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FEDERAL COMMUNICATIONS COMMISSION
Registration number: 282399

TEST REPORT

Application No.:	GZEM1205001512RF
Applicant:	Comba Telecom Ltd.
FCC ID:	PX8RH-8132
Product Name:	850MHz CDMA and UMTS Dual Mode Fiber Optic Repeater
Model No.:	RH-8132
Trade Mark:	Comba
Standards:	FCC Part 22, FCC Part 2
Date of Receipt:	2012-05-08
Date of Test:	2012-05-08 to 2012-05-15
Date of Issue:	2012-06-14
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.

Strong Yao
Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2012-06-14		Original

Authorized for issue by:				
Tested By		Daniel He **(Daniel Hew) /Project Engineer**		2012-05-08 to 2012-05-13 **Date**
Prepared By		Daniel He **(Daniel Hew) /Clerk**		2012-05-30 **Date**
Checked By		Strong yao **(Strong Yao)/Reviewer**		2012-06-14 **Date**

3 Test Summary

Test Item	Test Requirement	Test Method	Result
Output Power	FCC part 22.913	FCC part 2.1046 2-11-04/EAB/RF	PASS
Conducted Spurious Emissions	FCC part 22.917	FCC part 2.1051 2-11-04/EAB/RF	PASS
Band Edge& Intermodulation	FCC part 22.917	FCC part 2.1051 2-11-04/EAB/RF	PASS
Radiated Spurious Emissions	FCC part 22.917	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 22.355	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.			
No need to implement uplink test as it is cable connect to BTS (No air radiation), then the test about Uplink would be ignored.			

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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
Manufacturer:	Comba Telecom Systems(Guangzhou)Ltd.
Address of Manufacturer:	No.10 Shenzhou Road, Guangzhou Science City,Guangzhou 510663,Guangdong,P.R.China

5.2 General Description of E.U.T.

Product Name:	850MHz CDMA and UMTS Dual Mode Fiber Optic Repeater
Model No.:	RH-8132
Power Supply:	AC 200-240V 50/60Hz
Test power:	AC 230V
Operating Temperature:	Digital Access Unit: -10 °C to +40°C
	Digital Remote Unit: -10 °C to +55°C
Operating Humidity:	≤ 95%

5.3 Details of E.U.T.

Type of Modulation	CDMA & WCDMA
Emission Designator:	F9W(CDMA), F9W (WCDMA)
Frequency Band:	Downlink: 870MHz to 882.5MHz
Opereating Band:	CDMA Band:
	Downlink: 870MHz to 877.5MHz
	WCDMA Band:
	Downlink: 877.5MHz to 882.5MHz
Nominal Power Output:	40Wfor downlink
Nominal System Gain:	50dB for downlink

5.4 Product Description

The RH-8132 850MHz CDMA and UMTS Dual Mode Fiber Optic Repeater (hereinafter called "RH-8132") can be used in a point-to-point or point-to-multipoint distributed antenna system to provide effective coverage enhancement. It uses fiber transmission and is suitable for applications where large signal coverage is required, such as citywide enhancement, highways, canyons, campuses, underground tunnels, airports, convention centres, etc.

5.5 Standards Applicable for Testing

The standard used was FCC part 2 & FCC part 22

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, 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.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **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.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.

6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2012-09-06	2Y
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2012-11-11	1Y
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	10036	2013-03-12	1Y
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2012-06-09	1Y
EMC2025	Trilog Broadband Antenna 30-3000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9163	9163-450	2012-10-20	1Y
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2012-11-28	1Y
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2012-11-28	1Y
EMC2026	Horn Antenna 1-18GHz	R&S	BBHA 9120D	9120D-841	2012-10-20	1Y
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2012-08-29	1Y
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2012-08-29	1Y
EMC0049	Amplifier	Agilent	8447D	2944A10862	2013-03-12	1Y
EMC0075	310N Amplifier	Sonama	310N	272683	2012-08-29	1Y
EMC0523	Active Loop Antenna	EMCO	6502	42963	2012-11-17	1Y
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2014-06-01	3Y
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2014-04-27	2Y

Conducted Emission						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
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	2012-08-29	1Y
EMC0102	LISN	SCHAFFNER CHASE	MN2050D/1	1421	2012-11-23	1Y
EMC2046	Artificial Mains Network (LISN)	AFJ Instruments	LT32C	S.N.32031120150	2013-03-12	1Y
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2012-11-24	1Y
EMC0107	Coaxial Cable	SGS	2m	N/A	2012-07-18	1Y
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A	1Y
EMC0120	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	20550	2012-11-11	1Y
EMC0121	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	20549	2012-11-11	1Y
EMC0122	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	20548	2012-11-11	1Y
EMC167	Conical metal housing	SGS-EMC	N/A	N/A	2013-02-16	1Y

	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	2011.6.12	2012.6.11
NA	Signal Generator	Agilent	E4437B	US39260800	2011.6.17	2012.6.16
NA	Signal Generator	Agilent	E4438C	US39260800	2011.6.14	2012.6.14
NA	Spectrum Analyzer	Agilent	N9020A	MY48011385	2011.6.14	2012.6.14
NA	Spectrum Analyzer	Rohde&Schwarz	FSQ 8	SN0805772	2011.6.14	2012.6.14
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	2011.6.12	2012.6.11

General used equipment						
No.	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Due date (YYYY-MM-DD)**	**Calibration Interval**
EMC0006	DMM	Fluke	73	70681569	2012-11-14	1Y
EMC0007	DMM	Fluke	73	70671122	2012-11-14	1Y

7 Test Results

7.1 E.U.T. test conditions

Input voltage:	AC 230V
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 downlink. For detail test Modulation and Frequency, please refer to 7.2.

Remark:

FIBER-OPTIC AND OTHER SIMILAR RF DISTRIBUTION SYSTEMS

Fiber-optic distribution systems are a type of in-building radiation system that receives RF signals from an antenna, distributes the signal over fiber-optic cable, and then retransmits at another location for example within a building or tunnel. Most fiber-optic systems are signal boosters; however, some may be repeaters. These systems generally have two enclosures typically called host (or local or donor unit) and remote. Some systems may also have an optional expander box for fan-out to multiple remotes. The system transmits downlink signals from the remote unit to handsets, portables, or clients, and transmits uplink signals via from the host unit. Usually but not always the uplink goes through an intermediate amplifier to a “donor” antenna. Therefore both uplink and downlink must be tested, unless filing effectively documents how connection of uplink to donor antenna with or without an intermediate amplifier will be prevented, such as for always only a cabled connection to a base station. Fiber-optic systems are not amplifiers (AMP equipment class) – they are equipment class TNB or PCB. The same approval procedures also apply for multiple-enclosure systems connected by coax cable.

Synonyms and related terms: in-building radiation system, coverage enhancer, distributed antenna system, fiber-optic distribution system, converter, donor anten

Typical in-building or distributed antenna systems can consist of five different components (enclosures), not counting antennas:

1) host unit

a) transmits uplink to base station via antenna thru coax, ***passive interface unit*** , or ***active interface unit*** (amplifier)

b) sends base-station downlink via fiber-optic or coax to ***remote***

c) receives handset uplink via fiber-optic or coax from ***remote***

d) optional connection to ***expansion unit*** via fiber-optic

e) separate FCC ID from ***remote***, unless electrically identical

f) ***non-transmitting host unit***

i) connects directly to a base station via coax cable but does not connect to antenna or amplifier

ii) Part 15 digital device subject to Verification, no FCC ID

2) remote unit

a) receives base-station downlink via fiber-optic or coax from ***host***, transmits via antenna to handsets

b) returns handset uplink via fiber-optic or coax to ***host***

c) separate FCC ID from ***remote***, unless electrically identical

3) expansion unit
a) fiber-optic or coax from ***host***
b) fiber-optic or coax fan-out to ***remote(s)***
c) Part 15 digital device subject to Verification, no FCC ID
4) *passive interface unit*
a) contains attenuators, splitters, combiners
b) coax cable connection between ***host*** and base-station
c) passive device, no FCC ID
5) *active interface unit*
a) amplifies uplink signal from ***host unit*** for transmit by donor antenna
b) attenuates downlink from donor antenna
c) coax cable connection between ***host*** and ***active interface unit***
d) usually has separate FCC ID; in some cases could be combined/included with ***host*** as one enclosure

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.

This system is composed of Digital Access Unit and Digital Remote Unit.

Digital Access Unit: **host unit**, which uplink connect directly to a base station via coax cable but does not connect to antenna or amplifier, it is non-transmitting host unit and can comply with KDB definition above.

Digital Remote Unit： It is **remote unit**, which can comply with KDB definition above and has separate FCC ID in this test report.

7.2 Test **Procedure** & Measurement Data

Test Modulation and Frequency
CDMA Band:

Modulation	Lowest frequency	Middle frequency	Highest frequency
Downlink: 870MHz to 877.5MHz			
CDMA	871.5	873.75	876

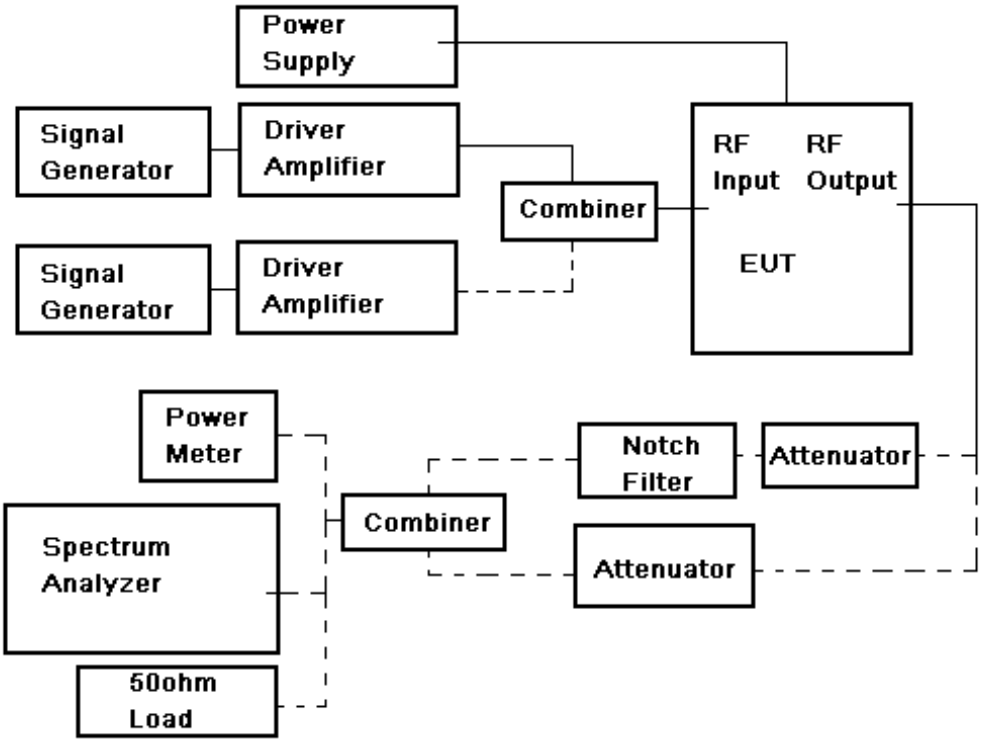
WCDMA Band:

Modulation	Lowest frequency	Middle frequency	Highest frequency
Downlink: 877.5MHz to 882.5MHz			
WCDMA	N/A	880	N/A

Remark:

1) We test the downlink in the lowest band; the middle band; the hightest band for CDMA Band and the middle band for WCDMA.

General Test Setup:



7.2.1 RF Output Power

Test Date: 2012-05-10

Test Requirement: FCC part 22.913(a)

22.913(a):Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts.

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:

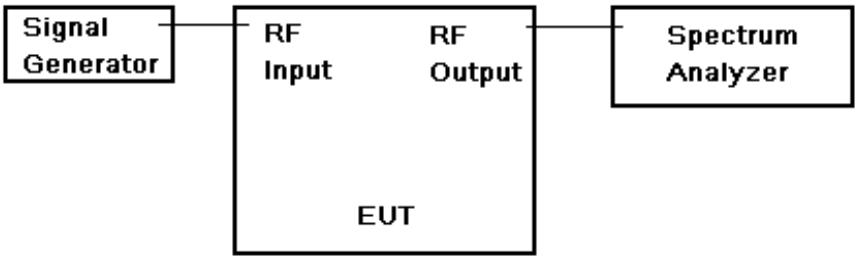


Fig.1 RF Output Power test configuration

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:

CDMA Band:

Per channel Power, Input=-3dBm for downlink			
Modulation	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Downlink: Working Band(870MHz ~ 877.5MHz),Measure Maximum Output power			
CDMA	46.14dBm(41.114W)	45.85dBm(38.459W)	46.54dBm(45.082W)

WCDMA Band:

Per channel Power, Input=-5dBm for downlink			
Modulation	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Downlink: Working Band(877.5MHz ~ 882.5MHz),Measure Maximum Output power			
WCDMA	N/A	46.15dBm(41.210W)	N/A

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.

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: 2012-05-08

Test Requirement: FCC part 22.917(a)

22.917(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.

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:

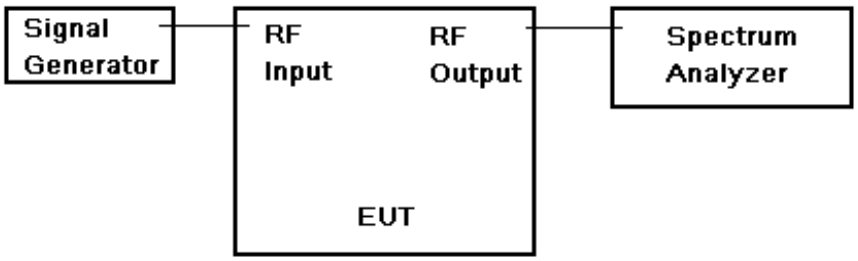
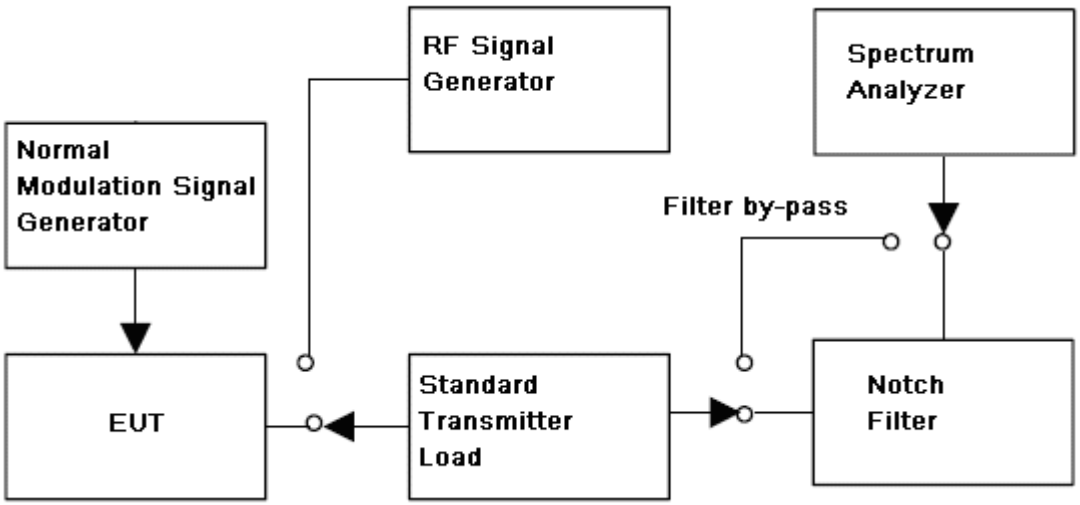


Fig.2. Conducted Spurious Emissions test configuration



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.

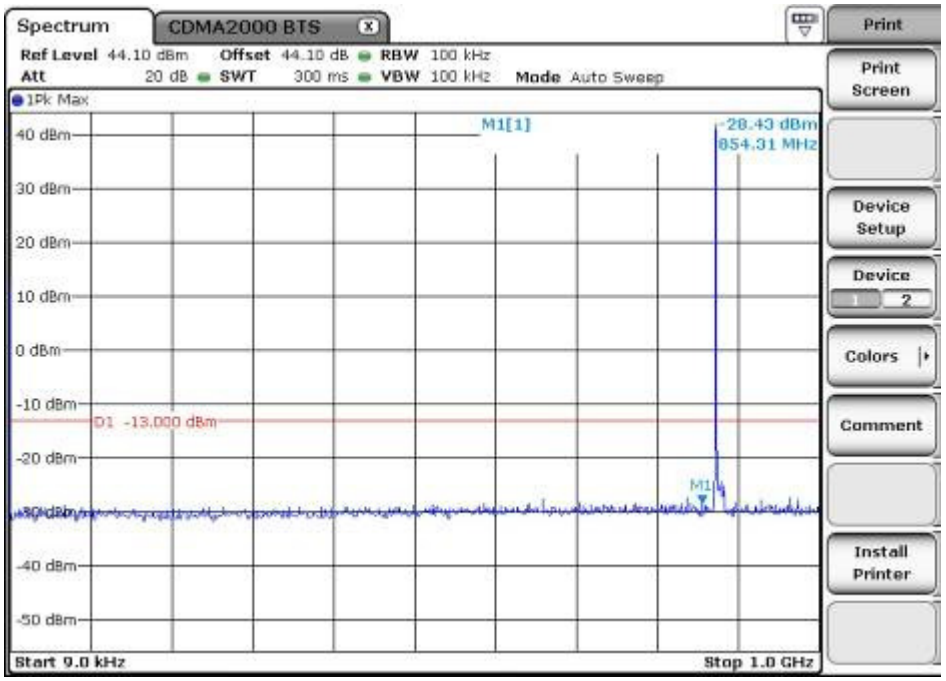
When the EUT fundamental carrier is not enough to make the status, the notch filter could be not used.

7.2.2.1 Measurement Record:

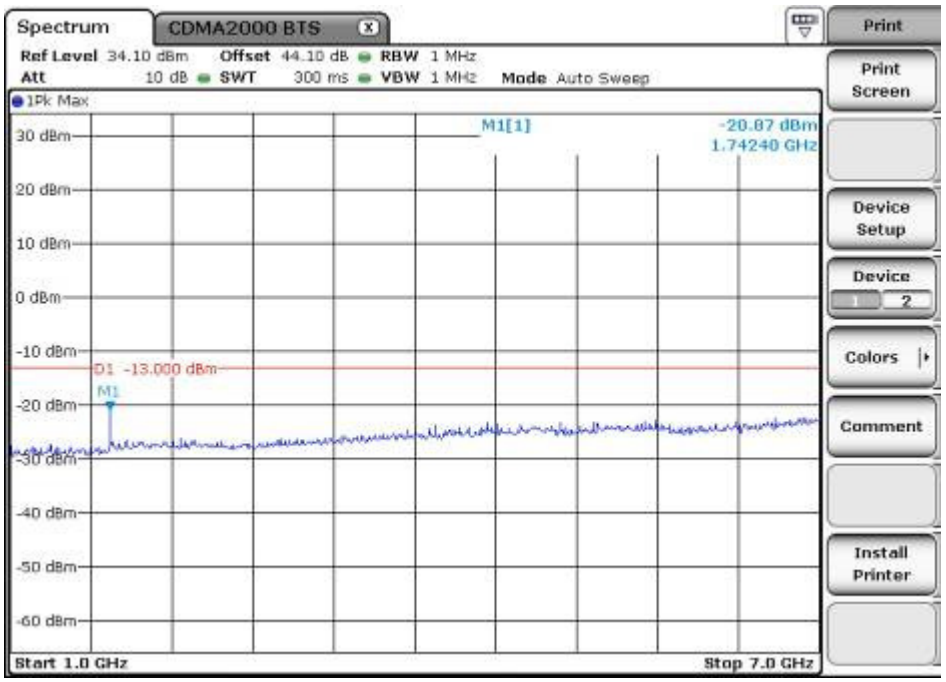
1.Test for CDMA:

1.1 Downlink: 870MHz ~ 877.5MHz (lowest frequency)

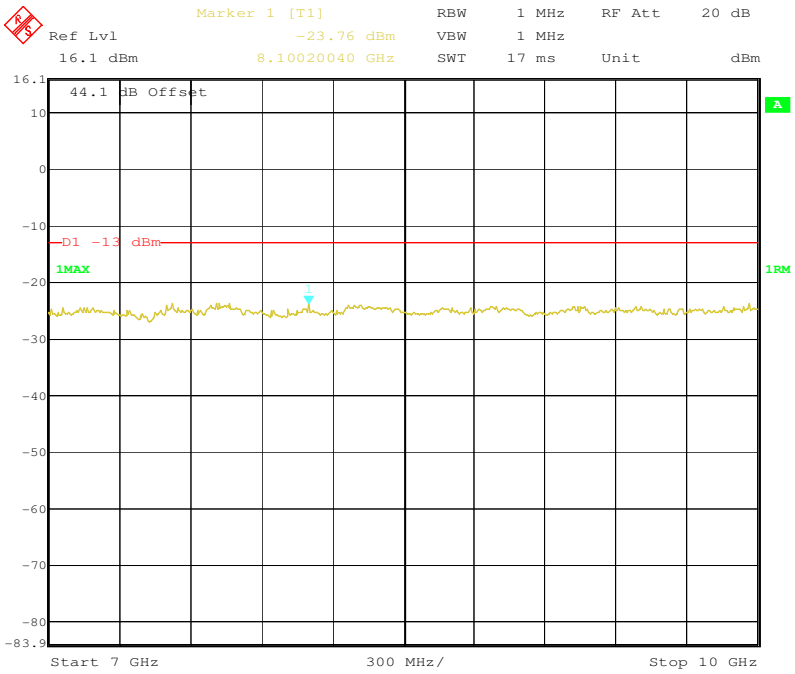
9KHz to 1GHz



1GHz to 7GHz

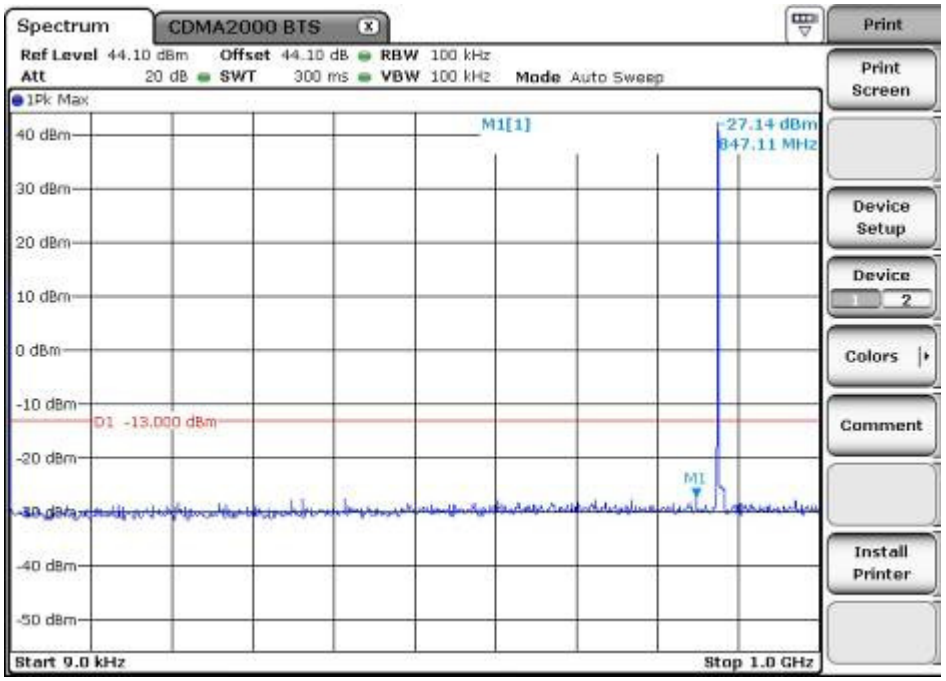


7GHz to 10GHz

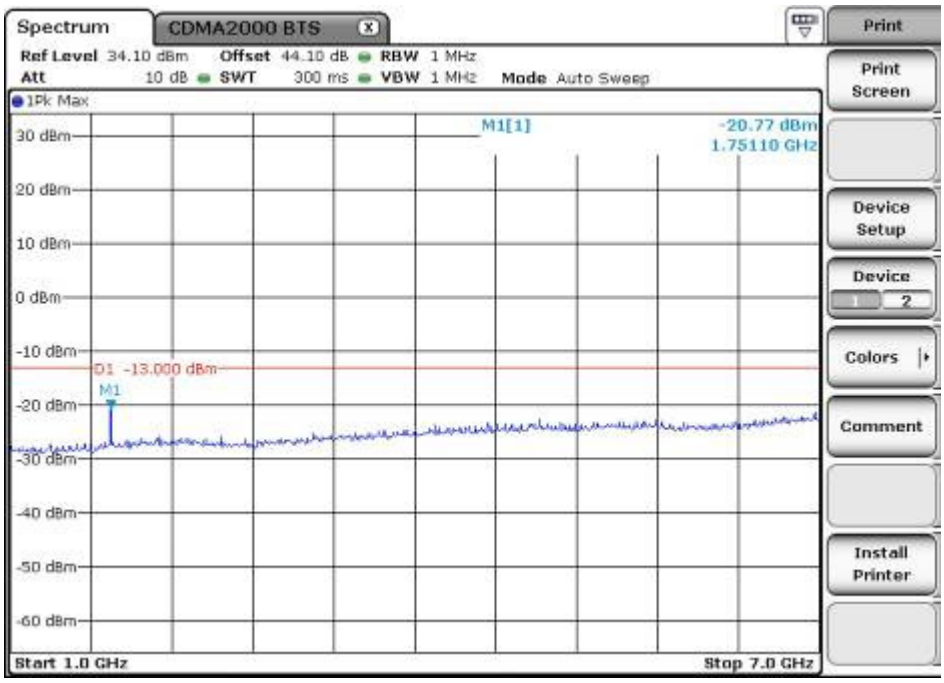


1.2 Downlink: 870MHz ~ 877.5MHz (Middle frequency)

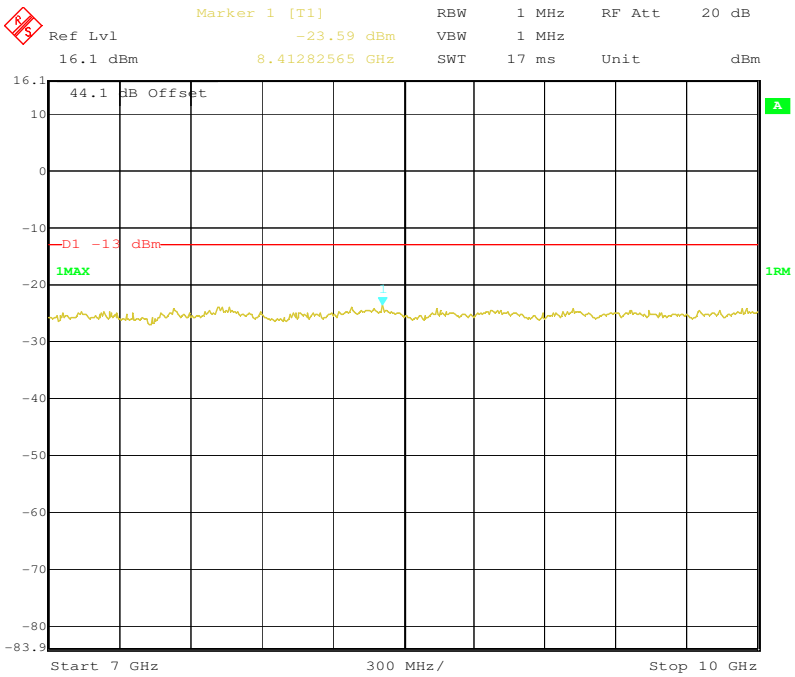
9KHz to 1GHz



1GHz to 7GHz

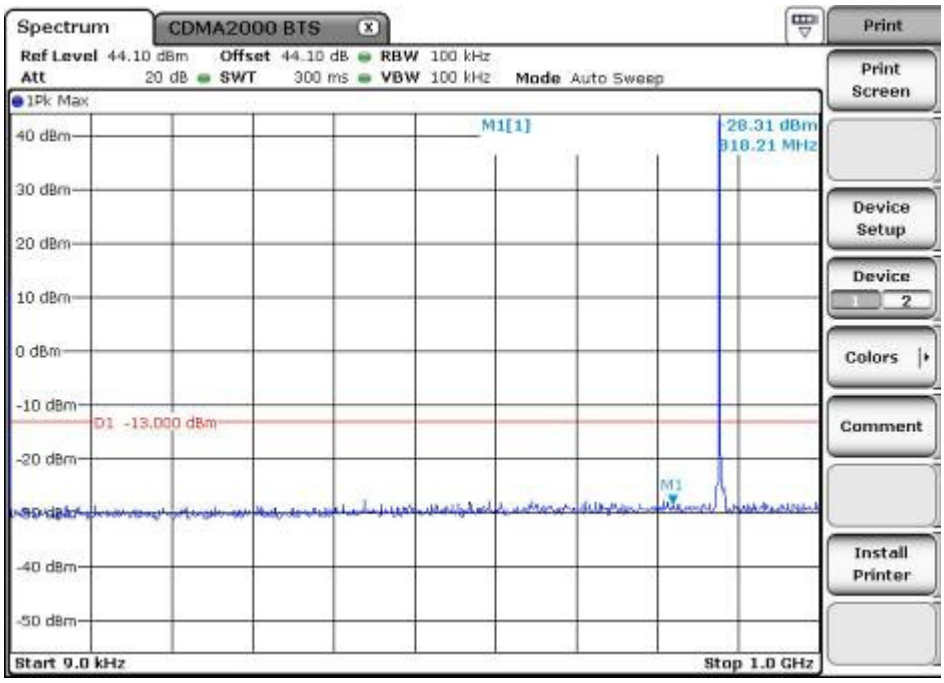


7GHz to 10GHz

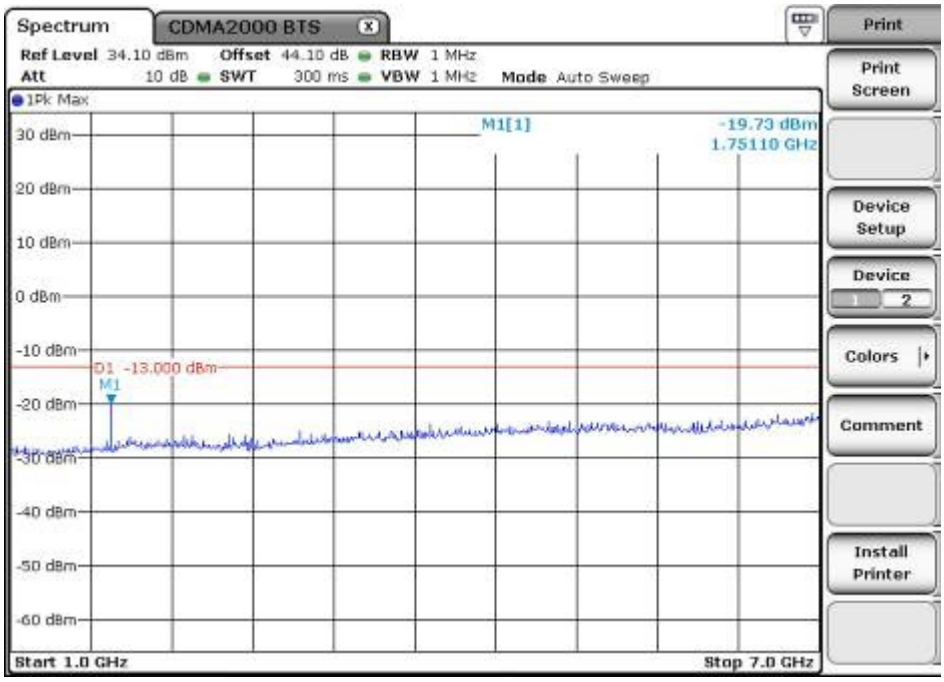


1.3 Downlink: 870MHz ~ 877.5MHz (highest frequency)

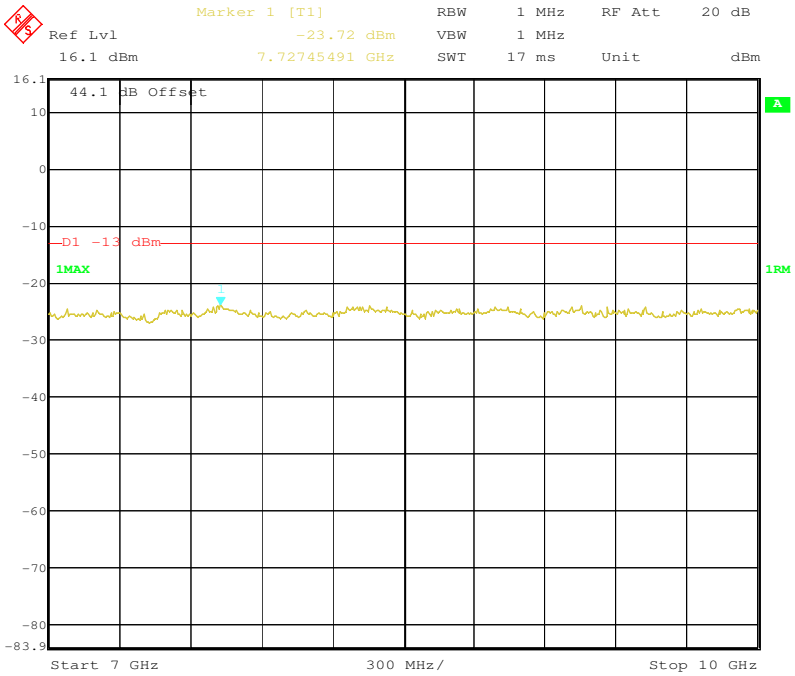
9KHz to 1GHz



1GHz to 7GHz



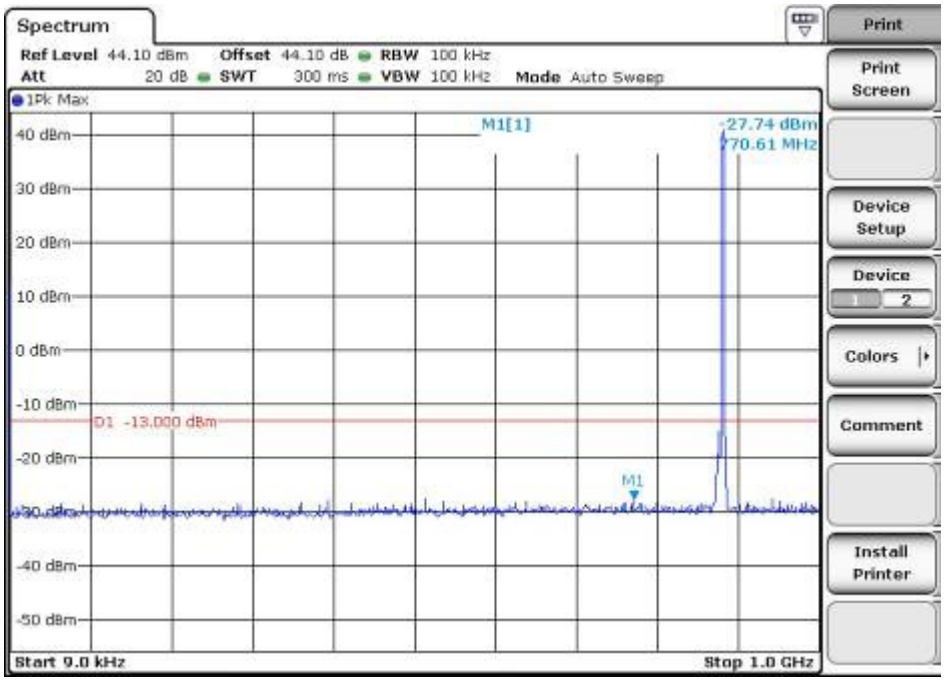
7GHz to 10GHz



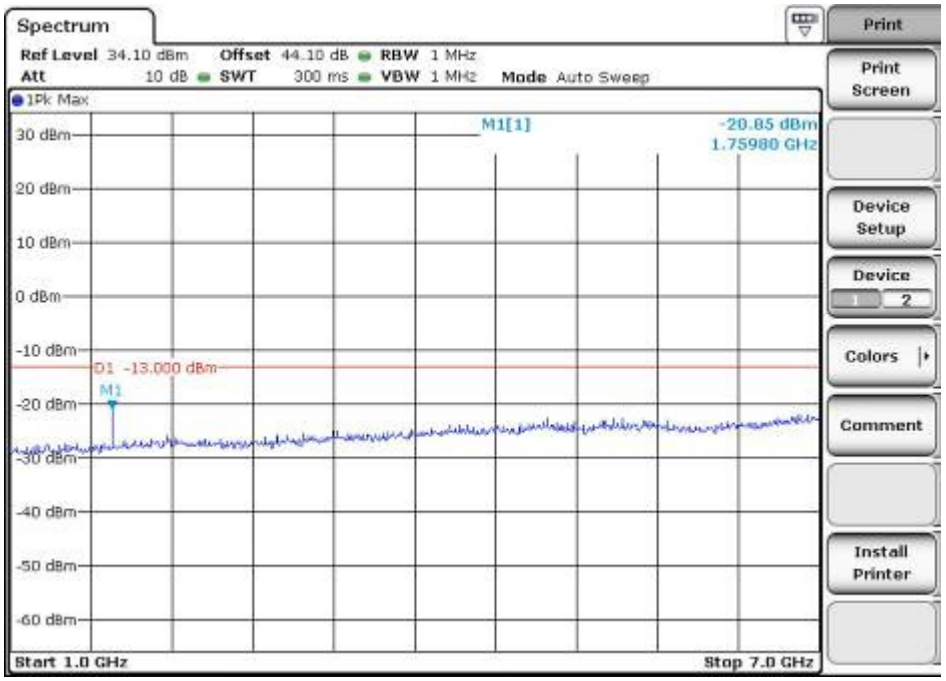
2.Test for WCDMA:

2.1 Downlink: 877.5MHz ~ 882.5MHz (Middle frequency)

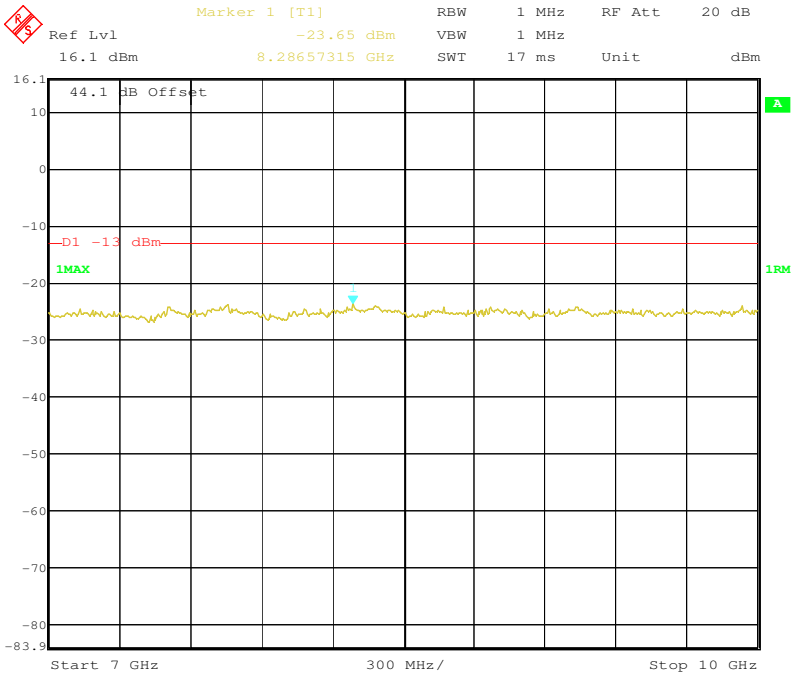
9KHz to 1GHz



1GHz to 7GHz



7GHz to 10GHz



7.2.3 Band Edge& Intermodulation

Test Date: 2012-05-08

Test Requirement: FCC part 22.917(b)

22.917(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.

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:

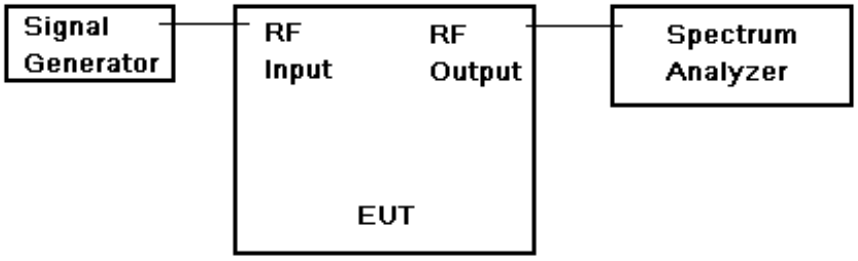
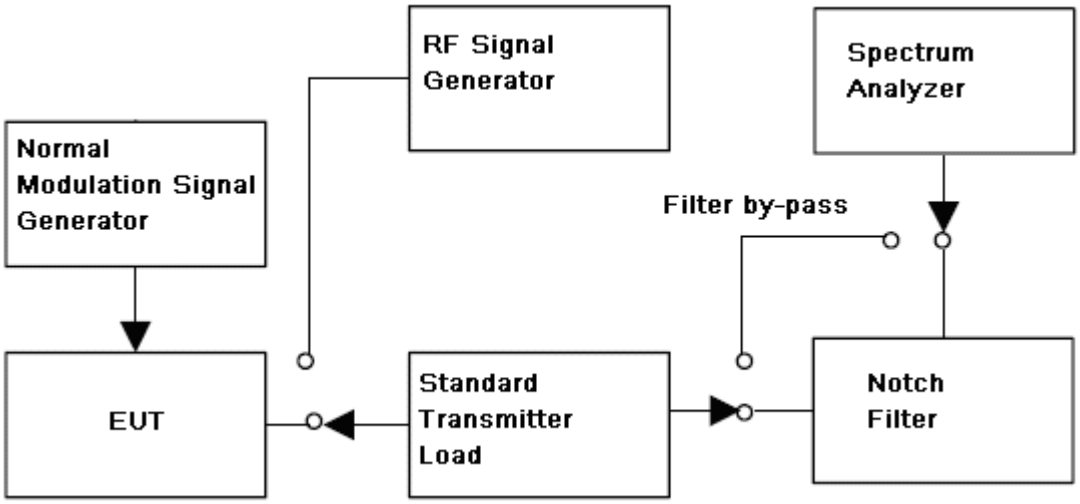


Fig.3. Band edge and Intermodulation test configuration



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.

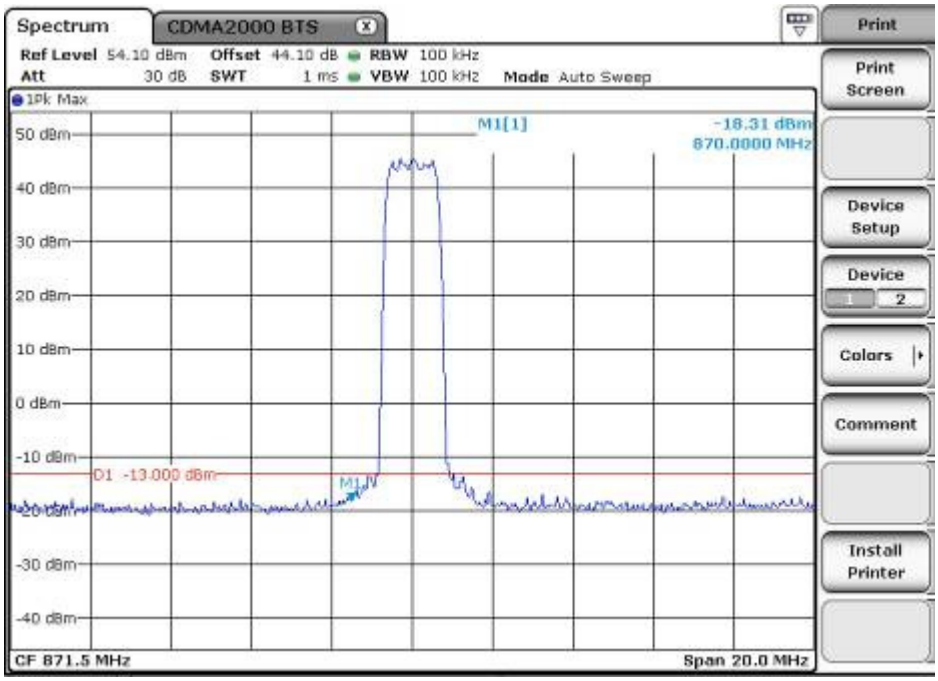
When the EUT fundamental carrier is not enough to make the status, the notch filter could be not used.

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: · 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.

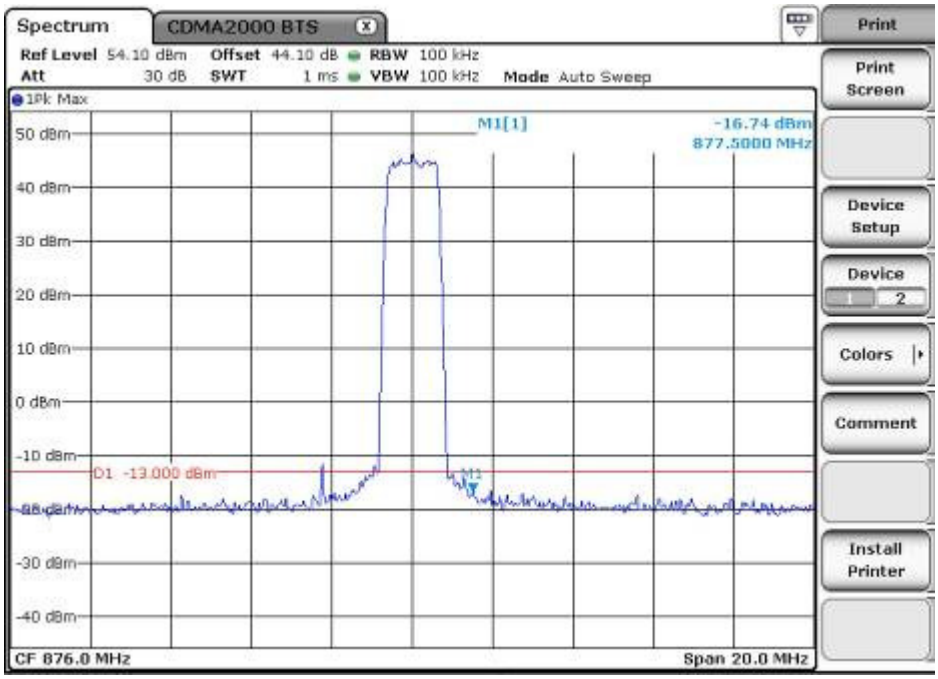
7.2.3.1 Measurement Record:

1.Test for CDMA:

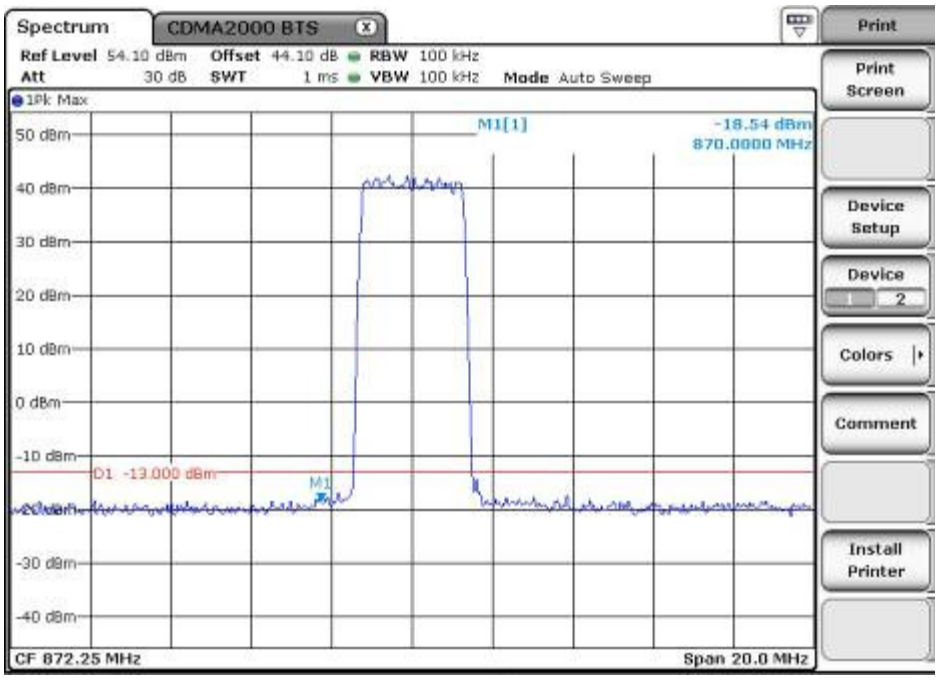
1.1 one signal input downlink(**870MHz ~ 877.5MHz**)– Lower Edge



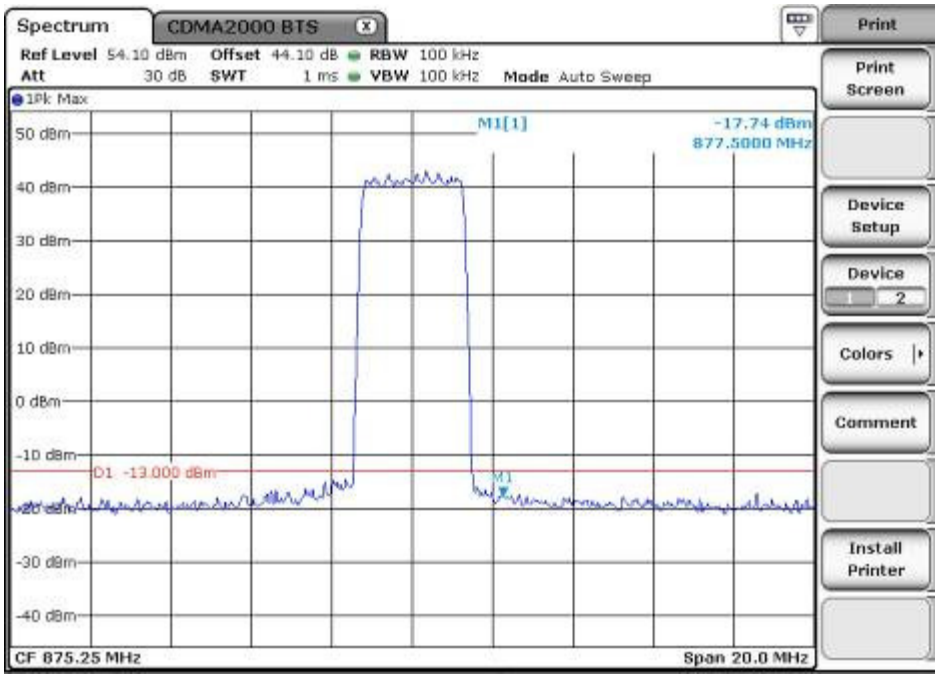
1.2 one signal input downlink(**870MHz ~ 877.5MHz**)– Upper Edge



1.3 two signal input downlink(**870MHz ~ 877.5MHz**)—Lower Edge

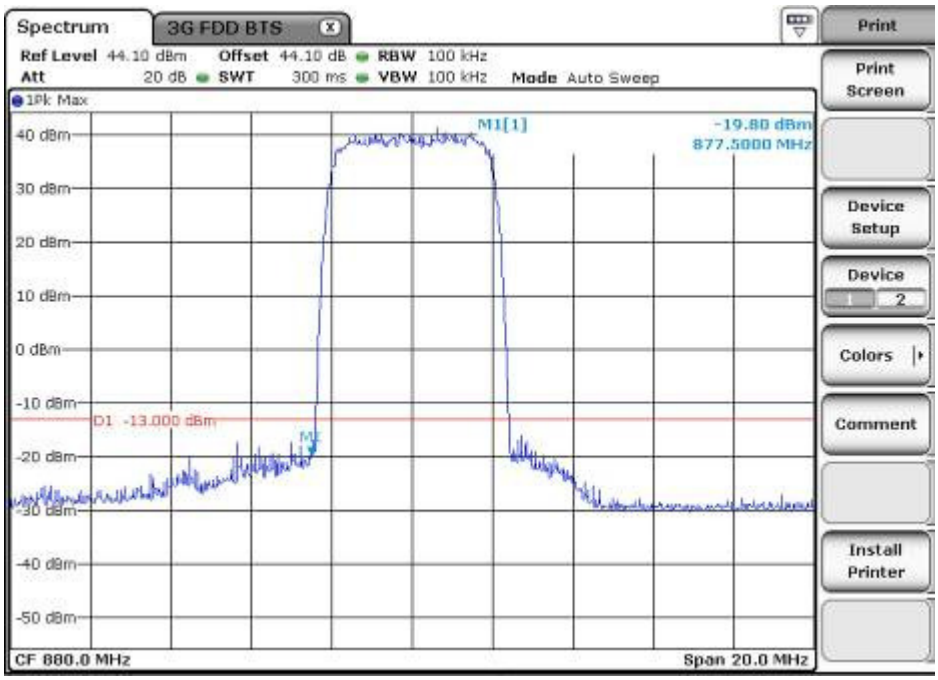


1.4 two signal input downlink(**870MHz ~ 877.5MHz**)—Upper Edge

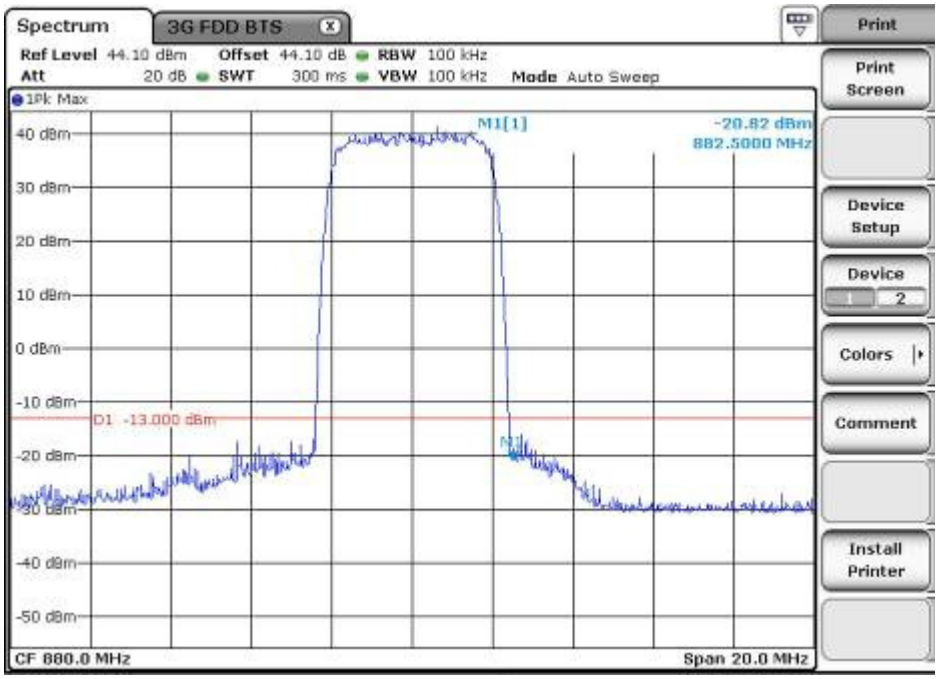


2.Test for WCDMA:

2.1 one signal input downlink(**877.5MHz ~ 882.5MHz**)– Lower Edge



2.2 one signal input downlink(**877.5MHz ~ 882.5MHz**)– 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: 2012-05-09

Test Requirement: FCC part 22.917(a)

22.917(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.

Test Method: FCC part 2.1053

ANSI/TIA-603-C-2004

EUT Operation:

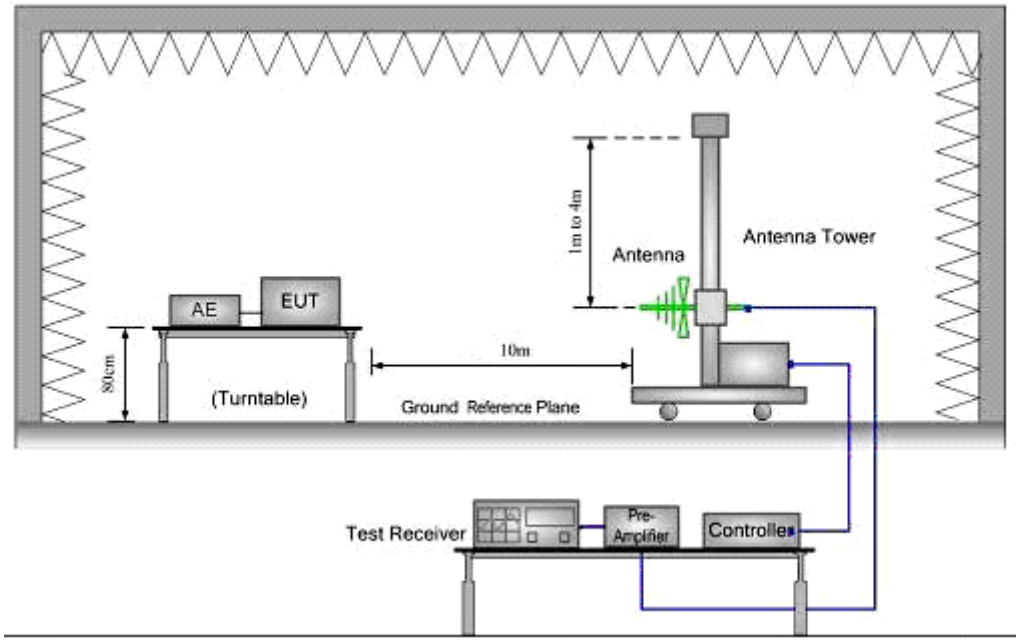
Status: Drive the EUT to maximum output power.

Conditions: Normal conditions

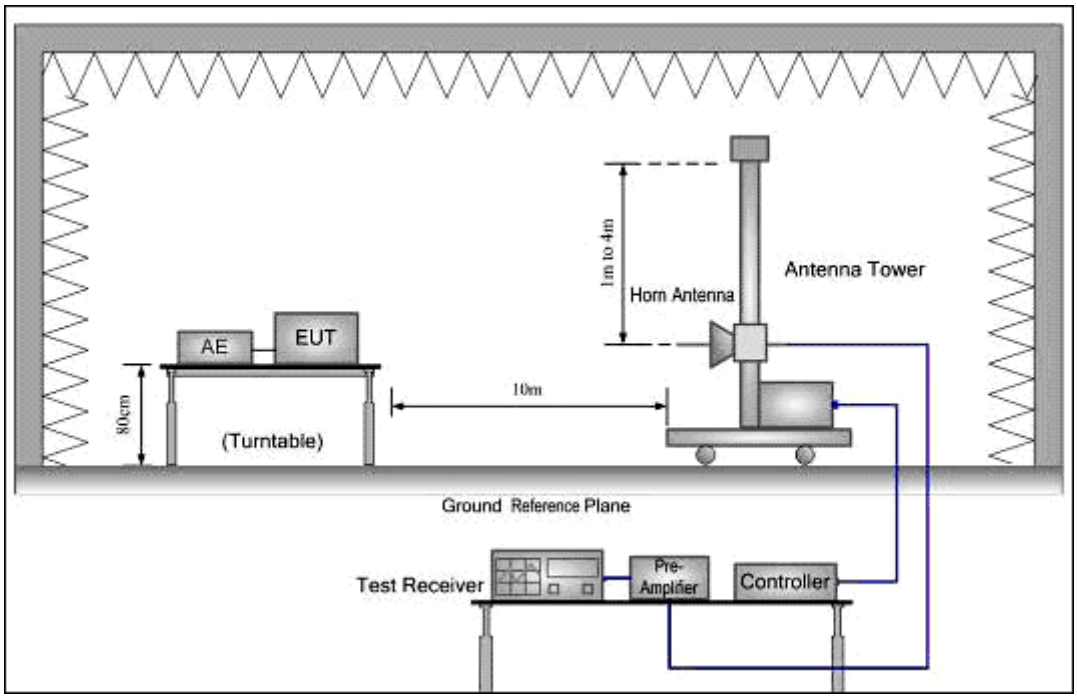
Application: Enclosure

Test Configuration:

30MHz to 1GHz emissions:



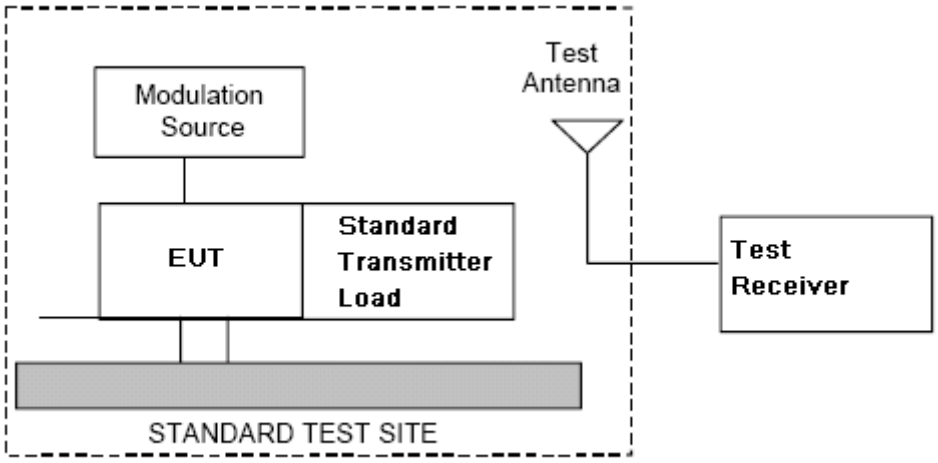
1GHz to 40GHz emissions:



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.

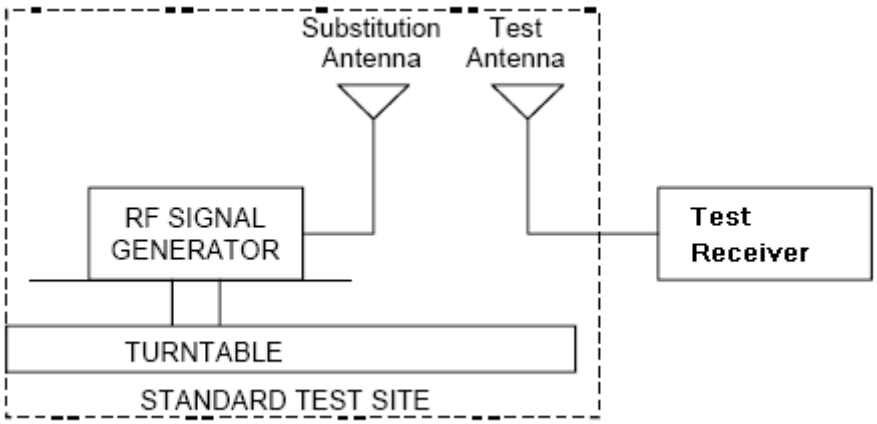
c) Place the transmitter to be tested on the turntable in the standard test site, The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length.

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 Downlink 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 : the Downlink.

The spectrum was searched from 30MHz to 10GHz (10th Harmonic) for downlink;

7.2.5 Occupied Bandwidth

Test Date: 2012-05-08 to 2012-05-13

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:

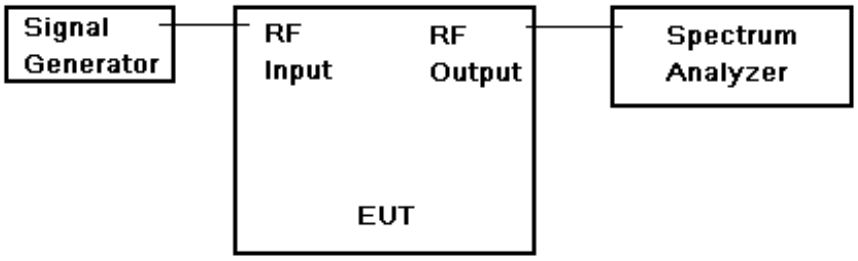


Fig.2. Conducted Spurious Emissions test configuration

Test Procedure: a) Set the spectrum analyzer RBW 300 Hz or >1%&<2% emission bandwidth of carrier.

b) Capture the trace of input signal;

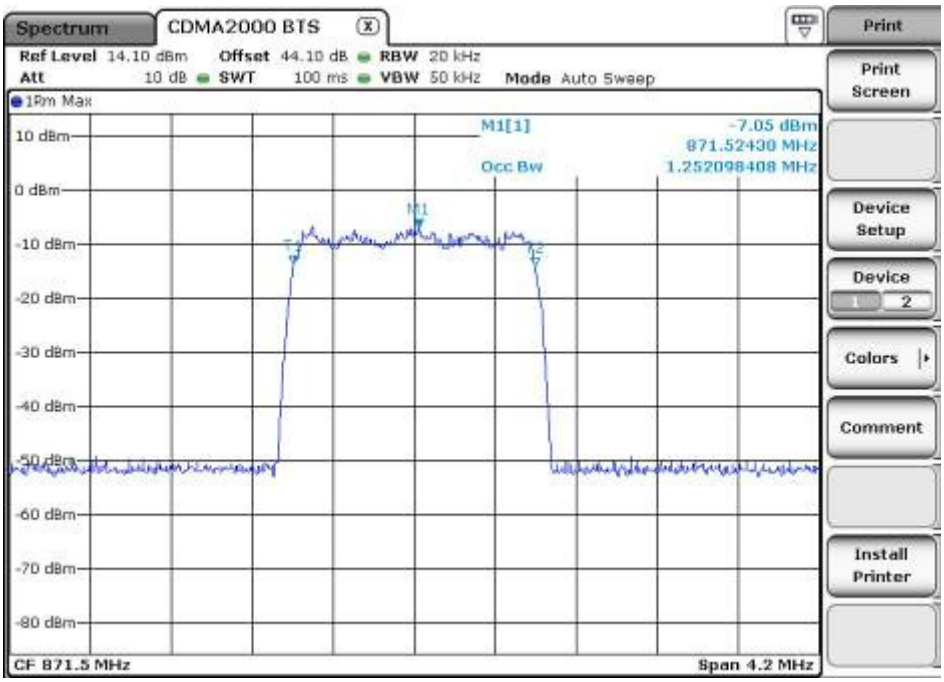
c) Connect the equipment as illustrated;

d) Capture the trace of output signal;

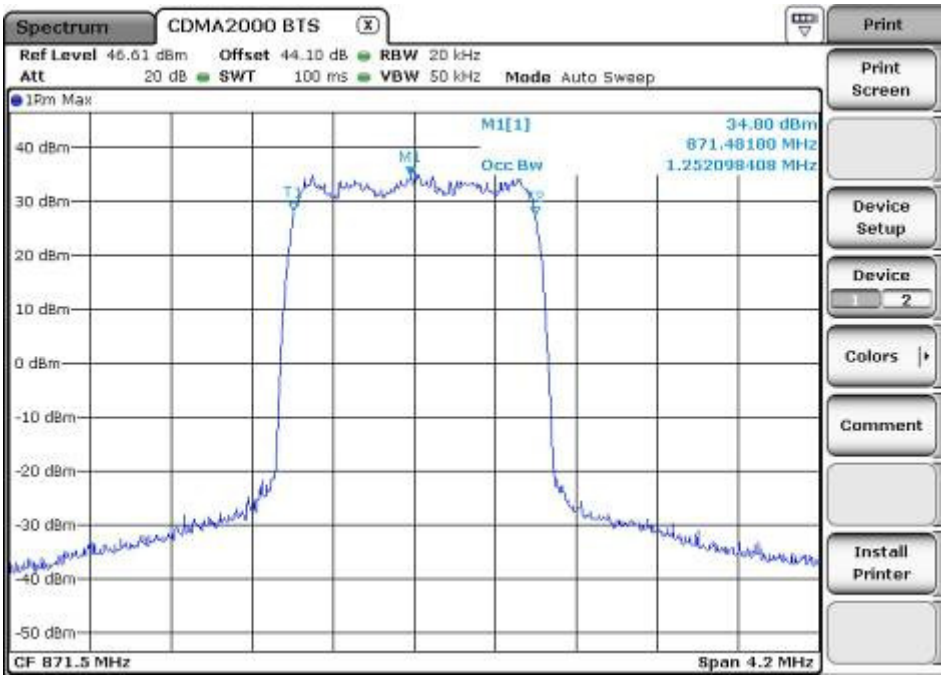
7.2.5.1 Measurement Record:

1.Test for CDMA:

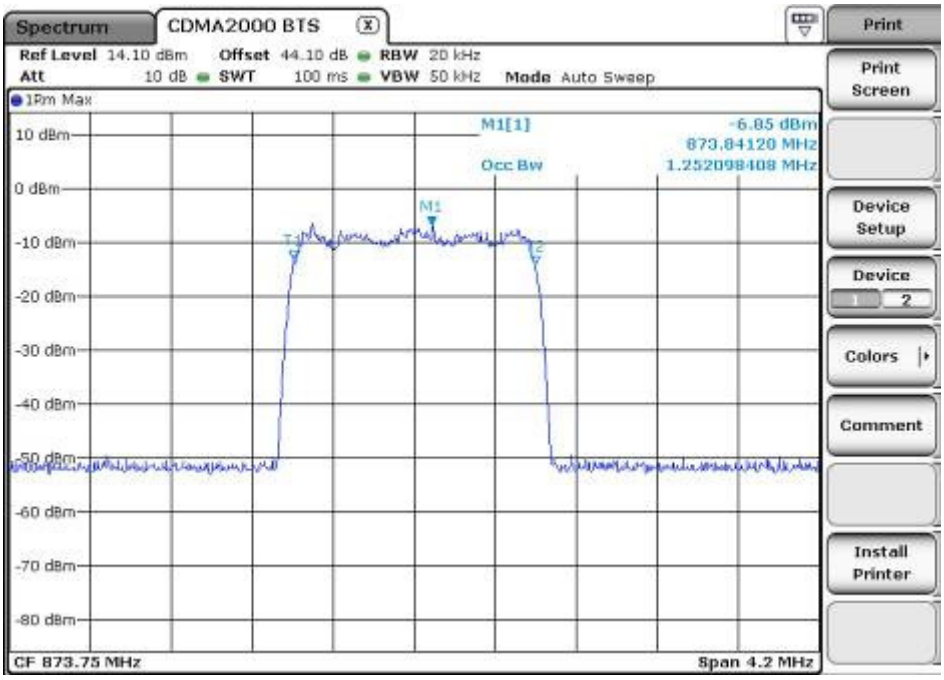
1.1 Downlink: **870MHz ~ 877.5MHz** (lowest frequency) – Input



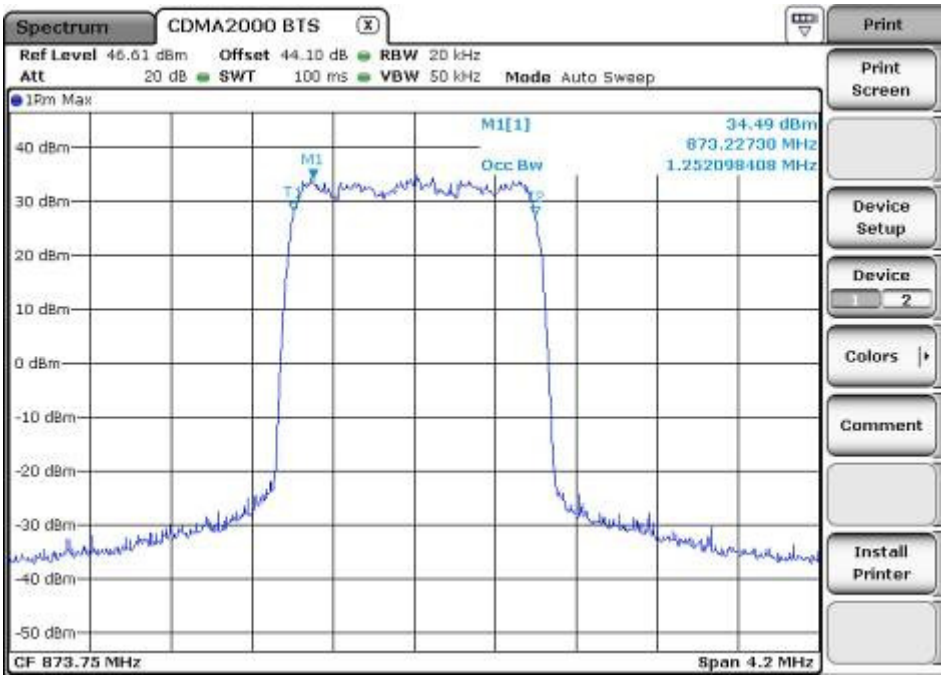
1.2 Downlink: **870MHz ~ 877.5MHz** (lowest frequency)-- Output



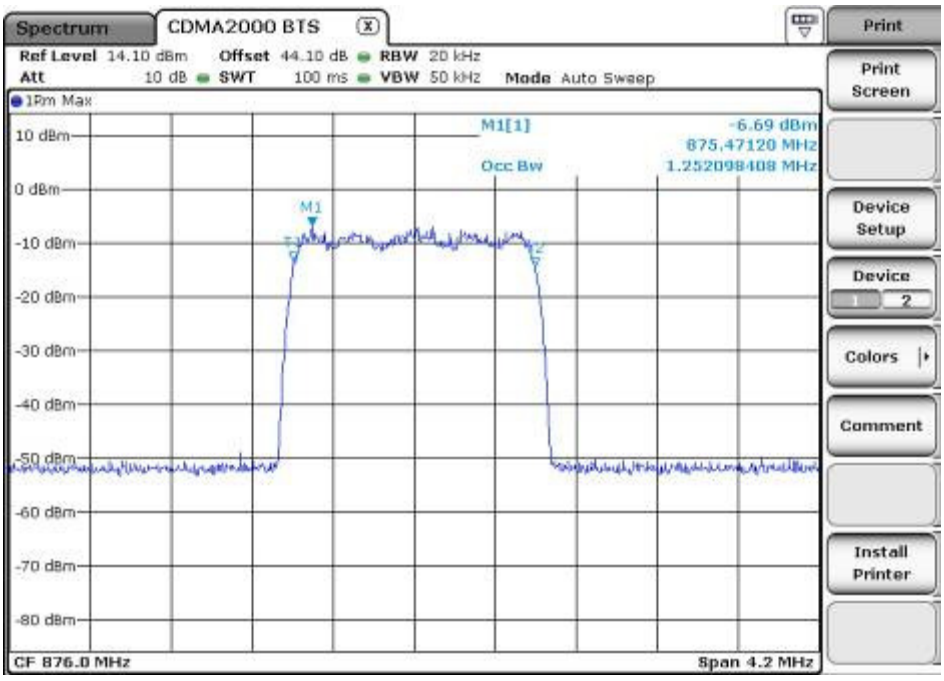
1.3 Downlink: **870MHz ~ 877.5MHz** (middle frequency)-- Input



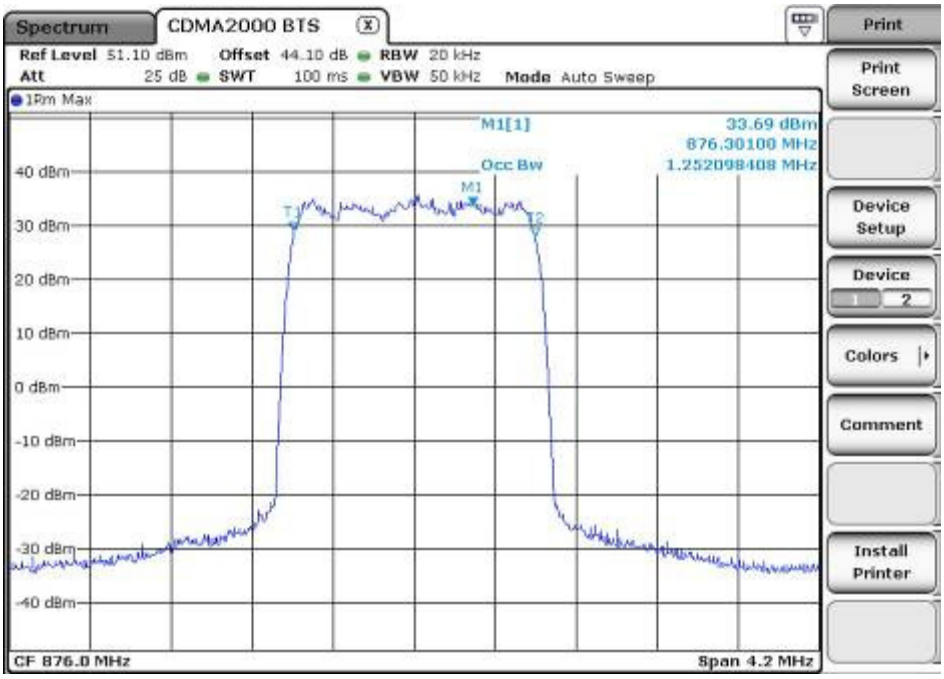
1.4 Downlink: **870MHz ~ 877.5MHz** (middle frequency)-- Output



1.5 Downlink: **870MHz ~ 877.5MHz** (highest frequency)—Input



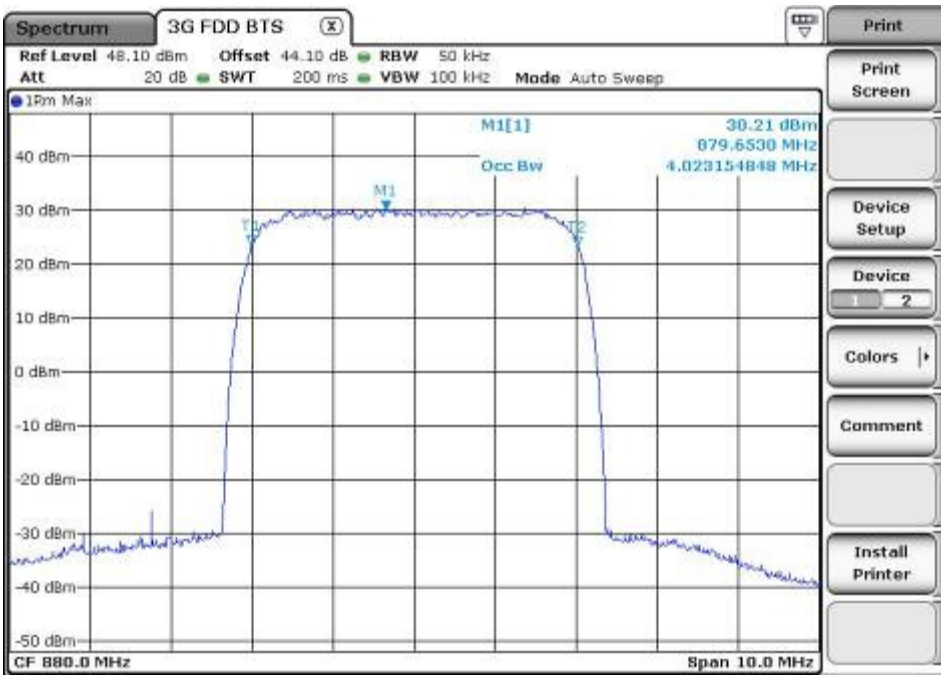
1.6 Downlink: **870MHz ~ 877.5MHz** (highest frequency)--Output



2.Test for WCDMA:

2.3 Downlink: **877.5MHz ~ 882.5MHz** (middle frequency)-- Input

2.4 Downlink: **877.5MHz ~ 882.5MHz** (middle frequency)-- Output



7.2.6 Out of Band Rejection

Test Date: 2012-05-08

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:

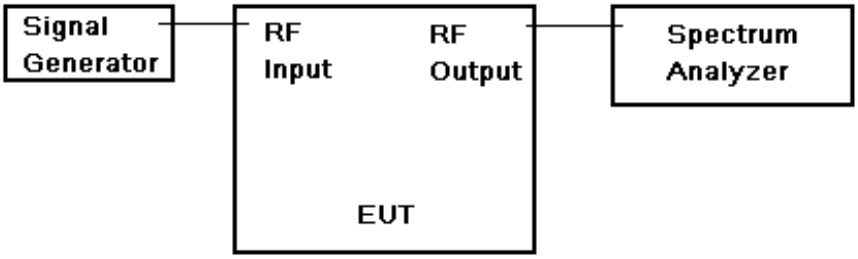


Fig.4. Out of Band rejection test configuration

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;

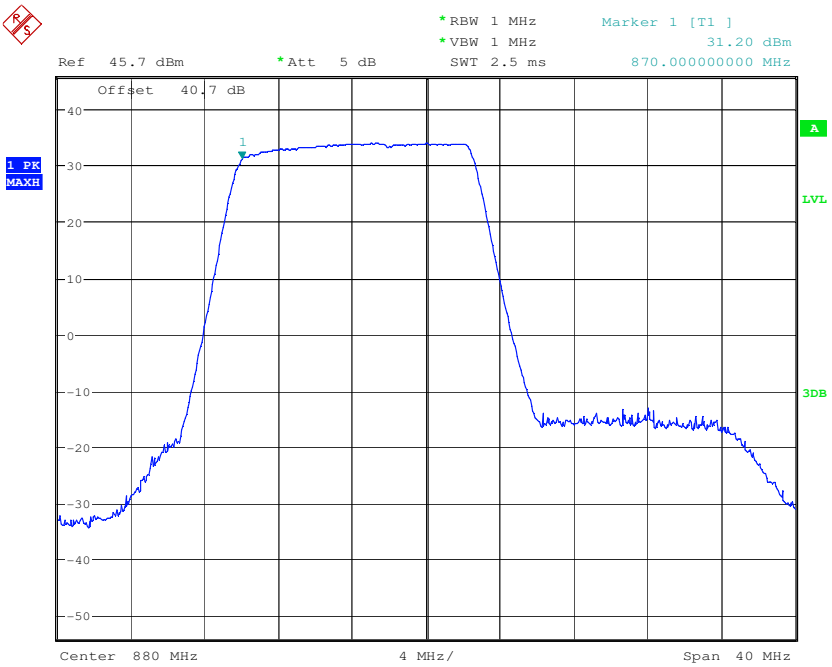
6. Signal generator sweep from the frequency more lower than the product frequency to the frequency more higher than it, find the product band filter characteristic;

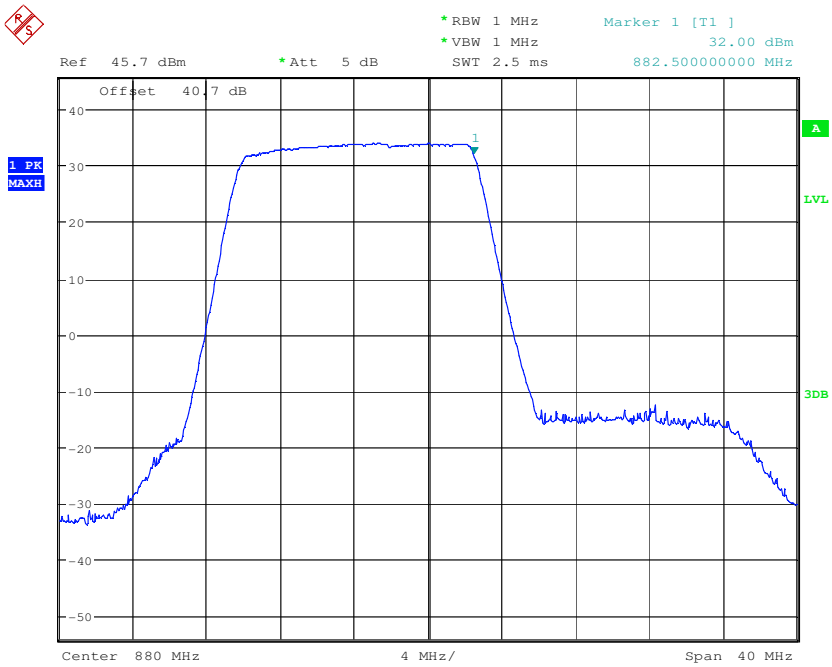
· CW signal rather than typical signal is acceptable (for FM).

· Multiple band filter will need test each other.

7.2.6.1 Measurement Record:

1.Test for Downlink:870MHz to 882.5MHz





7.2.7 Frequency Stability

Test Date: 2012-05-08

Test Requirement: FCC part 22.355

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 -10℃ to 55℃ 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:

1.Test for Downlink: 870~877.5MHz (middle channel 873.75MHz)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
55	873.7500325	0.0127039
40	873.7500236	0.0025179
30	873.7500137	-0.0088126
20	873.7500214	Reference
10	873.7500234	0.0022889
0	873.7500429	0.0246066
-10	873.7500421	0.0236910

2.Test for Downlink: 877.5~882.5MHz (middle channel 880MHz)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
55	880.0000339	0.0105682
40	880.0000375	-0.0064773
30	880.0000369	-0.0071591
20	880.0000432	Reference
10	880.0000423	-0.0010227
0	880.0000419	-0.0014773
-10	880.0000418	-0.0015909

Frequency Stability vs voltage:

3.Test for Downlink: 870~877.5MHz (middle channel 873.75MHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
195.5 (230*0.85)	873.7500336	0.0139628
230	873.7500214	Reference
264.5 (230*1.15)	873.7500427	0.0243770

4.Test for Downlink:877.5~882.5MHz (middle channel 880MHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
195.5 (230*0.85)	880.0000394	-0.00431818
230	880.0000432	Reference
264.5 (230*1.15)	880.0000478	-0.00522727

--The End of Report--