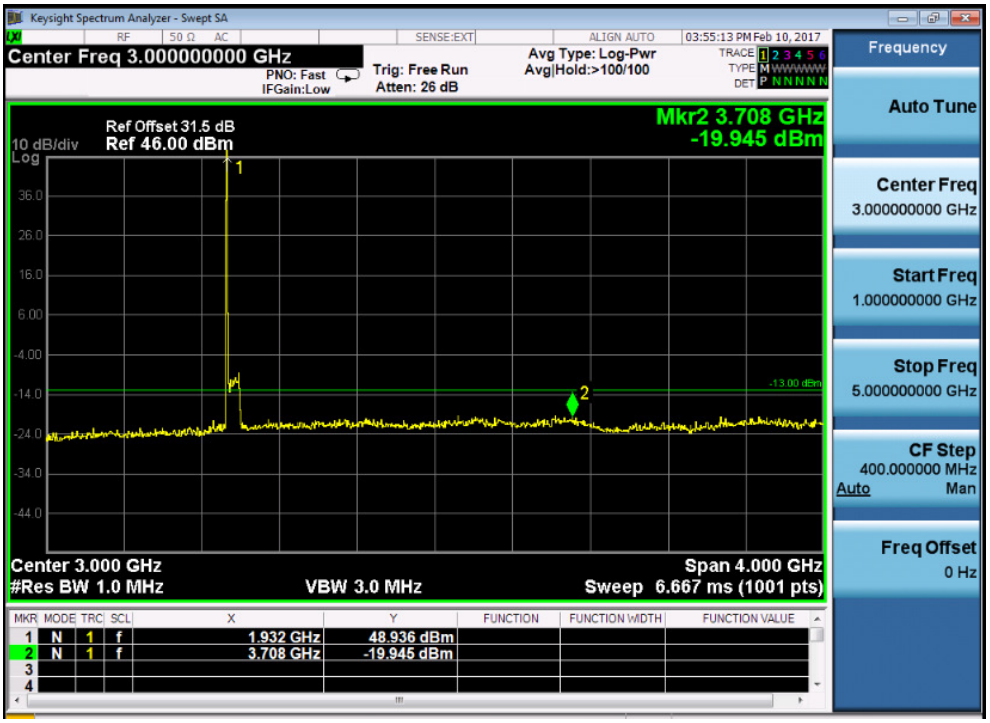
**3.Downlink: 1930MHz ~ 1995MHz (CDMA)**

**3.1 lowest frequency:**

9KHz to 1GHz

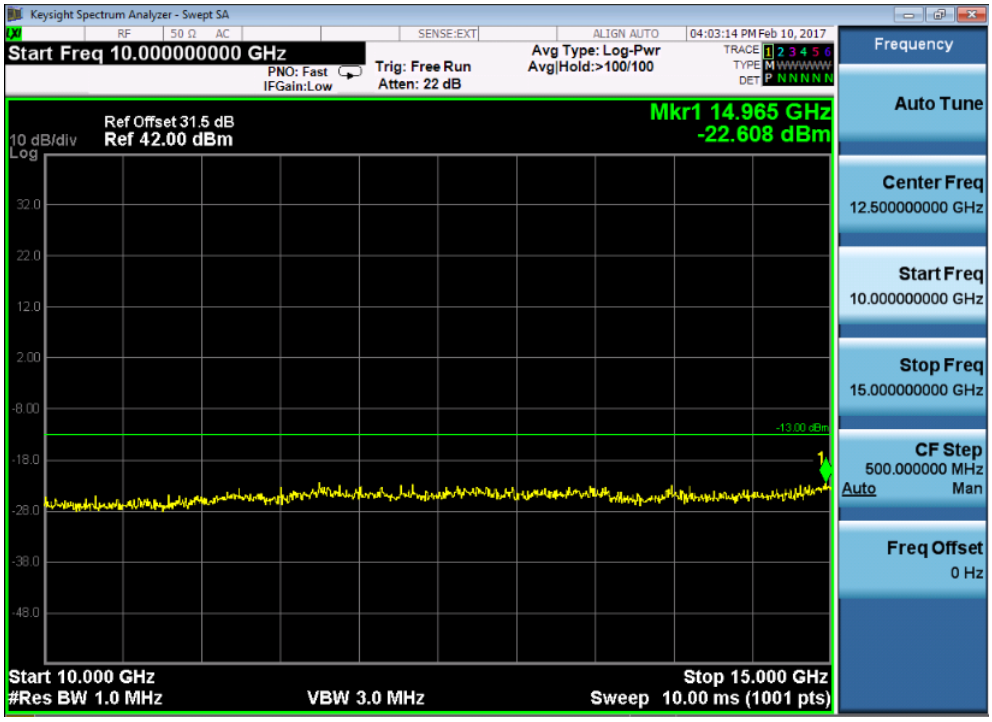



1GHz to 5GHz



5GHz to 10GHz

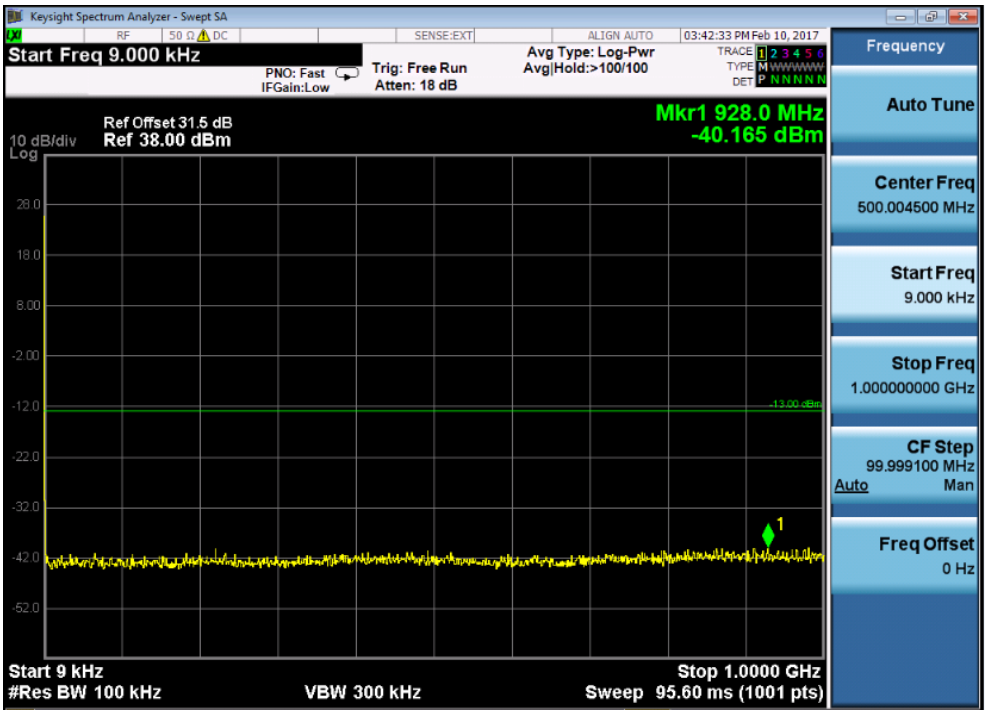

10GHz to 15GHz



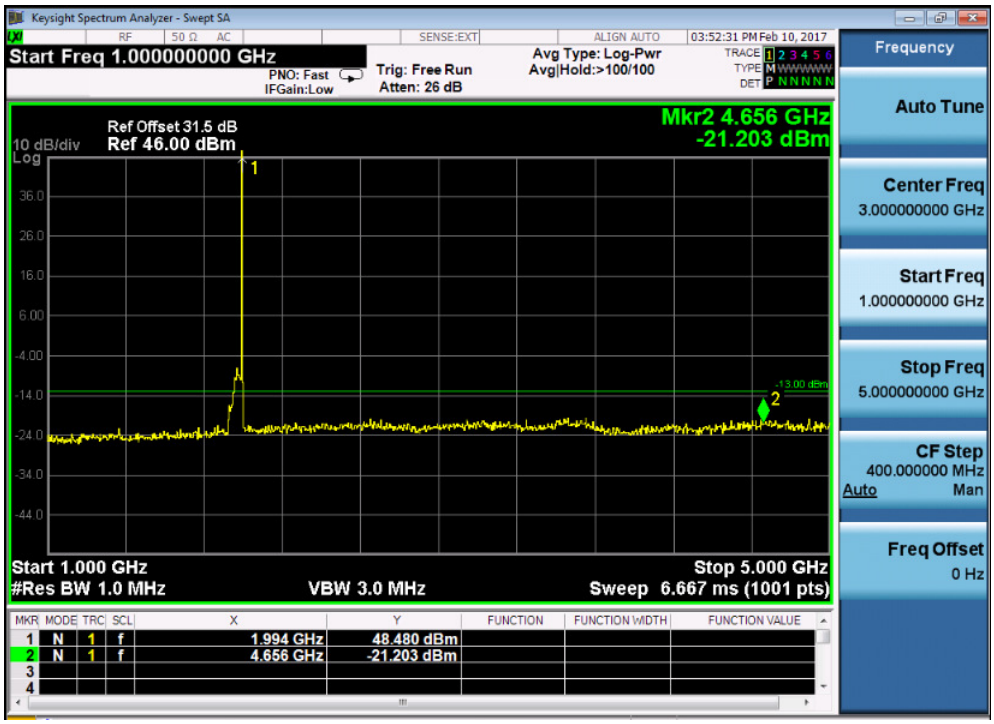
15GHz to 20GHz

### 3.2 Middle frequency

9KHz to 1GHz

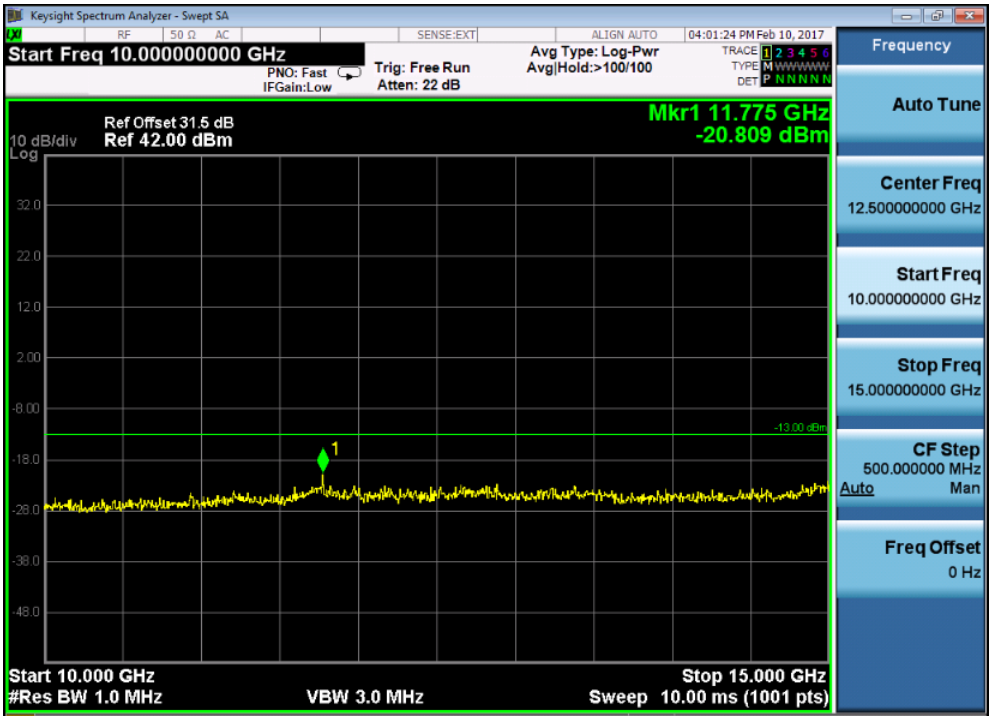



1GHz to 5GHz



5GHz to 10GHz

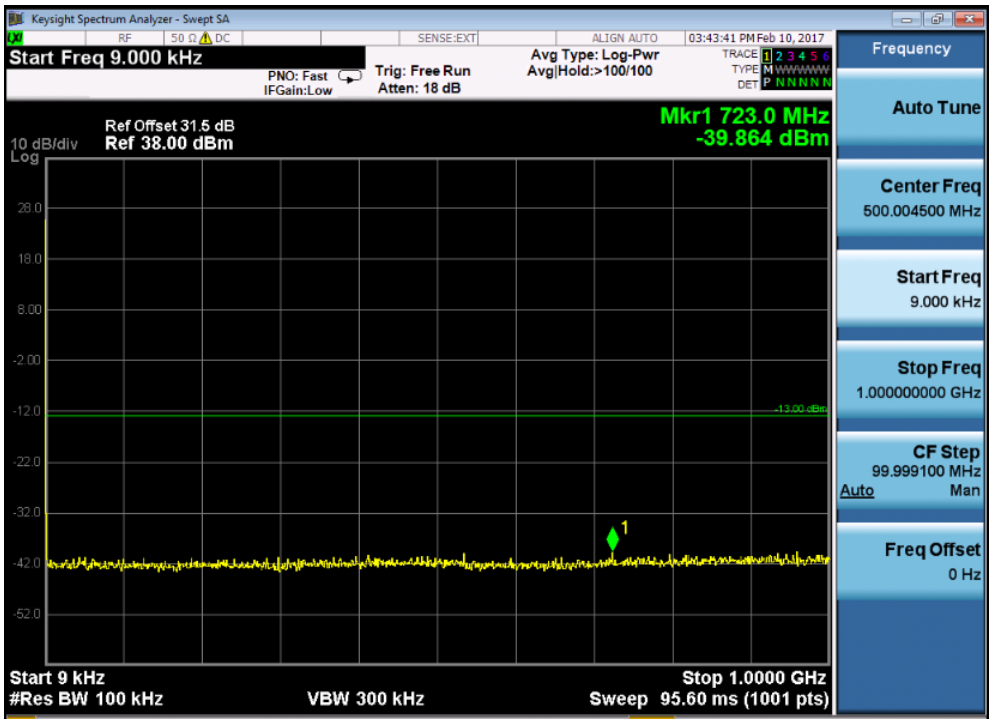

10GHz to 15GHz



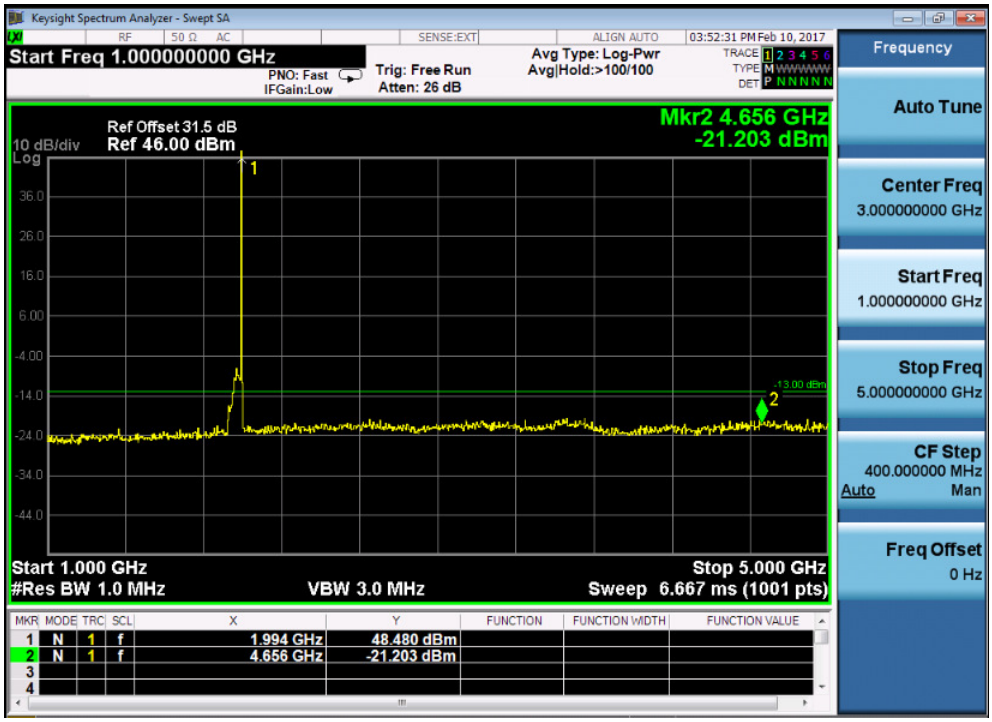
15GHz to 20GHz

**3.3 highest frequency**

9KHz to 1GHz

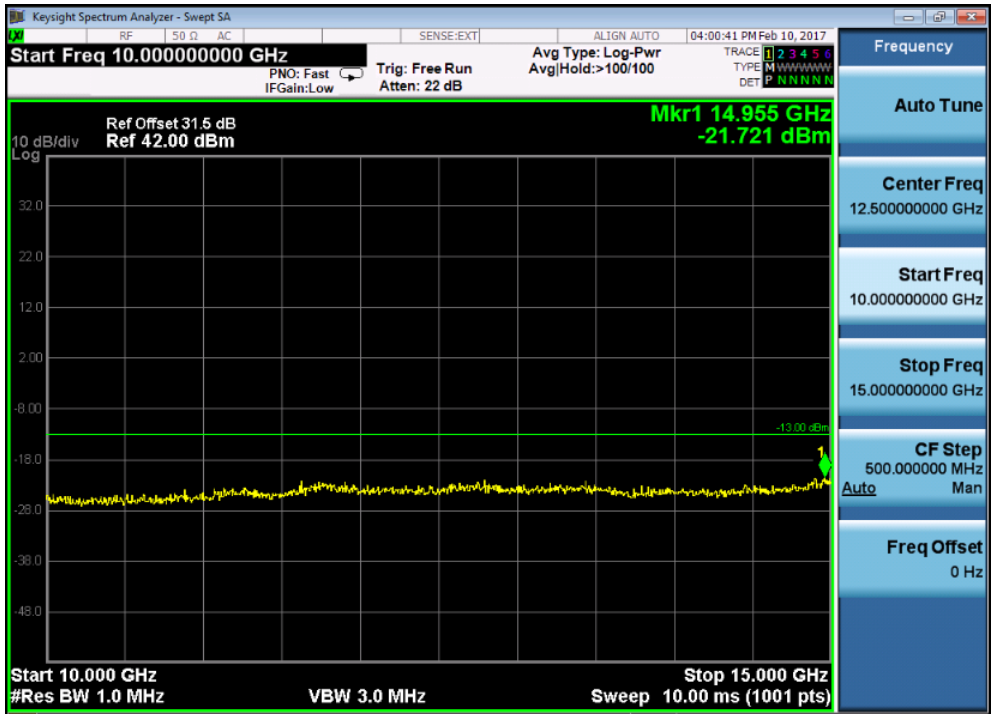



1GHz to 5GHz

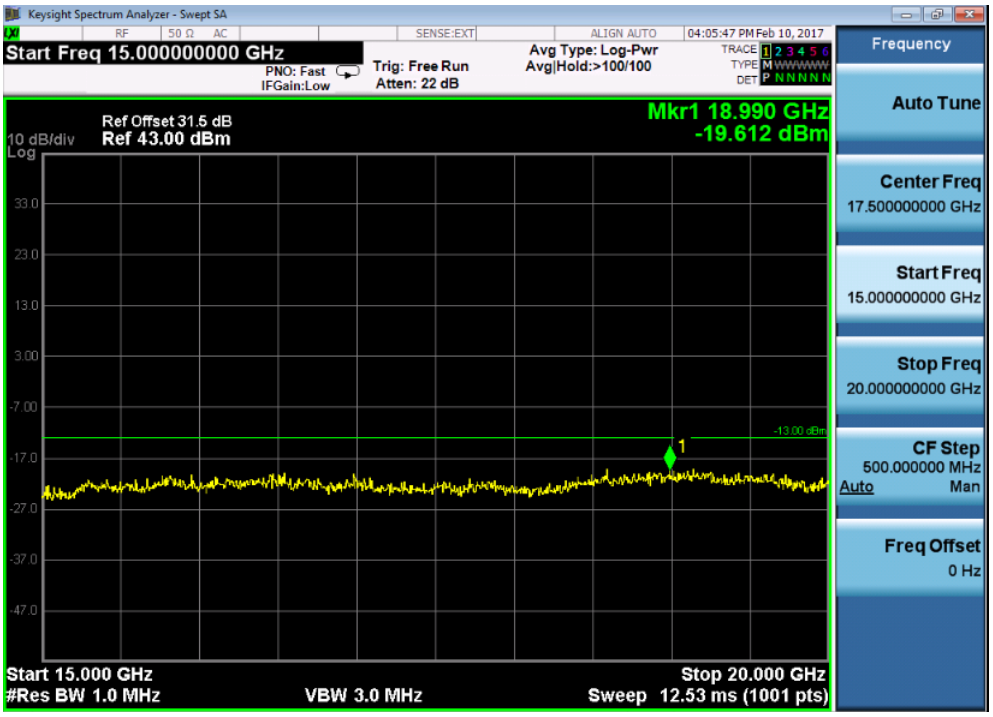


5GHz to 10GHz


10GHz to 15GHz



15GHz to 20GHz



### 7.2.3 Band Edge

Test Requirement: FCC part 24

Test Method: KDB 935210 D05 Indus Booster Basic Meas v01r01

EUT Operation:

Status: Drive the EUT to maximum output power.

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:

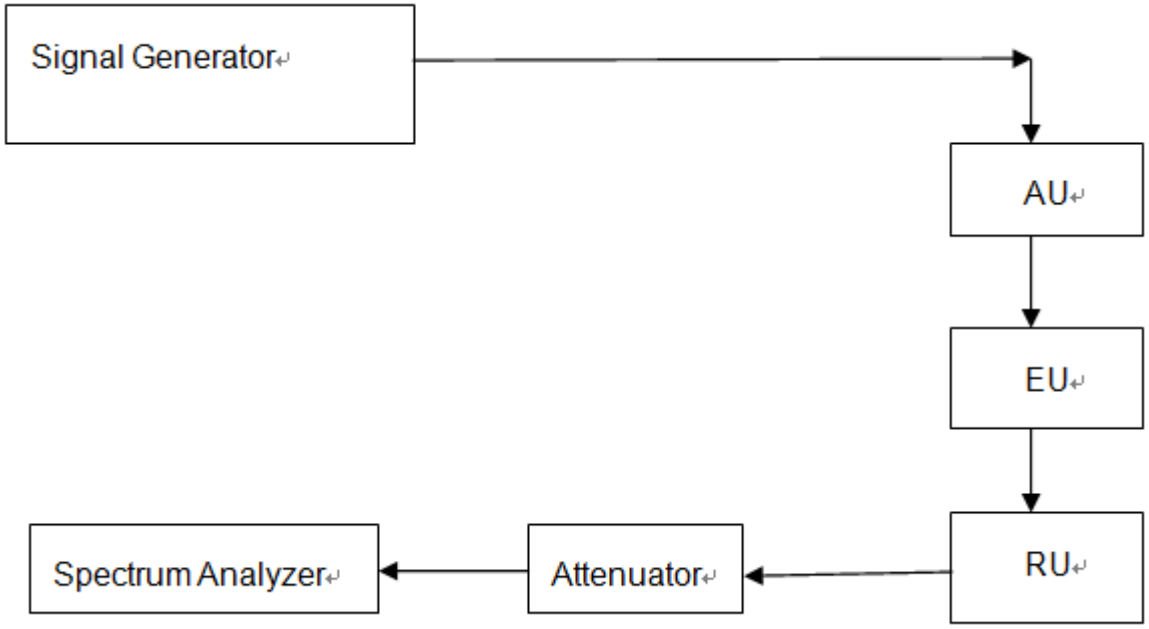



Fig.3. Band edge test configuration

Test Procedure: Conducted Emissions test procedure:

a) Connect the equipment as illustrated, with the notch filter by-passed, when the output power is over the max value of the Spectrum Analyzer, add the attenuator to avoid destroying the facility.

b) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.

c) Set the signal power level of the Signal Generator to 0dBm, and the modulation of the signal are LTE(64QAM), CDMA and WCDMA.

d) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth,( base the standard, apply the different set),here is 100KHz for frequency band less than 1GHz, 1MHz for frequency over 1GHz;

2) Video Bandwidth refer to standard requirement.

e) Adjust the center frequency of the spectrum analyzer for incremental

coverage of the range from:

1) the lowest radio frequency generated in the equipment, it can be 9KHz base the test method, here select 30MHz as lowest frequency start point;

2) the highest radion frequency shall higher than 10 times of carrier frequency;

f ) Record the frequencies and levels of spurious emissions from step e)

Remark:

The notch filter is used for avoid the EUT fundamental carrier output power making the spectrum overload and the harmonic spurious brought by it.

When the EUT fundamental carrier is not enough to make the status, the notch filter could be not used.

Remark:

· At maximum drive level, for each modulation: two tests (high-, low-band edge) with two tones

· Limit usually is -13dBm conducted.

· Not needed for Single Channel systems.

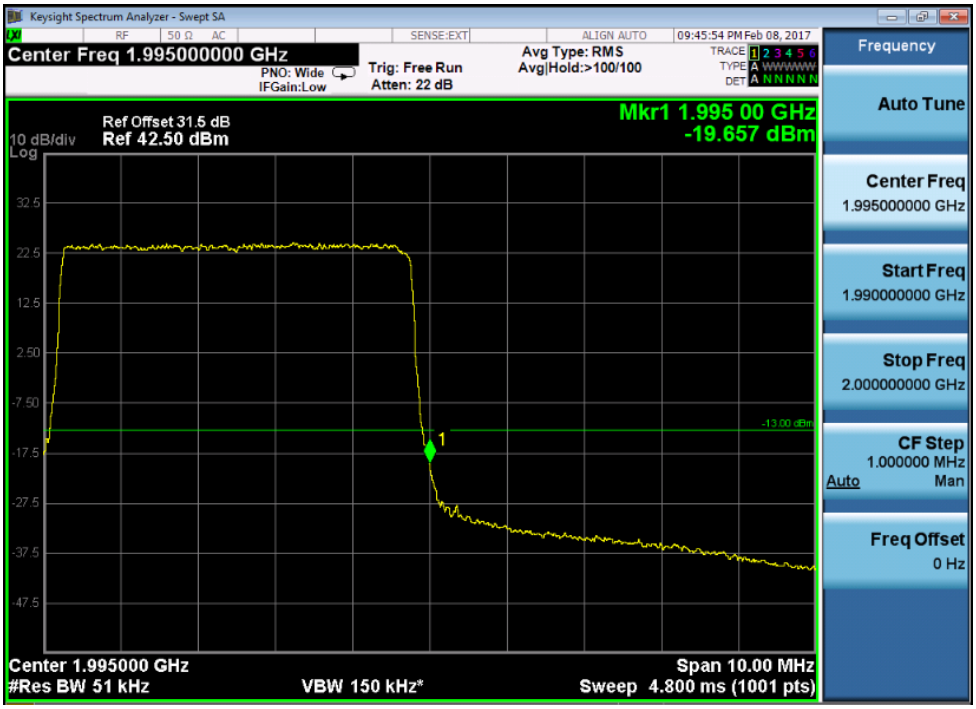
### 7.2.3.1 Measurement Record:

**Downlink: 1930MHz to 1995MHz (LTE Mode)**

**1. 5MHz bandwidth**

1.1 one signal input (Level=0dBm, modulation= LTE(64QAM),Frequency=1932.5MHz)—Lower Edge


1.2 one signal input (Level=0dBm, modulation= LTE(64QAM),Frequency=1992.5MHz)—Upper Edge

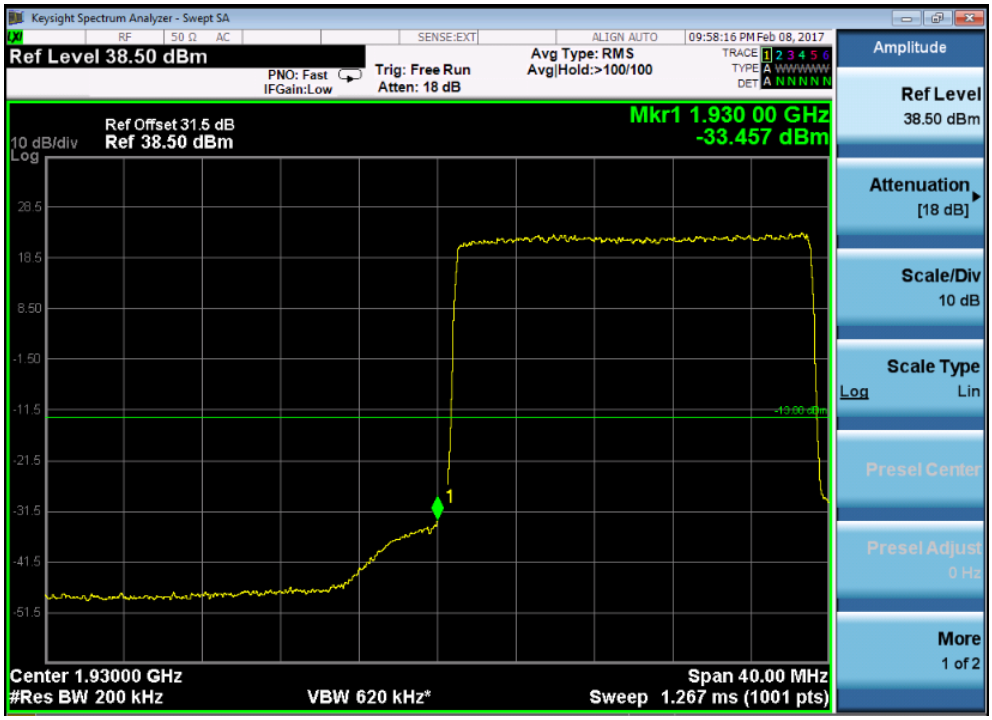


1.3 two signal input (Level=0dBm, modulation= LTE(64QAM),Frequency1=1932.5MHz,Frequency2=1937.5MHz) —Lower Edge

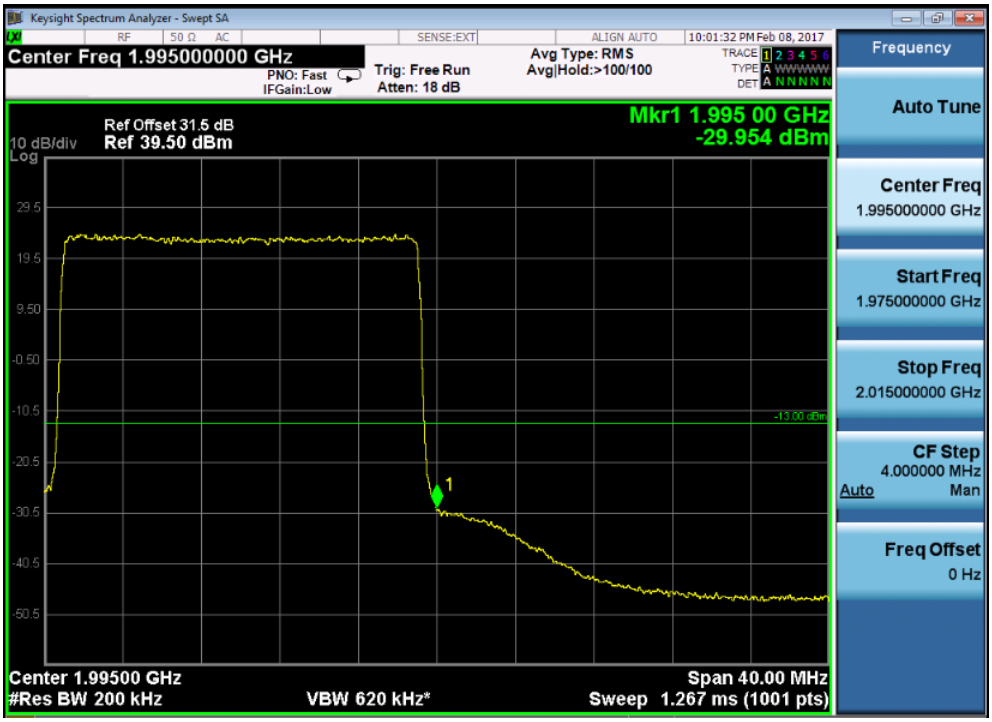

1.4 two signal input(Level=0dBm, modulation= LTE(64QAM),Frequency1=1992.5MHz,Frequency2=1987.5MHz) —Upper Edge

**2. 20MHz bandwidth**

2.1 one signal input(Level=0dBm, modulation= LTE(64QAM),Frequency=1940MHz) —Lower Edge



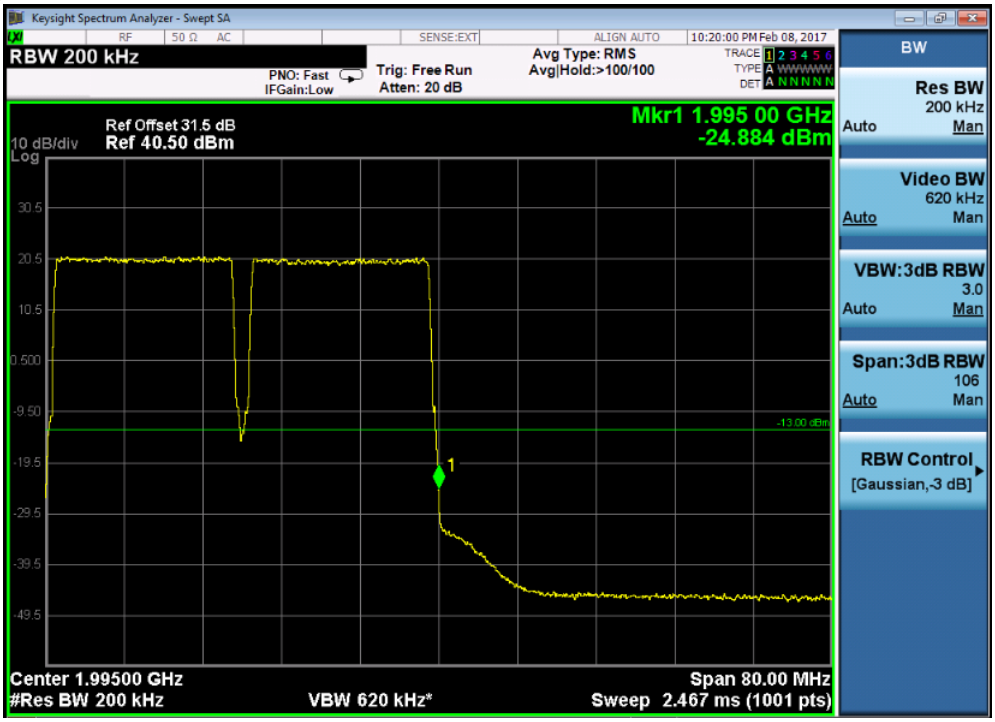

2.2 one signal input(Level=0dBm, modulation=LTE(64QAM),Frequency=1985MHz) —Upper Edge




2.3 two signal input (Level=0dBm, modulation= LTE(64QAM),Frequency1=1940MHz,Frequency2=1960MHz)

—Lower Edge


2.4 two signal input(Level=0dBm, modulation= LTE(64QAM),Frequency1=1985MHz,Frequency2=1965MHz)
—Upper Edge



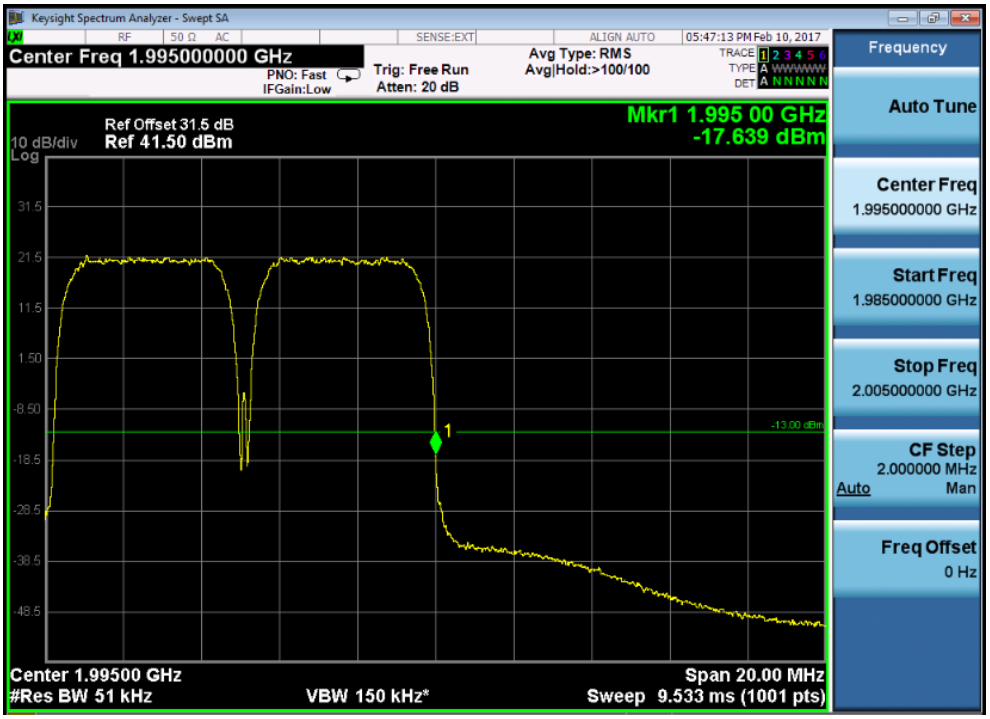
**Downlink: 1930MHz to 1995MHz (WCDMA Mode)**

1.one signal input(Level=0dBm, modulation=WCDMA,Frequency=1932.4MHz) —Lower Edge


2. one signal input(Level=0dBm, modulation=WCDMA,Frequency=1992.6MHz) —Upper Edge

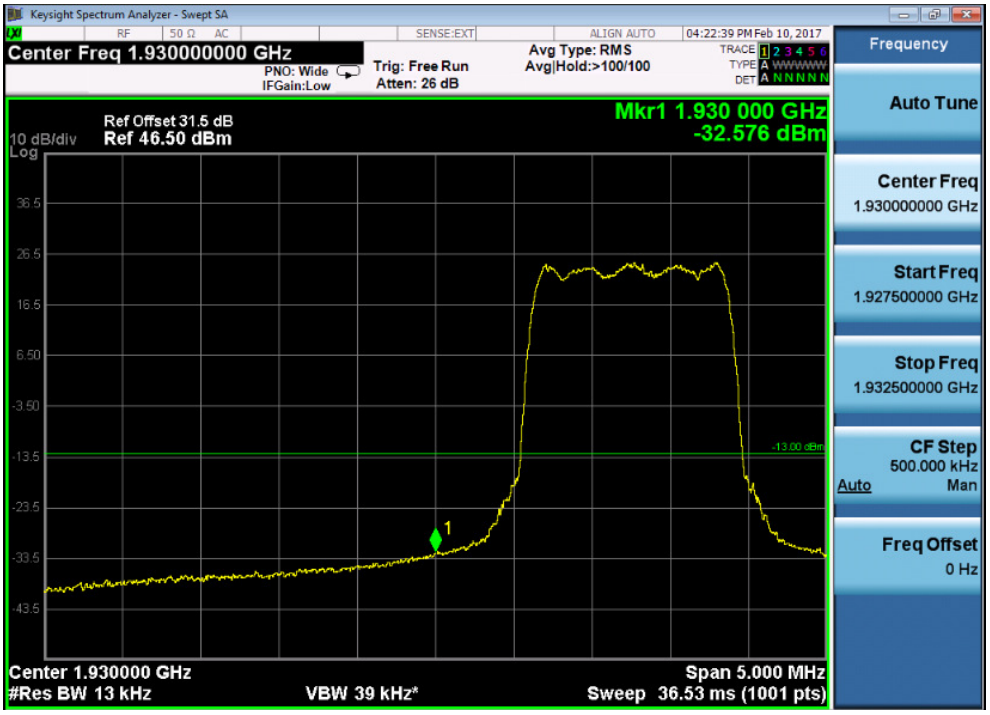
3. two signal input(Level=0dBm, modulation=WCDMA,Frequency1=1932.4MHz, Frequency2=1937.4MHz) —Lower Edge


4. two signal input(Level=0dBm, modulation=WCDMA,Frequency1=1992.6MHz, Frequency2=1987.6MHz) —Upper Edge



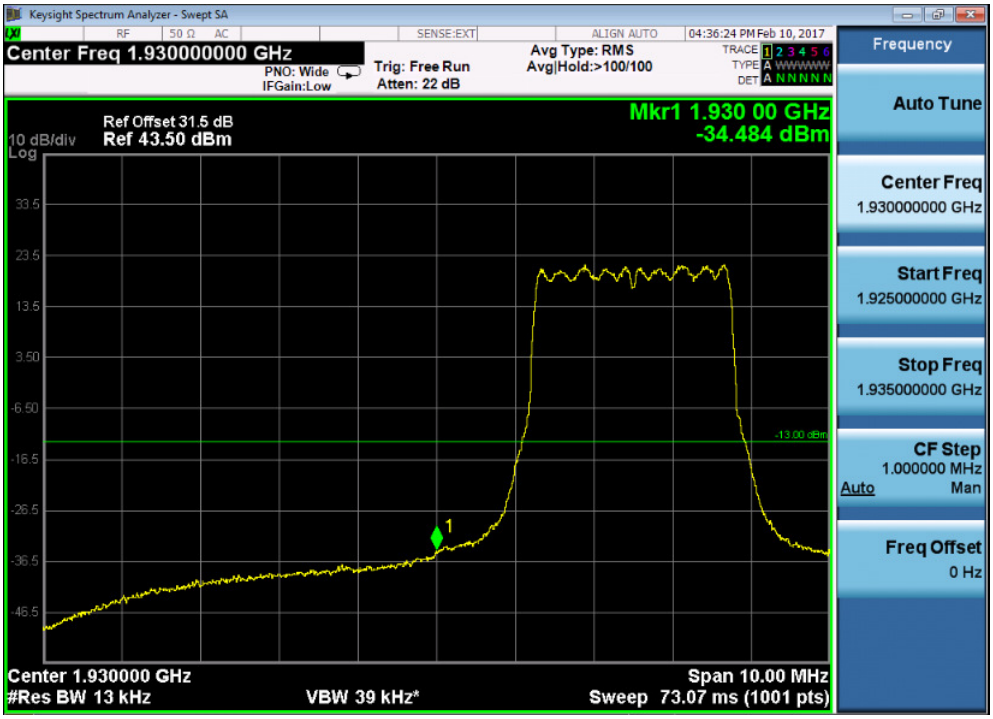
**Downlink: 1930MHz to 1995MHz (CDMA Mode)**

1. one signal input(Level=0dBm, modulation=CDMA,Frequency=1931.25MHz) —Lower Edge

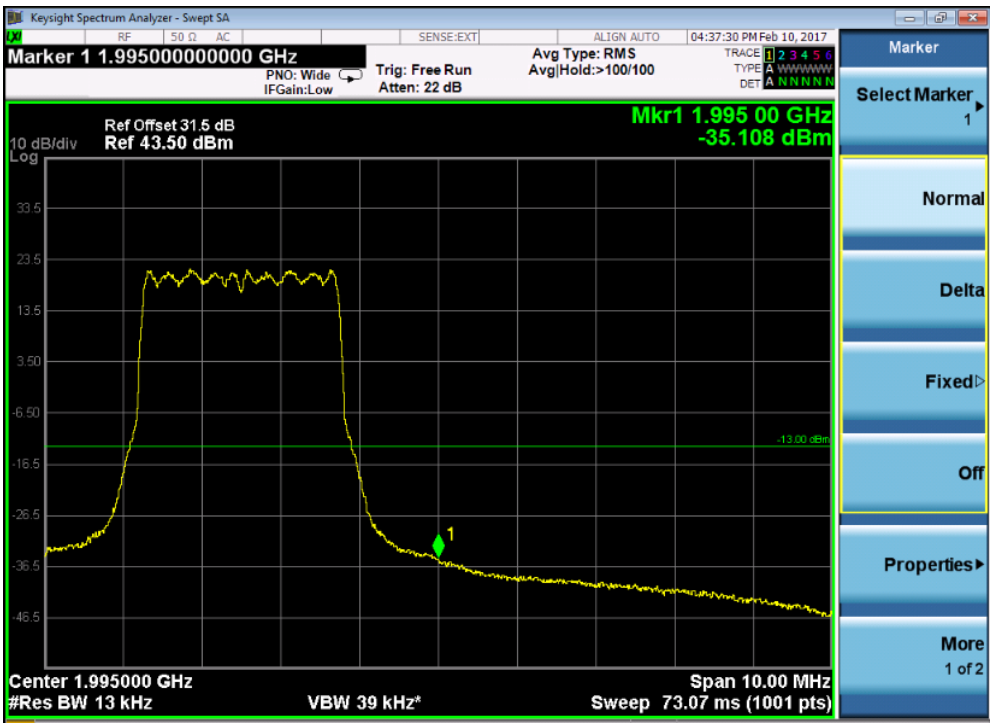



2. one signal input(Level=0dBm, modulation=CDMA,Frequency=1993.75MHz) —Upper Edge

3. two signal input(Level=0dBm, modulation=CDMA,Frequency1=1931.25MHz, Frequency2=1936.25MHz) —Lower Edge




4.two signal input(Level=0dBm, modulation=CDMA,Frequency1=1993.75MHz, Frequency2=1988.75MHz) —Upper Edge



## 7.2.4 Radiated Spurious Emissions

Test Requirement: FCC part 24

Test Method: KDB 935210 D05 Indus Booster Basic Meas v01r01

EUT Operation:

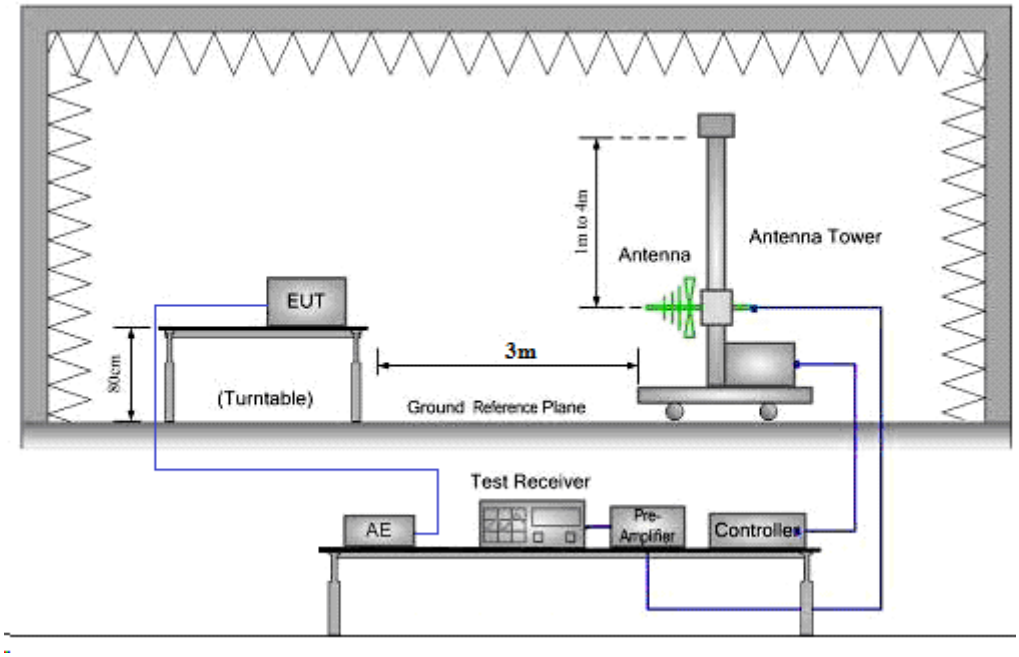
Status: Drive the EUT to maximum output power.

Conditions: Normal conditions

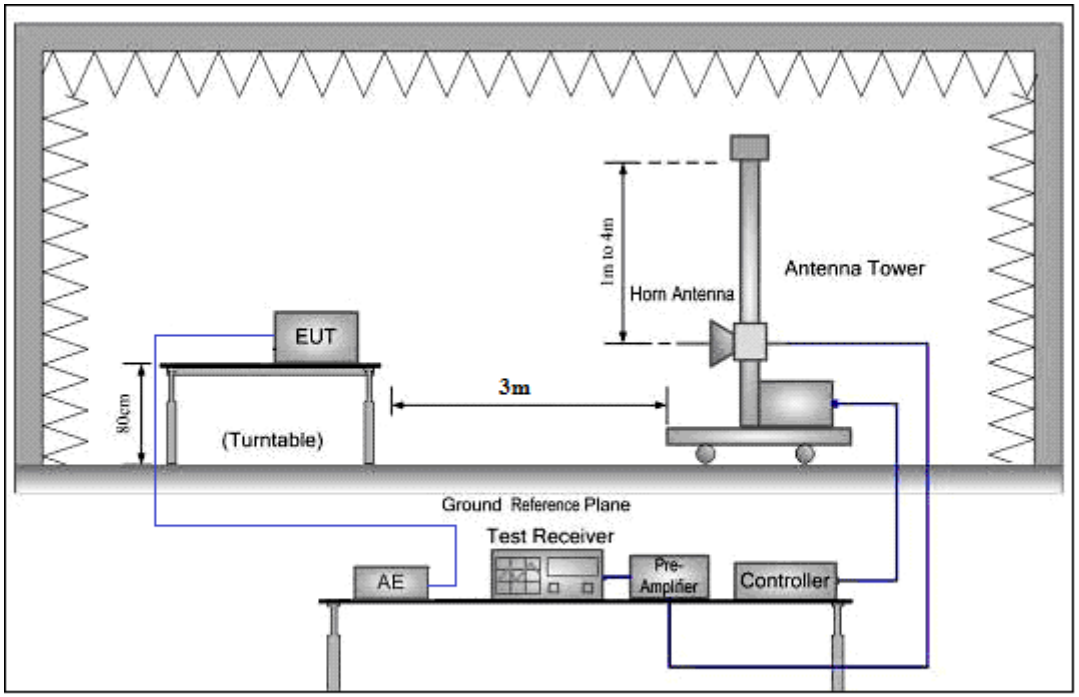
Application: Enclosure

Test Configuration:

30MHz to 1GHz emissions:



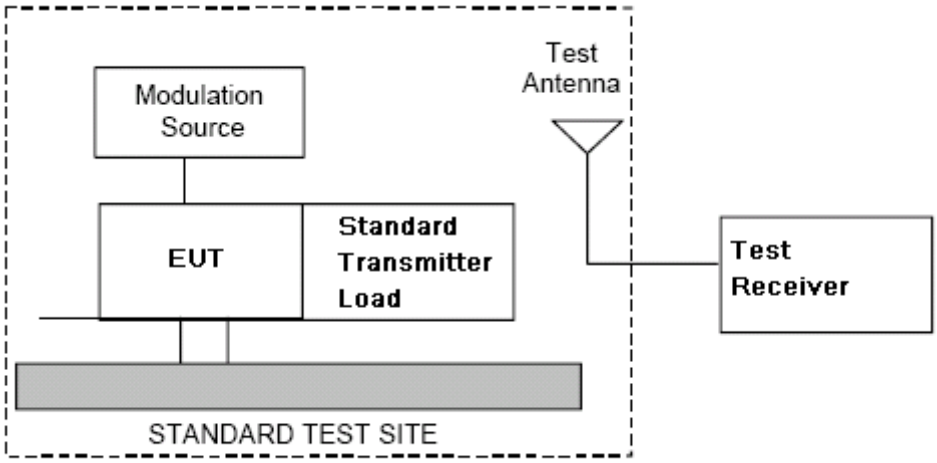
1GHz to 40GHz emissions:




Test Procedure:

1. Test the background noise level with all the test facilities;
2. Keep one transmitting path, all other connectors shall be connected by normal power or RF leads;
3. Select the suitable RF notch filter to avoid the test receiver or spectrum analyzer produce unwanted spurious emissions;
4. Keep the EUT continuously transmitting in max power;
5. Read the radiated emissioins of the EUT enclosure.

Radiated Emissions Test Procedure:



a) Connect the equipment as illustrated.

b) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth = 100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1GHz.

2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1 GHz.

3) Sweep Speed slow enough to maintain measurement calibration.

4) Detector Mode = Positive Peak.

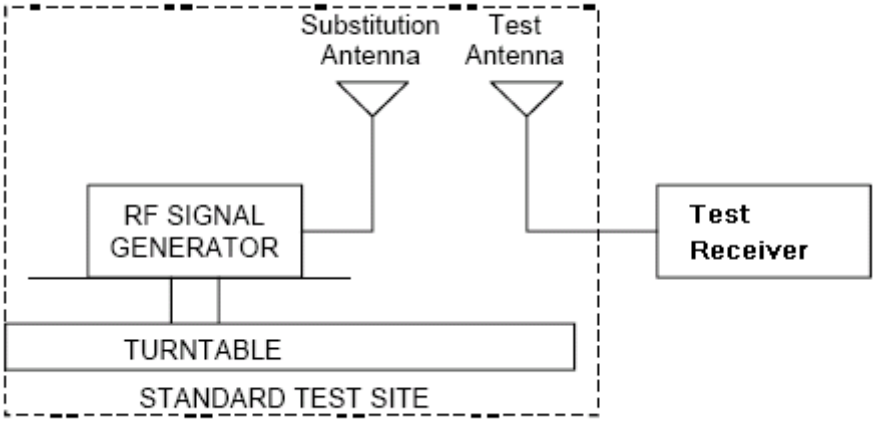
c) Place the transmitter to be tested on the turntable in the standard test site, The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length.

d) Measurements shall be made from30MHz to 10 tims of fundamental carrier, except for the region close to the carrier equal to ± the carrier bandwidth.

e) Key the transmitter without modulation or normal modulation base the standard.

f) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Then the turntable should be rotated 360° to determine the maximum reading. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.

g) Repeat step f) for each spurious frequency with the test antenna polarized vertically.



h) Reconnect the equipment as illustrated.

i) Keep the spectrum analyzer adjusted as in step b).

j) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

k) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

l) Repeat step k) with both antennas vertically polarized for each spurious frequency.

m) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps k) and l) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

*Pd*(dBm) = *Pg*(dBm) – *cable loss* (dB) + *antenna gain* (dB)

where:

*Pd* is the dipole equivalent power and

*Pg* is the generator output power into the substitution antenna.

NOTE:

1) It is permissible to use other antennas provided they can be referenced to a dipole.

2) For below 1GHz signal, the *antenna gain* (dB) is dBd, and for above 1GHz signal, the *antenna gain* (dB) is dBi

3) Effective radiated power (e.r.p) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2.15 dB between e.i.r.p.
and e.r.p.e.r.p (dBm) = e.i.r.p. (dBm) – 2.15

4)For this test ,the AU and EU are put outside of the chamber, connect to the RU through the optical fiber

### 7.2.4.1 Measurement Record:

No emissions were detected within 20dB below the limit for the Downlink direction.

**Downlink 1930MHz to 1995MHz:**

| Lowest Channel | | | | | |
|---|---|---|---|---|---|
| Frequency | Spurious Emission Level | | | Limit | Over limit |
| (MHz) | (Deg) | Polaxis | (dBm) | dBm | (dB) |
| 109.8 | 108.0 | H | -77.10 | -13.0 | -64.10 |
| 185.4 | 108.0 | H | -74.10 | -13.0 | -61.10 |
| 265.2 | 108.0 | H | -80.25 | -13.0 | -67.25 |
| 1031.0 | 134.0 | H | -66.09 | -13.0 | -53.09 |
| 1386.0 | 0.0 | H | -67.59 | -13.0 | -54.59 |
| 2672.0 | 0.0 | H | -57.77 | -13.0 | -44.77 |
| 4800.0 | 0.0 | H | -67.42 | -13.0 | -54.42 |
| 7800.0 | 0.0 | H | -64.90 | -13.0 | -51.90 |
| 10050.0 | 112.0 | H | -65.38 | -13.0 | -52.38 |

| Lowest Channel | | | | | |
|---|---|---|---|---|---|
| Frequency | Spurious Emission Level | | | Limit | Over limit |
| (MHz) | (Deg) | Polaxis | (dBm) | dBm | (dB) |
| 72.0 | 135.0 | V | -81.98 | -13.0 | -68.98 |
| 118.2 | 0.0 | V | -79.60 | -13.0 | -66.60 |
| 273.6 | 135.0 | V | -83.44 | -13.0 | -70.44 |
| 1221.0 | 359.0 | V | -66.37 | -13.0 | -53.37 |
| 1705.0 | 0.0 | V | -64.41 | -13.0 | -51.41 |
| 2496.0 | 0.0 | V | -58.90 | -13.0 | -45.90 |
| 3900.0 | 0.0 | V | -68.32 | -13.0 | -55.32 |
| 6150.0 | 112.0 | V | -64.70 | -13.0 | -51.70 |
| 9000.0 | 358.0 | V | -64.45 | -13.0 | -51.45 |

| Middle Channel | | | | | |
|---|---|---|---|---|---|
| Frequency | Spurious Emission Level | | | Limit | Over limit |
| (MHz) | (Deg) | Polaxis | (dBm) | dBm | (dB) |
| 59.4 | 26.0 | H | -80.26 | -13.0 | -67.26 |
| 109.8 | 79.0 | H | -80.70 | -13.0 | -67.70 |
| 185.4 | 79.0 | H | -75.52 | -13.0 | -62.52 |
| 1133.0 | 0.0 | H | -67.43 | -13.0 | -54.43 |
| 1474.0 | 0.0 | H | -66.07 | -13.0 | -53.07 |
| 2456.0 | 173.0 | H | -58.69 | -13.0 | -45.69 |
| 4200.0 | 0.0 | H | -67.82 | -13.0 | -54.82 |
| 5700.0 | 0.0 | H | -66.90 | -13.0 | -53.90 |
| 7950. 0 | 112.0 | H | -65.16 | -13.0 | -52.16 |

| Middle Channel | | | | | |
|---|---|---|---|---|---|
| Frequency | Spurious Emission Level | | | Limit | Over limit |
| (MHz) | (Deg) | Polaxis | (dBm) | dBm | (dB) |
| 72.0 | 136.0 | V | -81.91 | -13.0 | -68.91 |
| 122.4 | 0.0 | V | -79.61 | -13.0 | -66.61 |
| 527.0 | 358.0 | V | -83.44 | -13.0 | -70.44 |
| 1265.0 | 0.0 | V | -66.37 | -13.0 | -53.37 |
| 1683.0 | 0.0 | V | -64.75 | -13.0 | -51.75 |
| 2720.0 | 86.0 | V | -57.68 | -13.0 | -44.68 |
| 4800.0 | 0.0 | V | -67.53 | -13.0 | -54.53 |
| 7800.0 | 0.0 | V | -64.79 | -13.0 | -51.79 |
| 9750.0 | 0.0 | V | -65.01 | -13.0 | -52.01 |