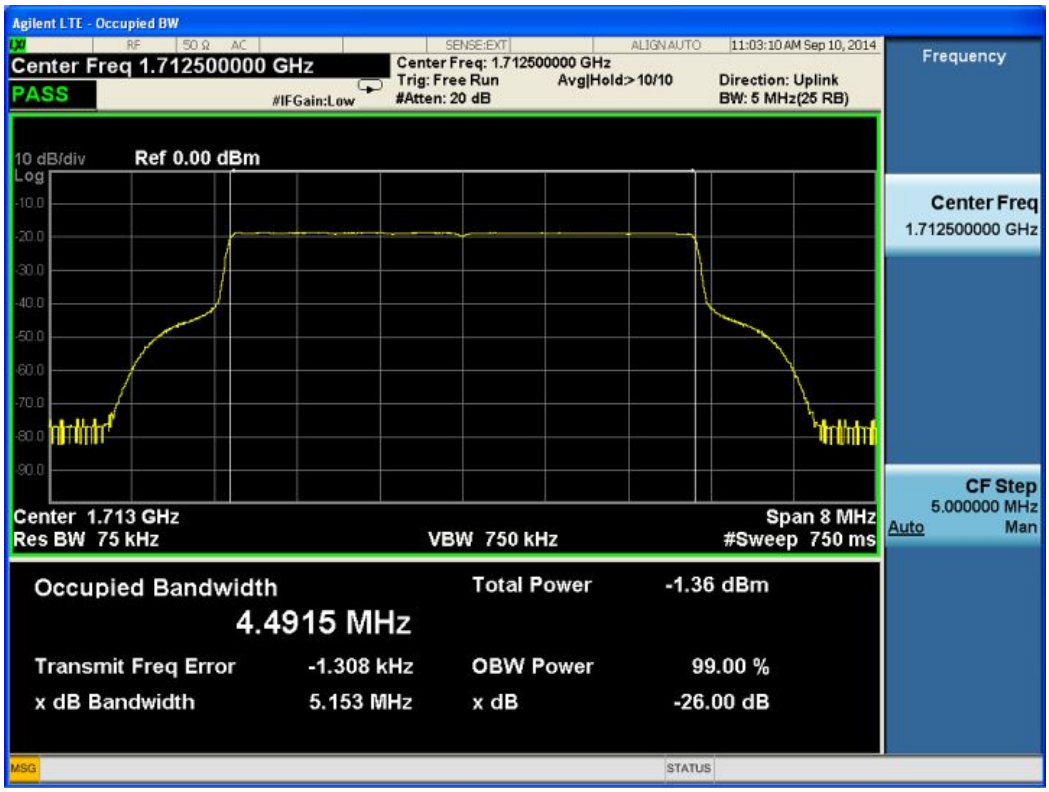
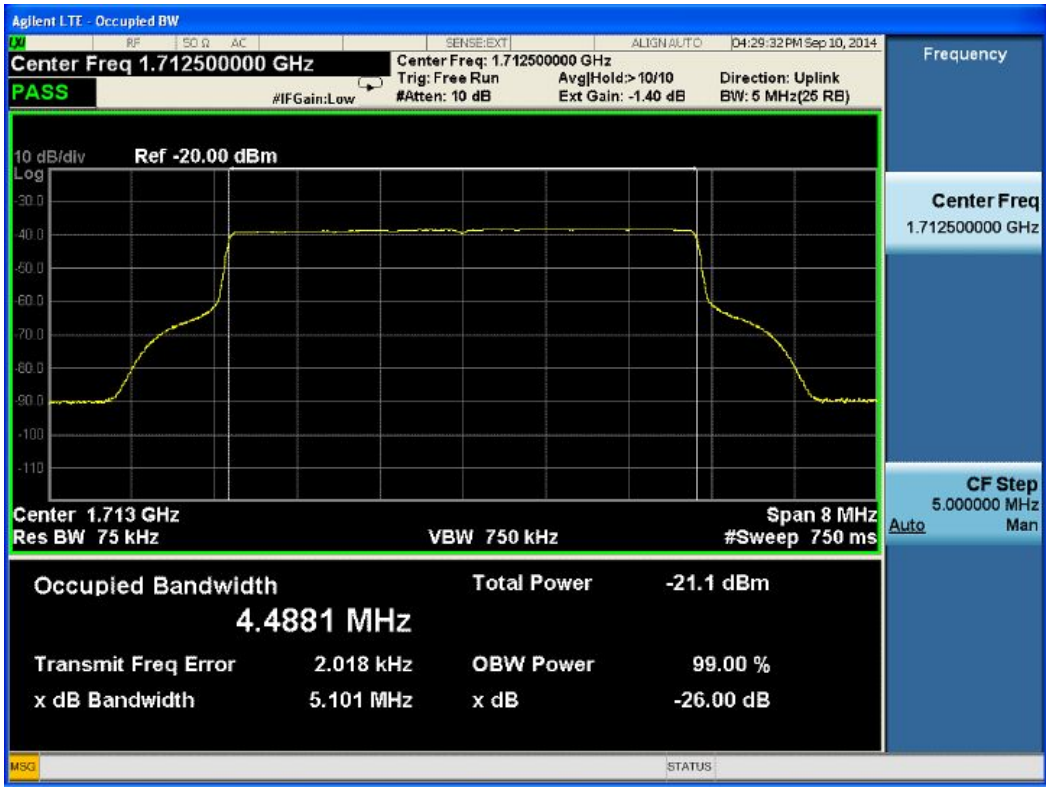
(1.3) Test for LTE 5 MHz

(1.3.1) Lowest frequency

(a) Input signal

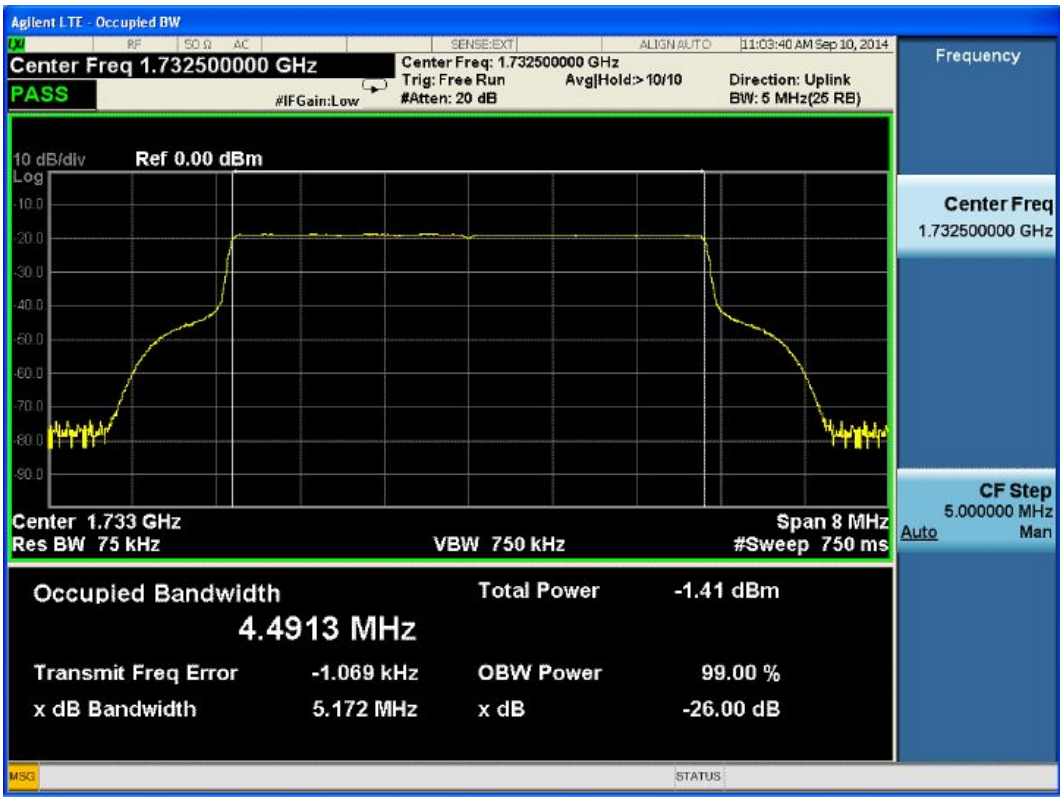


(b) Output signal

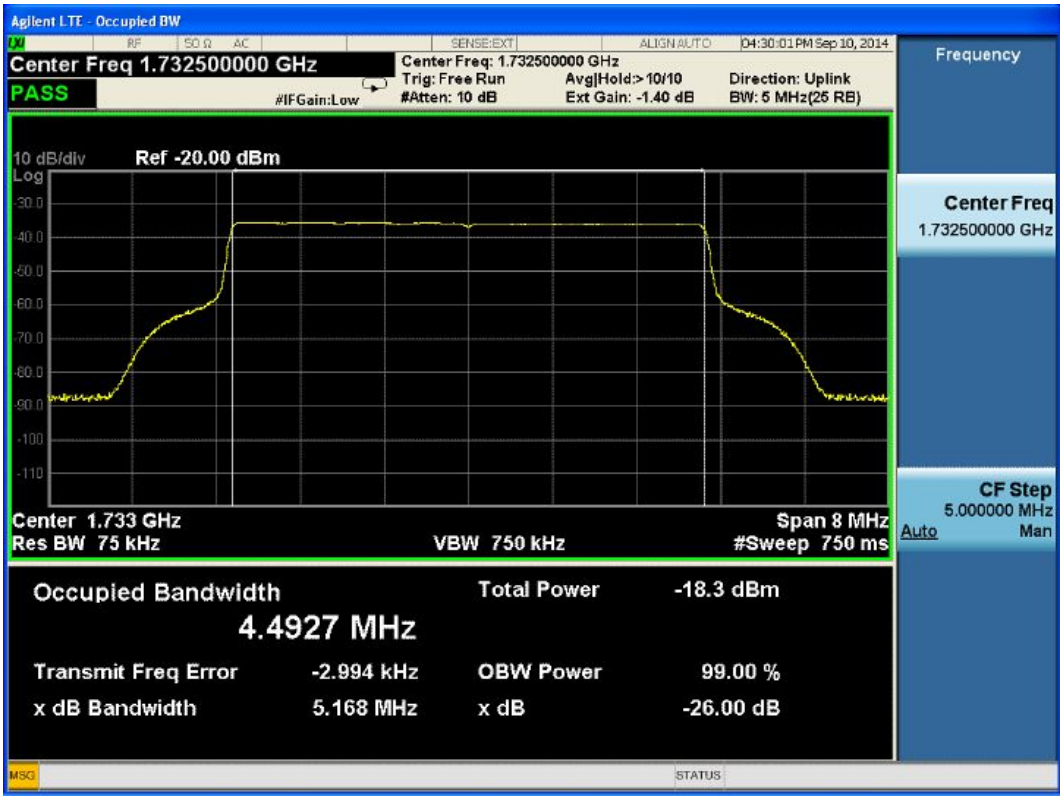


(1.3.2) Middle frequency

(a) Input signal



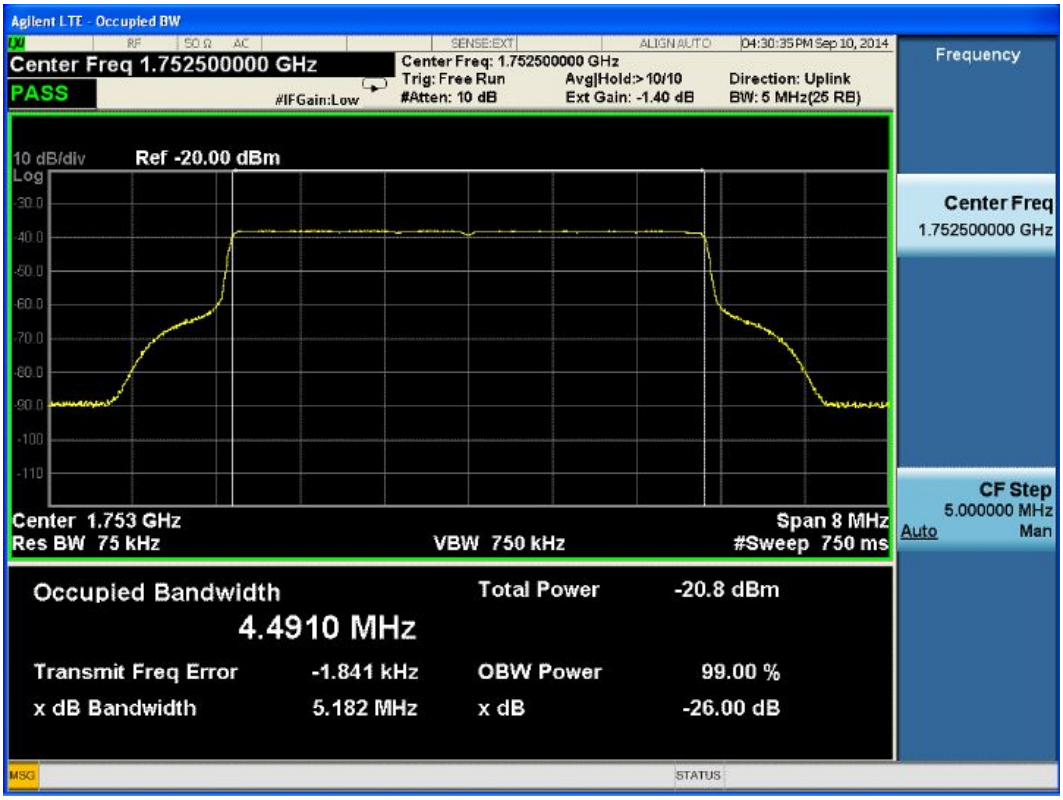
(b) Output signal



(1.3.3) Highest frequency

(a) Input signal

(b) Output signal



(1.4) Test for LTE 10 MHz

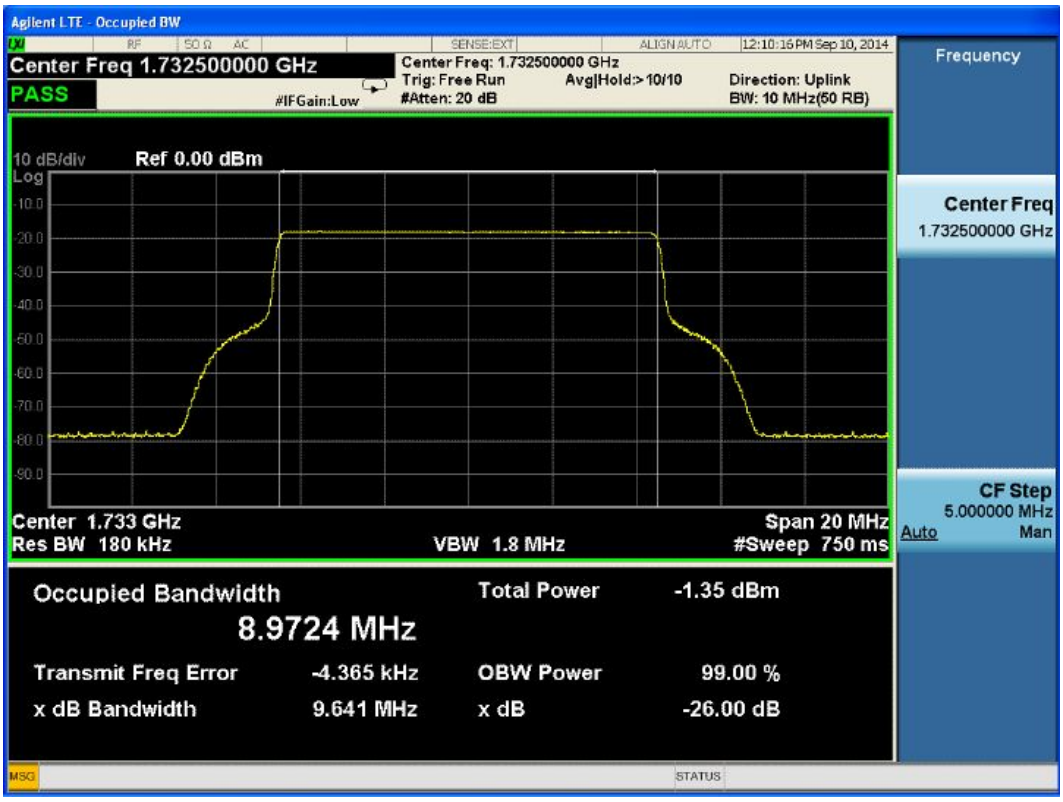
(1.4.1) Lowest frequency

(a) Input signal

(b) Output signal

(1.4.2) Middle frequency

(a) Input signal

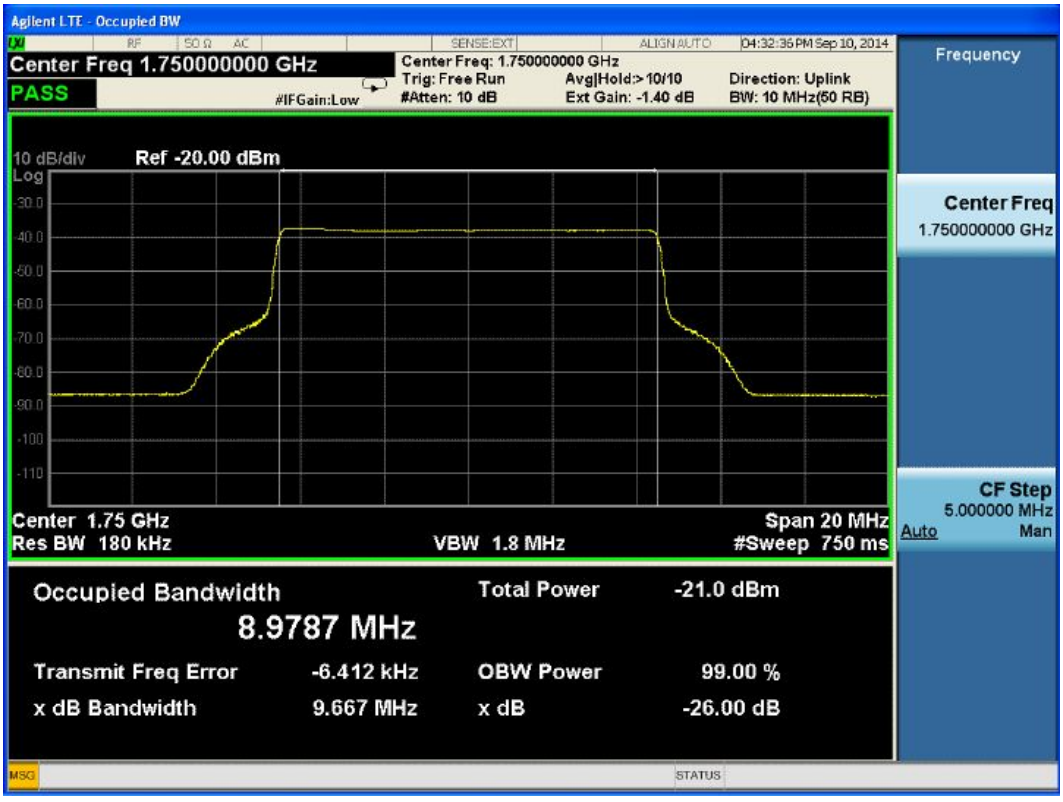


(b) Output signal

(1.4.3) Highest frequency

(a) Input signal

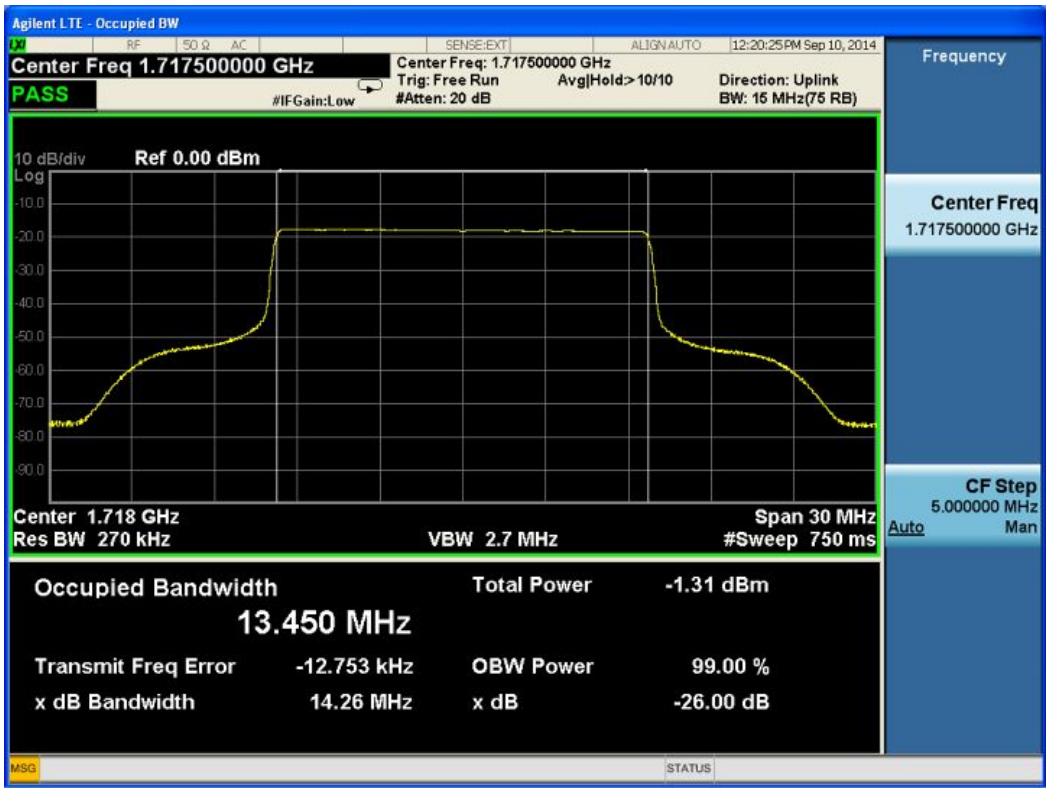
(b) Output signal



(1.5) Test for LTE 15 MHz

(1.5.1) Lowest frequency

(a) Input signal



(b) Output signal

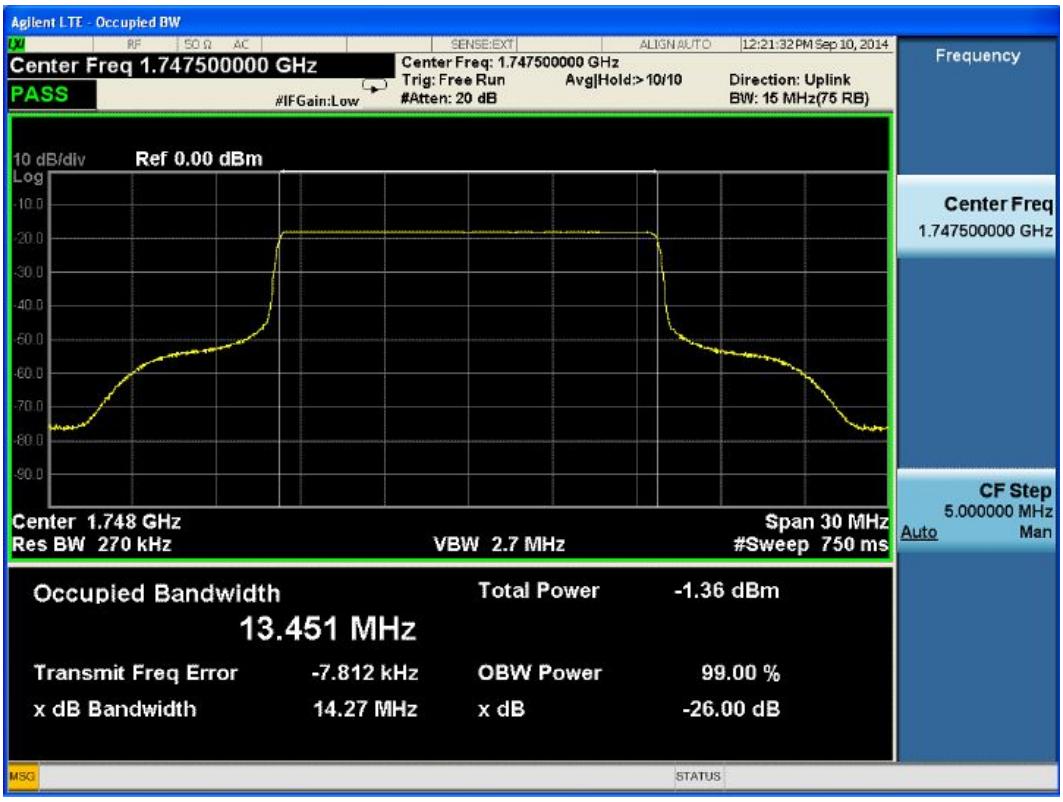
(1.5.2) Middle frequency

(a) Input signal

(b) Output signal

(1.5.3) Highest frequency

(a) Input signal



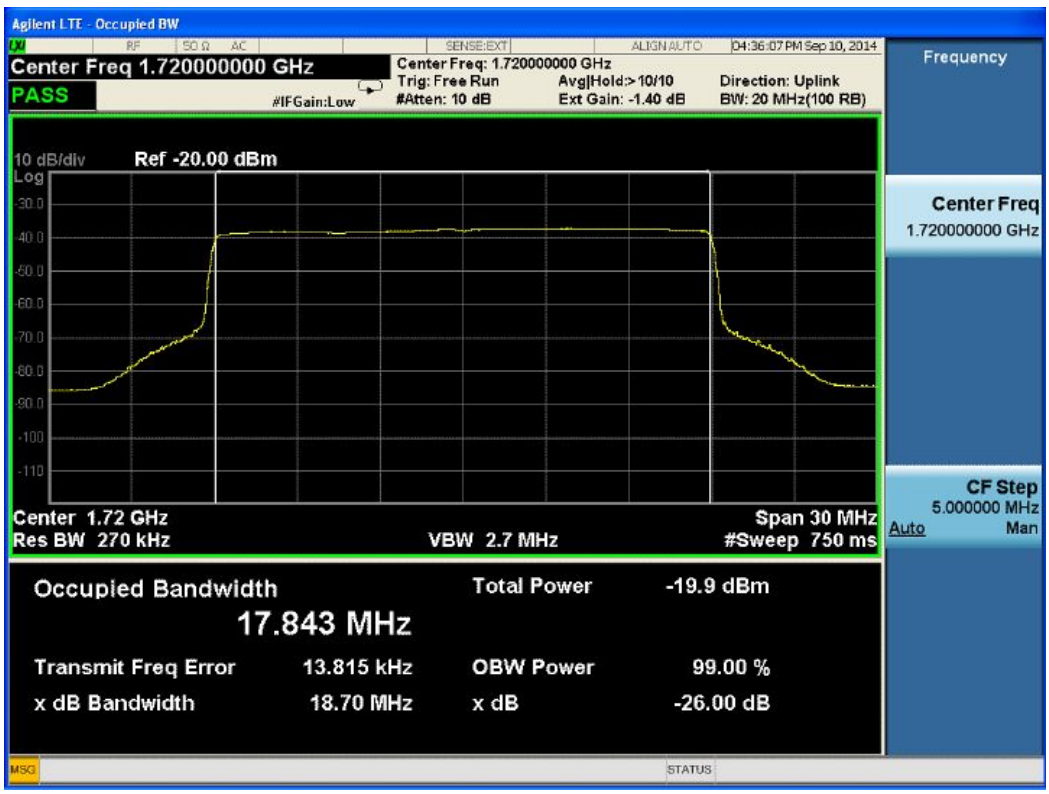
(b) Output signal

(1.6) Test for LTE 20 MHz

(1.6.1) Lowest frequency

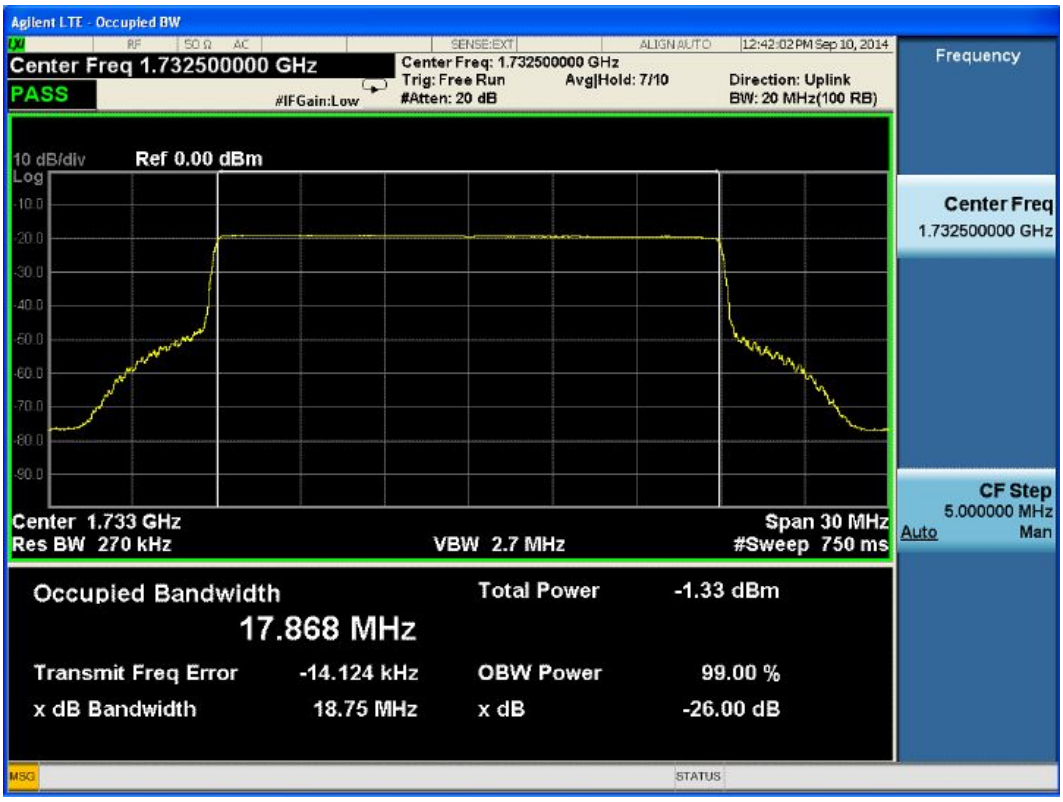
(a) Input signal

(b) Output signal

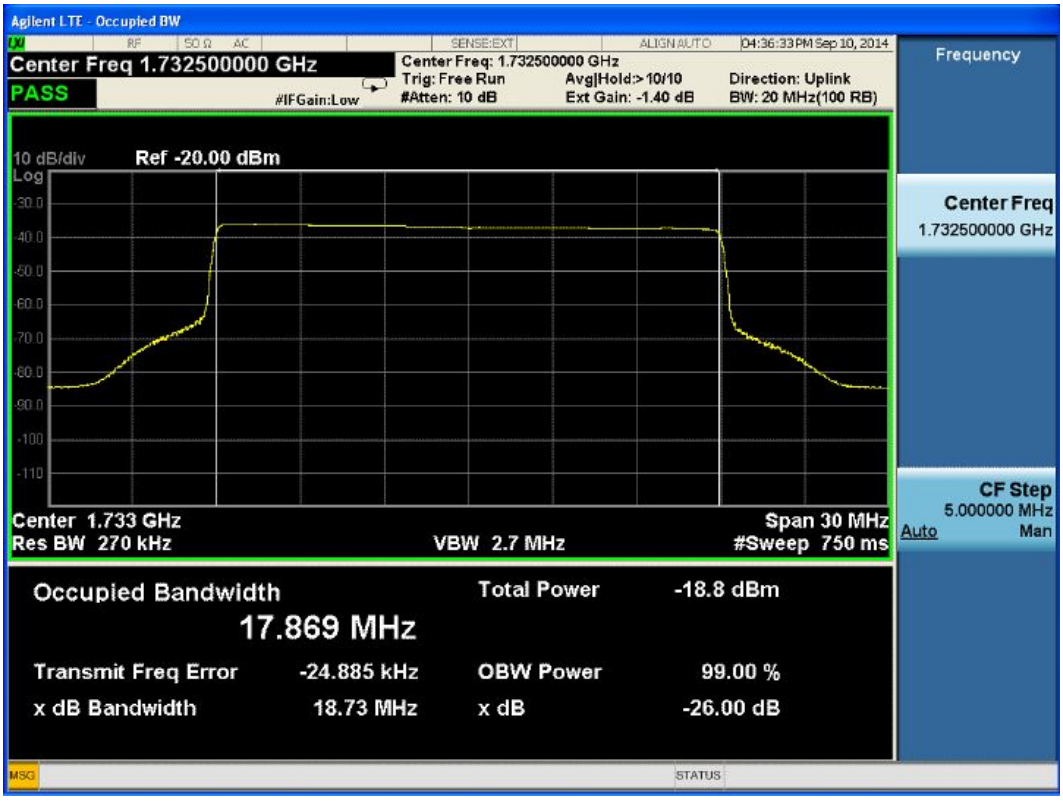


(1.6.2) Middle frequency

(a) Input signal

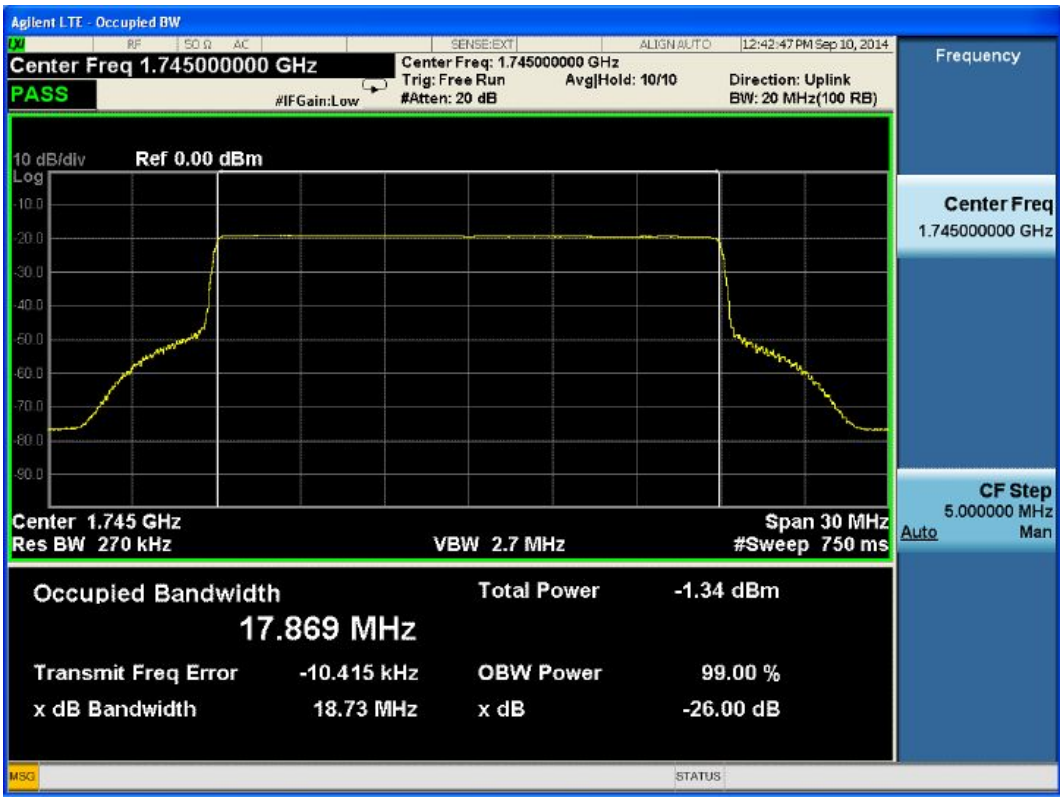


(b) Output signal

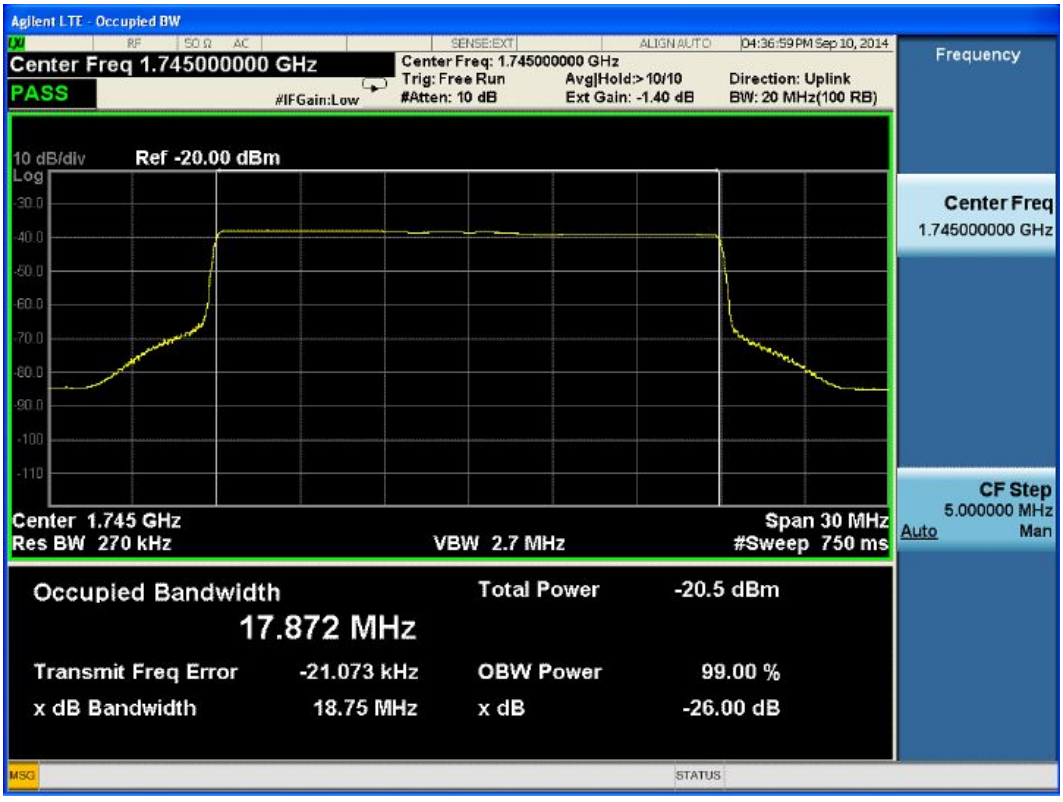


(1.6.3) Highest frequency

(a) Input signal



(b) Output signal

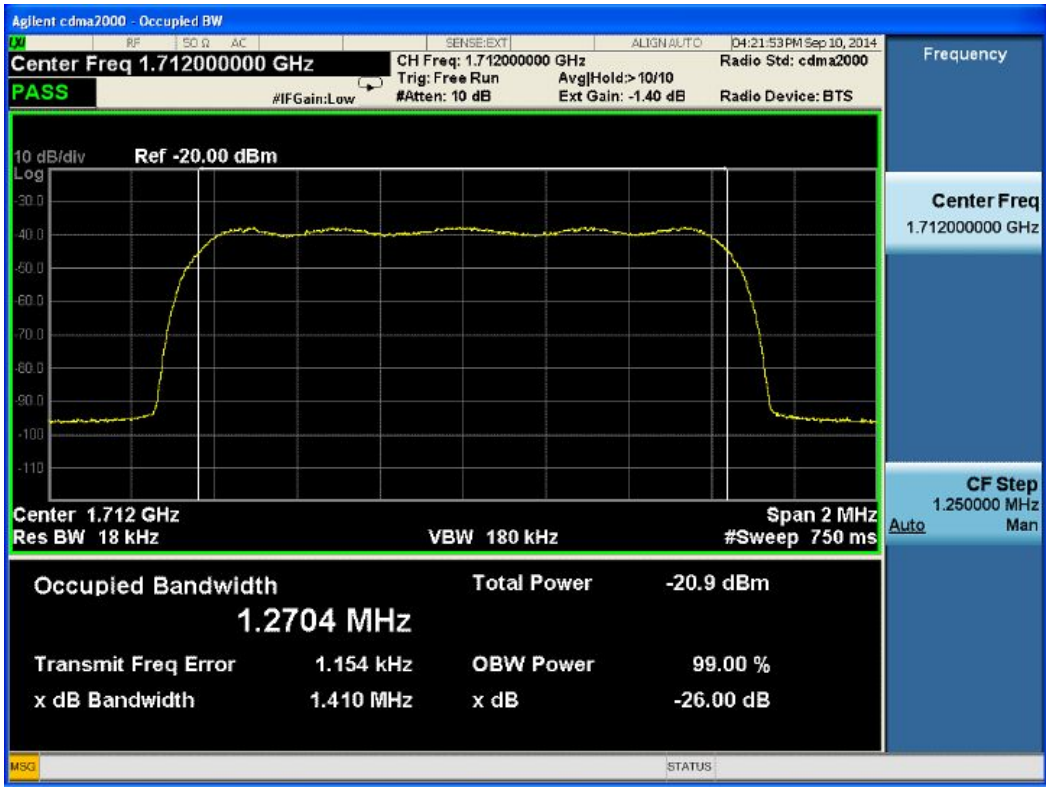


(2) CDMA modulation

(2.1) Lowest frequency

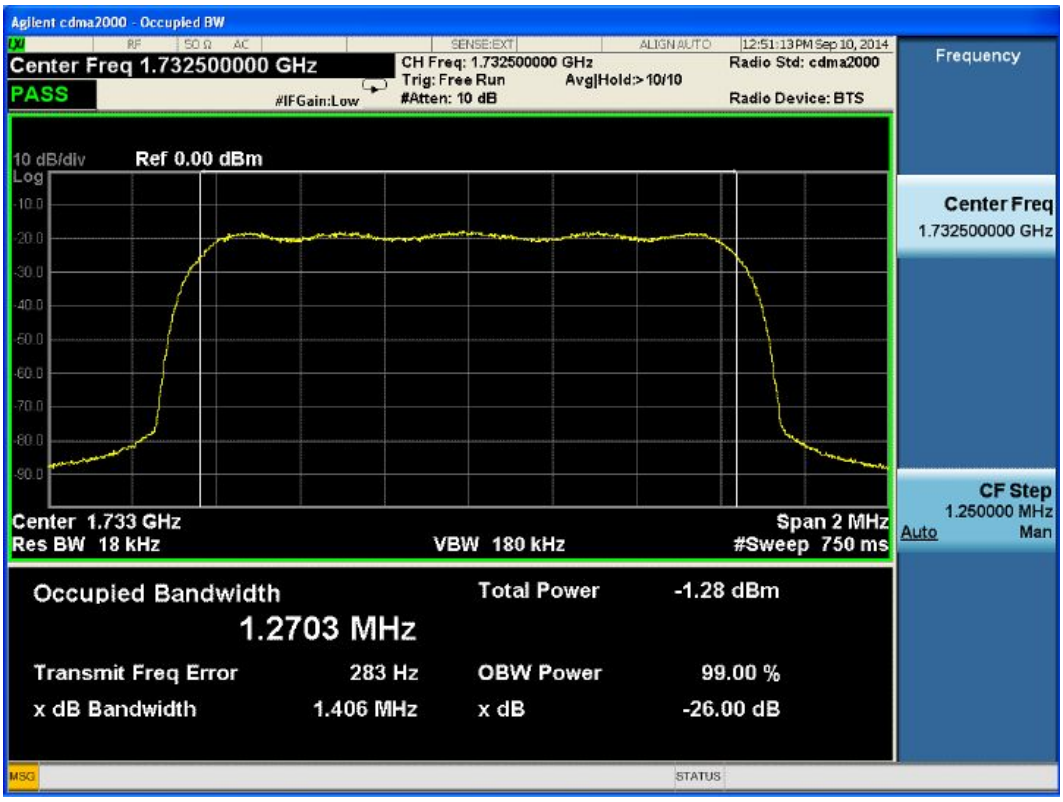
(a) Input signal

(b) Output signal

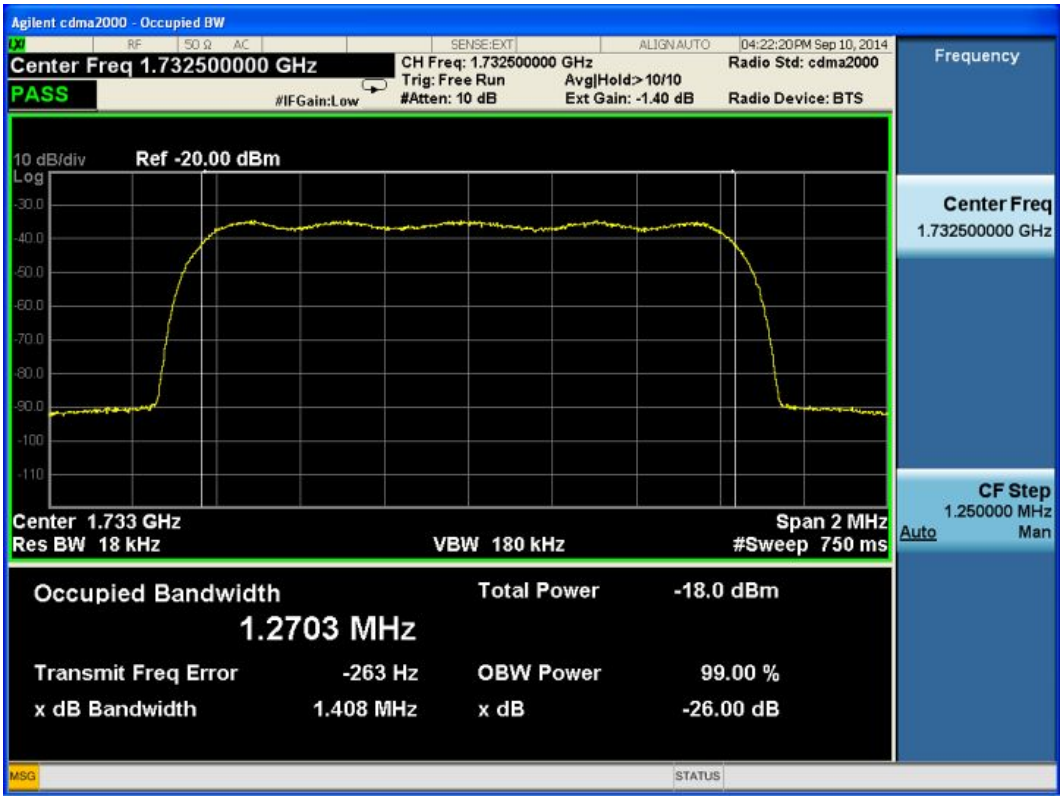


(2.2) Middle frequency

(a) Input signal

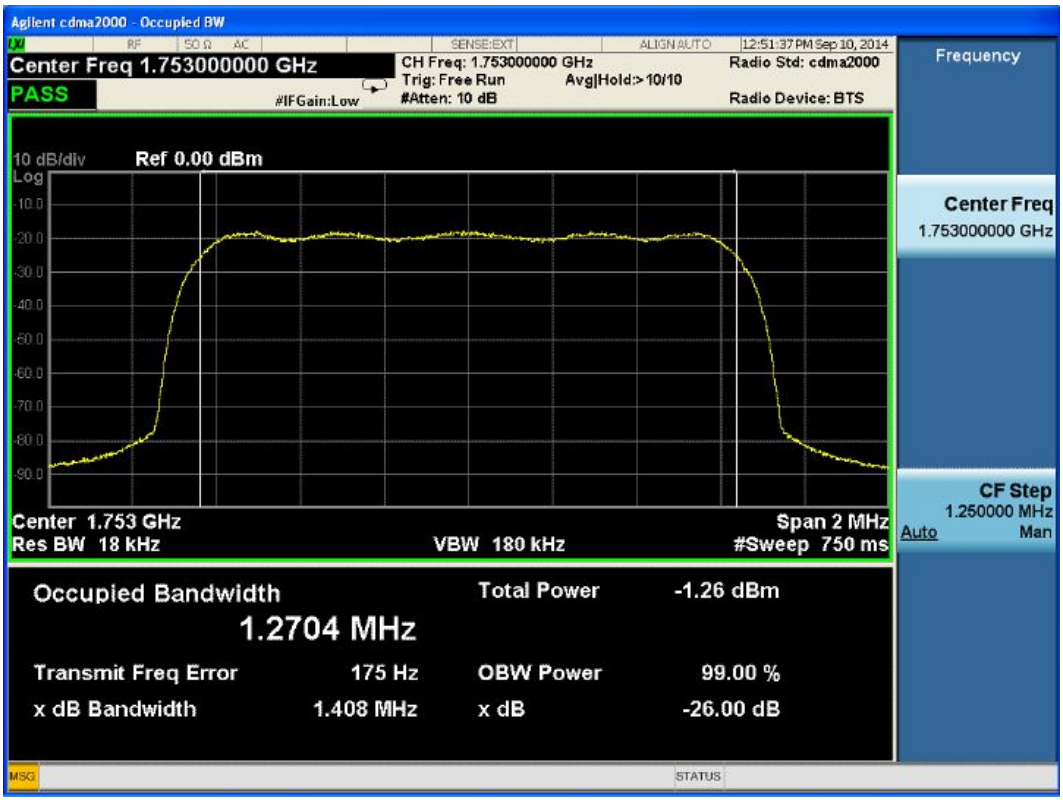


(b) Output signal

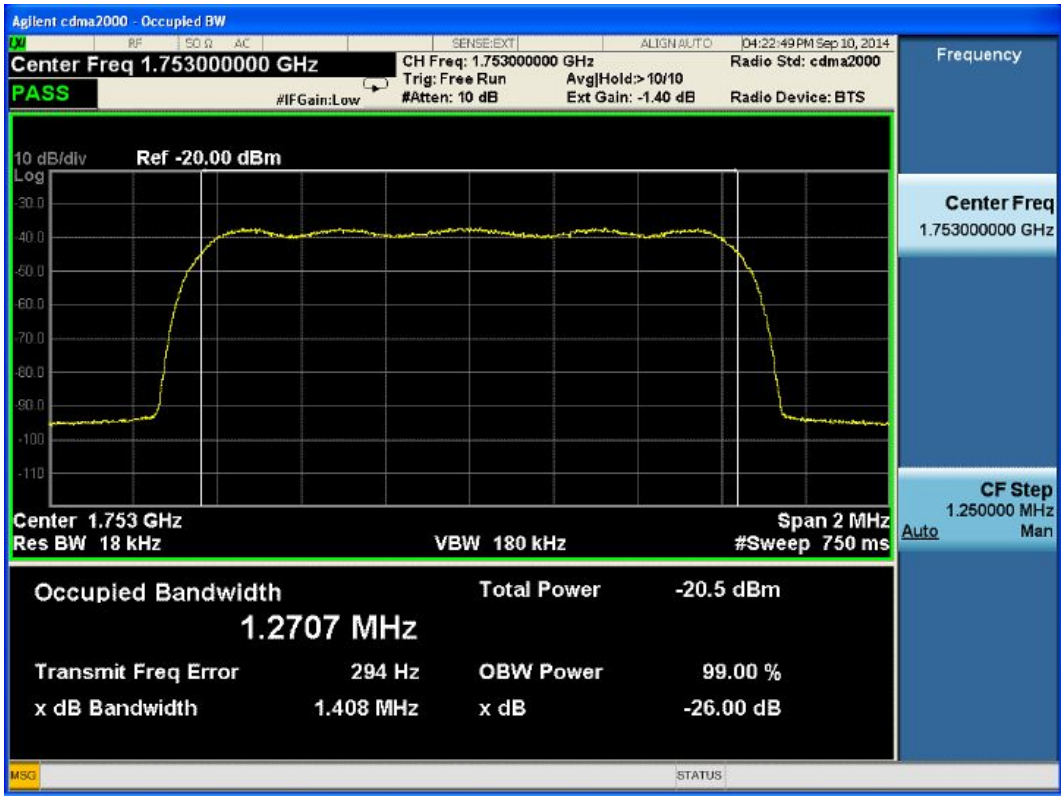


(2.3) Highest frequency

(a) Input signal



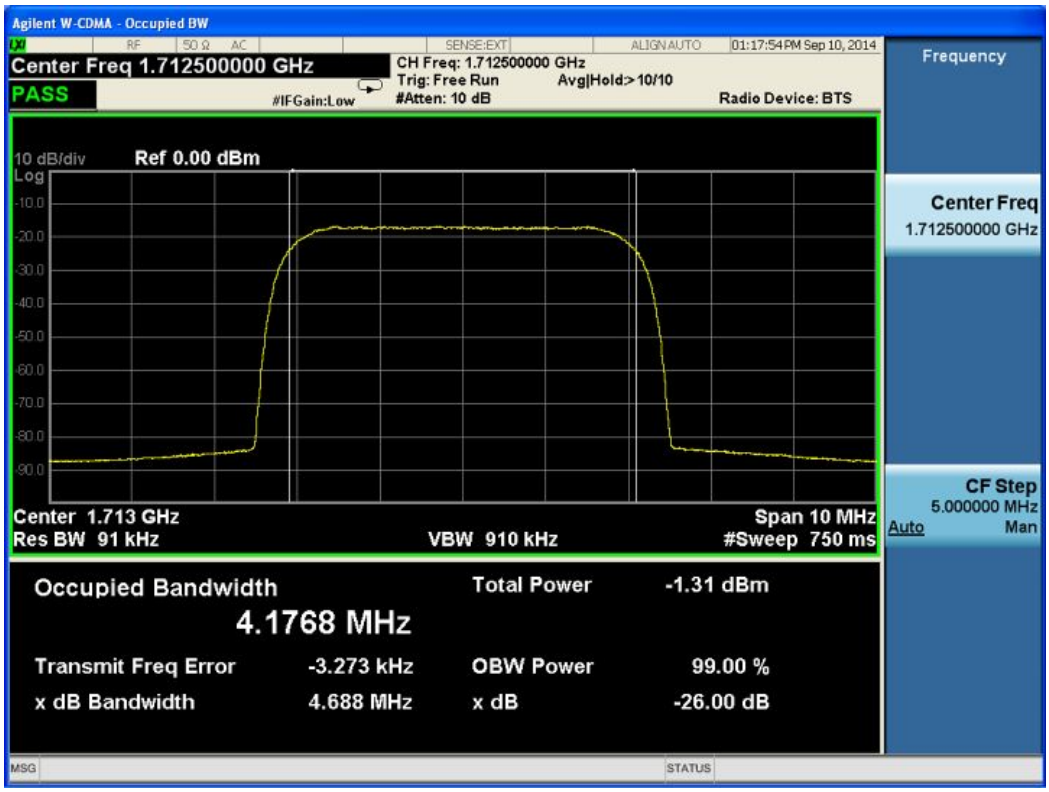
(b) Output signal



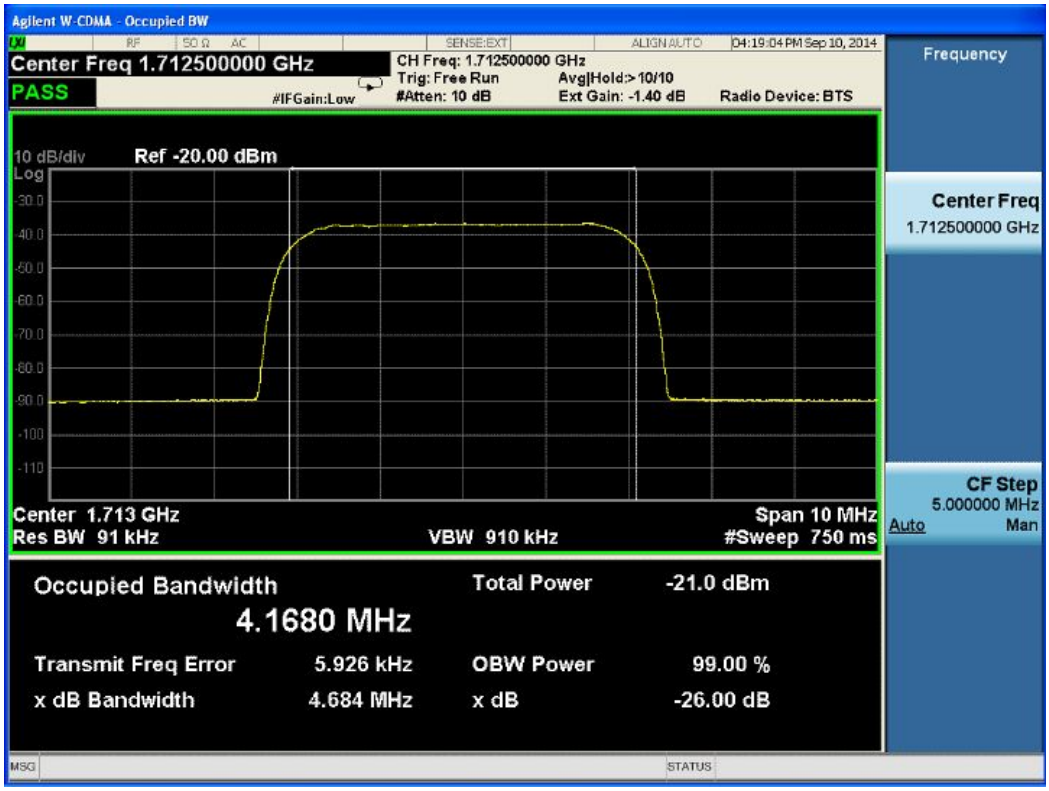
(3) WCDMA modulation

(3.1) Lowest frequency

(a) Input signal

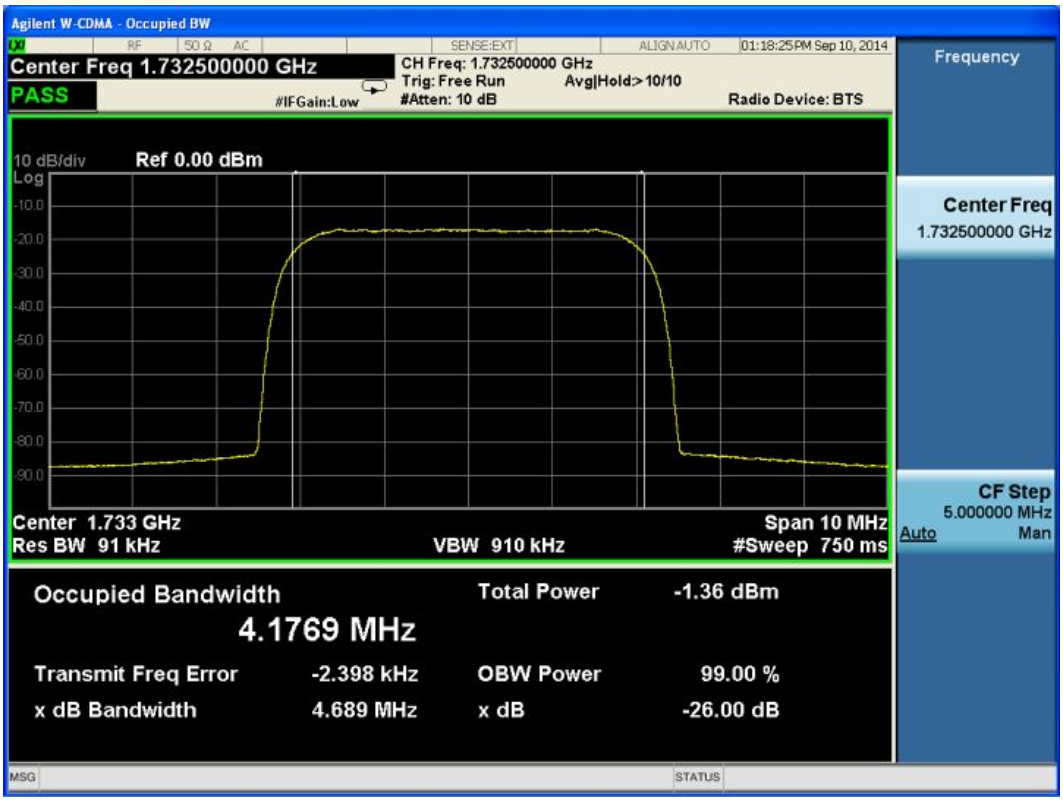


(b) Output signal



(3.2) Middle frequency

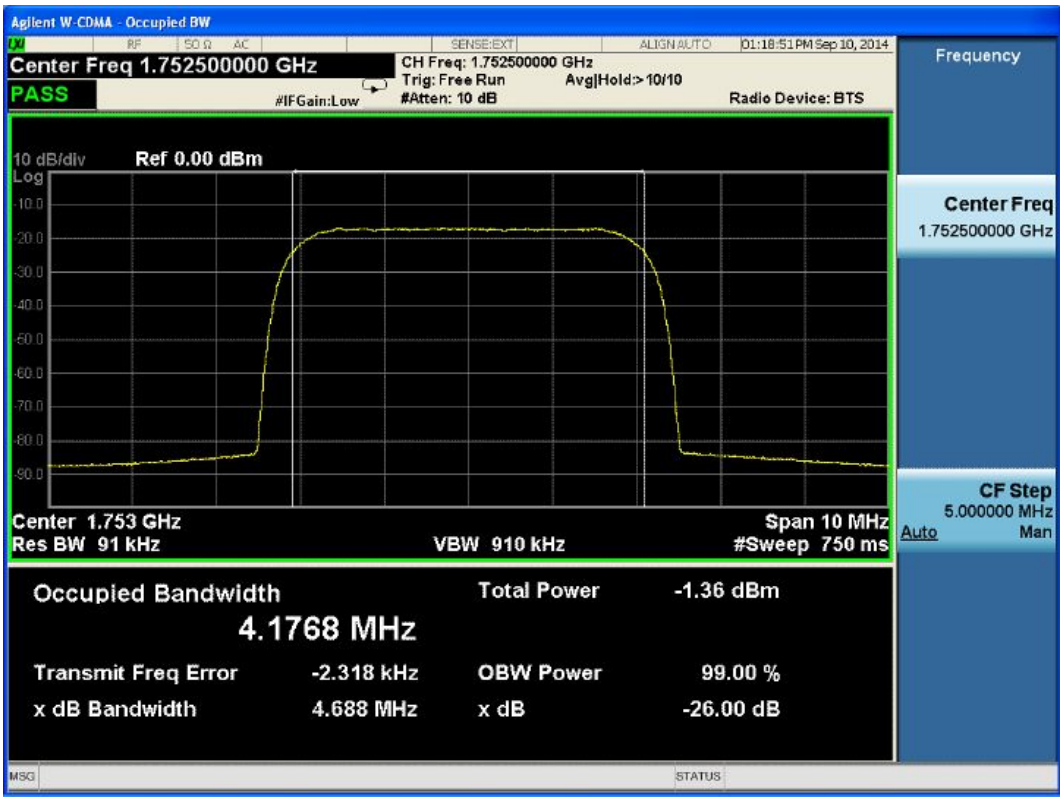
(a) Input signal



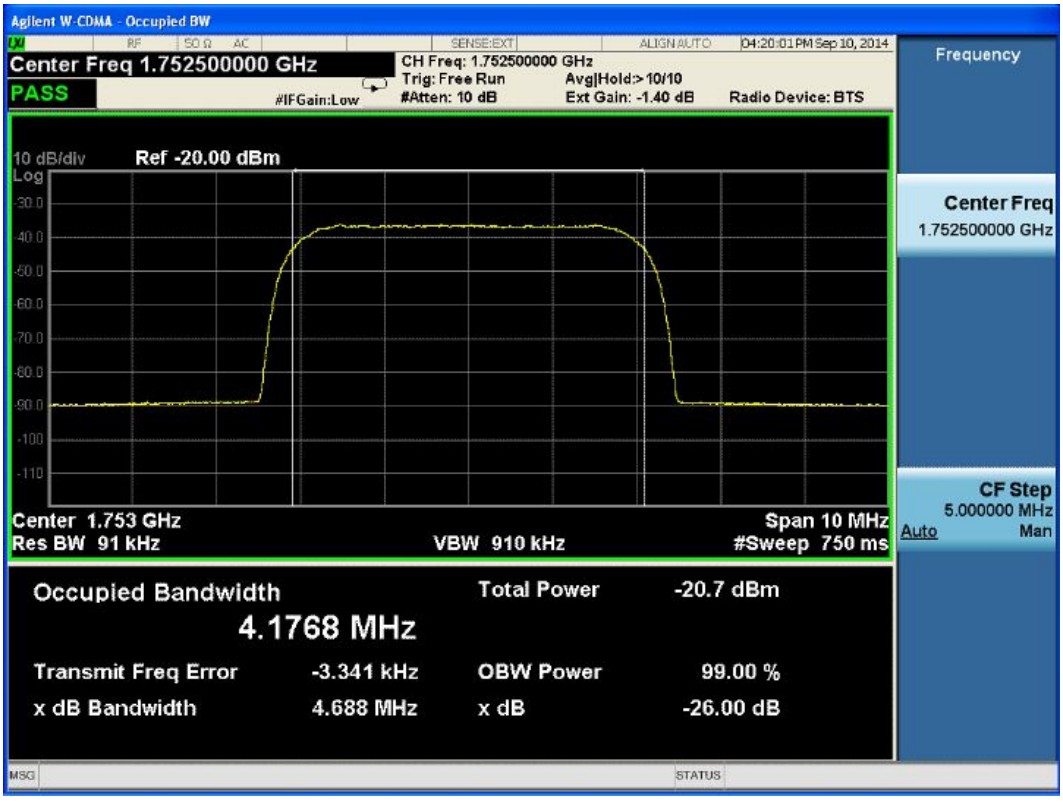
(b) Output signal

(3.3) Highest frequency

(a) Input signal



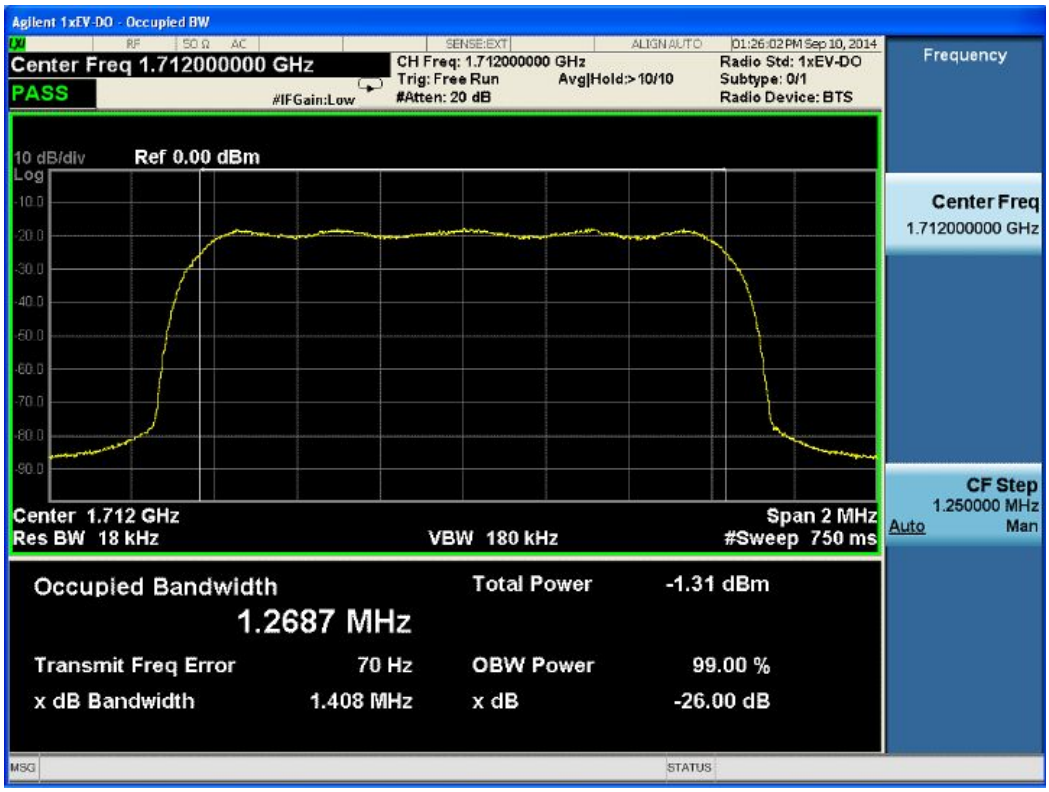
(b) Output signal



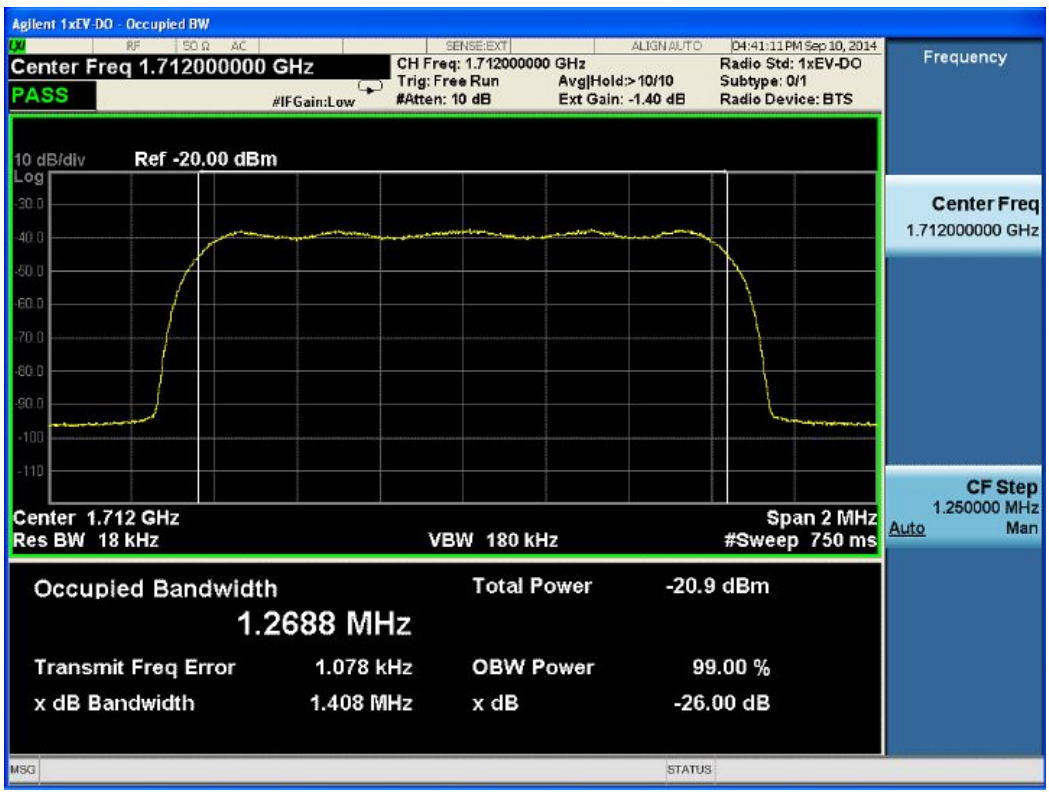
(4) 1x EV-DO modulation

(4.1) Lowest frequency

(a) Input signal

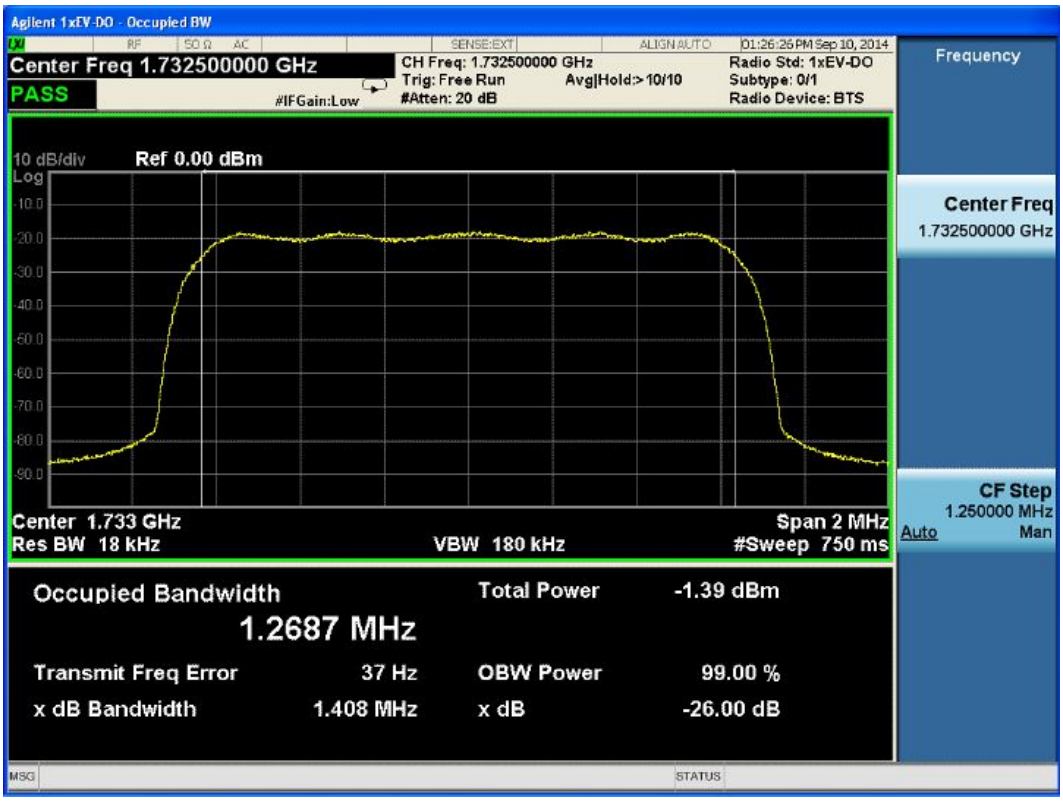


(b) Output signal

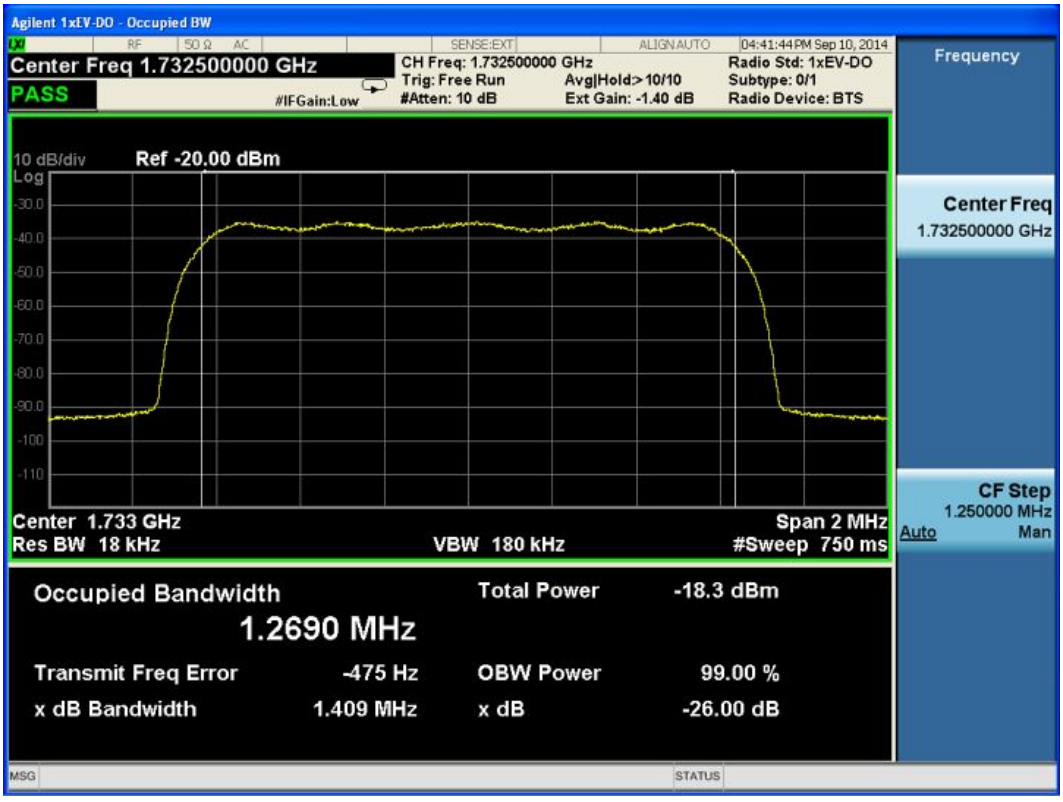


(4.2) Middle frequency

(a) Input signal

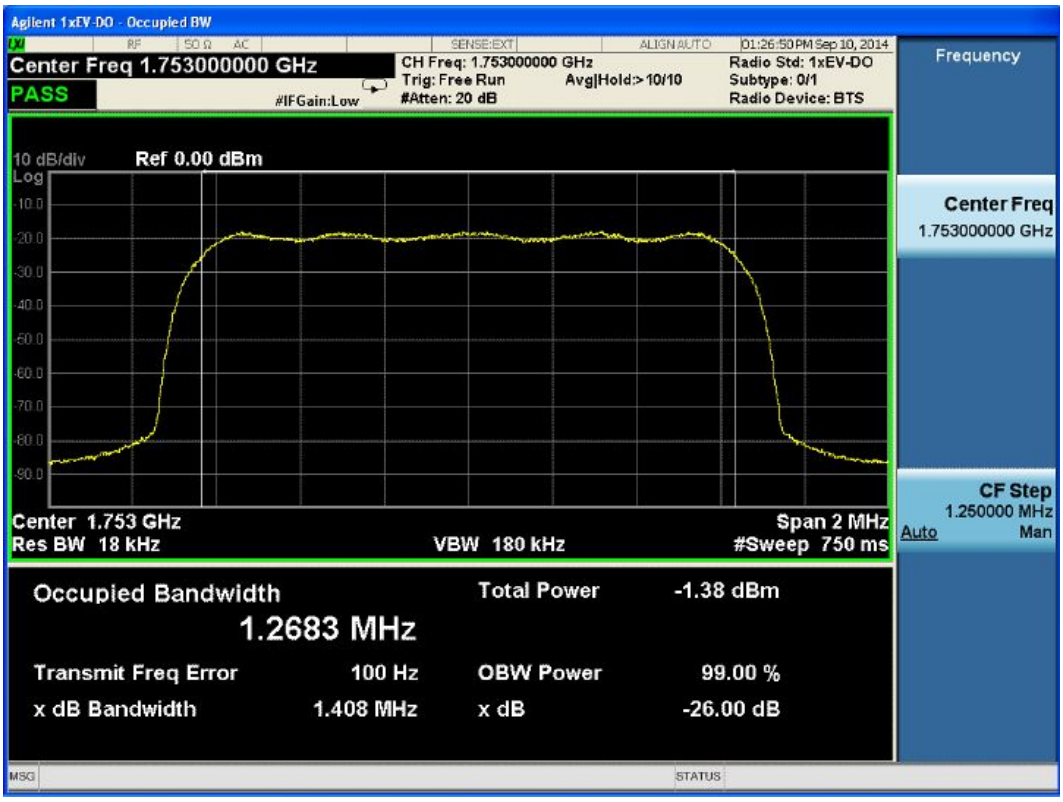


(b) Output signal

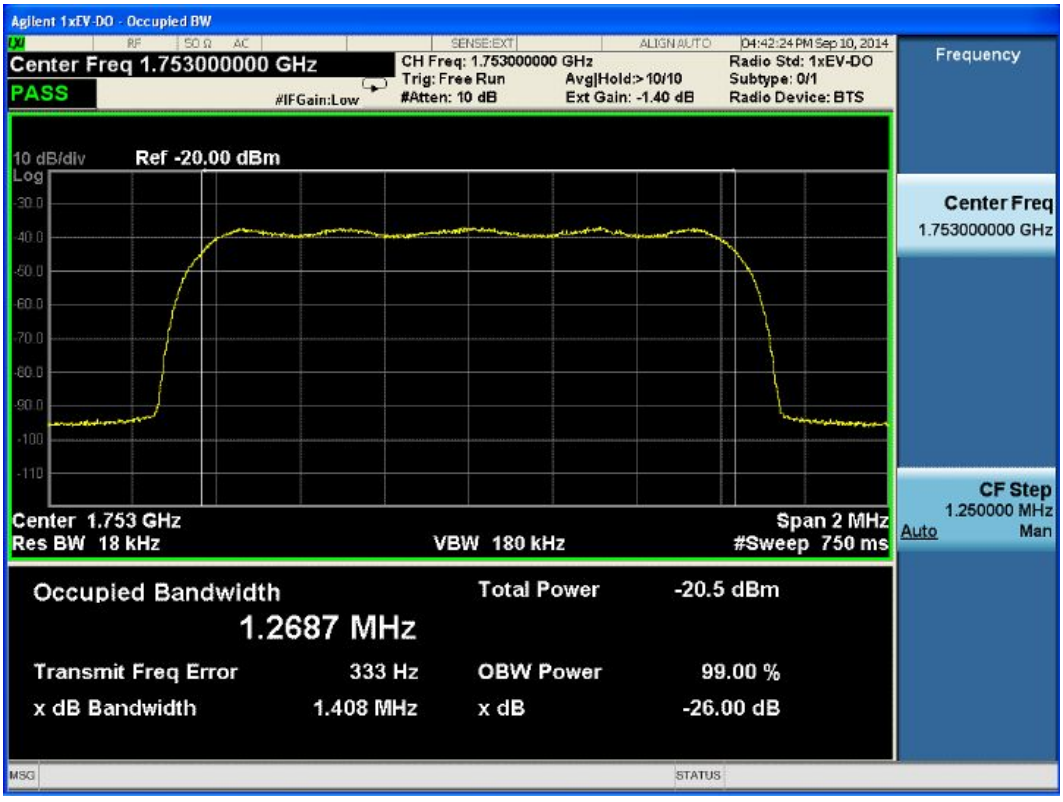


(4.3) Highest frequency

(a) Input signal



(b) Output signal



5.2.7 Out of Band Rejection

Test Date:	Sep 12, 2014 to Sep 15, 2014
Ambient Temp:	28.3℃
Humid :	61%
Atmospheric Pressure:	101kPa
Power supply:	AC 120V 60Hz
Test Method:	935210 D02 Signal Boosters Certification v02r01
Test Requirement:	935210 D02 Signal Boosters Certification v02r01
700MHz(Lower ABC) Band	Test for rejection of out of band signals. Filter freq. response plots are acceptable.
700MHz(Upper C) Band	935210 D02 Signal Boosters Certification v02r01 Test for rejection of out of band signals. Filter freq. response plots are acceptable.
800MHz Band	935210 D02 Signal Boosters Certification v02r01 Test for rejection of out of band signals. Filter freq. response plots are acceptable.
850MHz Band	935210 D02 Signal Boosters Certification v02r01 Test for rejection of out of band signals. Filter freq. response plots are acceptable.
1900MHz Band	935210 D02 Signal Boosters Certification v02r01 Test for rejection of out of band signals. Filter freq. response plots are acceptable.
AWS Band	935210 D02 Signal Boosters Certification v02r01 Test for rejection of out of band signals. Filter freq. response plots are acceptable.
EUT Operation:	The output power of EUT be set to maximum value, the gain of EUT be set to maximum value by software through the manufacture
Test conditions:	Normal conditions
Test configuration:	

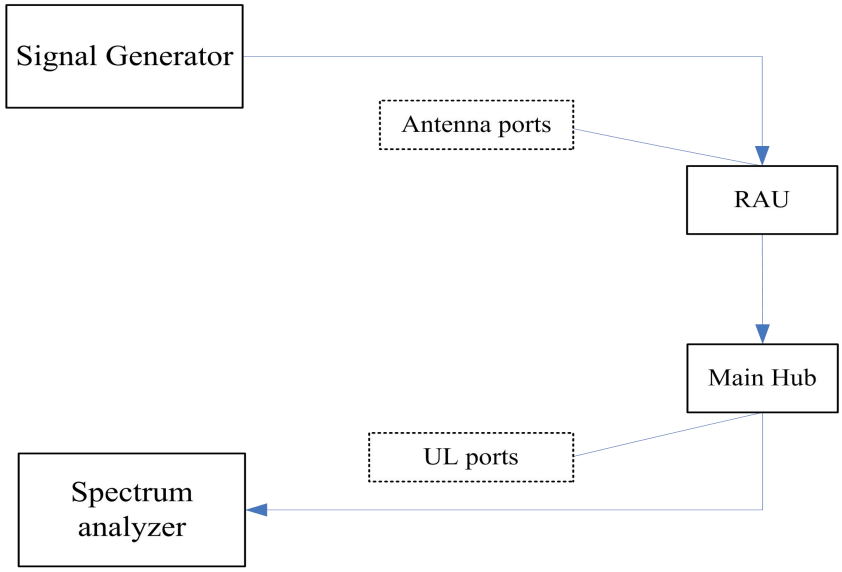


Figure 7: Uplink Out of Band Rejection Configuration

Test Procedure:

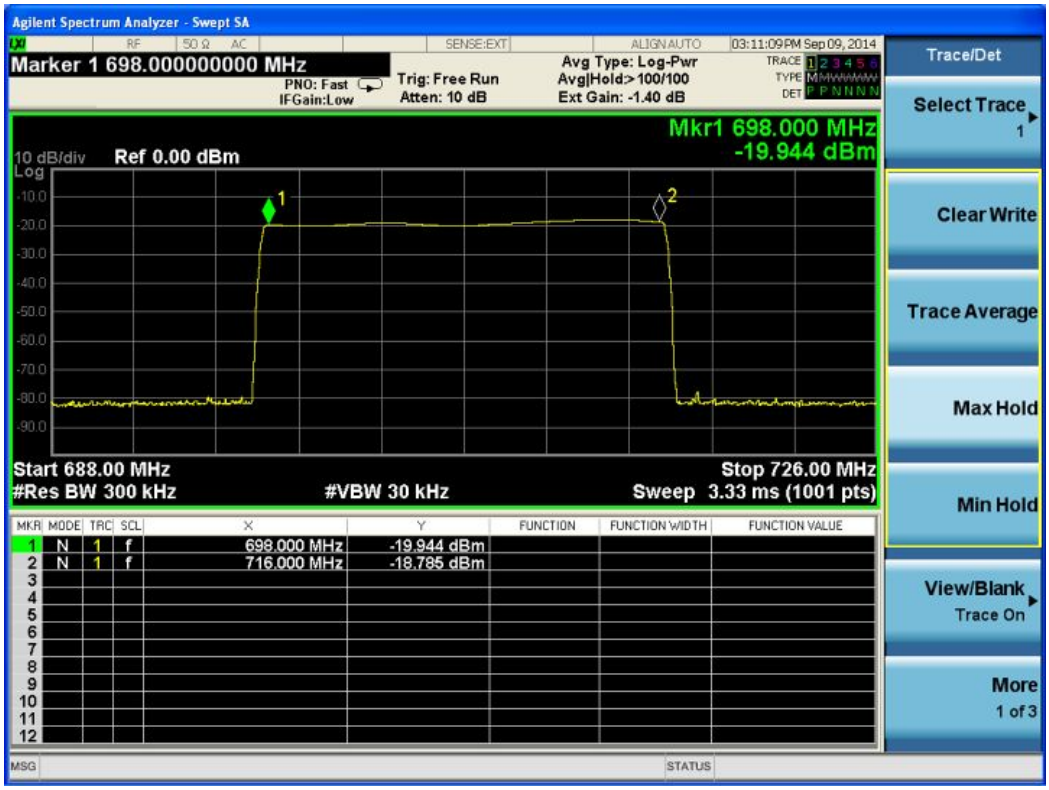
1) Connect the equipment as illustrated;
2) Test the background noise level with all the test facilities;
3) Keep one transmitting path, all other connectors shall be connected by normal power or RF leads;
4) Select the attenuator to avoid the test receiver or spectrum analyzer being destroyed;
5) Keep the EUT continuously transmitting in max power;
6) Signal generator sweep from the frequency more lower than the product frequency to the frequency more higher than it, find the product band filter characteristic;

.CW signal rather than typical signal is acceptable(for FM).

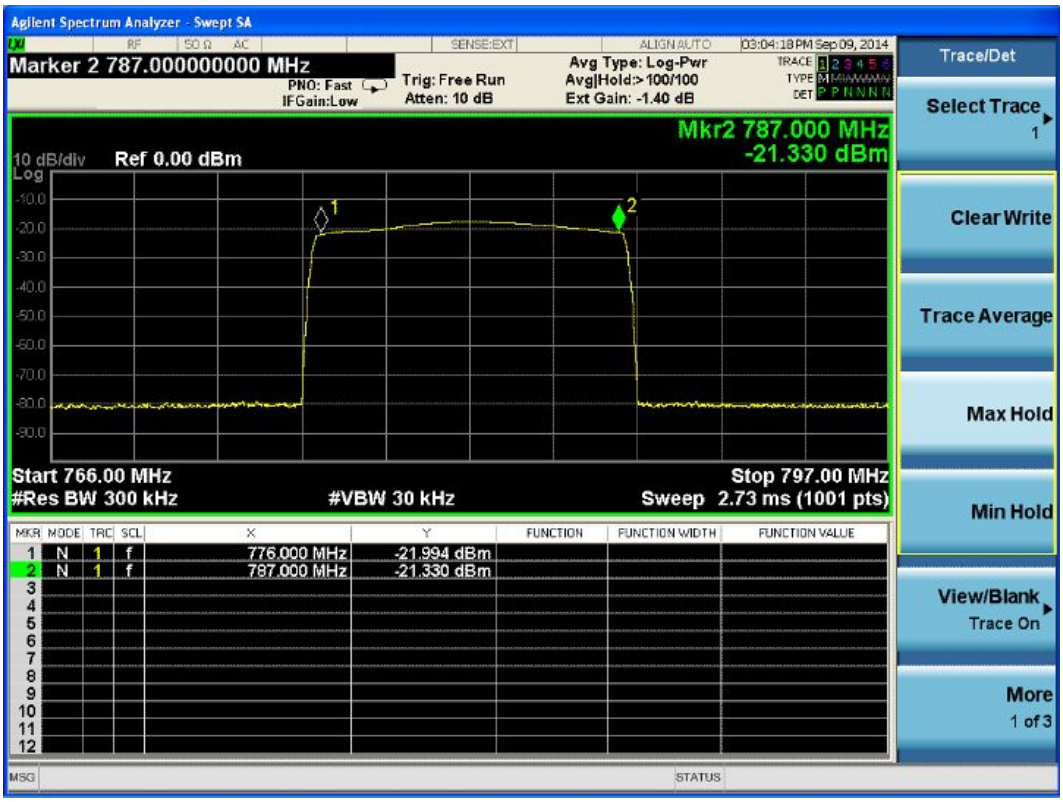
.Multiple band filter will need test each other.

5.2.7.1 Measurement Record

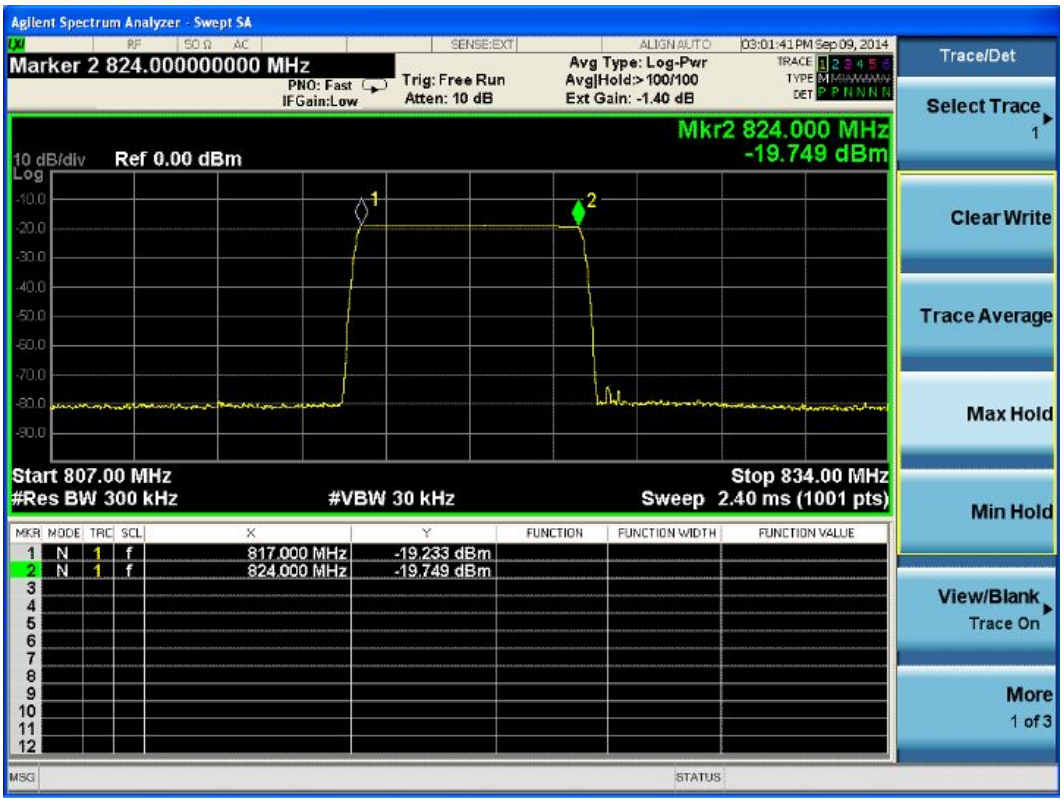
5.2.7.1.1 700MHz Lower ABC Band



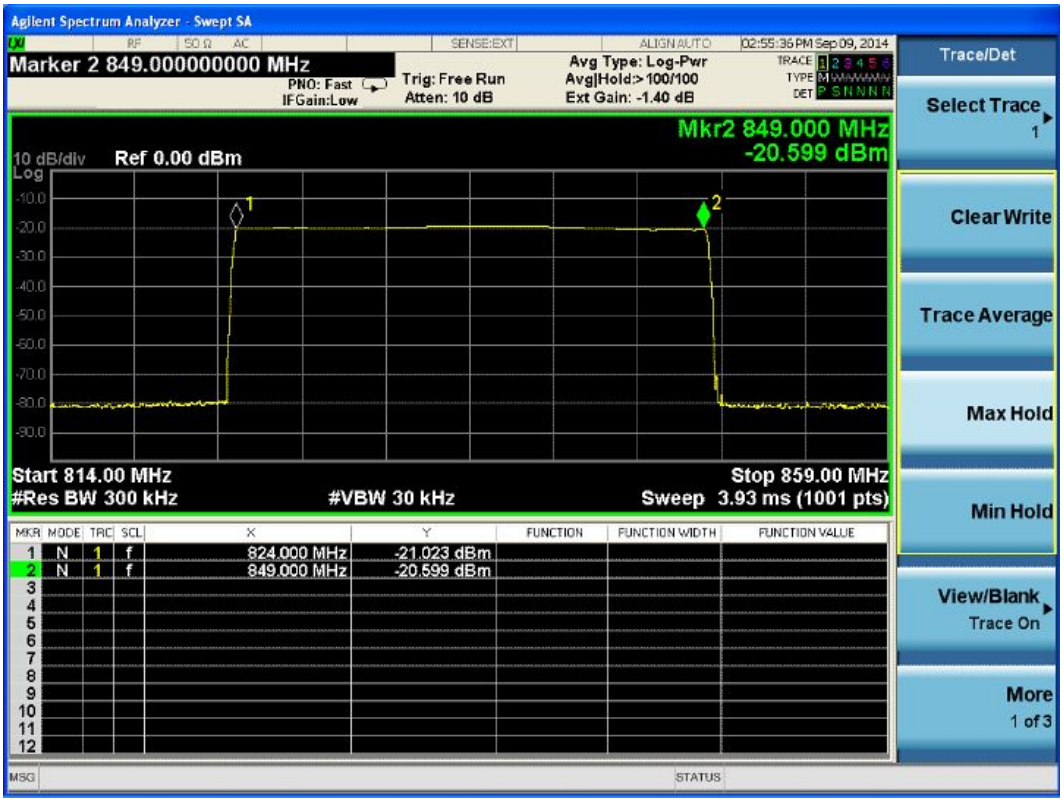
5.2.7.1.2 700MHz Upper C Band



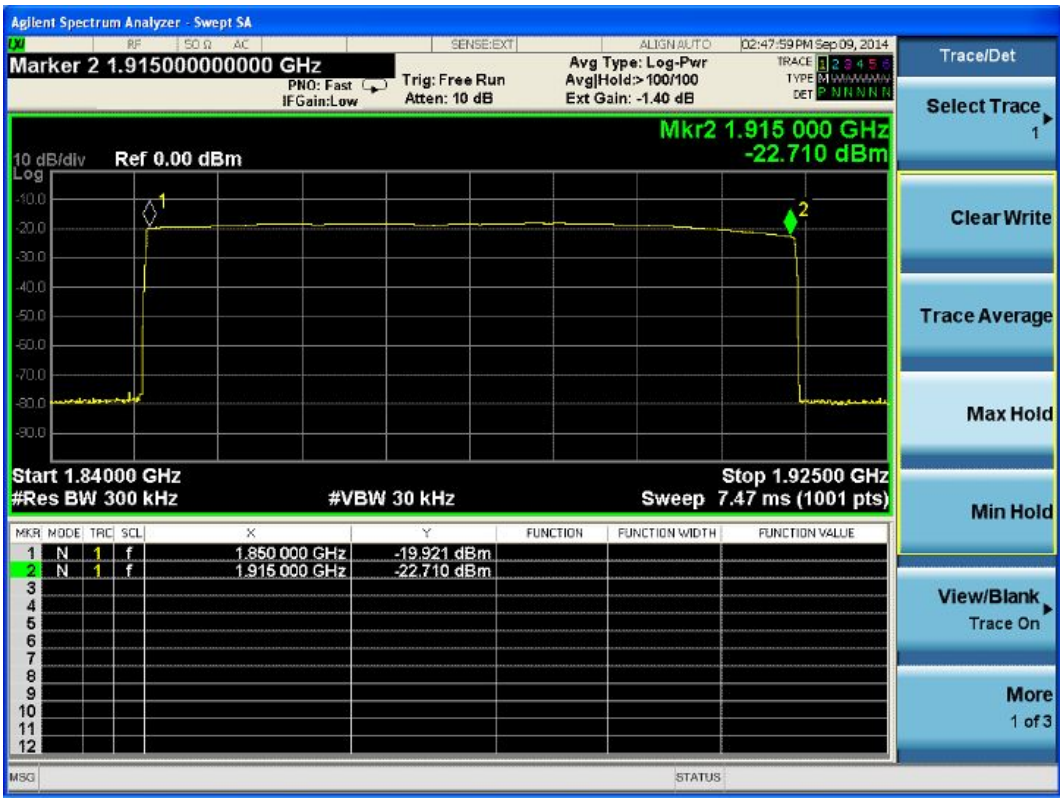
5.2.7.1.3 800MHz Band



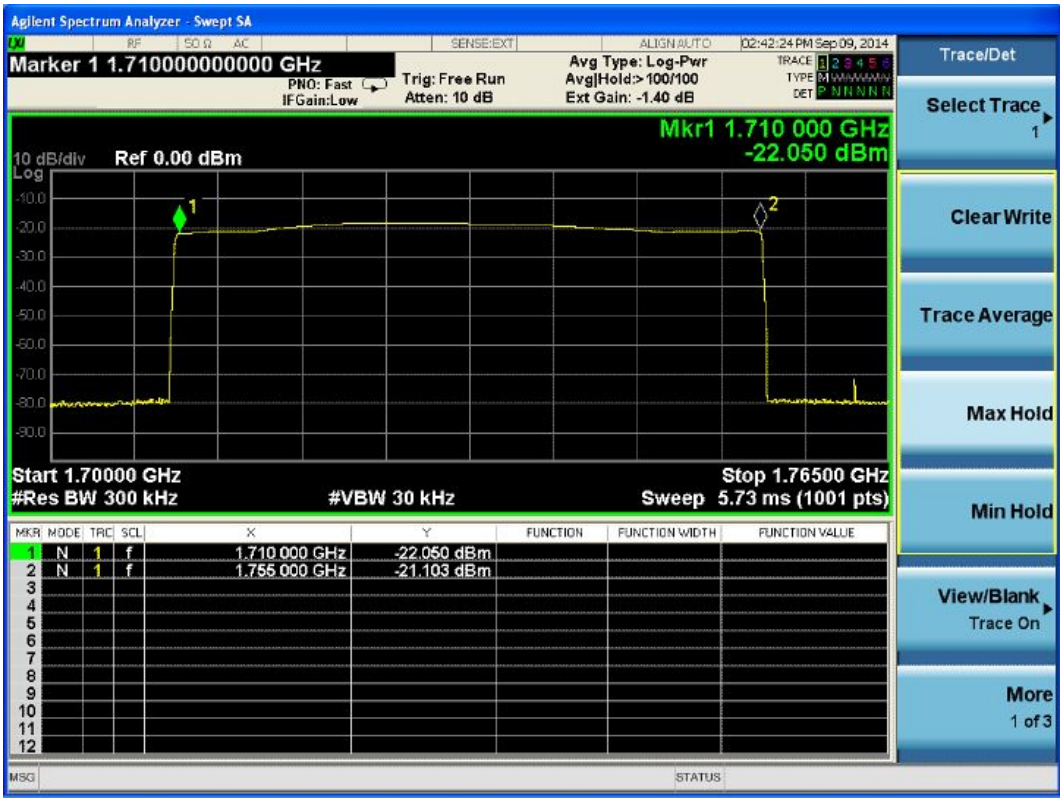
5.2.7.1.4 850MHz Band



5.2.7.1.5 1900MHz Band



5.2.7.1.6 AWS-1 Band



5.2.8 Radiated Spurious Emissions

Test Date:	Sep 16, 2014 to Sep 17, 2014
Ambient Temp:	23.9℃
Humid :	64%
Atmospheric Pressure:	101kPa
Power supply:	AC 120V 60Hz
Test Method:	FCC part 2.1053
Test Requirement:	FCC part 27. 53
700MHz(Lower ABC) Band	The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, or -13 dBm.
700MHz(Upper C) Band	FCC part 27. 53 The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, or -13 dBm.
800MHz Band	FCC part 90.210 The power of any emission outside a licensee's frequency block shall be attenuated below the transmitting power (P) by at least 43 + 10 log (P) dB, or -13 dBm.
850MHz Band	FCC part 22. 359 The power of any emission outside a licensee's frequency block shall be attenuated below the transmitting power (P) by at least 43 + 10 log (P) dB, or -13 dBm.
1900MHz Band	FCC part 24. 238 The power of any emission outside a licensee’s frequency block shall be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB, or -13 dBm.
AWS Band	FCC part 27. 53 The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, or -13 dBm.
EUT Operation:	The output power of EUT be set to maximum value, the gain of EUT be set to maximum value by software through the manufacture
Test conditions:	Normal conditions

Test configuration:

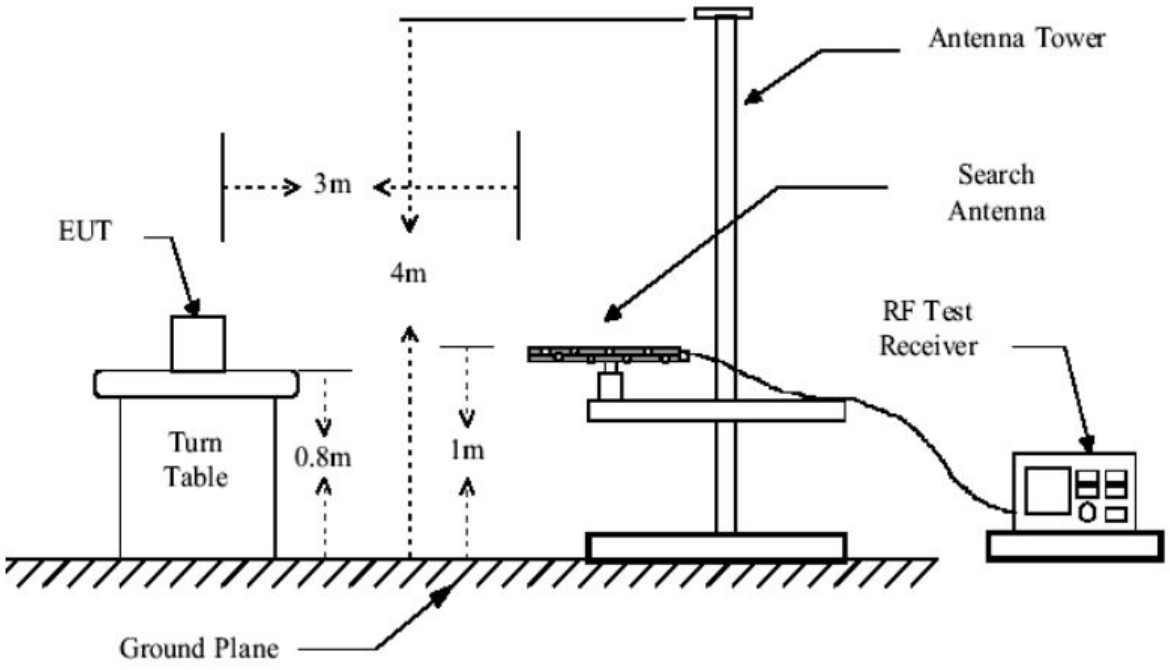


Figure 1: 30 MHz to 1 GHz radiated emissions test configuration

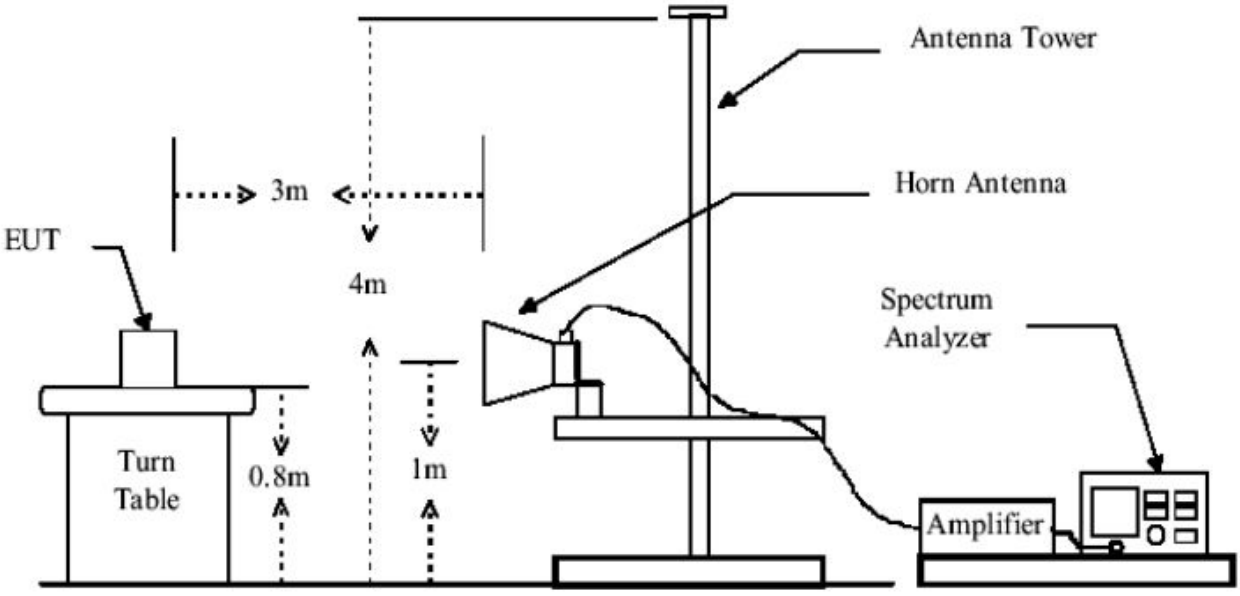


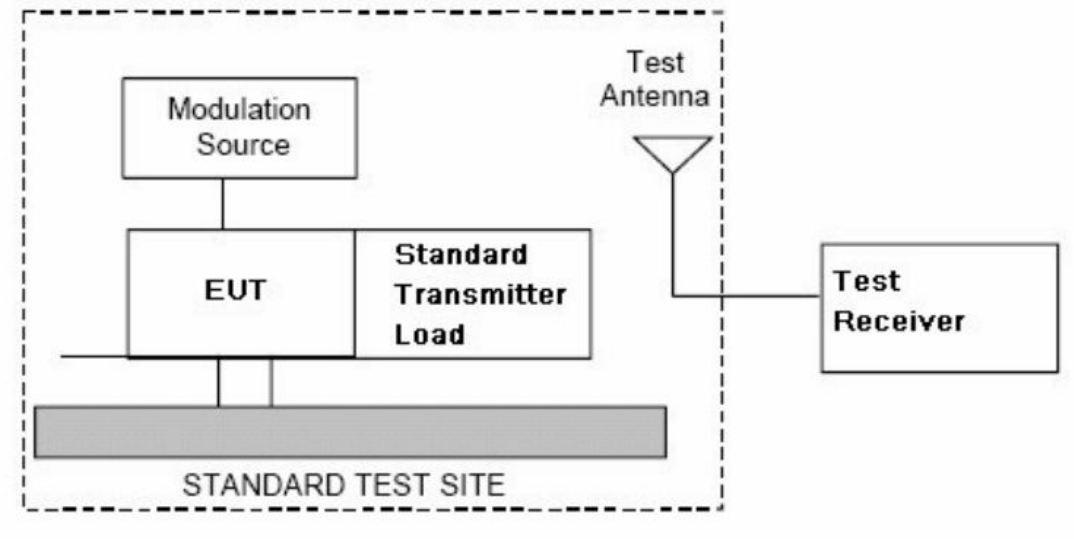
Figure 2: Above 1 GHz radiated emissions test configuration

Test Procedure:

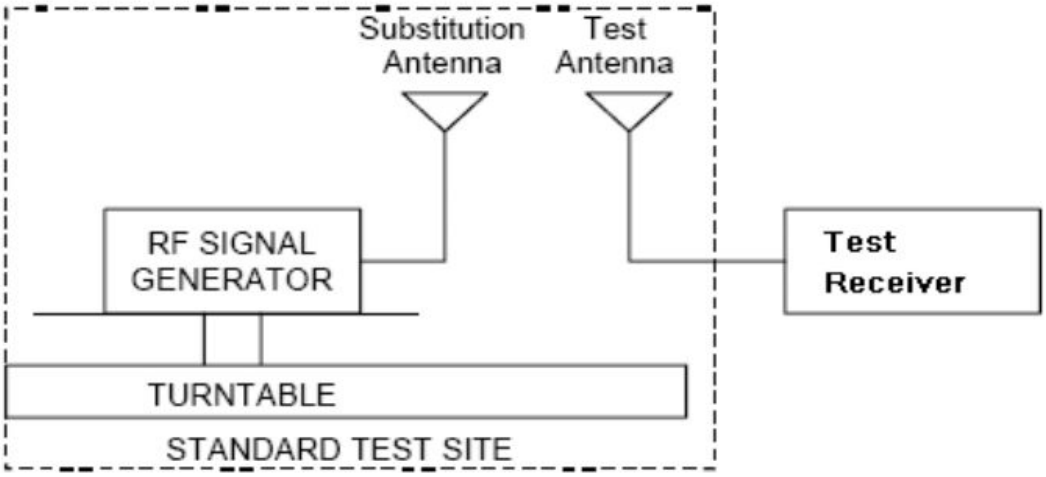
1) Test the background noise level with all the facilities;
2) Keep one transmitting path, all other connectors shall be connected by normal power or RF leads;

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;
Read the radiated emissions of the EUT enclosure;

Radiated spurious emissions test procedure:



a) Connect the equipment as illustrated;
b) Adjust the spectrum analyzer for the following setting;
1) RBW=100kHz for spurious emission below 1 GHz, and 1MHz for spurious emission above 1GHz;
2) VBW=300k for spurious emission below 1GHz, and 3MHz for spurious emission above 1GHz;
3) Sweep speed slow enough to maintain measurement calibration;
4) Detector Mode= Positive Peak;
c) Place the transmitter to be tested on the turnable in the standard test site, The transmitter is transmitting into a nonradiating load that is placed on the turnable, the RF cable to this load should be of minimum length.
d) Measurements shall be made from 30MHz to 10 times 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 turnable 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 0.3m 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 he spectrum analyzer. Adjuest the level of the signal generator output until the previously recorded maximum reading or 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 antennasvertically polarized for each spurious frequency.

m) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in step k) and i) 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: It is permissible to use other antennas provided they can be referenced to a dipole.

NOTE: Effective radiated power(e.r.p) refers to the radiation of a half wave tuned dipole instead of and 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(dB)-2.15

5.2.8.1 Measurement Record

5.2.8.1.1 700MHz Lower ABC Band

Test Frequency (MHz)	Measuring level(dBm)		Limit(dBm)	Margin(dB)	
	Vertical	Horizontal		Vertical	Horizontal
30	-51.93	-60.50	≤-13dBm	38.93	47.50
500	-54.87	-55.42		41.87	42.42
1000	-51.79	-51.31		38.79	38.31
2000	-44.68	-45.14		31.68	32.14
5000	-33.78	-33.76		20.78	20.76
10000	-24.68	-24.81		11.68	11.81
15000	-19.32	-20.81		6.32	7.81
20000	-19.68	-19.67		6.68	6.67

5.2.8.1.2 700MHz Upper C Band

Test Frequency (MHz)	Measuring level(dBm)		Limit(dBm)	Margin(dB)	
	Vertical	Horizontal		Vertical	Horizontal
30	-50.58	-60.13	≤-13dBm	37.58	47.13
500	-57.65	-57.83		44.65	44.83
1000	-50.60	-51.43		37.60	38.43
2000	-44.88	-45.27		31.88	32.27
5000	-33.95	-34.68		20.95	21.68
10000	-23.96	-24.87		10.96	11.87
15000	-20.18	-20.43		7.18	7.43
20000	-19.87	-19.96		6.87	6.96

5.2.8.1.3 800MHz Band

Test Frequency (MHz)	Measuring level(dBm)		Limit(dBm)	Margin(dB)	
	Vertical	Horizontal		Vertical	Horizontal
30	-53.77	-62.45	≤-13dBm	40.77	49.45
500	-56.90	-57.16		43.90	44.16
1000	-51.42	-51.39		38.42	38.39
2000	-45.78	-45.47		32.78	32.47
5000	-34.68	-34.24		31.68	31.24
10000	-25.57	-24.79		12.57	11.79
15000	-20.87	-20.39		7.87	7.39
20000	-19.77	-19.96		6.77	6.96

5.2.8.1.4 850MHz Band

Test Frequency (MHz)	Measuring level(dBm)		Limit(dBm)	Margin(dB)	
	Vertical	Horizontal		Vertical	Horizontal
30	-52.57	-63.45	≤-13dBm	39.57	50.45
500	-54.90	-56.16		41.90	43.16
1000	-50.70	-53.39		37.70	40.39
2000	-44.78	-45.47		31.78	32.47
5000	-33.58	-34.24		20.58	21.24
10000	-24.57	-25.29		11.57	12.29
15000	-20.38	-20.03		7.38	7.03
20000	-19.36	-19.95		6.36	6.95

5.2.8.1.5 1900MHz Band

Test Frequency (MHz)	Measuring level(dBm)		Limit(dBm)	Margin(dB)	
	Vertical	Horizontal		Vertical	Horizontal
30	-54.34	-63.60	≤-13dBm	41.34	50.60
500	-56.68	-56.83		43.68	43.83

1000	-52.32	-51.95		39.32	38.95
2000	-46.57	-46.36		33.57	33.36
5000	-35.59	-34.83		22.59	21.83
10000	-24.91	-24.28		11.91	11.28
15000	-19.46	-19.32		6.46	6.32
20000	-19.75	-19.49		6.75	6.49

5.2.8.1.6 AWS-1 Band

Test Frequency (MHz)	Measuring level(dBm)		Limit(dBm)	Margin(dB)	
	Vertical	Horizontal		Vertical	Horizontal
30	-51.71	-61.73	≤-13dBm	38.71	48.73
500	-58.08	-56.87		45.08	43.87
1000	-51.06	-51.87		38.06	38.87
2000	-45.69	-45.88		32.69	32.88
5000	-34.46	-34.38		21.46	21.38
10000	-25.36	-25.29		12.36	12.39
15000	-19.41	-19.41		6.41	6.41
20000	-19.60	-19.39		6.60	6.39

Remark:

Sweep all the modulation types emissions in 700MHz Lower ABC & Upper C band & 800MHz &850MHz Band & 1900MHz Band & AWS-1 band , find the worse case to report it.

Appendix A: photograph of the test configuration

(1) RF


FLUKE PM6685R
UNIVERSAL FREQUENCY COUNTER/CALIBRATOR
706.9999998
FUNCTION
INPUT A


FLUKE PM6685R
UNIVERSAL FREQUENCY COUNTER/CALIBRATOR
781.4999997
FUNCTION
INPUT A


820.4999999
FUNCTION
INPUT A

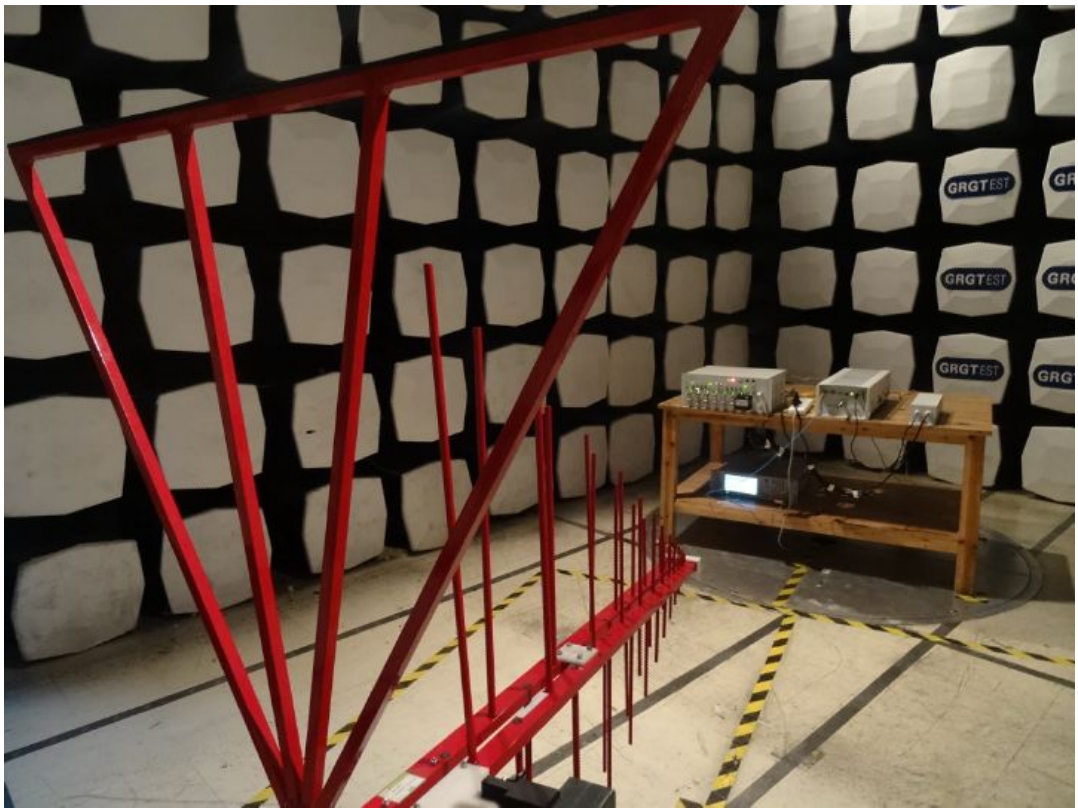

FLUKE PM6685R
UNIVERSAL FREQUENCY COUNTER/CALIBRATOR
836.5000002 6 Hz
FUNCTION
INPUT A


FLUKE PM6685R
UNIVERSAL FREQUENCY COUNTER/CALIBRATOR
1.882499999 9 Hz
FUNCTION
INPUT A

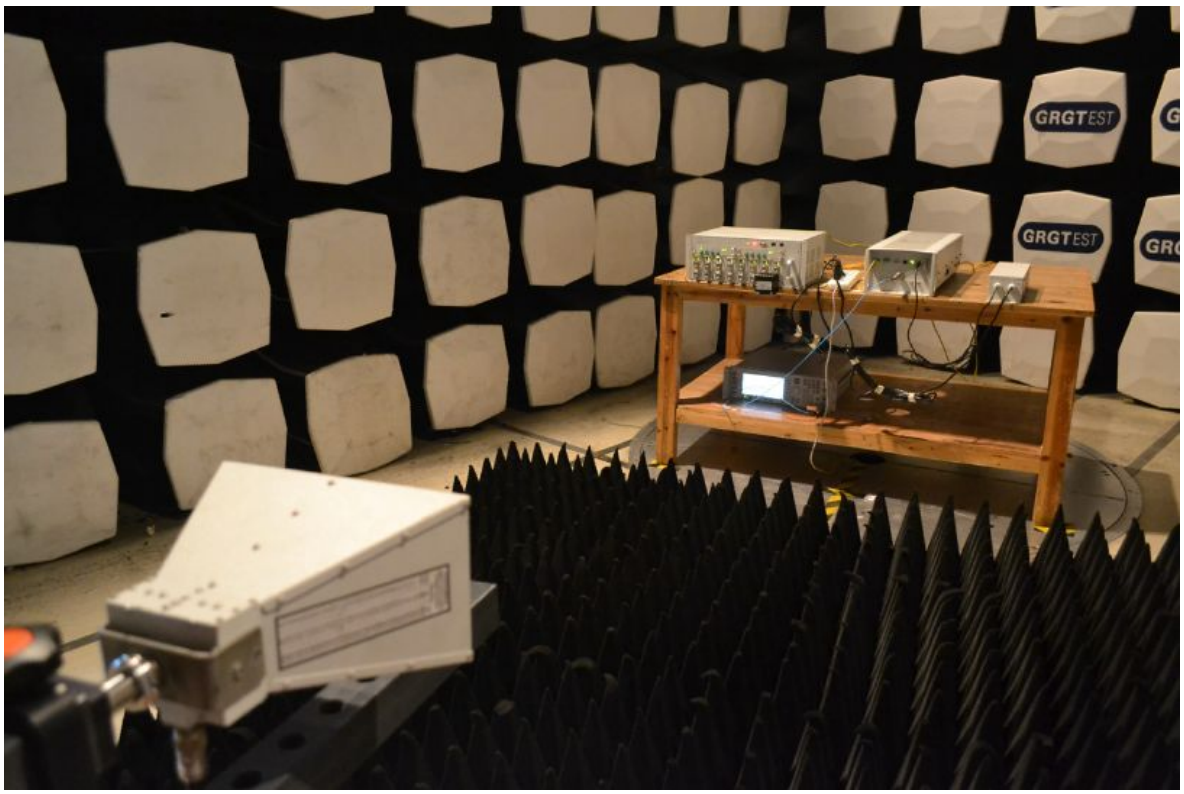

FLUKE PM6685R
FUNCTION
INPUT A


50.23

(2) RE (Below 1GHz)



RE (Above 1GHz)



----------This is the last page of the report. ----------