SGS-CSTC Standards Technical Services Ltd.

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FEDERAL COMMUNICATIONS COMMISSION
Registration number: 282399

TEST REPORT

Application No.:	GZEM1007001296RF
Applicant:	Comba Telecom Ltd.
FCC ID:	PX8RD-2020
Frequency Band:	Downlink: 2110MHz to 2155MHz
	Uplink: 1710MHz to 1755MHz
Equipment Under Test (EUT):	
Name:	RD2020 AWS Bandwidth Adjustable Repeater
Model No:	RD-2020
Standards:	FCC part 27, FCC part 2
Date of Receipt:	2010-07-23
Date of Test:	2010-07-23 to 2010-07-28
Date of Issue:	2010-11-02
Test Result :	**Pass***

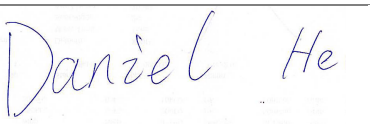
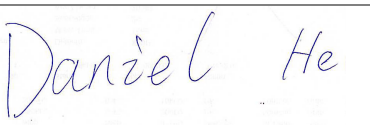
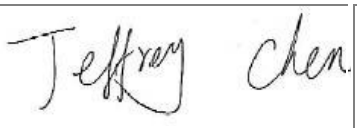
*In the configuration tested, the EUT detailed in this report complied with the standards specified above. Please refer to section 3 of this report for further details.

Authorized Signature:

Stephen Guo
Lab Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2010-11-02		Original

Authorized for issue by:				
Tested By		 **(Daniel Hew) /Project Engineer**		2010-07-23 to 2010-07-28 **Date**
Prepared By		 **(Daniel Hew) /Clerk**		2010-09-09 **Date**
Checked By		 **(Jeffrey Chen) /Reviewer**		2010-11-02 **Date**

3 Test Summary

Test Item	Test Requirement	Test Method	Result
Output Power	FCC part 27.50	FCC part 2.1046 2-11-04/EAB/RF	PASS
Conducted Spurious Emissions	FCC part 27.53	FCC part 2.1051 2-11-04/EAB/RF	PASS
Band Edge& Intermodulation	FCC part 27.53	FCC part 2.1051 2-11-04/EAB/RF	PASS
Radiated Spurious Emissions	FCC part 27.53	FCC part 2.1053 2-11-04/EAB/RF	PASS
Occupied Bandwidth	FCC part 2.1049	FCC part 2.1049 2-11-04/EAB/RF	PASS
Out of Band Rejection	2-11-04/EAB/RF	2-11-04/EAB/RF	PASS
Frequency Stablility	FCC part 27.54	FCC part 2.1055	PASS

Remark:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

4 Contents

5 General Information

5.1 Client Information

Applicant Name:	Comba Telecom Ltd.
Applicant Address:	611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park,Tai Po, Hong Kong

5.2 General Description of E.U.T.

Name:	RD2020 AWS Bandwidth Adjustable Repeater
Model No.:	RD-2020
Power Supply:	120V AC
DC Voltage & Current into Final AMPLIFIER	DC 28~28.5 V, 3.5 A
Operating Temperature:	-33 to +55
Operating Humidity:	≤ 95%

5.3 Description of EUT operation

Type of Modulation	CDMA
Emission Designator:	1M25F9W(CDMA)
Frequency Band:	AWS Band: Downlink: 2110MHz to 2155MHz Uplink: 1710MHz to 1755MHz
Working Band:	Downlink: adjusted wordking band from 1.25 to 10MHz for supporting 1 to 8 channels and can be moved wthin Frequency Band (2110MHz to 2155MHz); Uplink: adjusted wordking band from 1.25 to 10MHz for supporting 1 to 8 channels and can be moved wthin Frequency Band (1710MHz to 1755MHz);
Norminal Power Output:	40dBm for downlink 23dBm for uplink

5.4 Product Description

The RD-2020 bandwidth adjustable repeater is designed for CDMA AWS networks. Band-specific linear amplifier and filtering effectively amplifies the desired BTS carriers and provides superior out-of-band rejection. Remote configuration and surveillance is possible through Comba's remote control and monitoring system via PC or wireless modem to the OMT/OMC. Internal Li-ion backup battery ensures alarm signals are sent out during power failure. The unit comes in a sealed, cast aluminum enclosure, suitable for operation in all weather conditions.

5.5 Standards Applicable for Testing

The standard used was FCC part 2 & FCC part 27

5.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,

198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

5.7 Other Information Requested by the Customer

None.

5.8 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP – Lab Code: 200611-0**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **FCC – Registration No.: 282399**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002. With the above and NVLAP's accreditation, SGS-CSTC is an authorized test laboratory for the DoC process.

6 Equipments Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2010-09-06	2011-09-06
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2010-01-25	2011-01-25
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	10036	2010-06-02	2011-06-02
N/A	EMI Test Software	Audix	E3	N/A	N/A	N/A
EMC0514	Coaxial cable	SGS	N/A	N/A	2009-12-09	2010-12-09
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2009-12-20	2010-12-20
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2009-12-20	2010-12-20
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2010-09-11	2011-09-11
EMC0040	Spectrum Analyzer	Rohde & Schwarz	FSP30	100324	2009-12-05	2010-12-05
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2010-01-25	2011-01-25
EMC0049	Amplifier	Agilent	8447D	2944A10862	2010-04-21	2011-04-21
EMC0075	310N Amplifier	Sonama	310N	272683	2010-10-25	2011-10-25
EMC0523	Active Loop Antenna	EMCO	6502	42963	2009-11-17	2010-11-17
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	2010-05-17	2011-05-17

Conducted Emission						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
					(YYYY-MM-DD)	(YYYY-MM-DD)
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m^3	N/A	N/A	N/A
EMC0118	Two-line v-netwok	R&S	ENV216	100359	2010-09-25	2011-09-25
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2009-11-24	2010-11-24
EMC0107	Coaxial Cable	SGS	2m	N/A	2009-11-25	2010-11-25
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A	N/A
EMC0120	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	20550	2010-01-25	2011-01-25
EMC0121	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	20549	2010-01-25	2011-01-25
EMC0122	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	20548	2010-01-25	2011-01-25

	Other equipment					
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal. Due Date (dd-mm-yy)
NA	Power Meter	Agilent	E4419B	MY45100856	2010.6.12	2011.6.11
NA	Signal Generator	Agilent	E4437B	US39260800	2010.6.17	2011.6.16
NA	Signal Generator	Agilent	E4438C	US39260800	2010.6.14	2011.6.14
NA	Spectrum Analyzer	Agilent	N9020A	MY48011385	2010.6.14	2011.6.14
NA	Spectrum Analyzer	Rohde&Schwarz	FSQ 8	SN0805772	2010.6.14	2011.6.14
NA	Attenuator	SHX manufacturer	30dB/50W	09031816	----	----
NA	Attenuator	SHX manufacturer	40dB/50W	09031312	----	----
NA	Attenuator	SHX manufacturer	50dB/50W	09053023	----	----
NA	Signal Generator	Rohde&Schwarz	SMU 200A	08103303	2010.6.12	2011.6.11

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2009-12-16	2010-12-16
EMC0007	DMM	Fluke	73	70671122	2009-12-16	2010-12-16

7 Test Result

7.1 E.U.T. Operation

Input voltage:	120V AC
Operating Environment:	
Temperature:	22°C ~26°C
Humidity:	46%~56% RH
Atmospheric Pressure:	990~1005mbar
Test Requirement:	The RF output power of the EUT was measured at the antenna port, by adjusting the input power of signal generter to drive the EUT to get to maximum output power point and keep the EUT at maximum gain setteing for all tests. The device should be tested on both uplink and downlink. For detail test Modulation and Frequency, please refer to 7.2.

Remark:
GENERAL DEFINITIONS FOR CERTIFICATION PURPOSES:
The following three general definitions follow from those stated in the Part 22, 24, and 90 rule sections as listed above. Two of the definitions replace previous EAB internal definitions given for booster, repeater and extender. The general term “extender” is the same as booster, but booster should be used rather than extender. The general term “translator” is the same as repeater, but repeater should be used rather than translator.
External radio frequency power amplifier (ERFPA) - any device which, (1) when used in conjunction with a radio transmitter signal source, is capable of amplification of that signal, and (2) is not an integral part of a radio transmitter as manufactured. The EAS equipment class AMP is used only for an ERFPA device inserted between a transmitter (TNB/PCB) and an antenna (has only one antenna port)
Booster is a device that automatically reradiates signals from base transmitters without channel translation, for the purpose of improving the reliability of existing service by increasing the signal strength in dead spots. An “in-building radiation system” is a signal booster. These devices are not intended to extend the size of coverage from the originating base station. A booster can be either single or multiple channels**.**
Repeater is a device that retransmits the signals of other stations. Repeaters are different from boosters in that they can include frequency translation and can extend coverage beyond the design of the original base station. A repeater is typically single channel but can also be multiple channels.
ERFPA (AMP) and boosters/repeaters (TNB/PCB) can generally be authorized for all rule parts except 15 and 18.
Tests should be done with each typical signal. e.g., for F3E emissions use 2500 Hz with 2.5 or 5 kHz deviation. Use of CW signal for some tests is acceptable in lieu of actual emission, in some cases when CW signal gives worst case.

The EUT is a Repeater and belongs to *TNB* class.

7.2 Test Procedure & Measurement Data

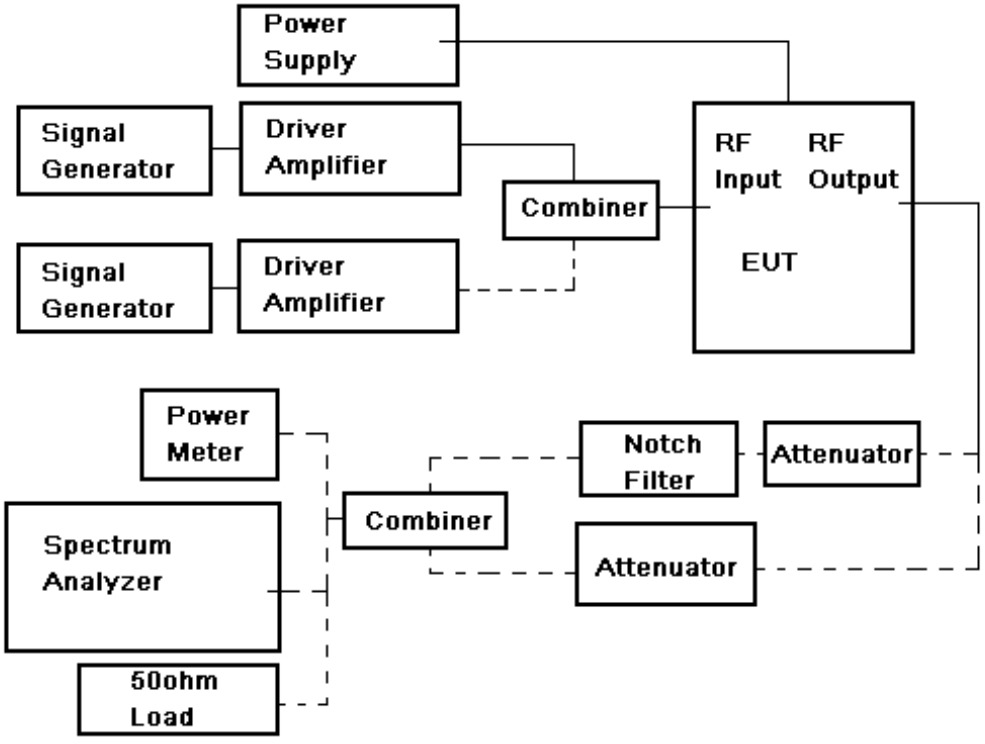
Test Modulation and Frequency
AWS Band

Modulation	Lowest frequency	Middle frequency	Highest frequency
Downlink: 2110MHz to 2155MHz (MHz)			
CDMA	2111.5	2132.5	2153.5
Uplink: 1710MHz to 1755MHz (MHz)			
CDMA	1711.5	1732.5	1753.5

Remark:

1) We adjusted the working band in the lowest band; the middle band; the hightest band and test the respective frequency as above table;
2) In this report, we pretested the adjusted working band at 1.25MH and 10MHz two extreme states, found the worse case is 10MHz and report it;

General Test Setup:



According to the tune up procedure, test the EUT DT port (Downlink) and MT port (Uplink) to achieve the the maximum output power,

7.2.1 RF Output Power

Test Date: 2010-07-23

Test Requirement: FCC part 27.50(d)

Para. No.27.53(d)(1). The power of each fixed or base station transmitting in the 2110-2155 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to a peak equivalent isotropically radiated power (EIRP) of 3280 watts. The power of each fixed or base station transmitting in the 2110-2155 MHz band from any other location is limited to a peak EIRP of 1640 watts. A licensee operating a base or fixed station utilizing a power of more than 1640 watts EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. Operations above 1640 watts EIRP must also be coordinated in advance with the following licensees within 120 kilometers (75 miles) of the base or fixed station: all Broadband Radio Service (BRS) licensees authorized under Part 27 in the 2155-2160 MHz band and all AWS licensees in the 2110-2155 MHz band.

Test Method: FCC part 2.1046

EUT Operation:

Status: Drive the EUT to maximum output power.

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:

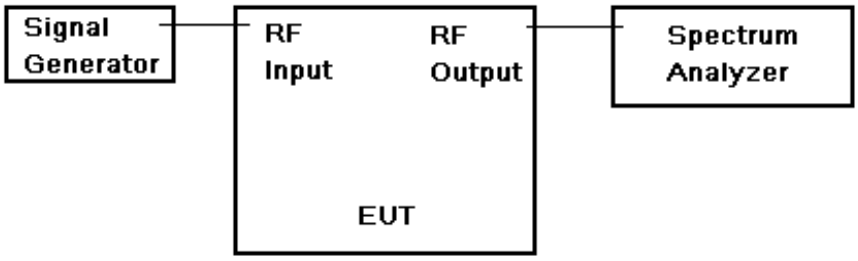


Fig.1 RF Output Power test configuration

Test Procedure:	RF output power test procedure: 1. a) Connect the equipment as illustrated, 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) do not apply any tone to modulate the EUT. d1) Adjust the spectrum analyzer for the following settings: 1) Resolution Bandwidth >> the carrier bandwidth, 2) Video Bandwidth refer to standard requirement. d2) Use spectrum analyzer channel power measurement function; e) Record the frequencies and levels of carrier power; f) Calculate the signal link way loss and final power value. Or 2. a) Connect the equipment as illustrated; b) Read the value from the power meter; c) Calculate the signal link way loss and final power value.
Remark:	Output power – . Power on Form 731 should be clearly understood as either composite of multichannels or per carrier. If power is composite include in comments field: "Power output listed is composite for multi-channel operation." . Check that the input drive level is at maximum input rating and maximum gain settings for all tests. Check both uplink and downlink input levels. See manual or brochures/technical description for maximum rating. May need to check FCC identifier of transmitter used for tests. . Confirm device can not operate in saturation. Are there means to control maximum power and to assure linear operation (use in system configuration may be necessary)? How is saturation or over-modulation prevented for pulsed signal inputs?

7.2.1.1 Measurement Record:

Per channel Power, Input=-50dBm for downlink and -67dBm for uplink.			
Modulation	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Downlink: Working Band(2110MHz ~ 2155MHz),Measure Maximum Out put power			
CDMA	39.0dBm (7.94W)	39.1dBm (8.13W)	38.8dBm (7.59W)
Uplink:Working Band(1710MHz ~ 1755MHz),Measure Maximum Out put power			
CDMA	22.7dBm (0.19W)	22.9dBm (0.2W)	22.3dBm (0.17W)

Remark: test in single channel status, output power is tested in full amplifying status.

Kept the EUT working in maximum gain, adjusted the input power until to get the EUT to maximum output power (ALC point).

Note: Conducted output power tested. EIRP was not tested because the amplifier does not come with an antenna.

7.2.2 Conducted Spurious Emissions

Test Date:	2010-07-25
Test Requirement:	FCC part 27.53(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.
Test Method:	FCC part 2.1051
EUT Operation:	
Status:	Drive the EUT to maximum output power.
Conditions:	Normal conditions
Application:	Cellular Band RF output ports
Test Configuration:	

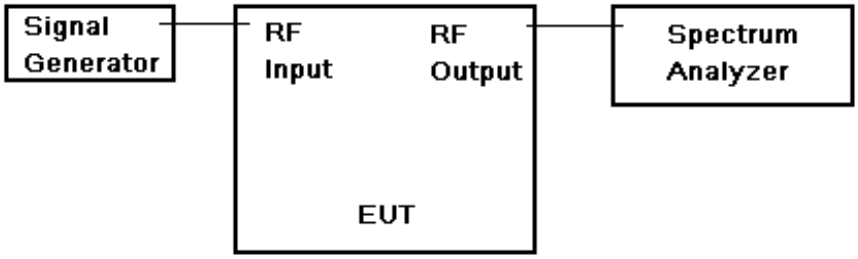
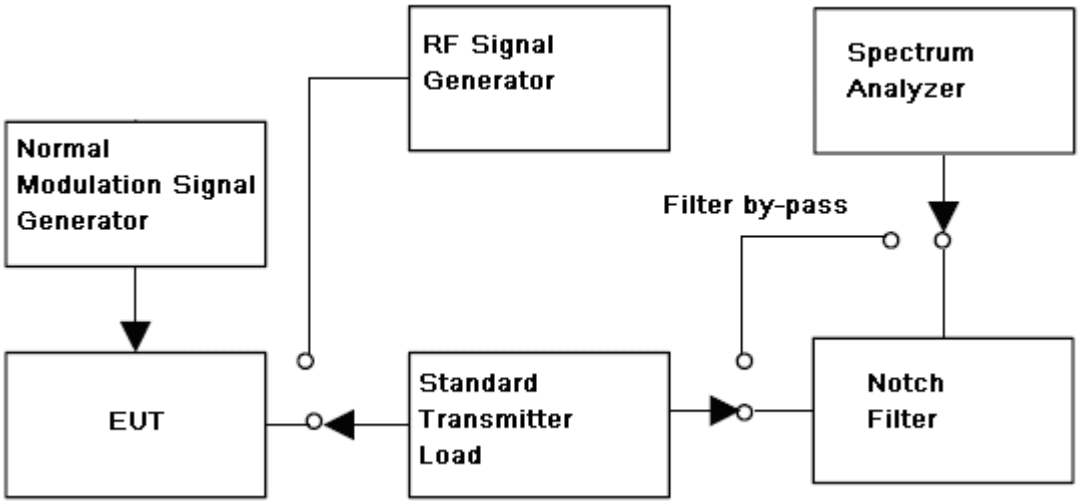


Fig.2. Conducted Spurious Emissions test configuration



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) do not apply any tone to modulate the EUT.

d) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth,(base the standard, apply the different set),her 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:

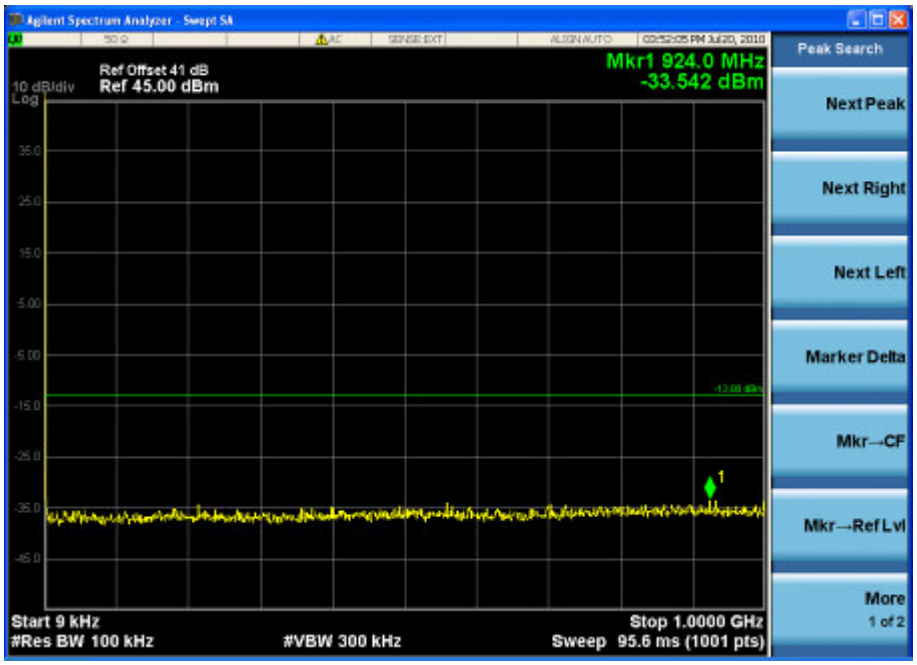
The notch filter is used for avoid the EUT fundamental carrier output power making the spectrum overload and the harmonic spurious brought by it.

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

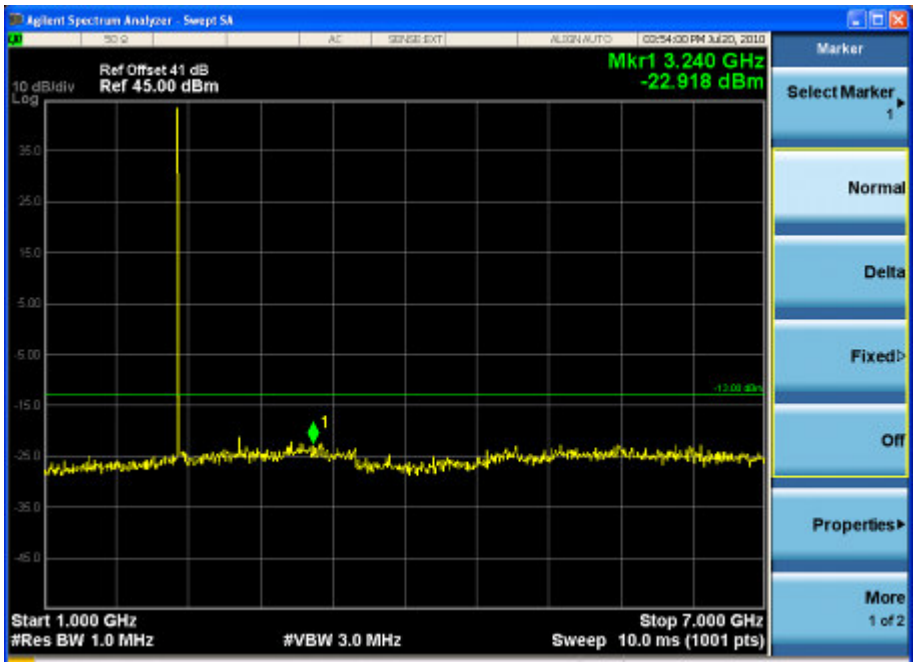
7.2.2.1 Measurement Record:

Test for Downlink:

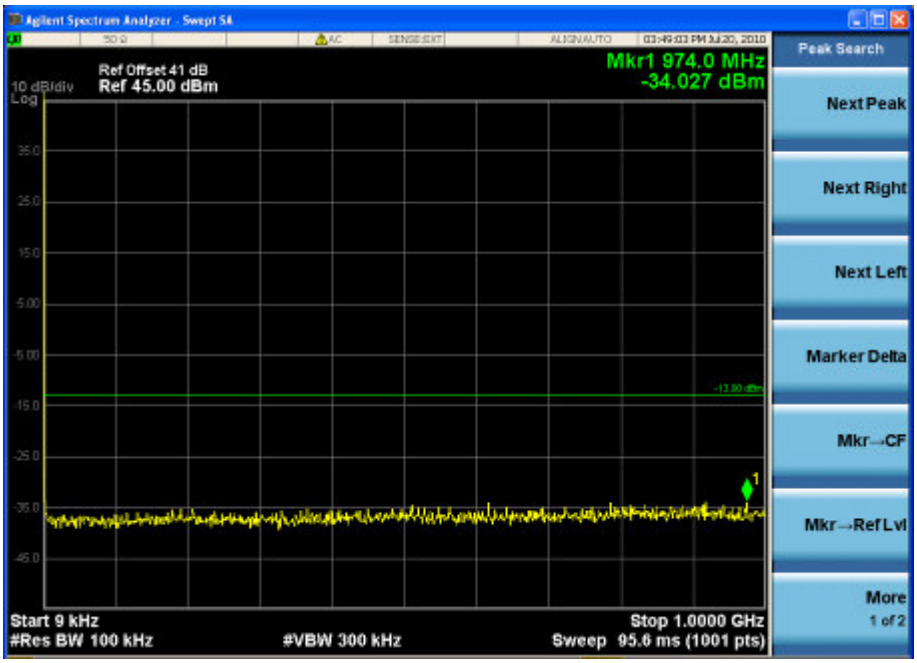
CDMA downlink(lowest frequency)



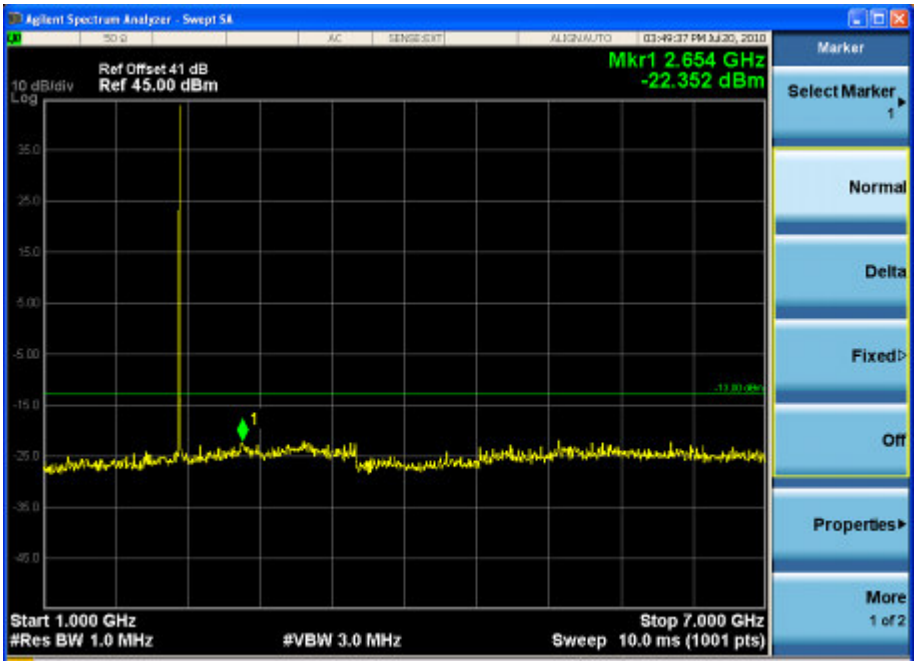
CDMA downlink(lowest frequency)



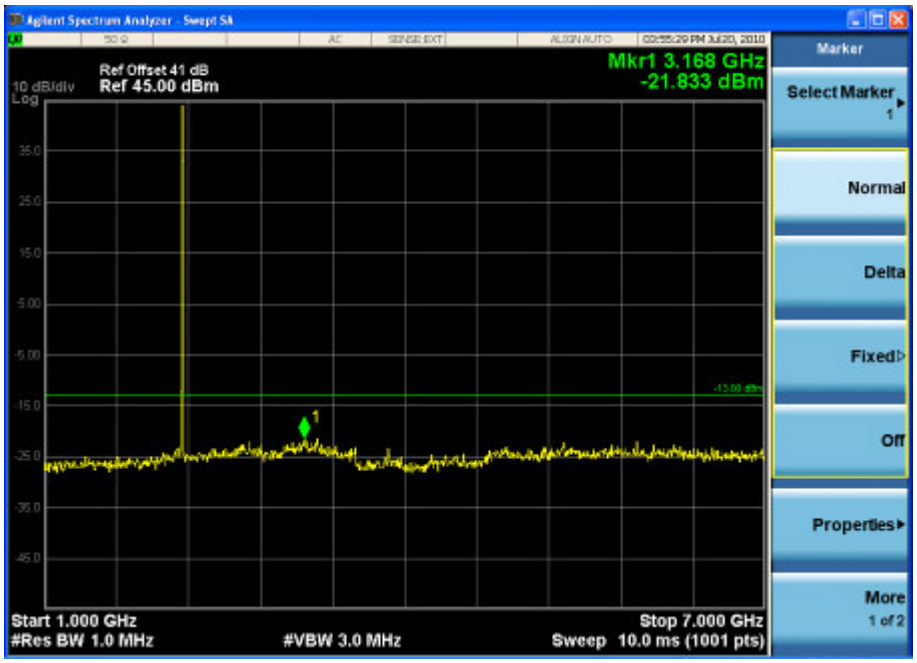
CDMA downlink(middle frequency)



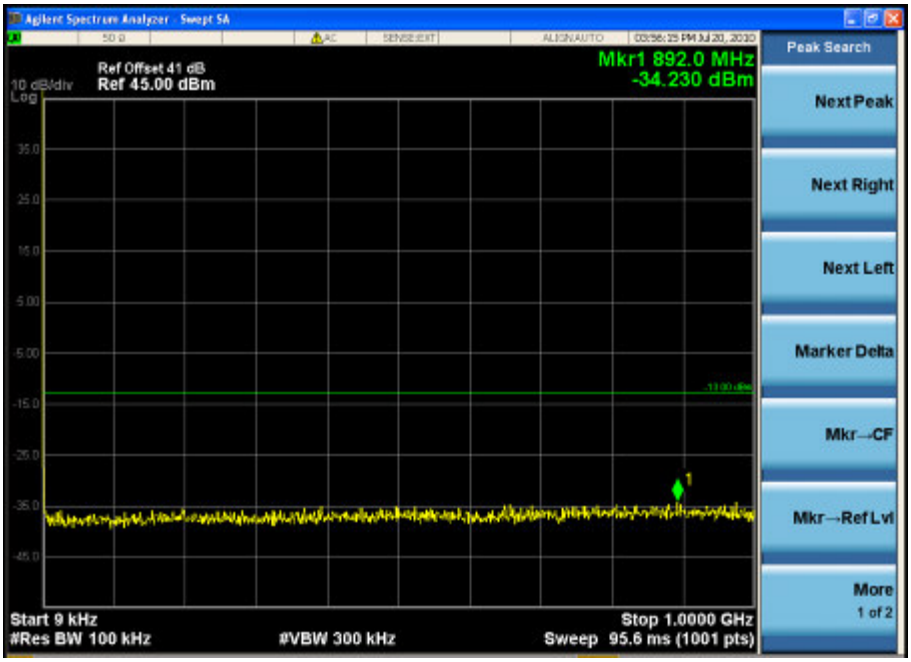
CDMA downlink(middle frequency)



CDMA downlink(highest frequency)

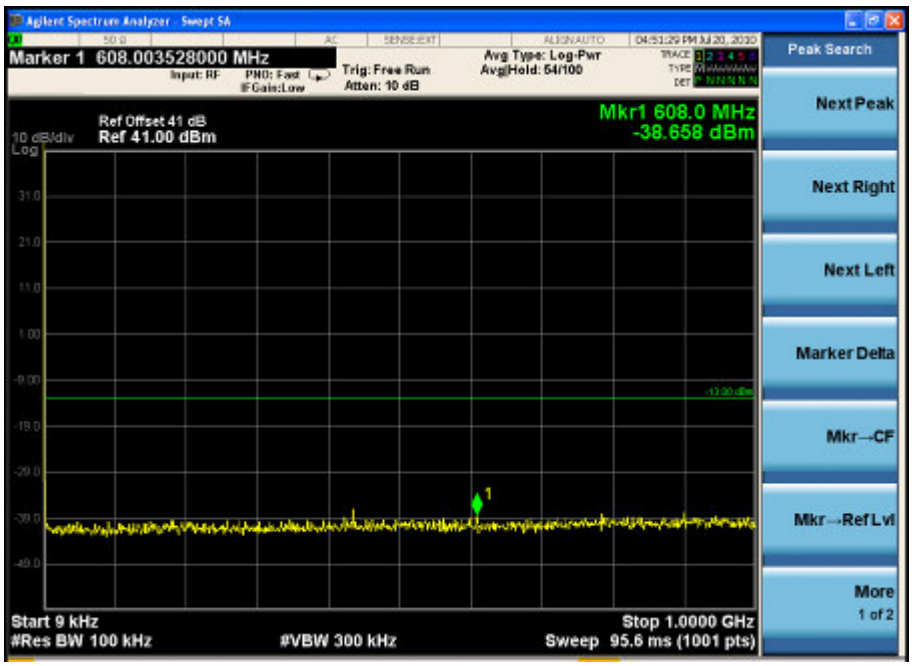


CDMA downlink(highest frequency)



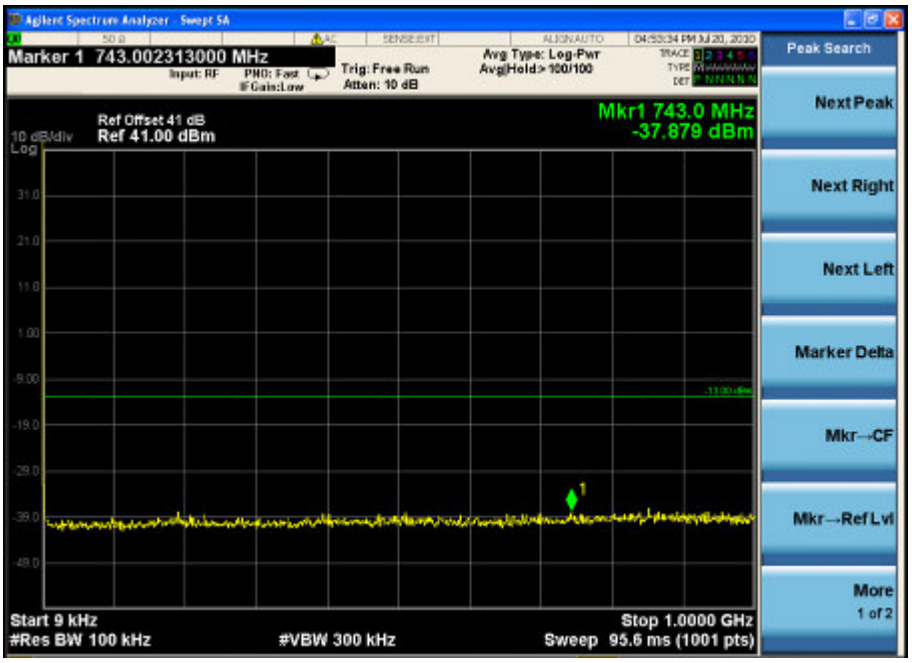
Test for Uplink:

CDMA uplink(lowest frequency)



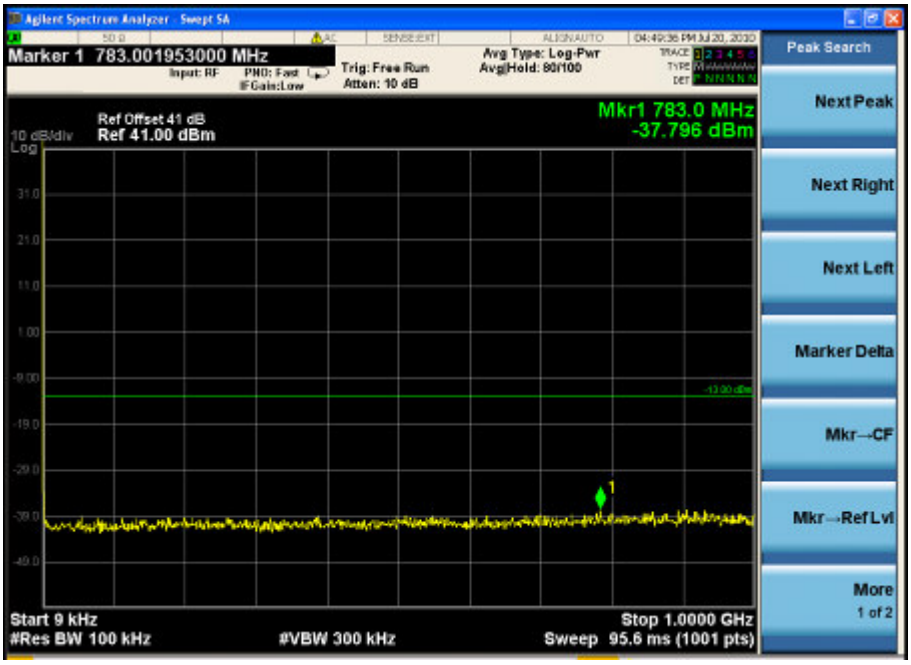
CDMA uplink(lowest frequency)

CDMA uplink(middle frequency)

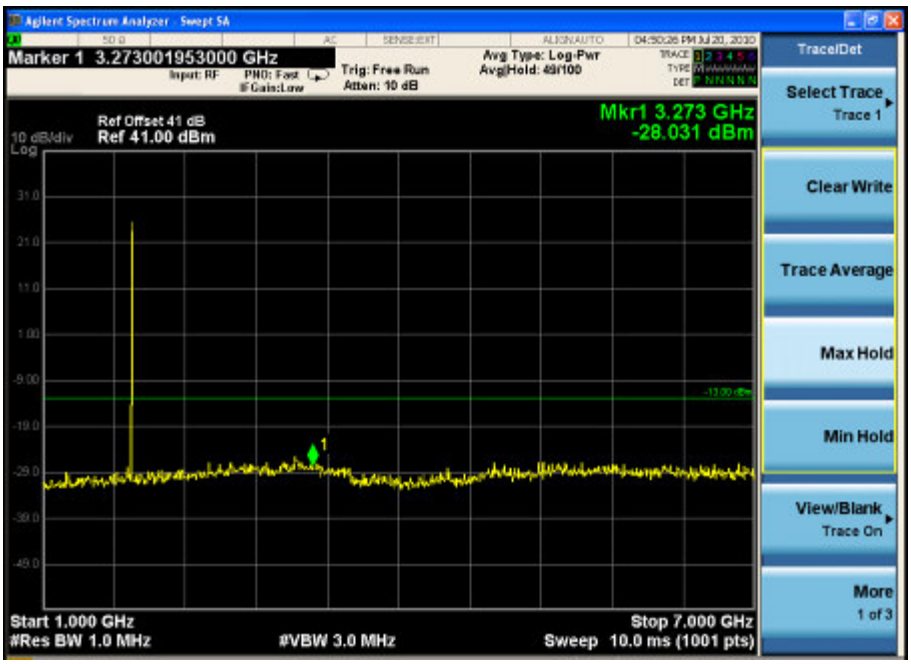


CDMA uplink(middle frequency)

CDMA uplink(highest frequency)



CDMA uplink(highest frequency)



7.2.3 Band Edge& Intermodulation

Test Date:	2010-07-23
Test Requirement:	FCC part 27.53(h)
	(1) 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 Method:	FCC part 2.1051&2-11-04/EAB/RF
EUT Operation:	
Status:	Drive the EUT to maximum output power.
Conditions:	Normal conditions
Application:	Cellular Band RF output ports
Test Configuration:	

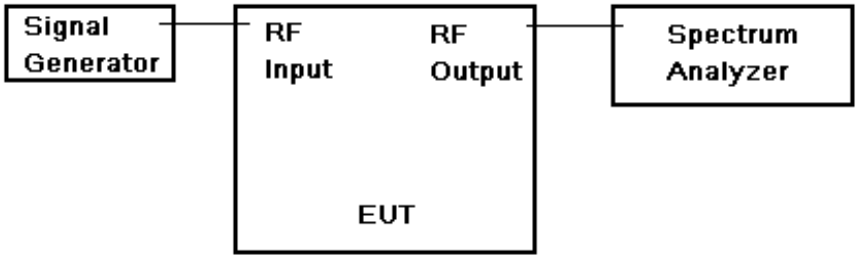
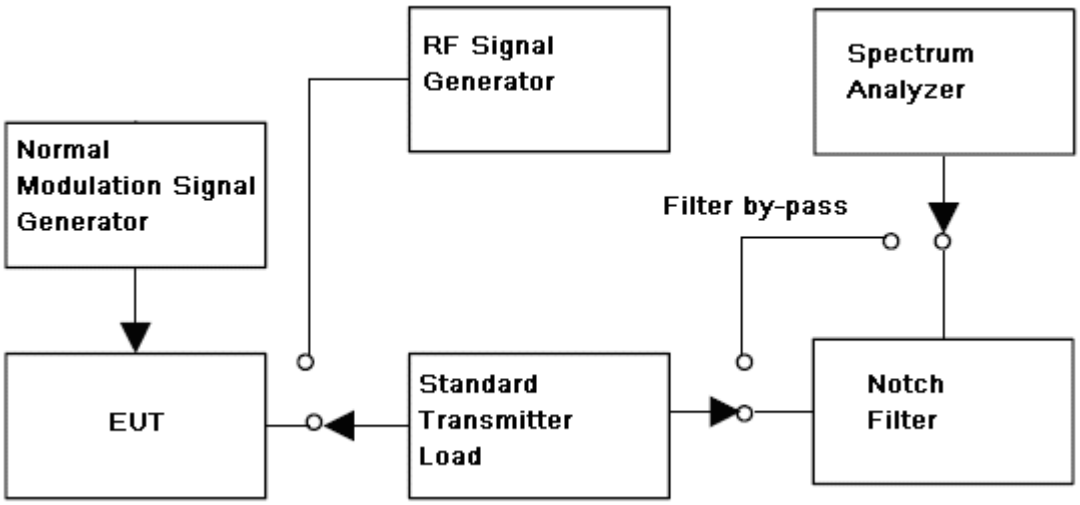


Fig.3. Band edge and Intermodulation test configuration



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) do not apply any tone to modulate the EUT.

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.

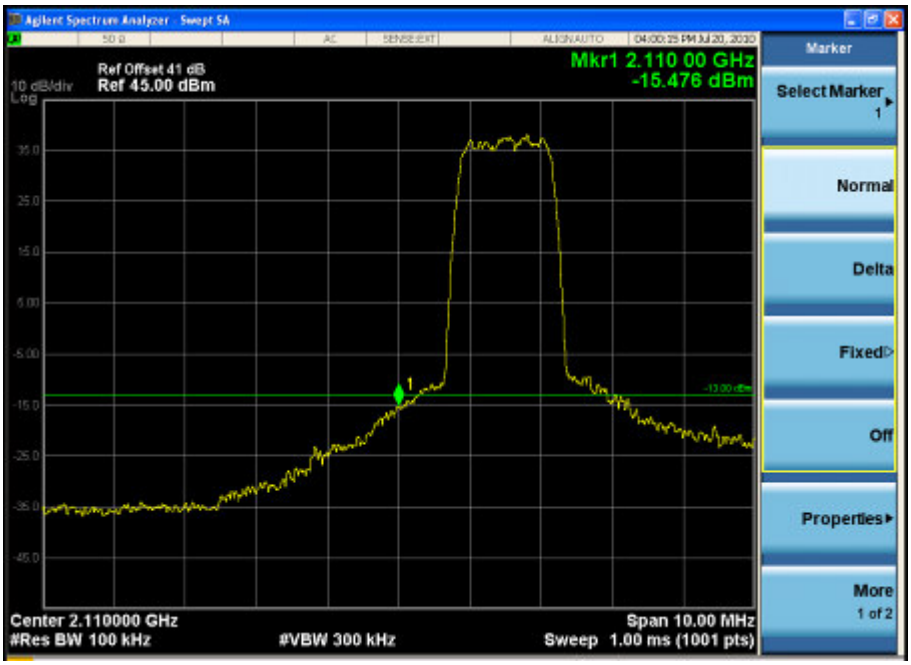
When the EUT fundamental carrier is not enough to make the status, the notch filter could be not used.

Intermodulation 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 destroied;
	5. Keep the EUT continuously transmitting in max power;
	6. Keep two signals are same in modulation type and level;
	7. Measure the 3 order intermodulated product by the EUT(the sum of the two unwanted signal should be rated power);
	8. Correct for all losses in the RF path;
	9. Read the conducted spurious emissioins of the EUT antenna port.
	Remark:
	· CW signal rather than typical signal is acceptable (for FM).
	· At maximum drive level, for each modulation: one test with three tones, or two tests (high-, low-band edge) with two tones
	· Limit usually is -13dBm conducted.
	· Not needed for Single Channel systems.
	· Combination of modulation types not needed.

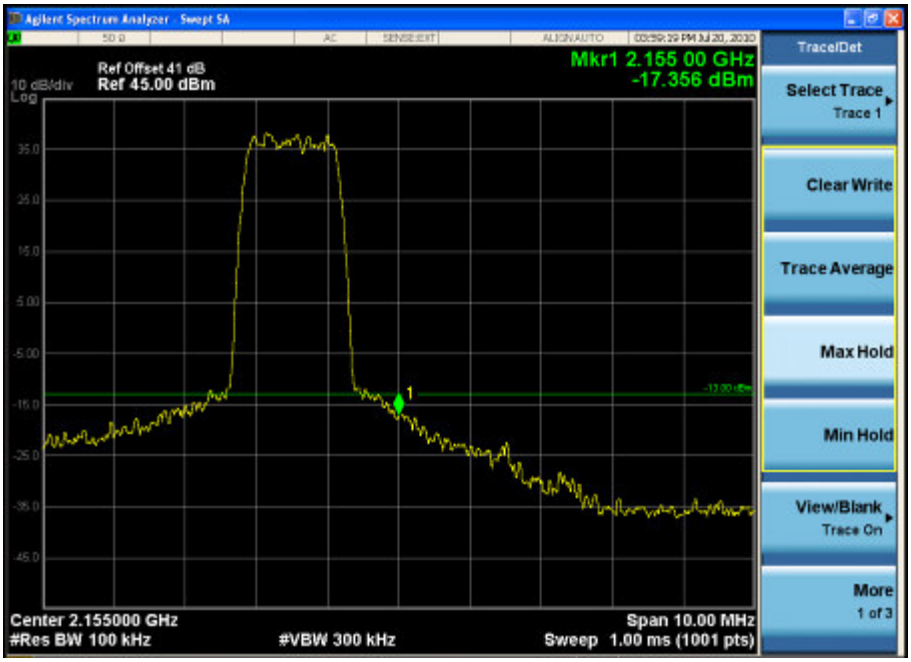
7.2.3.1 Measurement Record:

Test for Downlink:

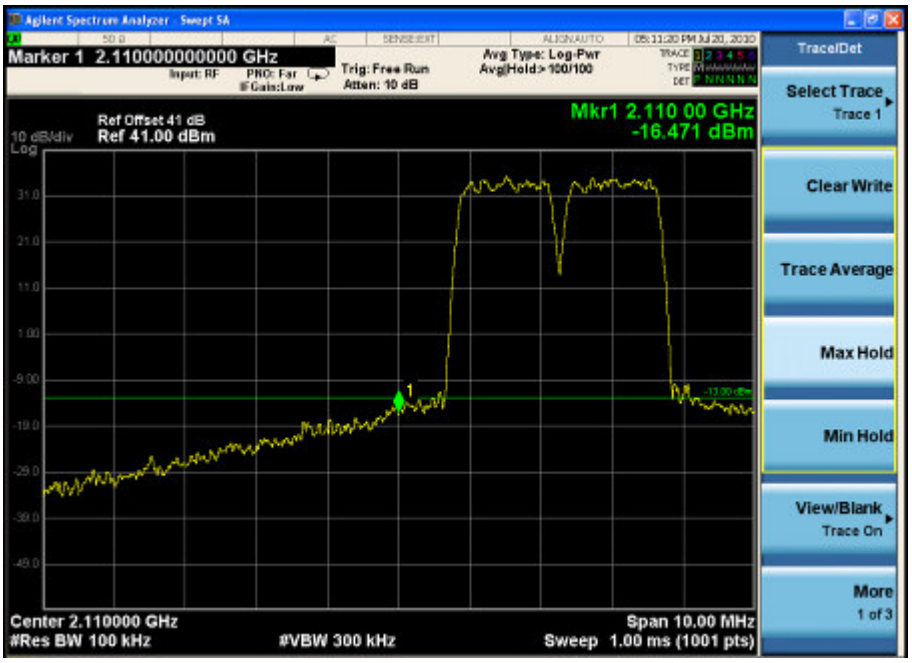
CDMA one signal input downlink– Lower Edge



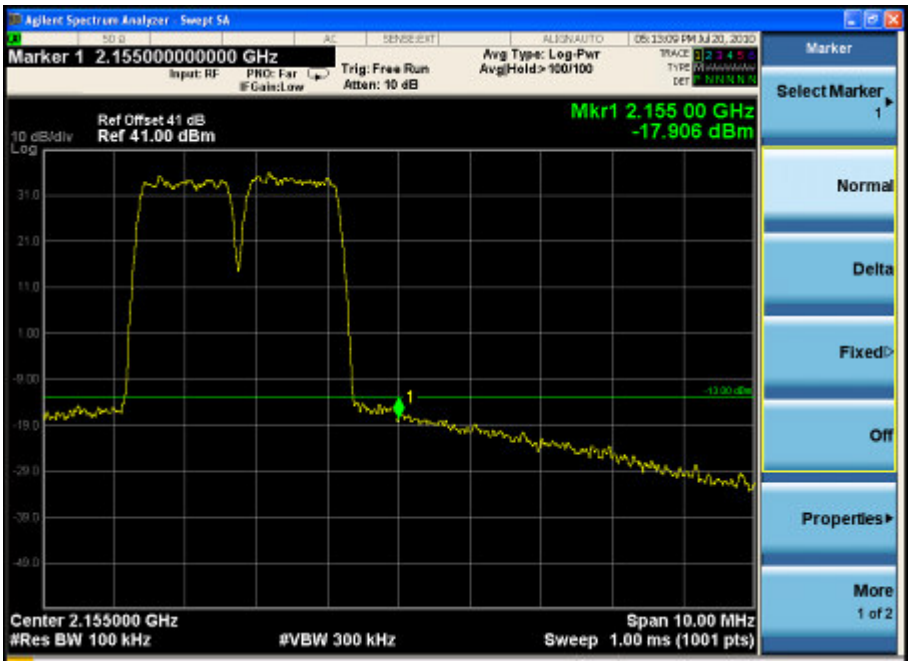
CDMA one signal input downlink– Upper Edge



CDMA two signal input downlink—Lower Edge

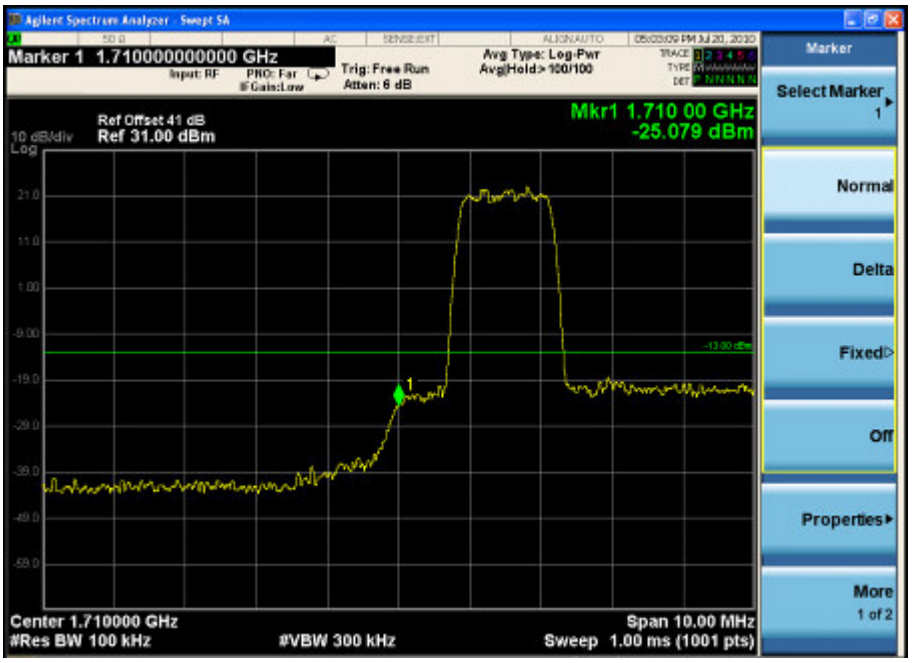


CDMA two signal input downlink—Upper Edge

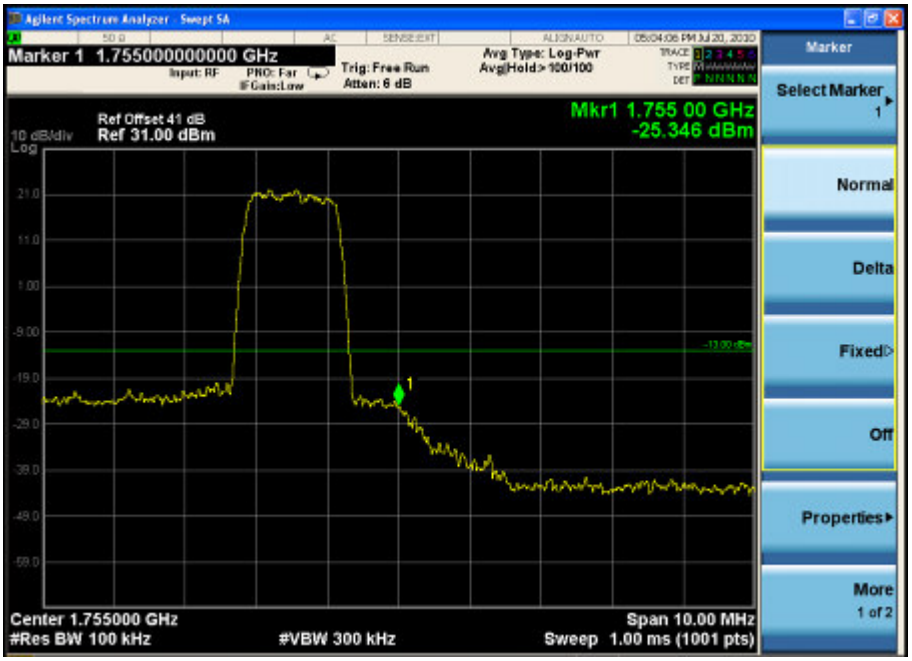


Test for Uplink:

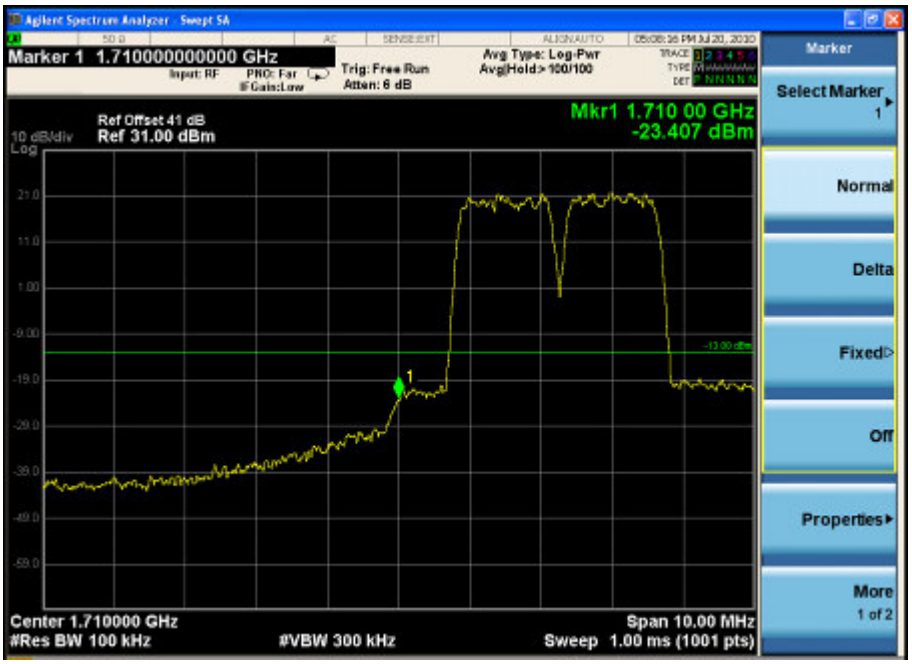
CDMA one signal input uplink– Lower Edge



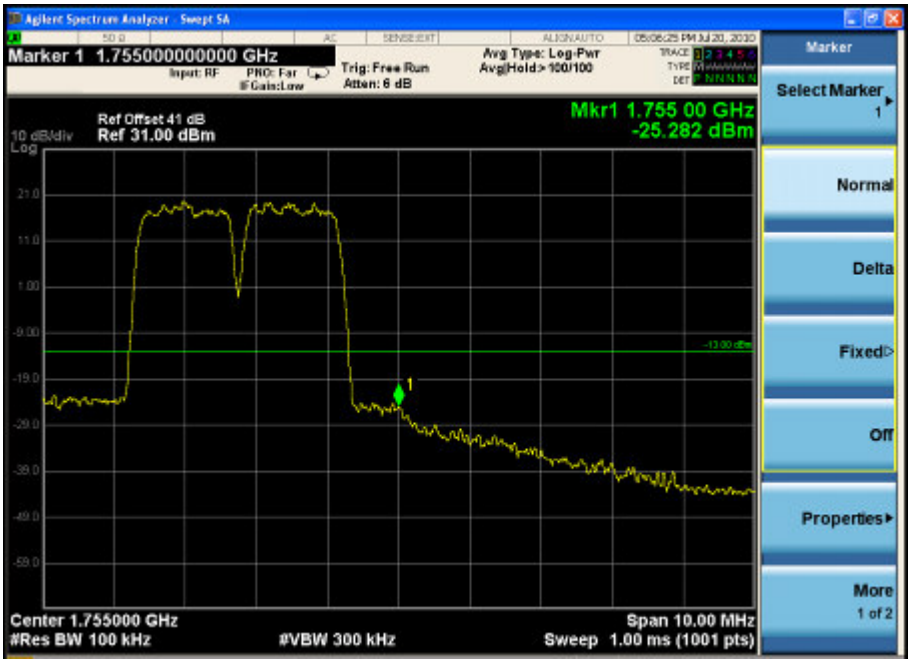
CDMA one signal input uplink– Upper Edge



CDMA two signal input uplink—Lower Edge



CDMA two signal input uplink—Upper Edge



Remark:

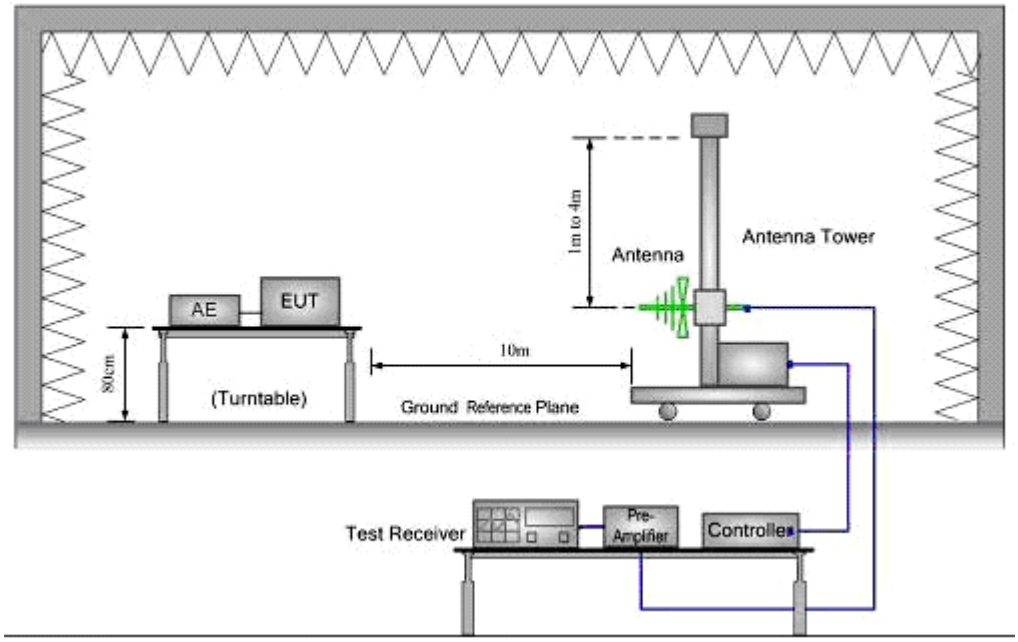
For the test in two signal input or intermodulation, test input signal f1 and f2 will consider as follows conditions:

1) EUT frequency band span and the amount of channels;
2) f1 is the frequency lower, f2 is the frequency higher, △f is the channel spacing;
3) in lower edge test, f1 is the lower edge frequency +1 channel frequency, and f2 is +2 channel frequency;
4) in higher edge test, f1 is the higher edge frequency -2 channel frequency, and f2 is -1 channel frequency;
5) according to the amplifier characteristic, the 3rd product will appear when two signals input;
6) base the 3rd product frequency F1= 2f1-f2 and F2=2f2-f1, when the f1 and f2 frequency select above,
   a) in lower edge test, F1=2f1-(f1+△f)=f1-△f=lower edge frequency;
   b) in higher edge test, F2=2f2-(f2-△f)=f2+△f=higher edge frequency.

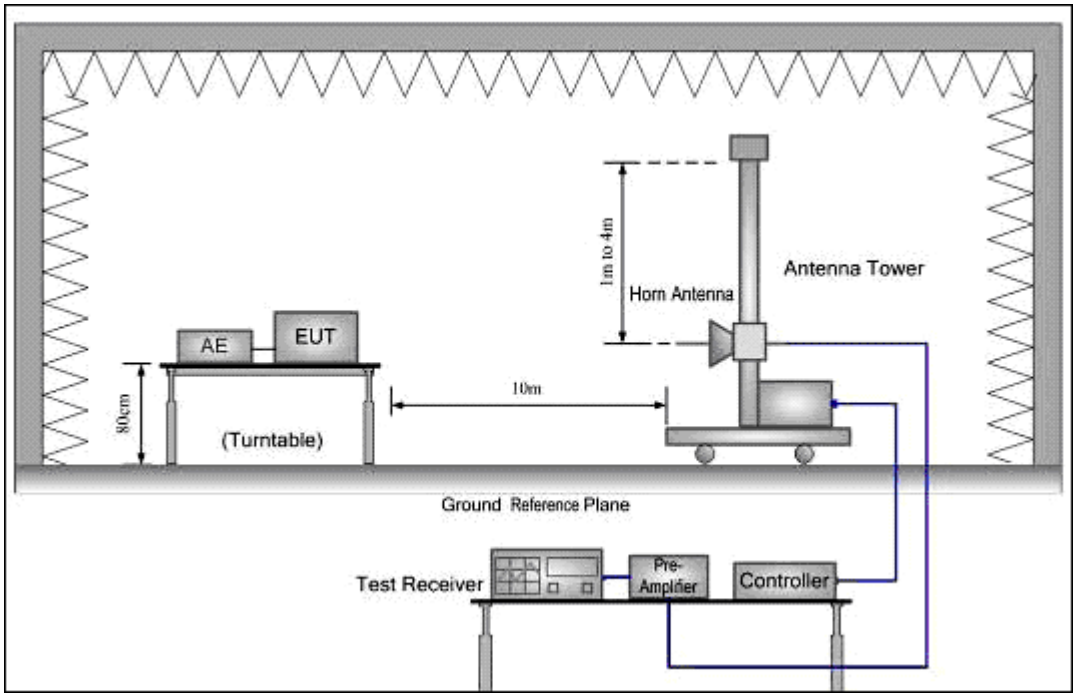
7.2.4 Radiated Spurious Emissions

Test Date:	2010-07-28
Test Requirement:	FCC part 27.53(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.
Test Method:	FCC part 2.1053 ANSI/TIA-603-C-2004
EUT Operation:	
Status:	Drive the EUT to maximum output power.
Conditions:	Normal conditions
Application:	Enclosure
Test Configuration:	

30MHz to 1GHz emissions:



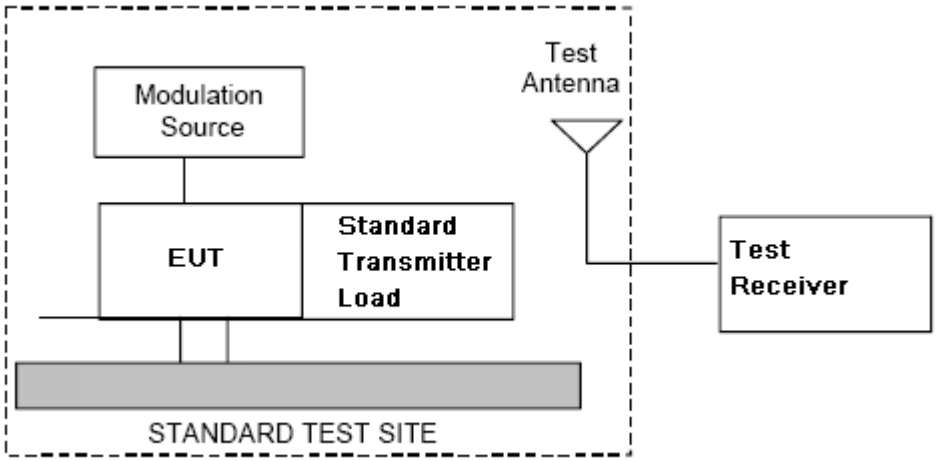
1GHz to 40GHz emissions:



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.

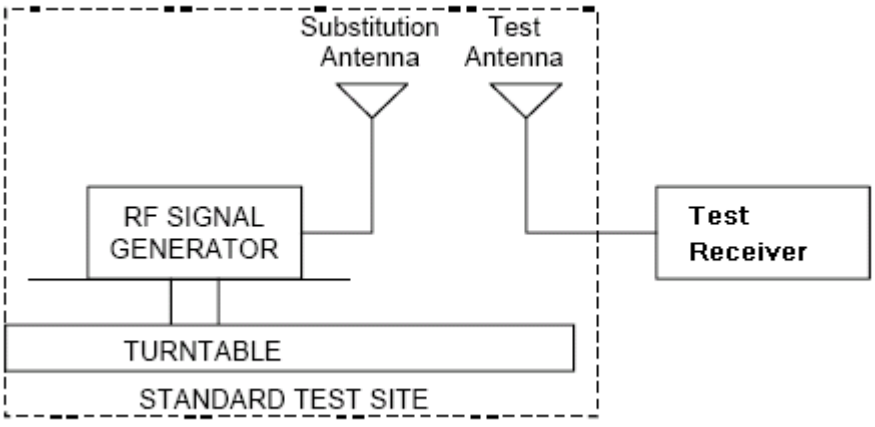
c) Place the transmitter to be tested on the turntable in the standard test site, The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length.

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: 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 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

7.2.4.1 Measurement Record:

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

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

Remark:
The cabinet radiation was measured with the equipment transmitting a CW signal into a non-radiating 50 Ohm load at maximum output power on a signal frequency .
Measured were performed in the lowest, middle and hightest frequency for both the Downlink and Uplink.
The spectrum was searched from 30MHz to 22GHz (10th Harmonic) for downlink;
The spectrum was searched from 30MHz to 18GHz (10th Harmonic) for Uplink;

7.2.5 Occupied Bandwidth

Test Date:	2010-07-28
Test Requirement:	2-11-04/EAB/RF
Test Method:	FCC part 2.1049, 2-11-04/EAB/RF
	The spectral shape of the output should look similar to input for all modulations.
EUT Operation:	
Status:	Drive the EUT to maximum output power. .
Conditions:	Normal conditions
Application:	Cellular Band RF output ports

Test Configuration:

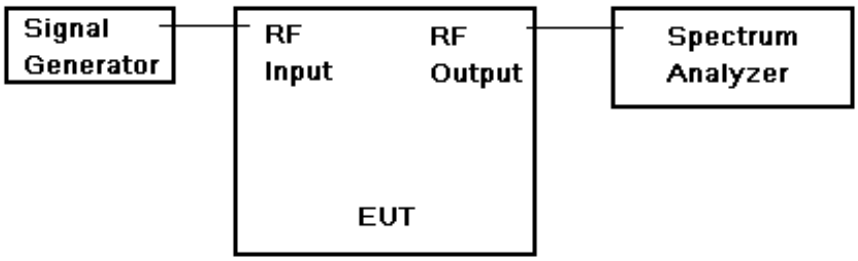


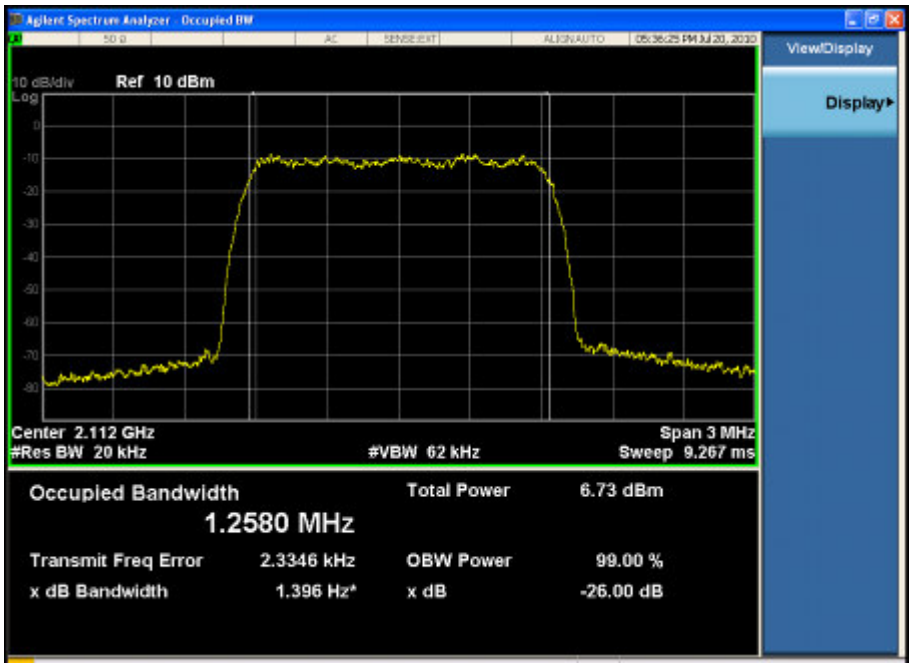
Fig.2. Conducted Spurious Emissions test configuration

Test Procedure:
a) Set the spectrum analyzer RBW 300 Hz or >1%&<2% emission bandwidth of carrier.
b) Capture the trace of input signal;
c) Connect the equipment as illustrated;
d) Capture the trace of output signal;

7.2.5.1 Measurement Record:

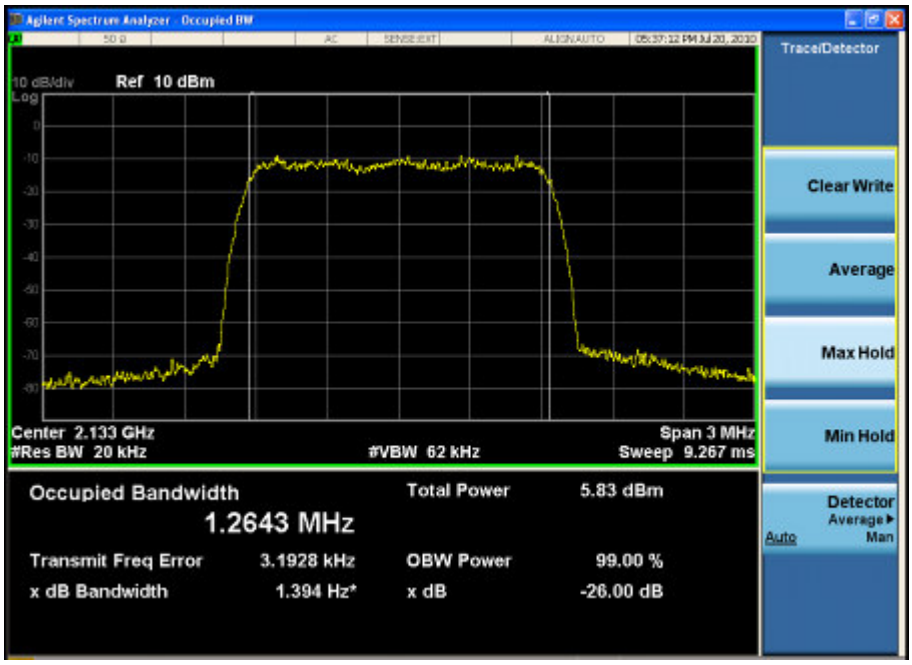
Test for Downlink:

CDMA downlink(lowest frequency) -- Input

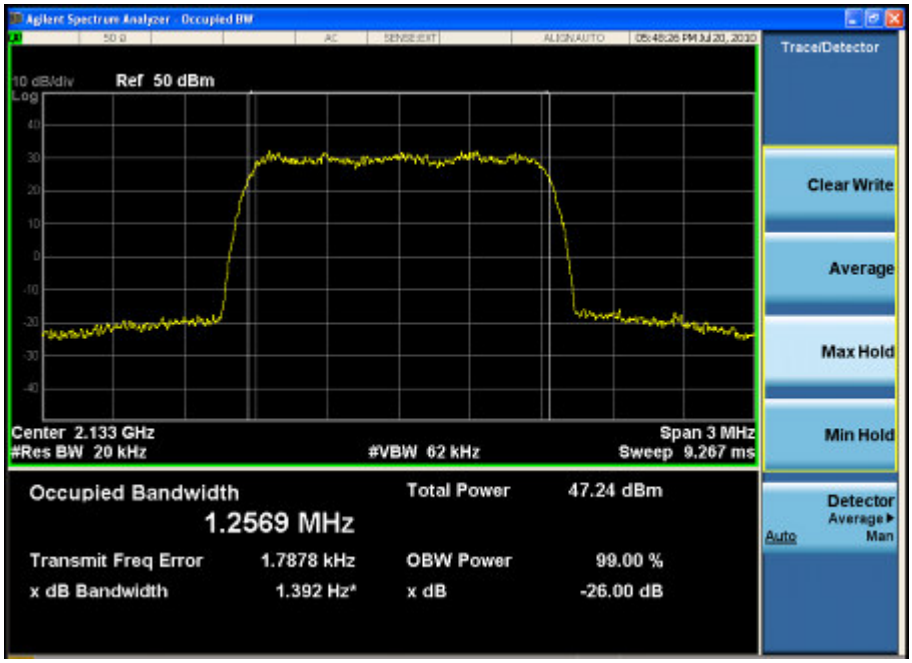


CDMA downlink(lowest frequency)-- Output

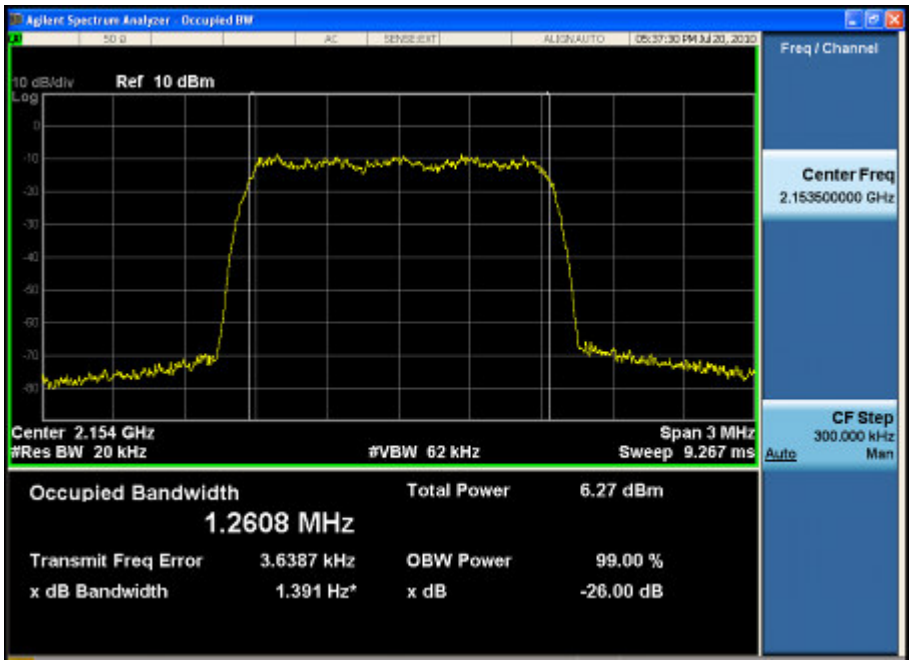
CDMA downlink (middle frequency)-- Input



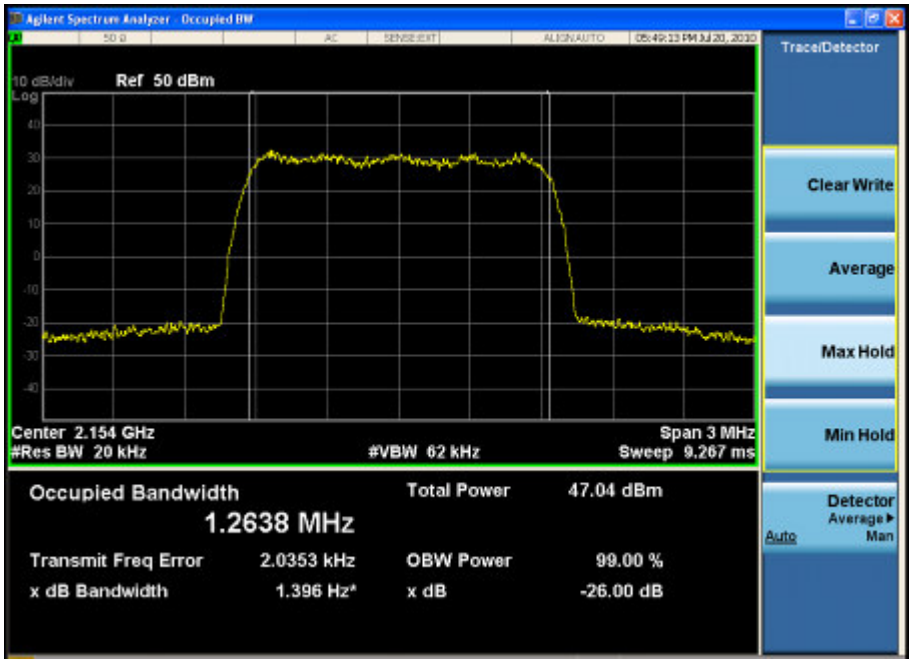
CDMA downlink (middle frequency)-- Output



CDMA downlink (highest frequency)—Input

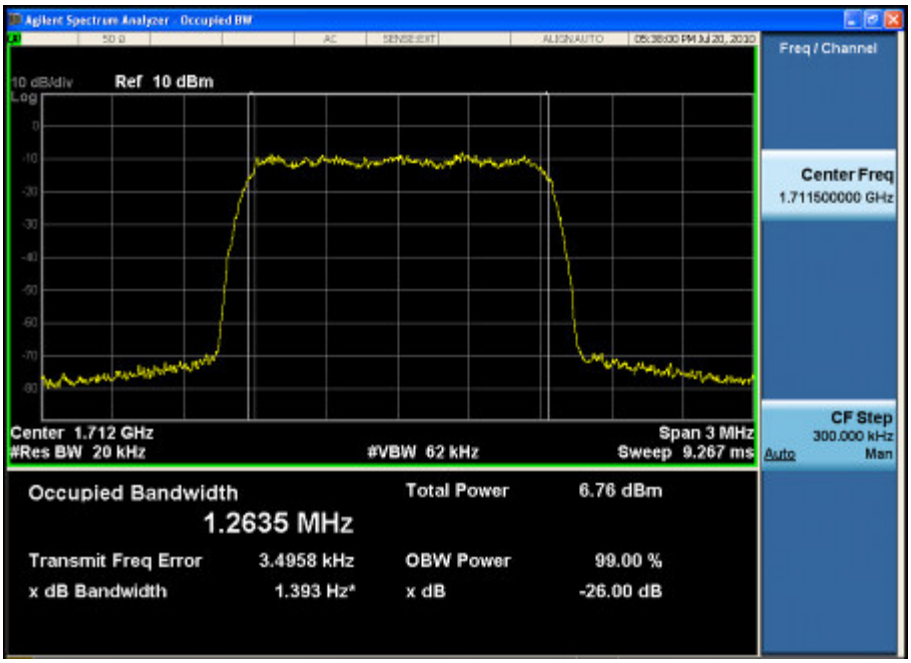


CDMA downlink (highest frequency)--Output

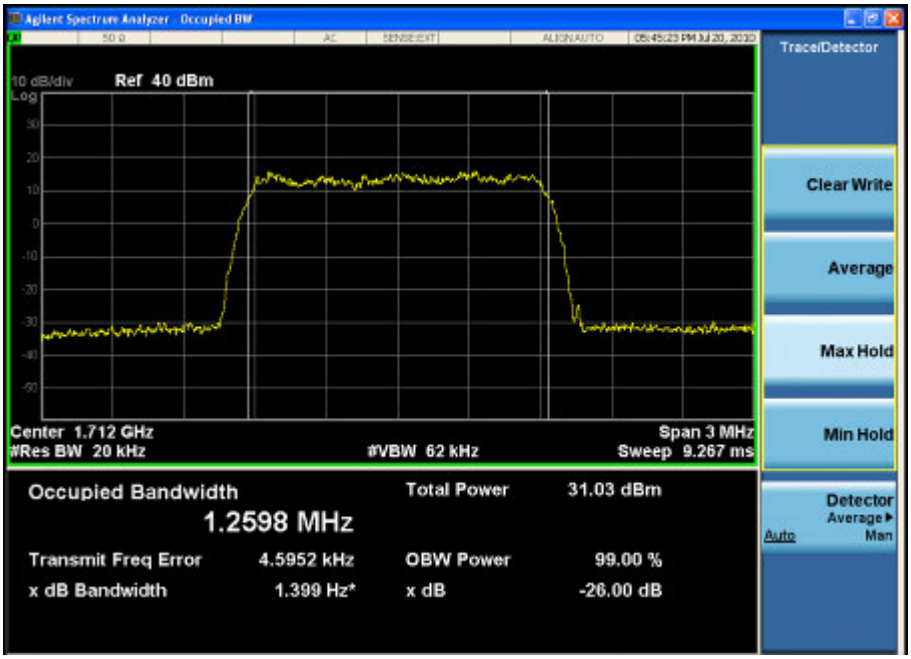


Test for Uplink:

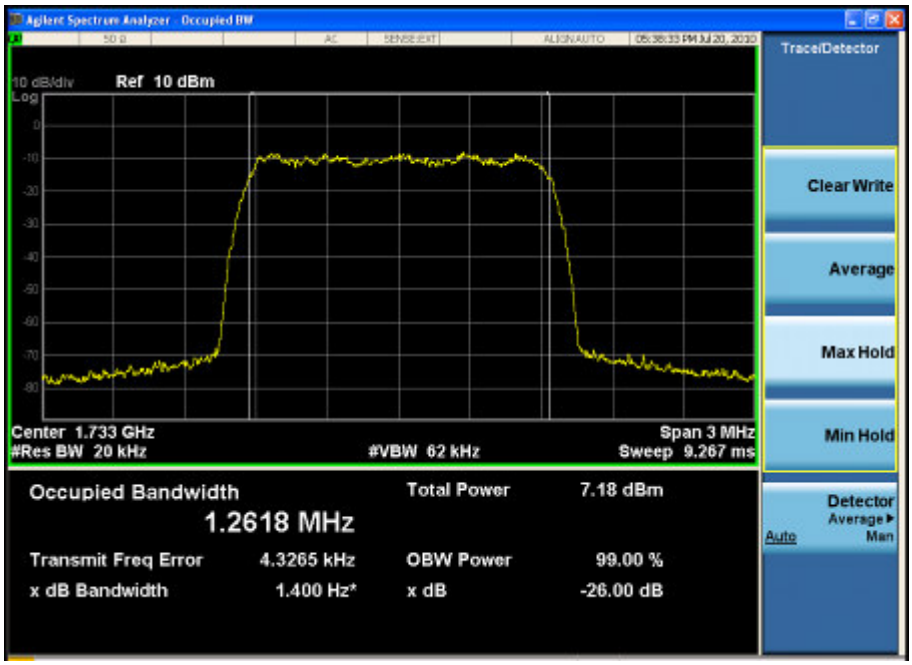
CDMA uplink(lowest frequency) -- Input



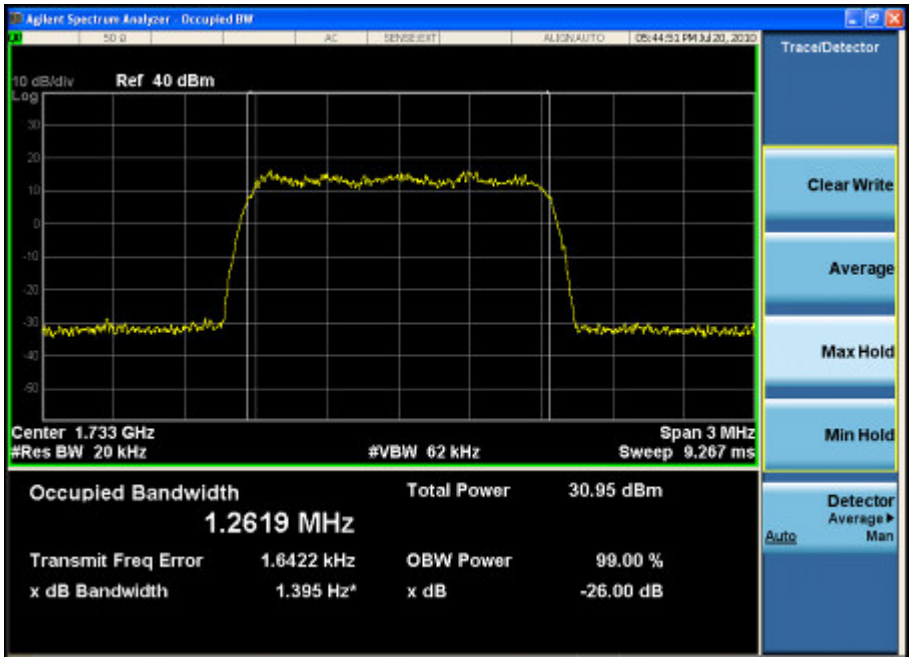
CDMA uplink(lowest frequency)-- Output



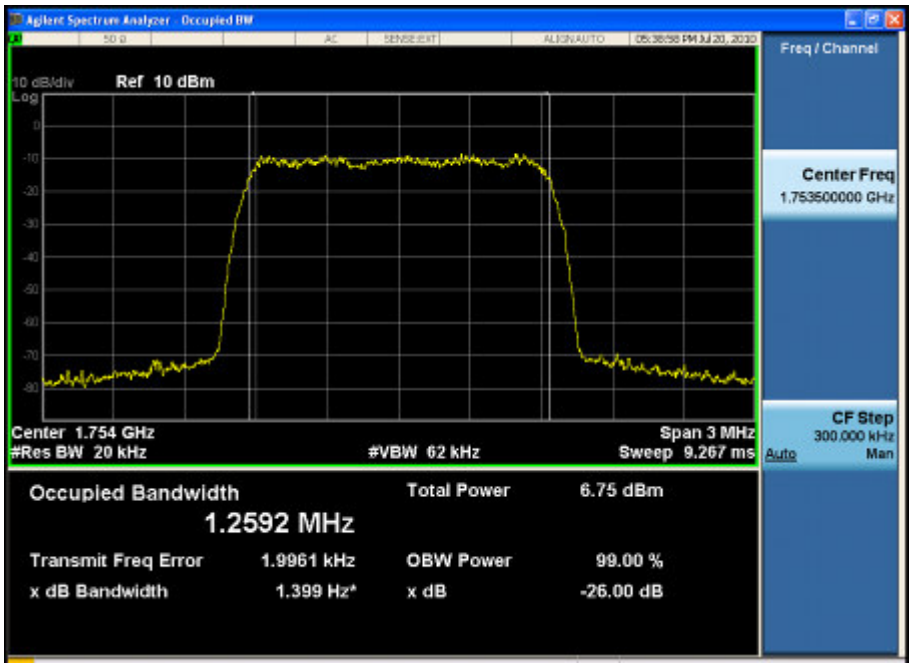
CDMA uplink (middle frequency)-- Input



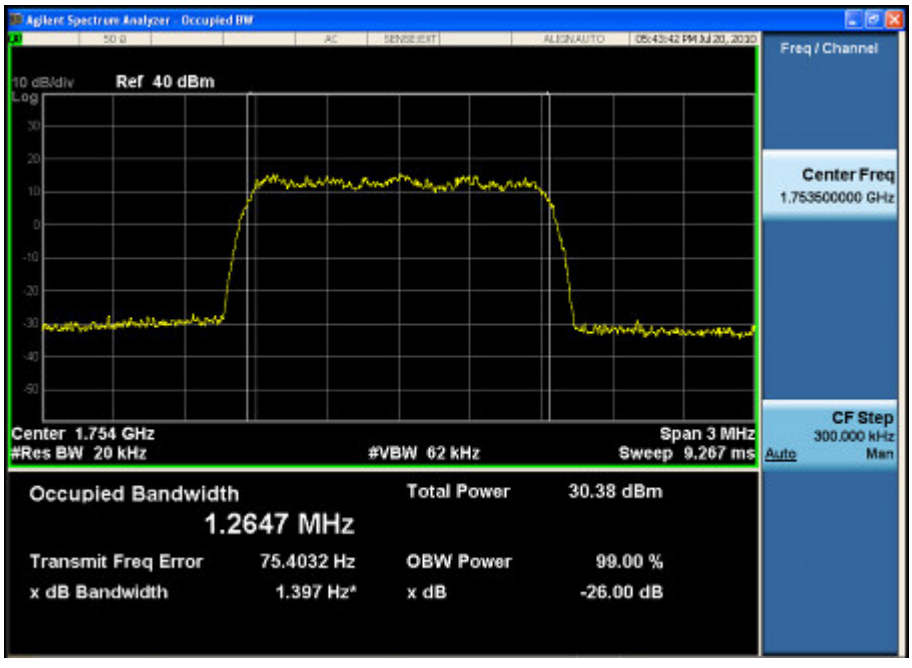
CDMA uplink (middle frequency)-- Output



CDMA uplink (highest frequency)—Input



CDMA uplink (highest frequency)--Output



7.2.6 Out of Band Rejection

Test Date:	2010-07-26
Test Requirement:	2-11-04/EAB/RF
	Test for rejection of out of band signals. Filter freq. response plots are acceptable.
Test Method:	2-11-04/EAB/RF
EUT Operation:	
Status:	Drive the EUT to maximum output power. .
Conditions:	Normal conditions
Application:	Cellular Band RF output ports

Test Configuration:

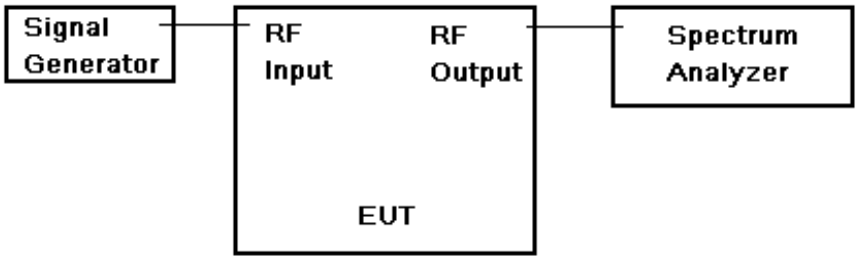


Fig.4. Out of Band rejection test configuration

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 destroied;
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;

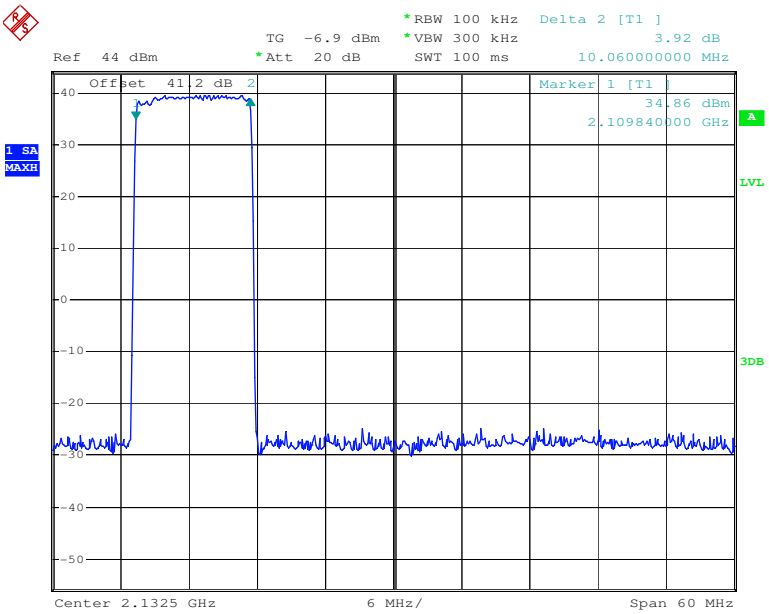
· CW signal rather than typical signal is acceptable (for FM).

· Multiple band filter will need test each other.

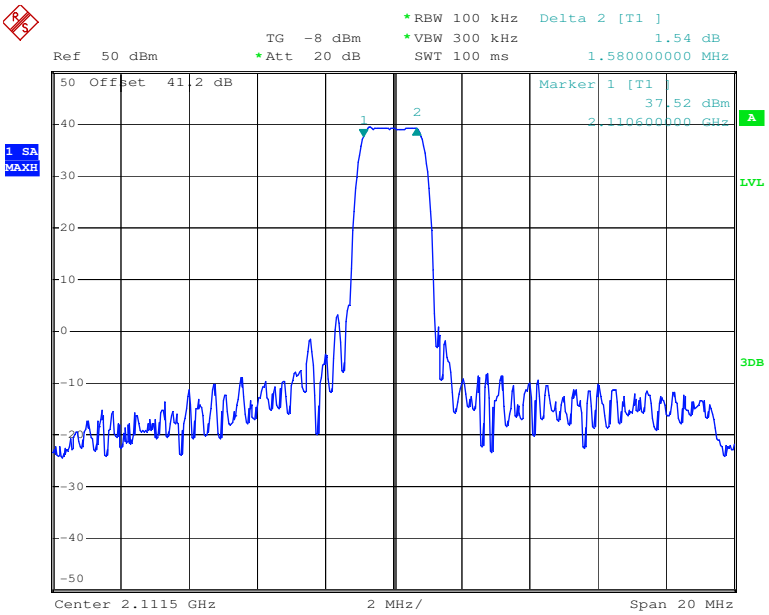
7.2.6.1 Measurement Record:

Test for Downlink:

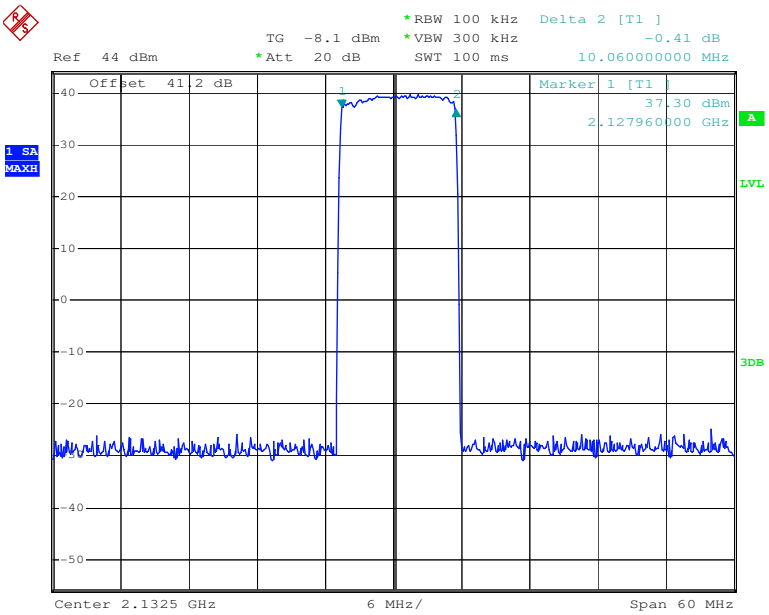
downlink(setting the working band(10MHz) in lowest)



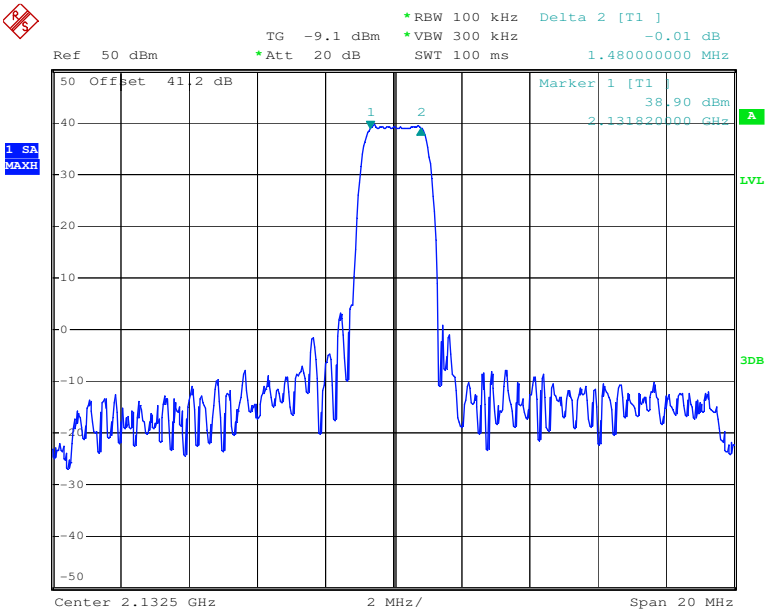
downlink(setting the working band(1.25MHz) in lowest)



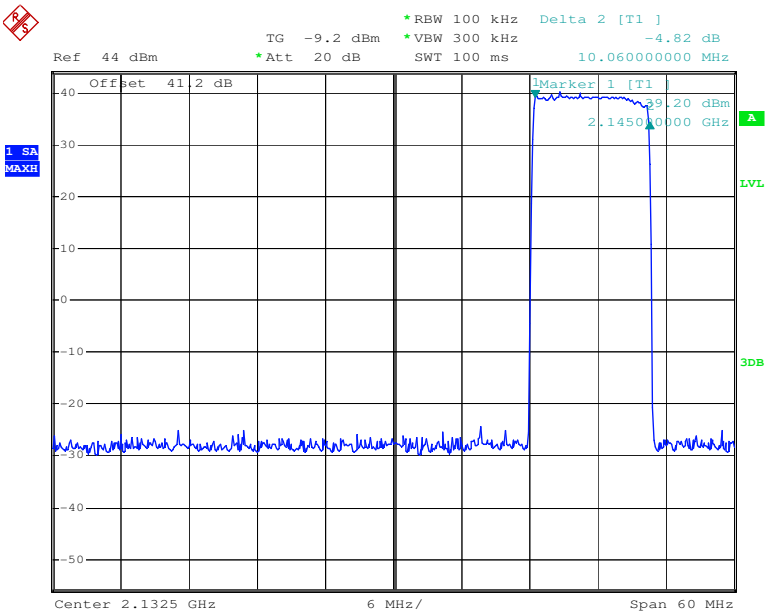
downlink(setting the working band(10MHz) in middle)



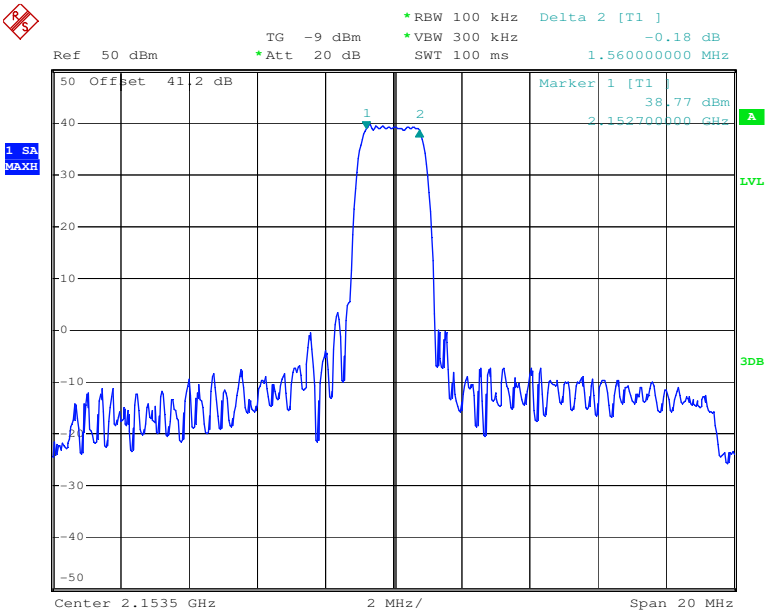
downlink(setting the working band(1.25MHz) in middle)



downlink(setting the working band(10MHz) in in highest)

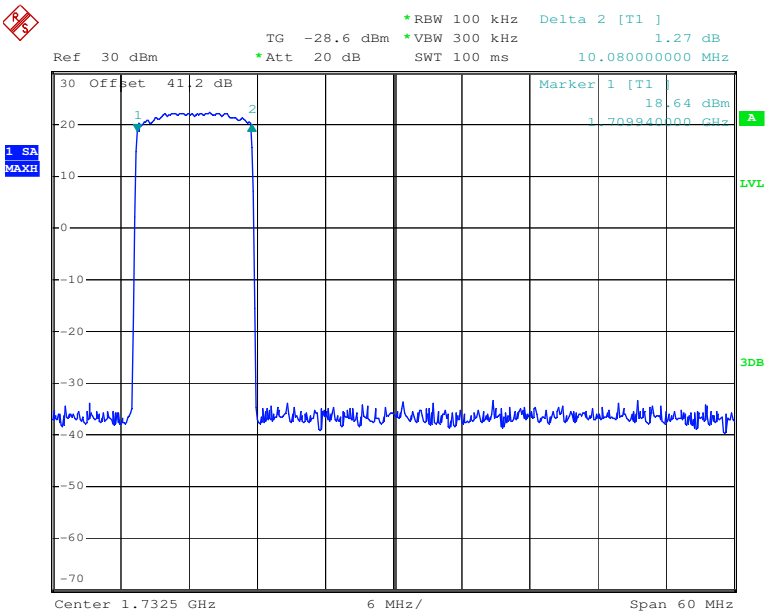


downlink(setting the working band(1.25MHz) in in highest)

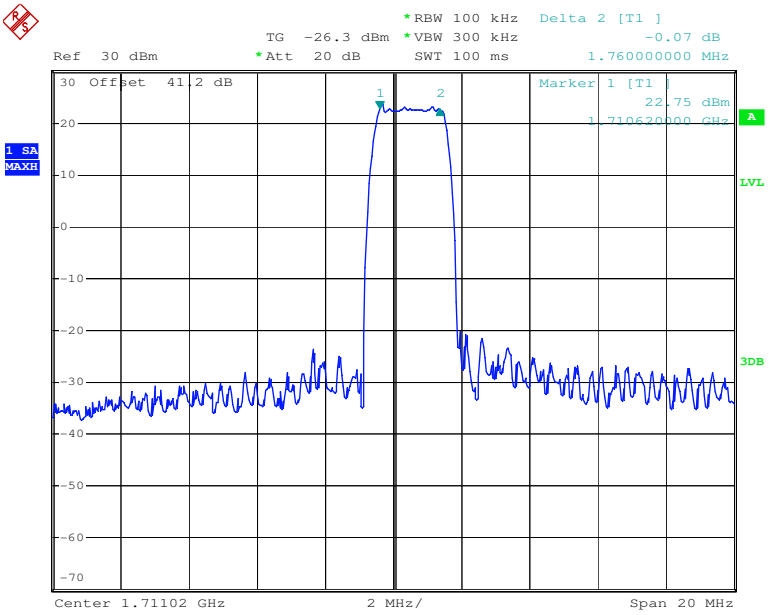


Test for uplink:

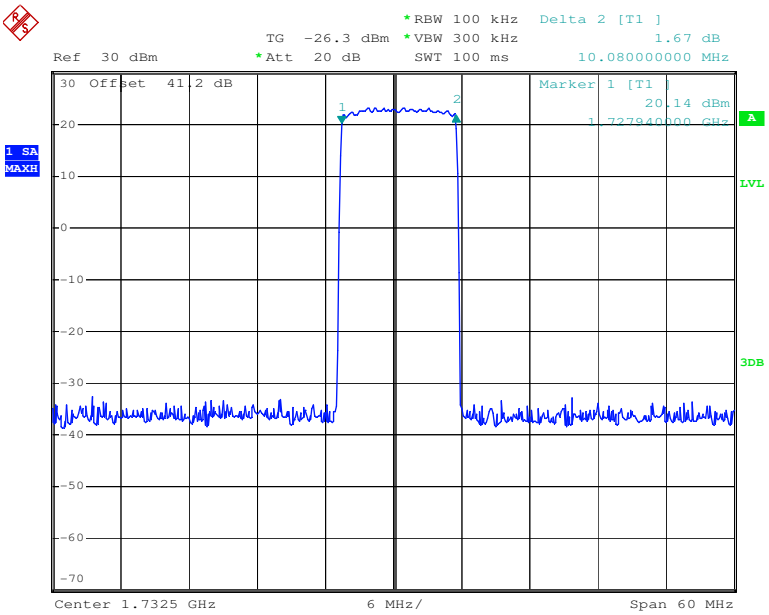
uplink(setting the working band(10MHz) in lowest)



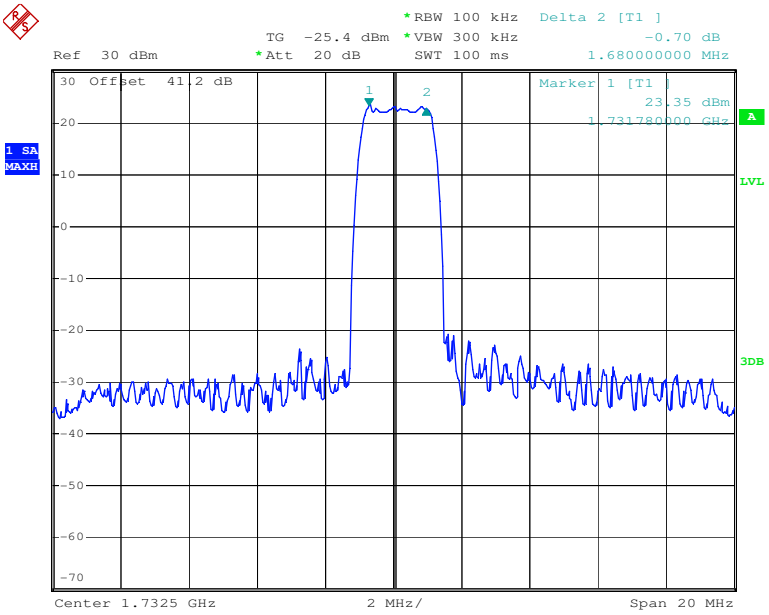
uplink(setting the working band(1.25MHz) in lowest)



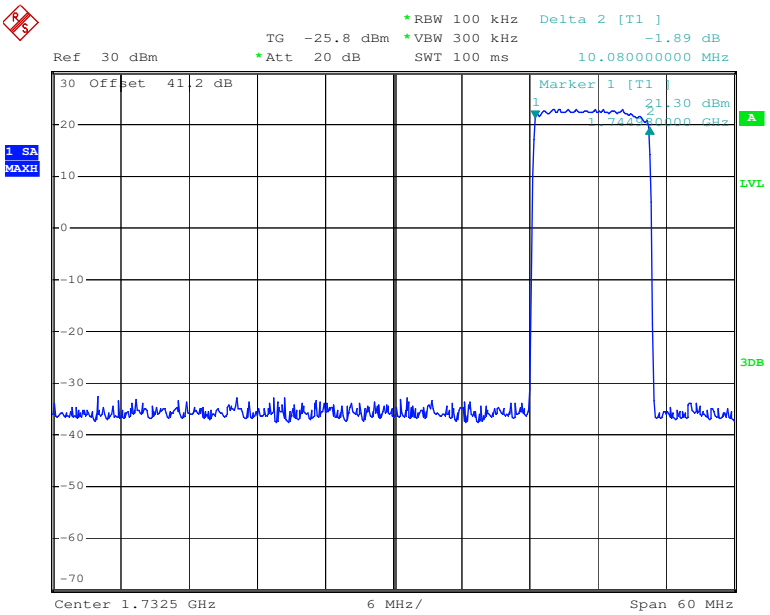
uplink (setting the working band(10MHz) in middle)



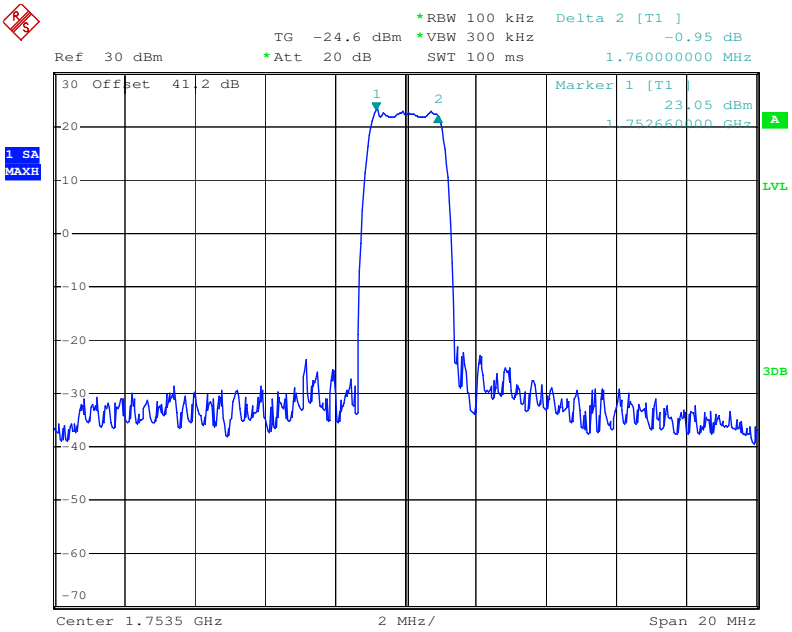
uplink (setting the working band(1.25MHz) in middle)



uplink (setting the working band(10MHz) in in highest)



uplink (setting the working band(1.25MHz) in in highest)



7.2.7 Frequency Stability

Test Date:	2010-07-28
Test Requirement:	FCC part 27.54
	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.
Test Method:	FCC part 2.1055
EUT Operation:	
Status:	Drive the EUT to maximum output power.
Conditions:	Temperature conditions, voltage conditions
Application:	Cellular Band RF output ports

Test Procedure:

1. Temperature conditions:
   a) The RF output port of the EUT was connected to Frequency Meter;
   b) Set the working Frequency in the middle channel;
   c) record the 20℃ and norminal voltage frequency value as reference point;
   d) vary the temperature from -30℃ to 50℃ with step 10℃
   e) when reach a temperature point, keep the temperature banlance at least 1 hour to make the product working in this status;
   f) read the frequency at the relative temperature.

2. Voltage conditions:
   a) record the 20℃ and norminal voltage frequency value as reference point;
   b) vary the voltage from -15% norminal voltage to +15% voltage;
   c) read the frequency at the relative voltage.

7.2.7.1 Measurement Record:

Frequency Stability vs temperature:

Test for Downlink: (middle channel 2132.5MHz)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
50	2132.500036	0.004
40	2132.500033	0.002
30	2132.500022	-0.002
20	2132.500027	Reference
10	2132.500018	-0.004
0	2132.500029	0.001
-10	2132.500014	-0.006
-20	2132.500011	-0.007
-30	2132.500033	0.002

Test for Uplink: (middle channel 1732.5MHzMHz)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
50	1732.500029	0.006
40	1732.500032	0.008
30	1732.500031	0.008
20	1732.500017	Reference
10	1732.500010	-0.004
0	1732.500012	-0.003
-10	1732.500022	0.003
-20	1732.500028	0.006
-30	1732.500027	0.005

Frequency Stability vs voltage:

Test for Downlink: (middle channel 2132.5MHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
102 (120*0.85)	2132.500038	0.005
120	2132.500027	Reference
138 (120*1.15)	2132.500019	-0.003

Test for Uplink: (middle channel 1732.5MHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
102 (120*0.85)	1732.500029	0.007
120	1732.500017	Reference
138 (120*1.15)	1732.500013	-0.002

--End of the Report-