

FCC RF Test Report

**Product Name: HSPA/HSUPA/UMTS/GPRS/GSM/EDGE
Mobile Phone**

Product Model: HUAWEI H867G, H867G

Report Number: SYBH(Z-RF)035112012-2001

FCC ID: QISH867G

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

Tel: +86 755 28780808

Fax: +86 755 89652518

Notice

1. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-2.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers of test site No.1 are R-2364, G-415, C-2583, and T-256, and the accreditation numbers of test site No.2 are R-3760, G-485, C-4210 and T-1237.
6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
7. The test report is invalid if there is any evidence of erasure and/or falsification.
8. The test report is only valid for the test samples.
9. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian,
 Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt Sample: 2012-11-30
Start Date of Test: 2012-11-30
End Date of Test: 2012-12-17

Test Result: Pass

Approved by Senior Engineer:	2012-12-19	Dai Linjun	
	Date	Name	Signature

Prepared by:	2012-12-19	Guo Xingxing	
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1		First report.



CONTENT

1	General Information	6
1.1	Applied Standard	6
1.2	Test Location	6
1.3	Test Environment Condition	6
2	Test Summary	7
2.1	Cellular Band (824-849 MHz paired with 869-894 MHz)	7
2.2	PCS Band (1850-1915 MHz paired with 1930-1995 MHz)	8
2.3	AWS Band (1710-1755 MHz paired with 2110-2155 MHz)	9
3	Description of the Equipment under Test (EUT)	10
3.1	General Description	10
3.2	EUT Identity	10
3.3	Technical Specification	11
4	General Test Conditions / Configurations	12
4.1	Test Modes	12
4.2	Test Environment	12
4.3	Test Frequency	12
4.4	DESCRIPTION OF TESTS	14
4.5	Test Setups	17
4.6	Test Conditions	19
5	Main Test Instruments	21
6	Measurement Uncertainty	22



1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 02:2011
47 CFR FCC Part 22: 2011
47 CFR FCC Part 24: 2011
47 CFR FCC Part 27 :2011

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v01
FCC KDB 662911 D01 Multiple Transmitter Output v01

1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Ambient Temperature: 19.5 to 25 °C
Ambient Relative Humidity: 40 to 55 %
Atmospheric Pressure: Not applicable



2 Test Summary

2.1 Cellular Band (824-849 MHz paired with 869-894 MHz)

Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
RF Power Output	§2.1046, §22.913	RSS-Gen, §4.8; RSS-132, §4.4	FCC: ERP ≤ 7 W. IC: EIRP ≤ 11.5 W.	Appendix A	Pass
Bandwidth	§2.1049, §22.917	RSS-Gen, §4.6	OBW: No limit. EBW: No limit.	Appendix B	Pass
Band Edges Compliance	§2.1051, §22.917	RSS-Gen, §4.9; RSS-132, §4.5	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix C	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	RSS-Gen, §4.9; RSS-132, §4.5	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges. IC: ≤ -13 dBm/100 kHz (for EBW ≤ 4 MHz) or ≤ -13 dBm/1 MHz (for EBW > 4 MHz), from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Appendix D	Pass
Frequency Stability	§2.1055, §22.355	RSS-Gen, §4.7; RSS-132, §4.3	≤ ±2.5ppm.	Appendix E	Pass
Radiated spurious emission	§2.1053, §22.917	RSS-Gen, §4.9; RSS-132, §4.5	FCC: ≤ -13 dBm/100 kHz. IC: ≤ -13 dBm/100 kHz (for EBW ≤ 4 MHz) or ≤ -13 dBm/1 MHz (for EBW > 4 MHz).	Appendix F	Pass
Receiver Spurious Emissions (NOTE 1)	---	RSS-Gen, §4.10; RSS-Gen, §6; RSS-132, §4.6	Radiated limit: RSS-Gen, §6.1 field strength limit. Conducted limit: ≤ -57 dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and ≤ -53 dBm/1 MHz (AV), from 1 GHz to 3 rd harmonics.	Appendix G	N/T
<p>NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna.</p> <p>NOTE 2: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".</p>					

2.2 PCS Band (1850-1915 MHz paired with 1930-1995 MHz)

Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
RF Power Output	§2.1046, §24.232	RSS-Gen, §4.8; RSS-133, §6.4	EIRP ≤ 2 W; PAR ≤ 13 dB.	Appendix A	Pass
Bandwidth	§2.1049, §22.917	RSS-Gen, §4.6	OBW: No limit. EBW: No limit.	Appendix B	Pass
Band Edges Compliance	§2.1051, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix C	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Appendix D	Pass
Frequency Stability	§2.1055, §24.235	RSS-Gen, §4.7; RSS-133, §6.3	FCC: within authorized frequency block. IC: ≤ ±2.5 ppm.	Appendix E	Pass
Radiated spurious emission	§2.1053, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	≤ -13 dBm/1 MHz.	Appendix F	Pass
Receiver Spurious Emissions (NOTE 1)	---	RSS-Gen, §4.10; RSS-Gen, §6; RSS-133, §6.6	Radiated limit: RSS-Gen, §6.1 field strength limit. Conducted limit: ≤ -57 dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and ≤ -53 dBm/1 MHz (AV), from 1 GHz to 3 rd harmonics.	Appendix G	N/T
Photos of Test Setups	---	---	---	Appendix H	---
<p>NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna.</p> <p>NOTE 2: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".</p>					

2.3 AWS Band (1710-1755 MHz paired with 2110-2155 MHz)

Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
RF Power Output	§2.1046, §27.50(d)	RSS-Gen, §4.8; RSS-139, §6.4	EIRP ≤ 1 W; PAR ≤ 13 dB.	Appendix A	Pass
Bandwidth	§2.1049, §22.917	RSS-Gen, §4.6	OBW: No limit. EBW: No limit.	Appendix B	Pass
Band Edges Compliance	§2.1051, §27.53(h)	RSS-Gen, §4.9; RSS-139, §6.5	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix C	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(h)	RSS-Gen, §4.9; RSS-139, §6.5	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Appendix D	Pass
Frequency Stability	§2.1055, §27.54	RSS-Gen, §4.7; RSS-139, §6.3	Within authorized bands of operation/frequency block.	Appendix E	Pass
Radiated spurious emission	§2.1053, §27.53(h)	RSS-Gen, §4.9; RSS-139, §6.5	≤ -13 dBm/1 MHz.	Appendix F	Pass
Receiver Spurious Emissions (NOTE 1)	---	RSS-Gen, §4.10; RSS-Gen, §6; RSS-139, §6.6	Radiated limit: RSS-Gen, §6.1 field strength limit. Conducted limit: ≤ -57 dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and ≤ -53 dBm/1 MHz (AV), from 1 GHz to 3 rd harmonics.	Appendix G	N/T
<p>NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna.</p> <p>NOTE 2: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".</p>					

3 Description of the Equipment under Test (EUT)

3.1 General Description

HUAWEI H867G, H867G is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band I, Band II, Band IV, and Band V, but Band I test data doesn't include in this report. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

3.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

3.2.1 Board

Board		
SN	Hardware Version	Description
C9F01A92B1000526	HD1H867GM	Main board of Mobile Phone

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
AC/DC Adapter	HW-050055U1W	Huawei Technologies Co., Ltd.	Input voltage: ~100-240V 50/60Hz 0.2A Output voltage: 5V  550mA Rate power: 2.75W

3.3 Technical Specification

Characteristics	Description	
Radio System Type		<input checked="" type="checkbox"/> GSM <input checked="" type="checkbox"/> UMTS
Supported Frequency Range	GSM850	Transmission (TX): 824-849 MHz
		Receiving (RX): 869-894 MHz
	GSM1900	Transmission (TX): 1850-1910 MHz
		Receiving (RX): 1930-1990 MHz
	WCDMA850	Transmission (TX): 824-849 MHz
		Receiving (RX): 869-894 MHz
WCDMA1900	Transmission (TX): 1850-1910 MHz	
	Receiving (RX): 1930-1990 MHz	
WCDMA1700	Transmission (TX): 1710-1755 MHz	
	Receiving (RX): 2110-2155 MHz	
TX and RX Antenna Ports	TX & RX port:	1
	TX-only port:	0
	RX-only port:	0
Supported Channel Bandwidth	GSM system:	<input checked="" type="checkbox"/> 200 kHz
	UMTS system:	<input checked="" type="checkbox"/> 5 MHz
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	GSM850:	247KGXW, 248KG7W
	GSM1900	247KGXW, 244KG7W
	UMTS 850	4M17F9W
	UMTS1900	4M18F9W
	UMTS1700	4M19F9W

4 General Test Conditions / Configurations

4.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	Test Modes Description
GSM/TM1	GSM system, GSM/GPRS, GMSK modulation
GSM/TM2	GSM system, EDGE, 8PSK modulation
UMTS/TM1	WCDMA system, QPSK modulation
UMTS/TM2	HSDPA system, QPSK modulation
UMTS/TM3	HSUPA system, QPSK modulation

4.2 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	3.6V
	VN	3.7V
	VH	4.2V

NOTE: VL= lower extreme test voltage
VN= nominal voltage
VH= upper extreme test voltage

TN= normal temperature

4.3 Test Frequency

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM/TM1& GSM/TM2	TX	Channel 128	Channel 190	Channel 251
		824.2MHz	836.6MHz	848.8MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2MHz	881.6MHz	893.8MHz
GSM/TM1& GSM/TM2	TX	Channel 512	Channel 661	Channel 810
		1850.2MHz	1880.0MHz	1909.8MHz



Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz
UMTS/TM1& UMTS/TM2& UMTS/TM3	TX	Channel 4132	Channel 4182	Channel 4233
		826.4MHz	836.4MHz	846.6MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4MHz	881.4MHz	891.6MHz
UMTS/TM1& UMTS/TM2& UMTS/TM3	TX	Channel 9262	Channel9400	Channel9538
		1852.4MHz	1880.0MHz	1907.6MHz
	RX	Channel 9662	Channel 9800	Channel 9938
		1932.4 MHz	1960.0 MHz	1987.6 MHz
UMTS/TM1& UMTS/TM2& UMTS/TM3	TX	Channel1312	Channel1413	Channel1513
		1712.4MHz	1732.6MHz	1752.6MHz
	RX	Channel 1537	Channel 1638	Channel 1738
		2112.4 MHz	2132.6 MHz	2152.6 MHz

4.4 DESCRIPTION OF TESTS

4.4.1 Radiated Power and Radiated Spurious Emissions

Radiated spurious emissions are investigated indoors in a semi-anechoic chamber to determine the frequencies producing the worst case emissions. Final measurements for radiated power and radiated spurious emissions are performed on the 3 meter OATS per the guidelines of ANSI/TIA-603-C-2004. The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Emissions are also investigated with the receive antenna horizontally and vertically polarized.

A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized. Measure the EUT maximum RF power and record the result.

A half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power [Watts]})$.

Note: Reference test setup 3

4.4.2 Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

Note: Reference test setup 1.

4.4.3 Spurious and Harmonic Emissions at Antenna Terminal

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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 emission are attenuated at least 26 dB below the transmitter power.

Note: Reference test setup 1.

4.4.4 Peak-Average Ratio

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

Note: Reference test setup 1.

4.4.5 Frequency Stability / Temperature Variation

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

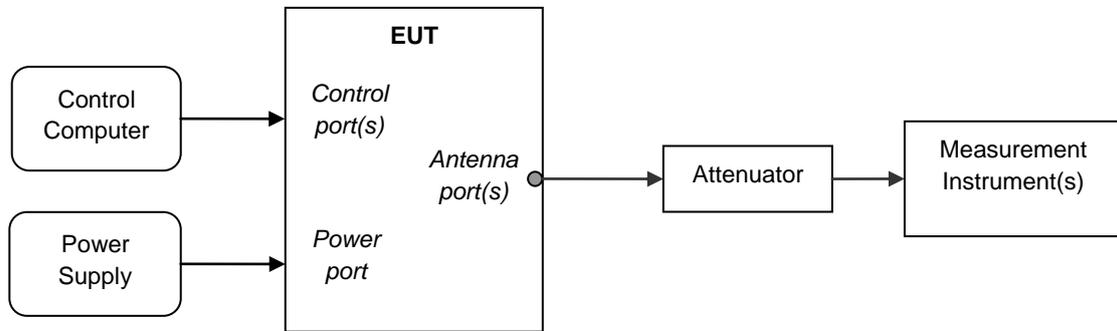
Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

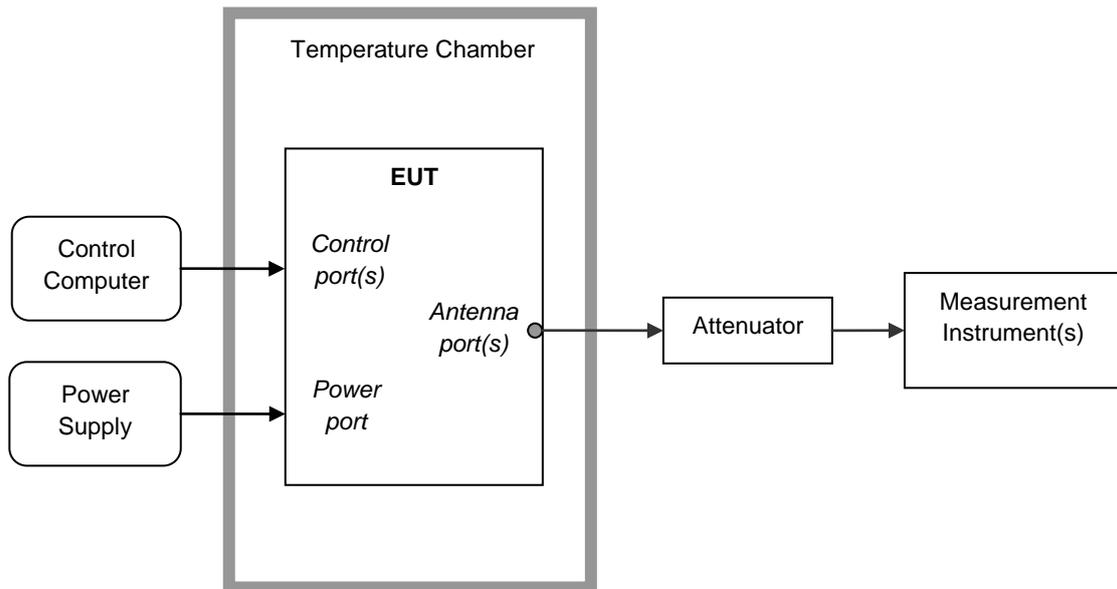
Note: Reference test setup 2.

4.5 Test Setups

4.5.1 Test Setup 1



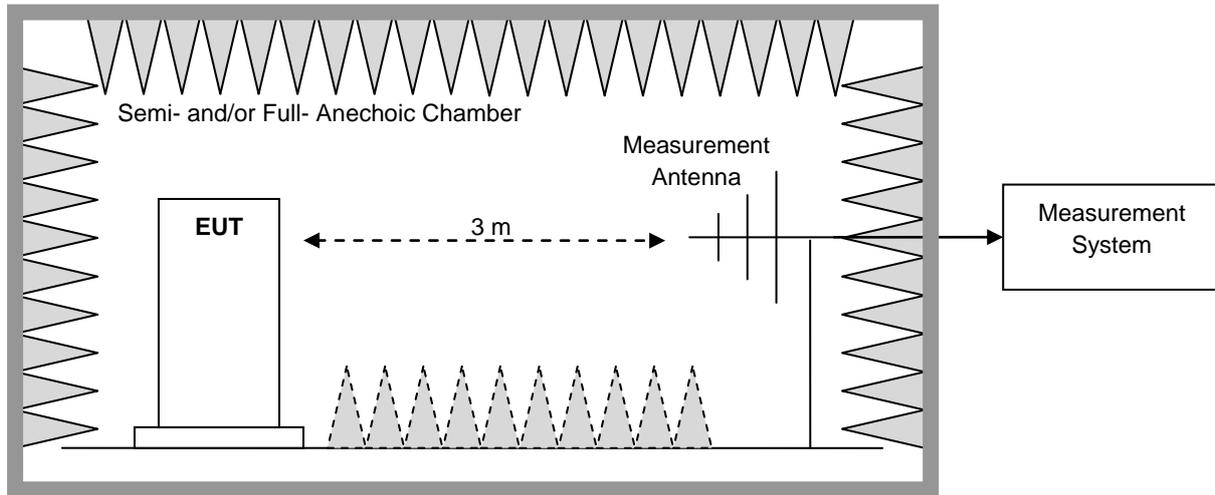
4.5.2 Test Setup 2



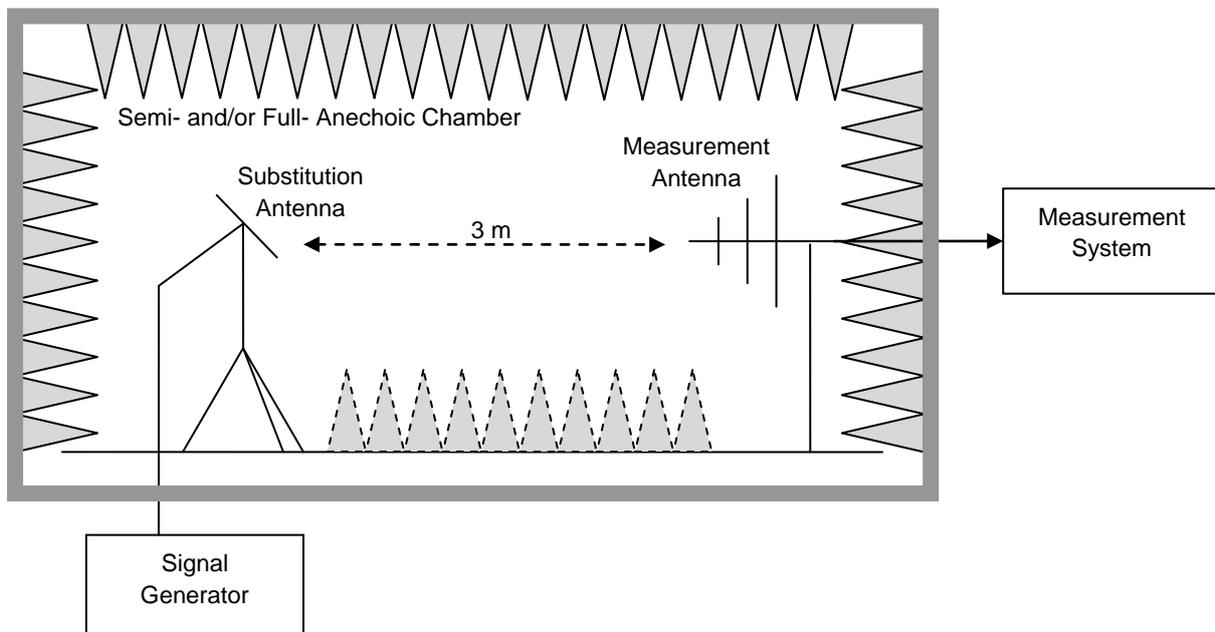
4.5.3 Test Setup 3

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

4.5.3.1 Step 1: Pre-test



4.5.3.2 Step 2: Substitution method to verify the maximum ERP



4.6 Test Conditions

Test Case		Test Conditions	
Transmitter Output Power	Average Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1&UMTS/TM2&UMTS/TM3
	Peak-to-Average Ratio (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1&UMTS/TM2&UMTS/TM3
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1
	Emission Bandwidth (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1
Band Edges Compliance	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Seup 1	
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)	
	Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1	
Spurious Emission at Antenna Terminals	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Seup 1	
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)	
	Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1	
Radiated spurious emission	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Seup 3	
	Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1&UMTS/TM2&UMTS/TM3 NOTE: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected.	
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)	



Test Case	Test Conditions	
Frequency Stability	Test Env.	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2)VL, VN and VH of Rated Voltage at Ambient Climate.
	Test Setup	Test Seup 2
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	GSM/TM1& GSM/TM2&UMTS/TM1

5 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal. Due
Power supply	KEITHLEY	2303	1288003	2012-11-09	2013-11-08
Universal Radio Communication Tester	R&S	CMU200	117341	2012-01-13	2013-01-12
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	2012-11-09	2013-11-08
Spectrum Analyzer	Agilent	E4440A	MY49420179	2012-07-18	2013-07-17
Signal Analyzer	R&S	FSQ31	200021	2012-11-09	2013-11-08
Temperature Chamber	WEISS	WKL64	24600294	2012-02-14	2013-02-13
Signal generator	Agilent	E8257D	MY49281095	2012-07-10	2013-07-09
Spectrum analyzer	R&S	FSU3	200474	2012-03-06	2013-03-05
Spectrum analyzer	R&S	FSU43	100144	2012-03-06	2013-03-05
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	2012-04-06	2013-04-05
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100391	2012-04-06	2013-04-05
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBEC K	VULB 9163	9163-521	2012-07-18	2013-07-17
Pyramidal Horn Antenna(26GHz-40GHz)	ETS-Lindgren	3160-10	00123940	2012-02-28	2013-02-27
Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	00125912	2012-02-28	2013-02-27



6 Measurement Uncertainty

For a 95% confidence level ($k = 2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
RF Power Output	Power [dBm]	U = 0.39 dB
Bandwidth	Magnitude [%]	U = 0.2%
Band Edge Compliance	Disturbance Power [dBm]	U = 2.0 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	U = 2.0 dB
Field Strength of Spurious Radiation	ERP [dBm]	For 3 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz) For 10 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy [ppm]	U = 0.21 ppm

END

Appendix A: Effective Radiated Power Output Data

Part I - Test Results

1.1. For GSM850 & WCDMA850

1.1.1. Conducted Power of Transmitter

TEST CONDITIONS		RF Output Power (Conducted)					
		Channel128(L)		Channel190(M)		Channel251(H)	
		824.2MHz		836.6MHz		848.8MHz	
		dBm		dBm		dBm	
T_{nom} / V_{nom}		Measured	Limit	Measured	Limit	Measured	Limit
GSM/TM1		31.68	38.5	31.61	38.5	31.59	38.5
GSM/TM2		26.81	38.5	26.79	38.5	26.81	38.5
TEST CONDITIONS		Channel4132(L)		Channel4182(M)		Channel4233(H)	
		826.4MHz		836.4MHz		846.6MHz	
		dBm		dBm		dBm	
		T_{nom} / V_{nom}		Measured	Limit	Measured	Limit
UMTS/TM1		21.66	38.5	21.54	38.5	21.44	38.5
UMTS/TM2	Case1	22.01	38.5	21.96	38.5	21.89	38.5
	Case2	21.85	38.5	21.65	38.5	21.61	38.5
	Case3	21.09	38.5	20.99	38.5	20.95	38.5
	Case4	21.01	38.5	20.96	38.5	20.91	38.5
UMTS/TM3	Case1	21.57	38.5	21.45	38.5	21.53	38.5
	Case2	20.14	38.5	19.98	38.5	19.86	38.5
	Case3	20.29	38.5	20.21	38.5	20.29	38.5
	Case4	19.95	38.5	19.84	38.5	19.86	38.5
	Case5	21.63	38.5	21.52	38.5	20.67	38.5

1.1.2. Effective Radiated Power of Transmitter (ERP)

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (ERP)	FCC limit [dBm]	Result
							[dBm]		
GSM/TM1	824.2	29.97	Dipole Ant.	33.12	-2.75	0.6	29.77	38.5	Pass
GSM/TM1	836.6	29.9	Dipole Ant.	33.17	-2.87	0.6	29.7	38.5	Pass
GSM/TM1	848.8	29.88	Dipole Ant.	33.13	-2.85	0.6	29.68	38.5	Pass
GSM/TM2	824.2	25.1	Dipole Ant.	28.53	-2.75	0.6	25.18	38.5	Pass
GSM/TM2	836.6	25.08	Dipole Ant.	28.35	-2.87	0.6	24.88	38.5	Pass
GSM/TM2	848.8	25.1	Dipole Ant.	28.35	-2.85	0.6	24.9	38.5	Pass
UMTS/TM1	826.4	19.95	Dipole Ant.	23.1	-2.75	0.6	19.75	38.5	Pass
UMTS/TM1	836.4	19.83	Dipole Ant.	23.1	-2.87	0.6	19.63	38.5	Pass
UMTS/TM1	846.6	19.73	Dipole Ant.	22.98	-2.85	0.6	19.53	38.5	Pass

Note: a, For getting the ERP (Efficient Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

b, SGP=Signal Generator Level

1.2 For GSM1900 & WCDMA1900

1.1.3. 1.2.1 Conducted Power of Transmitter

		RF Output Power (Conducted)					
TEST CONDITIONS		Channel512(L)		Channel661(M)		Channel810(H)	
		1850.2MHz		1880.0MHz		1909.8MHz	
		dBm		dBm		dBm	
T_{nom} / V_{nom}		Measured	Limit	Measured	Limit	Measured	Limit
GSM/TM1		29.81	33	29.96	33	29.49	33
GSM/TM2		26.01	33	26.13	33	25.71	33
		Channel9262(L)		Channel9400(M)		Channel9538(H)	
TEST CONDITIONS		1852.4MHz		1880.0MHz		1907.6MHz	
		dBm		dBm		dBm	
		T_{nom} / V_{nom}		Measured	Limit	Measured	Limit
UMTS/TM1		22.09	33	22.16	33	22.13	33
UMTS/TM2	Case1	22.53	33	22.63	33	22.65	33
	Case2	22.27	33	22.41	33	22.35	33
	Case3	21.72	33	21.83	33	21.85	33
	Case4	21.59	33	21.82	33	21.77	33
UMTS/TM3	Case1	21.97	33	21.82	33	21.96	33
	Case2	20.39	33	20.44	33	20.57	33
	Case3	20.82	33	21.27	33	20.84	33
	Case4	20.45	33	21.01	33	20.41	33
	Case5	21.31	33	21.99	33	22.06	33

1.2.2 Effective Isotropic Radiated Power of Transmitter (EIRP)

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP)	FCC limit [dBm]	Result
							[dBm]		
GSM/TM1	1850.2	31.21	Horn Ant.	27.51	4.5	1	31.01	33	Pass
GSM/TM1	1880	31.36	Horn Ant.	27.89	4.5	1	31.39	33	Pass
GSM/TM1	1909.8	30.89	Horn Ant.	27.16	4.8	1	30.96	33	Pass
GSM/TM2	1850.2	27.41	Horn Ant.	24.1	4.5	1	27.6	33	Pass
GSM/TM2	1880	27.53	Horn Ant.	24.09	4.5	1	27.59	33	Pass
GSM/TM2	1909.8	27.11	Horn Ant.	23.49	4.8	1	27.29	33	Pass
UMTS/TM1	1852.4	23.49	Horn Ant.	19.79	4.5	1	23.29	33	Pass
UMTS/TM1	1880	23.56	Horn Ant.	19.86	4.5	1	23.36	33	Pass
UMTS/TM1	1907.6	23.53	Horn Ant.	19.53	4.8	1	23.33	33	Pass

Note: a, For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

b, SGP=Signal Generator Level

1.2.3 Peak-to-Average Ratio

TEST CONDITIONS	Peak-to-Average Ratio					
	Channel512(L)		Channel661(M)		Channel810(H)	
	1850.2MHz		1880.0MHz		1909.8MHz	
	dB		dB		dB	
T_{nom} / V_{nom}	Measured	Limit	Measured	Limit	Measured	Limit
GSM/TM1	0.11	13	0.12	13	0.12	13
GSM/TM2	3.12	13	3.19	13	3.15	13
TEST CONDITIONS	Channel9262(L)		Channel9400(M)		Channel9538(H)	
	1852.4MHz		1880.0MHz		1907.6MHz	
	dB		dB		dB	

T_{nom} / V_{nom}		Measured	Limit	Measured	Limit	Measured	Limit
UMTS/TM1		3.33	13	3.47	13	3.65	13
UMTS/TM2	Case1	3.50	13	3.52	13	3.54	13
	Case2	4.18	13	4.30	13	4.19	13
	Case3	4.68	13	4.63	13	4.62	13
	Case4	4.66	13	4.72	13	4.70	13
UMTS/TM3	Case1	5.52	13	5.46	13	5.44	13
	Case2	5.38	13	5.72	13	6.19	13
	Case3	6.08	13	6.14	13	6.10	13
	Case4	6.58	13	6.64	13	6.43	13
	Case5	5.38	13	5.34	13	5.37	13

1.3 For WCDMA1700

1.3.1 Conducted Power of Transmitter

TEST CONDITIONS		RF Output Power (Conducted)					
		Channel 1312(L)		Channel 1413(M)		Channel 1513(H)	
		1712.4MHz		1732.6MHz		1752.6MHz	
		dBm		dBm		dBm	
T_{nom} / V_{nom}		Measured	Limit	Measured	Limit	Measured	Limit
UMTS/TM1		22.54	30	22.91	30	22.56	30
UMTS/TM2	Case1	22.91	30	23.31	30	22.96	30
	Case2	22.65	30	22.98	30	22.68	30
	Case3	21.99	30	22.34	30	22.16	30
	Case4	22.01	30	22.34	30	22.15	30
UMTS/TM3	Case1	22.16	30	22.25	30	22.59	30
	Case2	20.71	30	21.36	30	20.87	30
	Case3	21.59	30	21.47	30	21.32	30
	Case4	21.25	30	21.29	30	20.99	30
	Case5	22.23	30	22.31	30	22.67	30

1.3.2 Effective Isotropic Radiated Power of Transmitter (EIRP)

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	Limit [dBm]	Result
UMTS/TM1	1712.4	22.62	Horn Ant.	18.92	4.5	1	22.42	30	Pass
UMTS/TM1	1732.6	22.99	Horn Ant.	19.29	4.5	1	22.79	30	Pass
UMTS/TM1	1752.6	22.64	Horn Ant.	18.64	4.8	1	22.44	30	Pass

Note: a, For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

b, SGP=Signal Generator Level

1.3.3 Peak-to-Average Ratio

TEST CONDITIONS		Peak-to-Average Ratio					
		Channel 1312(L)		Channel 1413(M)		Channel 1513(H)	
		1712.4MHz		1732.6MHz		1752.6MHz	
		dB		dB		dB	
T_{nom} / V_{nom}		Measured	Limit	Measured	Limit	Measured	Limit
UMTS/TM1		3.31	13	3.25	13	3.30	13
UMTS/TM2	Case1	3.47	13	3.49	13	3.51	13
	Case2	4.15	13	4.27	13	4.16	13
	Case3	4.65	13	4.60	13	4.59	13
	Case4	4.63	13	4.69	13	4.67	13
UMTS/TM3	Case1	5.49	13	5.43	13	5.41	13
	Case2	5.35	13	5.69	13	6.16	13
	Case3	6.05	13	6.11	13	6.07	13
	Case4	6.55	13	6.61	13	6.40	13
	Case5	5.35	13	5.31	13	5.34	13

Appendix B: Bandwidth

Part I - Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth [kHz]	Emission Bandwidth [kHz]	Verdict
GSM850	GSM/TM1	LCH	242.06	319.88	Pass
		MCH	246.52	316.10	Pass
		HCH	244.59	319.11	Pass
	GSM/TM2	LCH	241.66	311.21	Pass
		MCH	244.55	304.10	Pass
		HCH	247.69	304.13	Pass
GSM1900	GSM/TM1	LCH	246.06	317.90	Pass
		MCH	243.20	310.92	Pass
		HCH	246.21	314.87	Pass
	GSM/TM2	LCH	242.61	321.44	Pass
		MCH	242.56	315.80	Pass
		HCH	243.62	309.03	Pass
Test Band	Test Mode	Test Channel	Occupied Bandwidth [MHz]	Emission Bandwidth [MHz]	Verdict
WCDMA850	UMTS/TM1	LCH	4.17	4.67	Pass
		MCH	4.17	4.67	Pass
		HCH	4.17	4.67	Pass
WCDMA1900	UMTS/TM1	LCH	4.17	4.67	Pass
		MCH	4.18	4.68	Pass
		HCH	4.17	4.68	Pass
WCDMA1700	UMTS/TM1	LCH	4.19	4.68	Pass
		MCH	4.18	4.68	Pass
		HCH	4.17	4.68	Pass



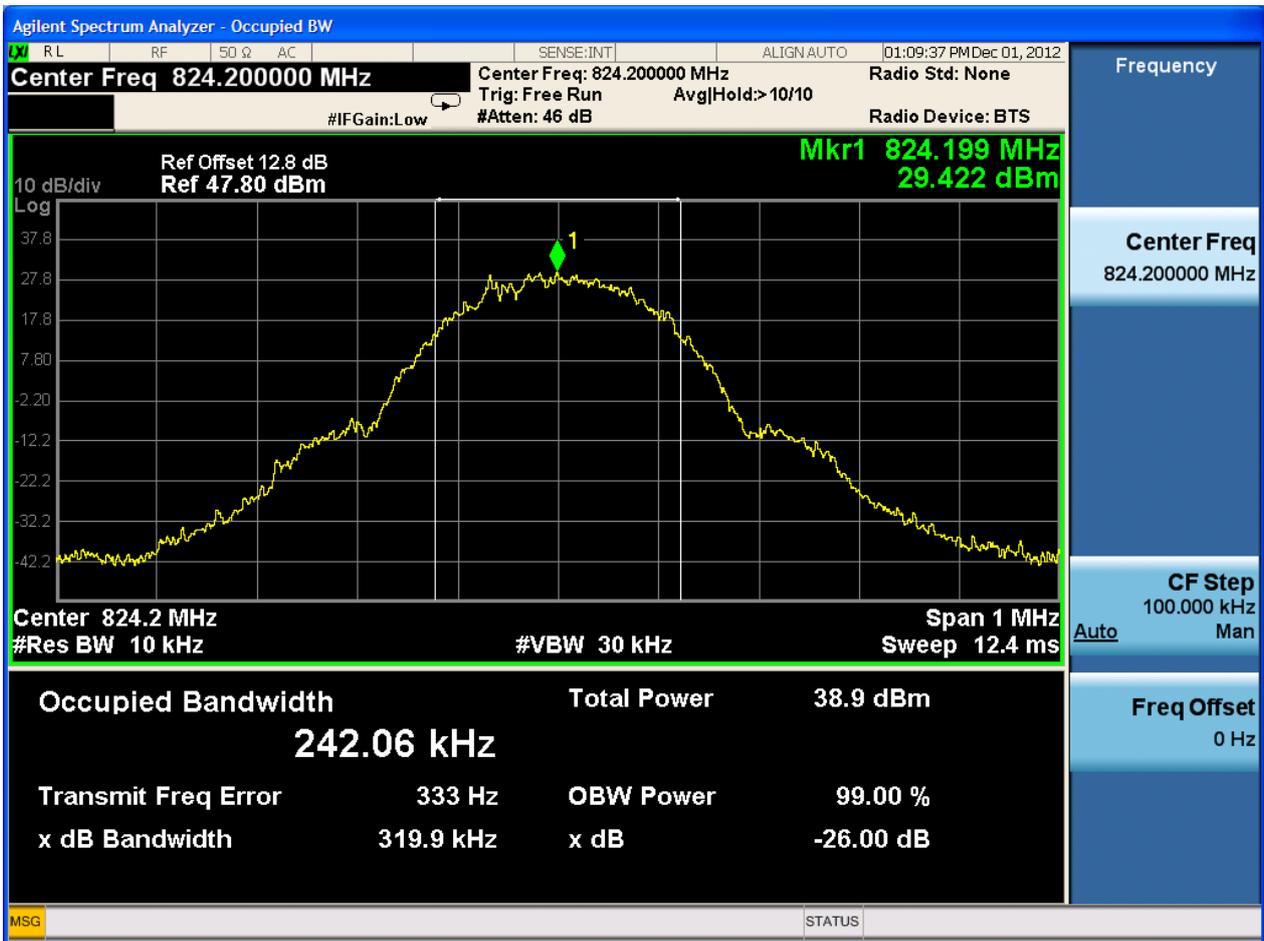
Part II - Test Plots

2.1 For GSM

2.1.1 Test Band = GSM850

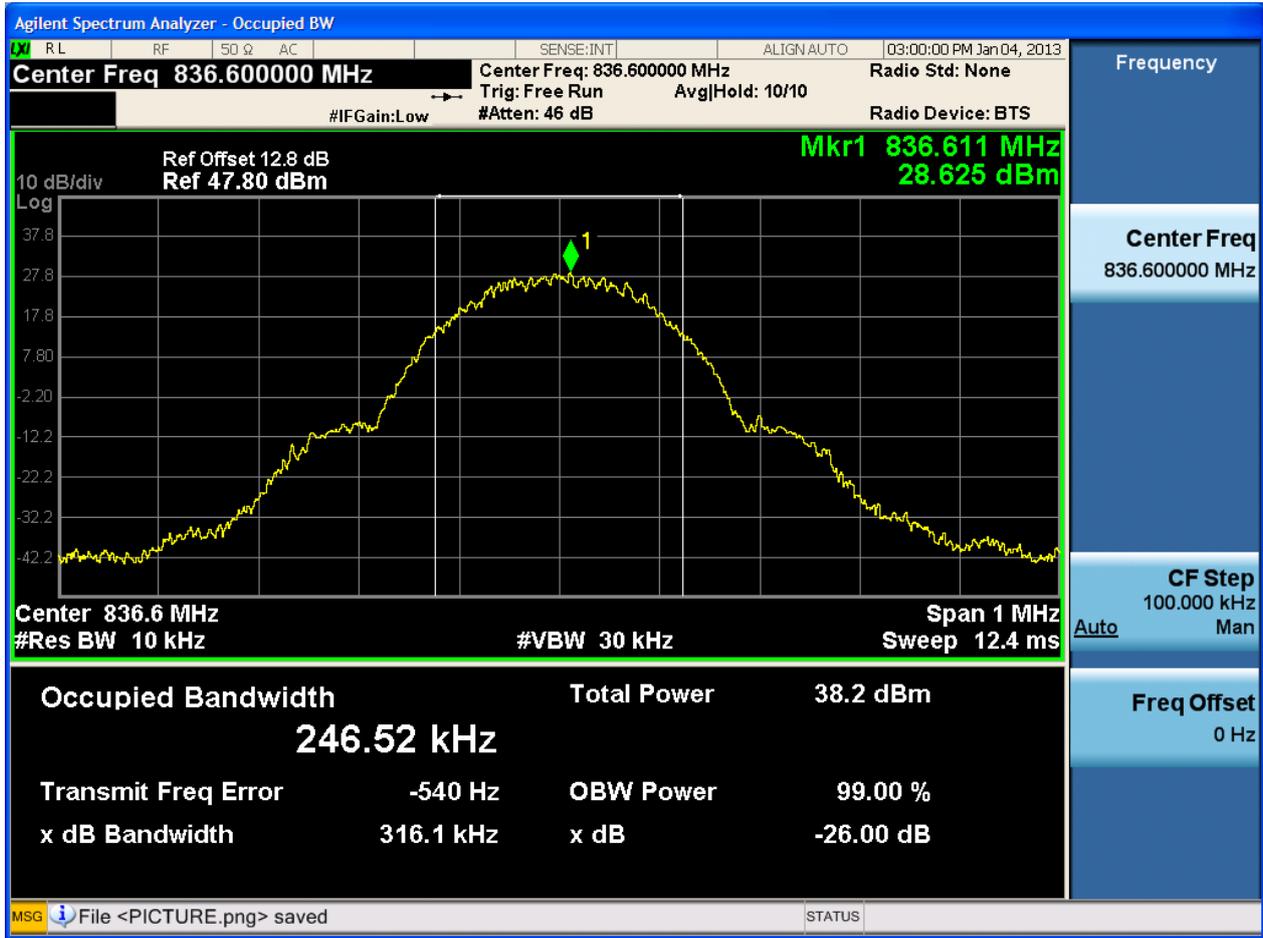
2.1.1.1 Test Mode = GSM/TM1

2.1.1.1.1 Test Channel = LCH



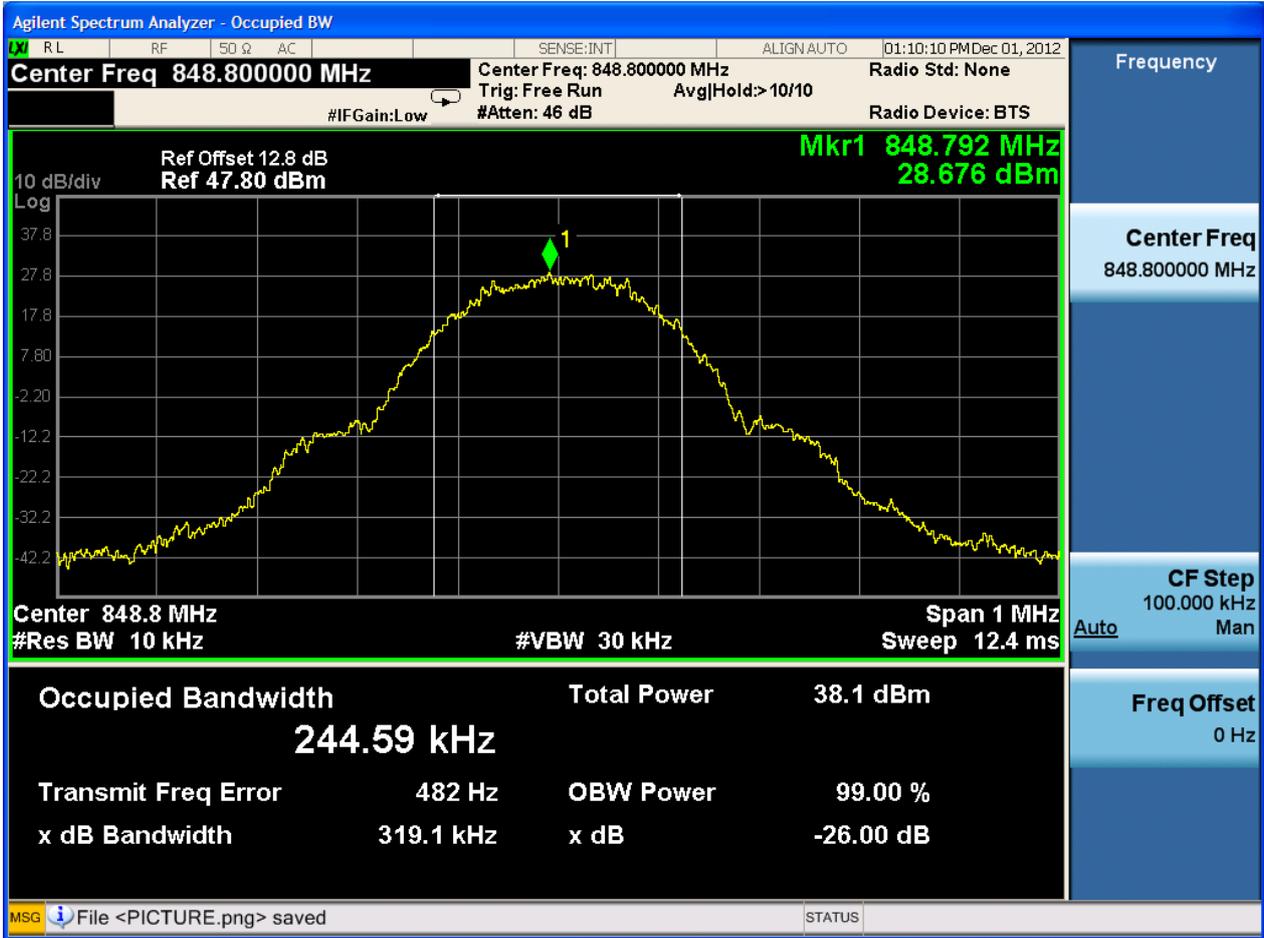


2.1.1.1.2 Test Channel = MCH





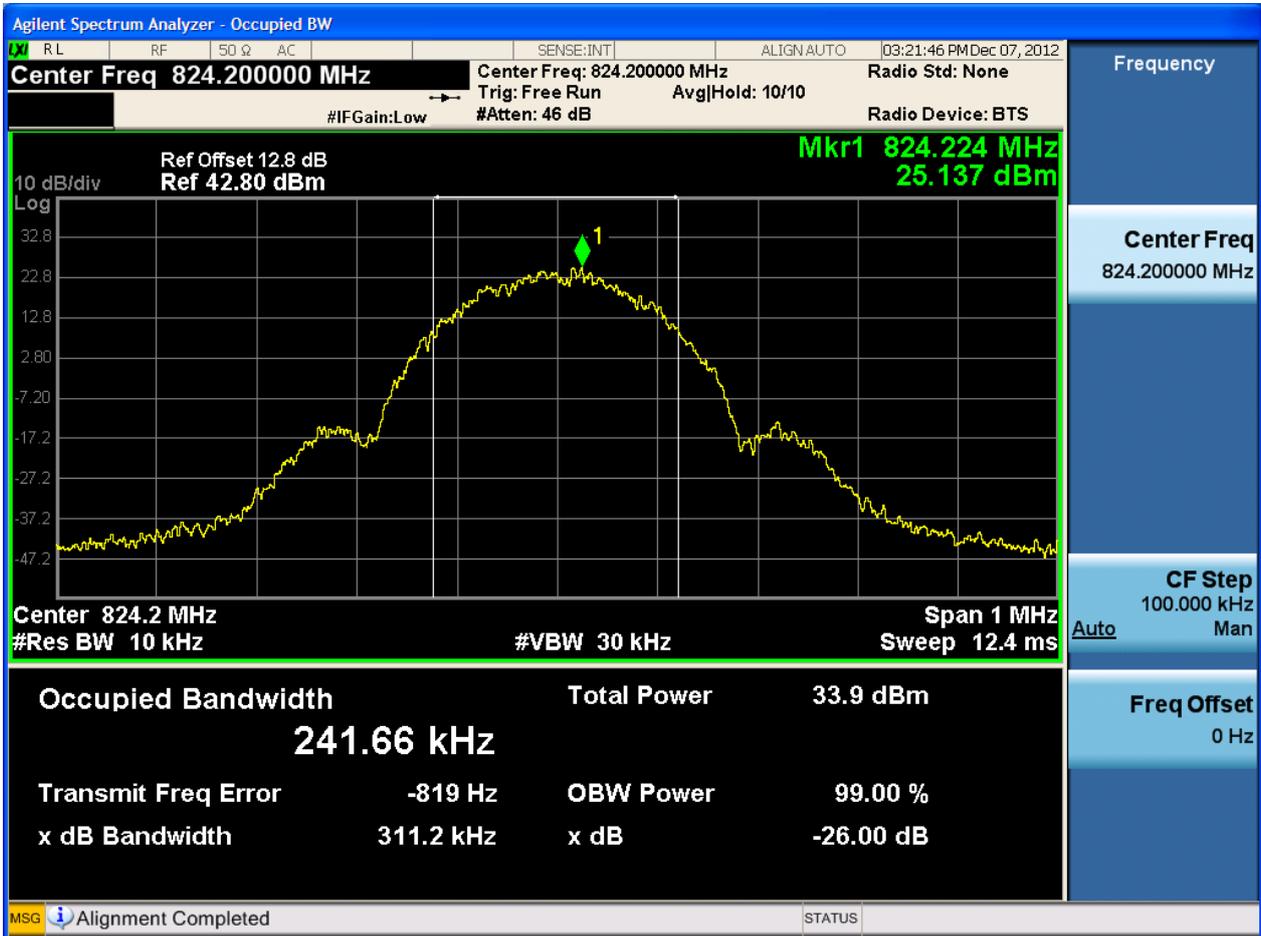
2.1.1.1.3 Test Channel = HCH





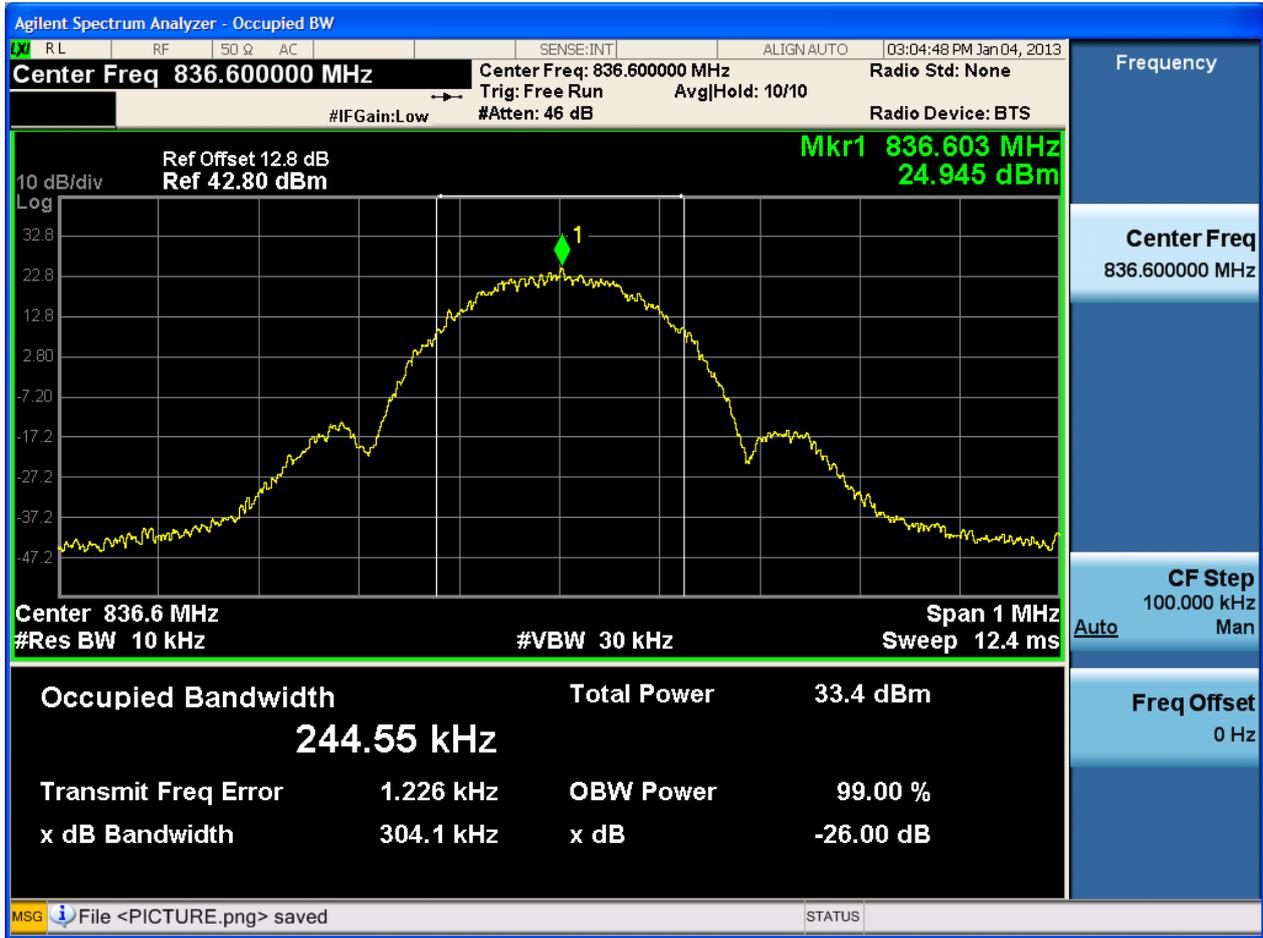
2.1.1.2 Test Mode = GSM/TM2

2.1.1.2.1 Test Channel = LCH



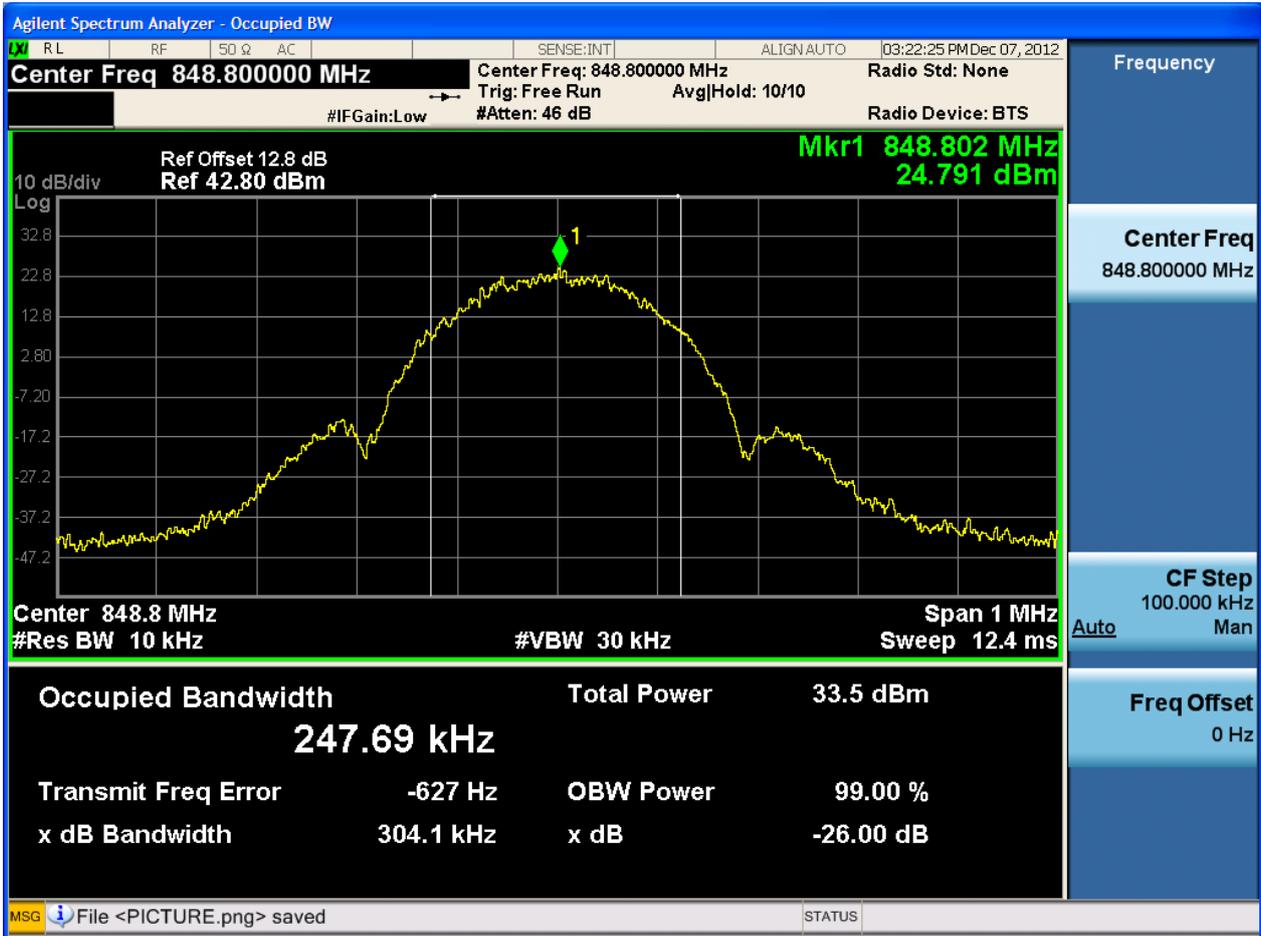


2.1.1.2.2 Test Channel = MCH





2.1.1.2.3 Test Channel = HCH

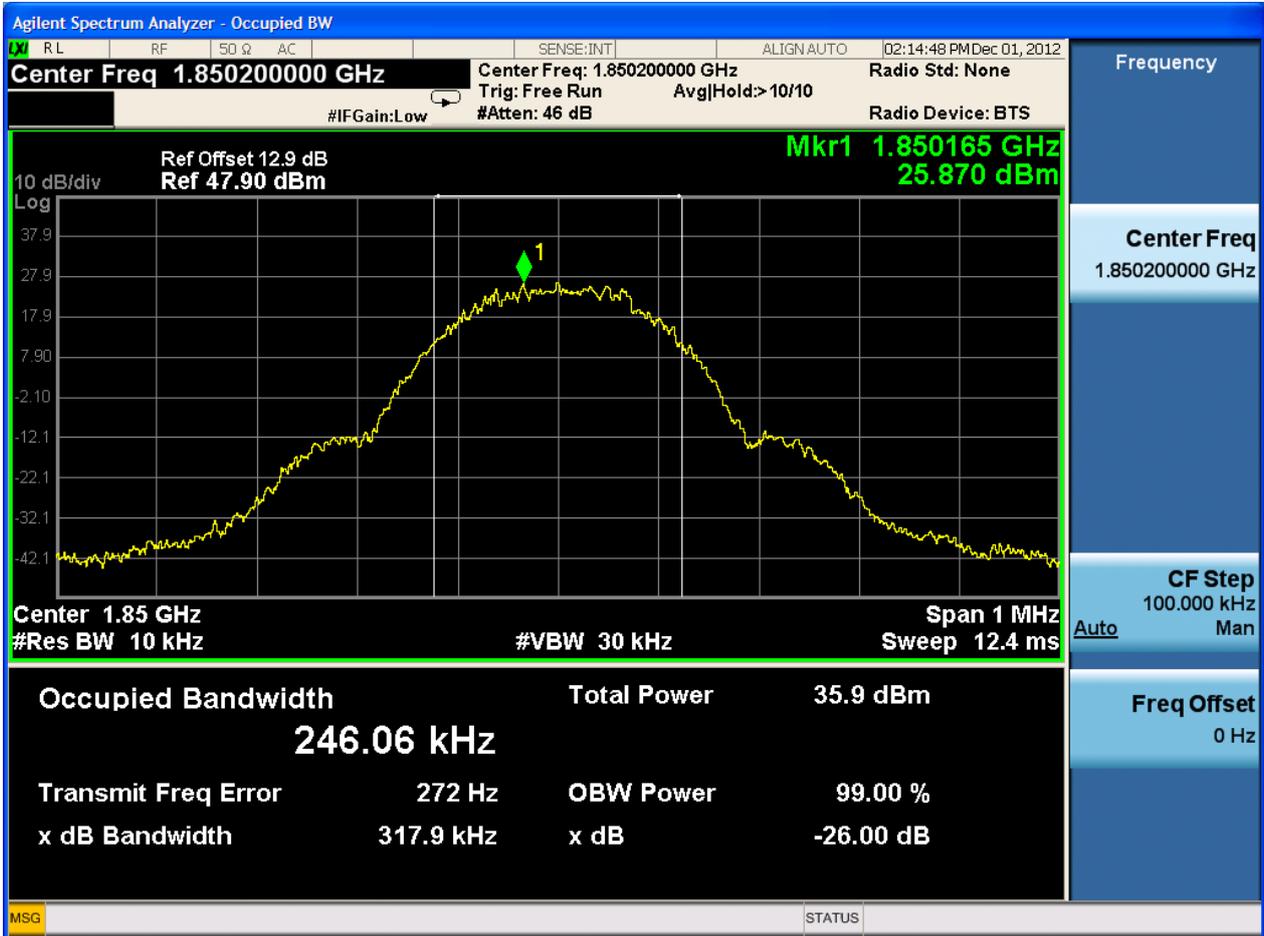




2.1.2 Test Band = GSM1900

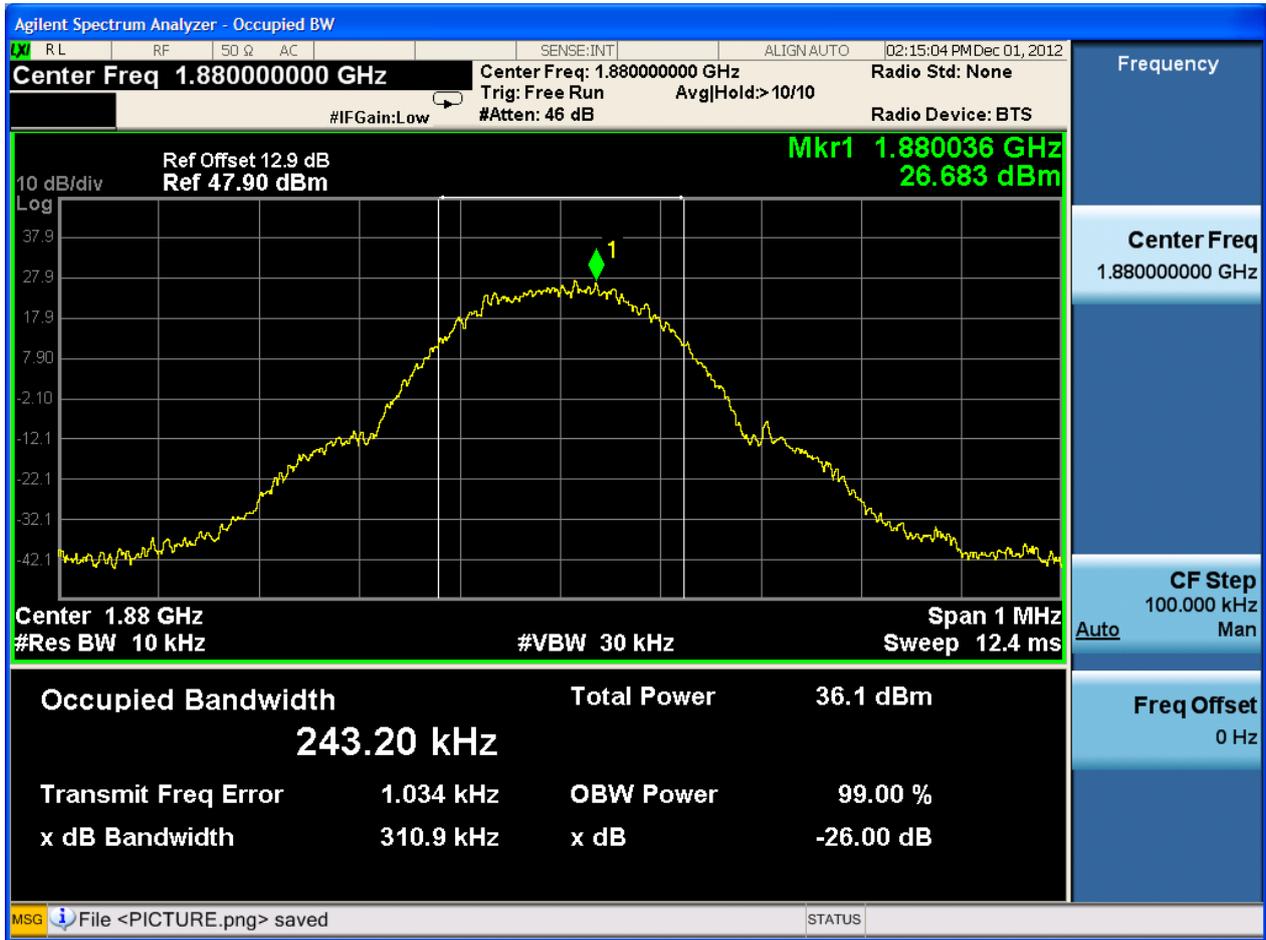
2.1.2.1 Test Mode = GSM/TM1

2.1.2.1.1 Test Channel = LCH



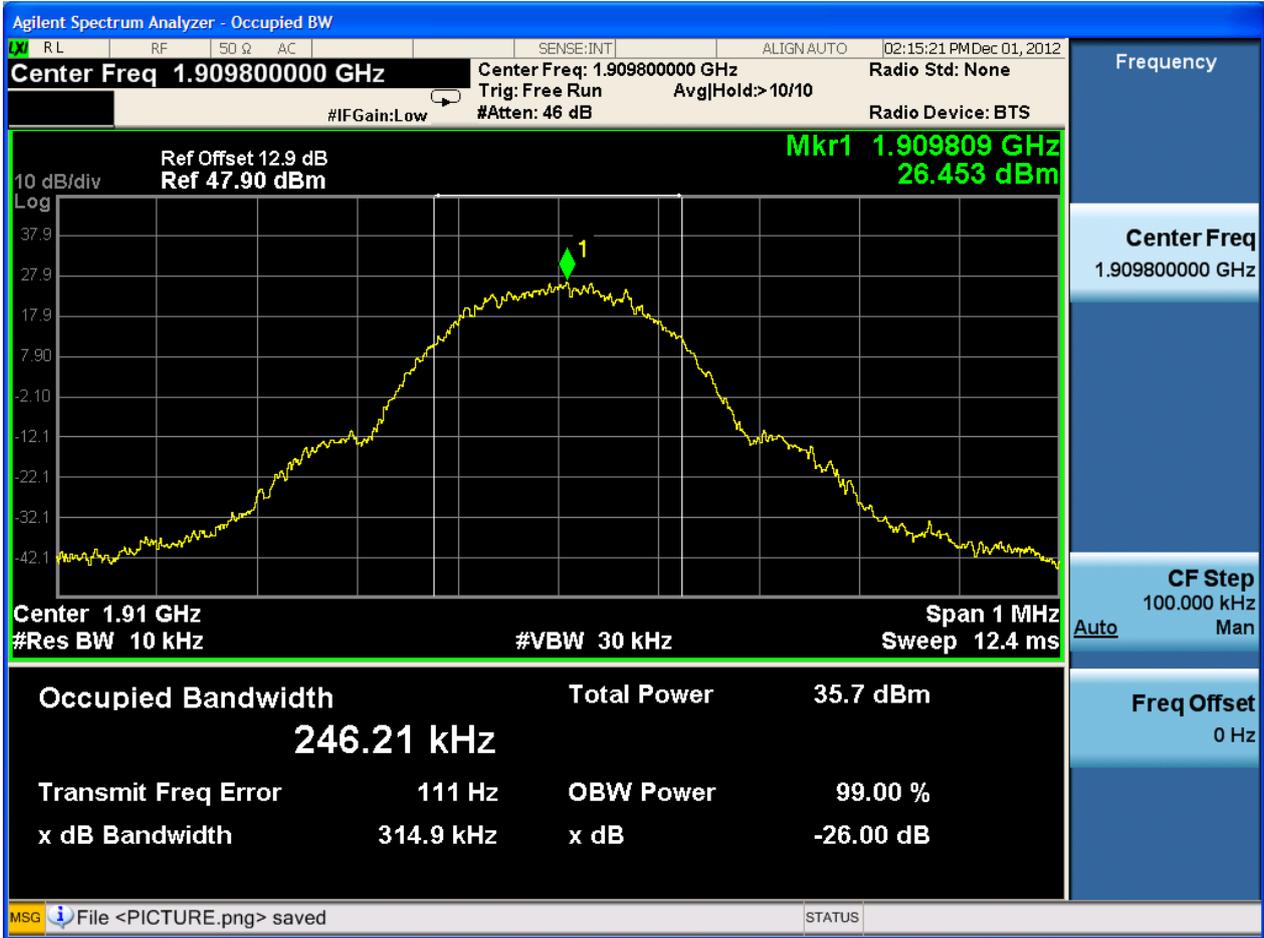


2.1.2.1.2 Test Channel = MCH





2.1.2.1.3 Test Channel = HCH





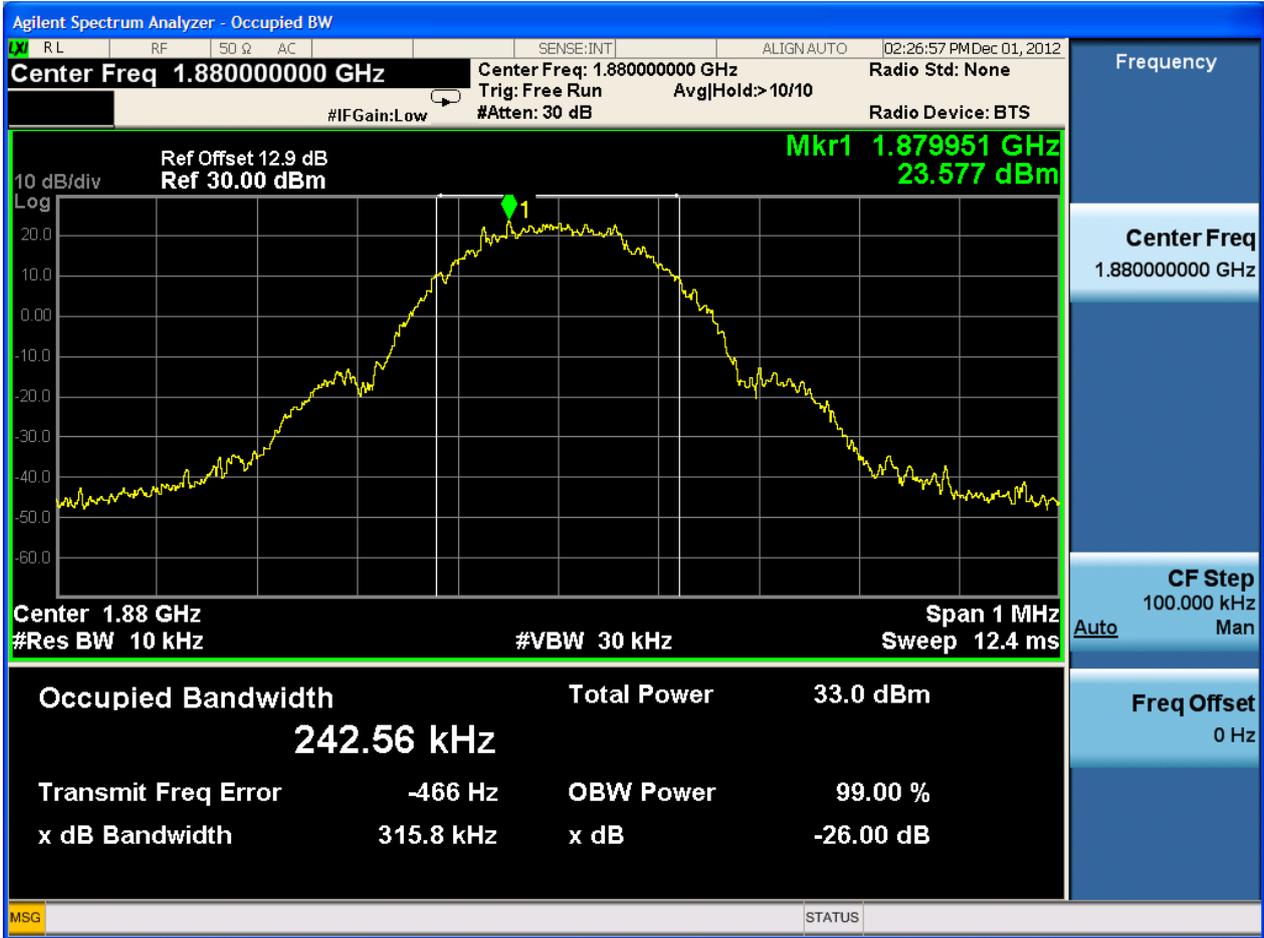
2.1.2.2 Test Mode = GSM/TM2

2.1.2.2.1 Test Channel = LCH



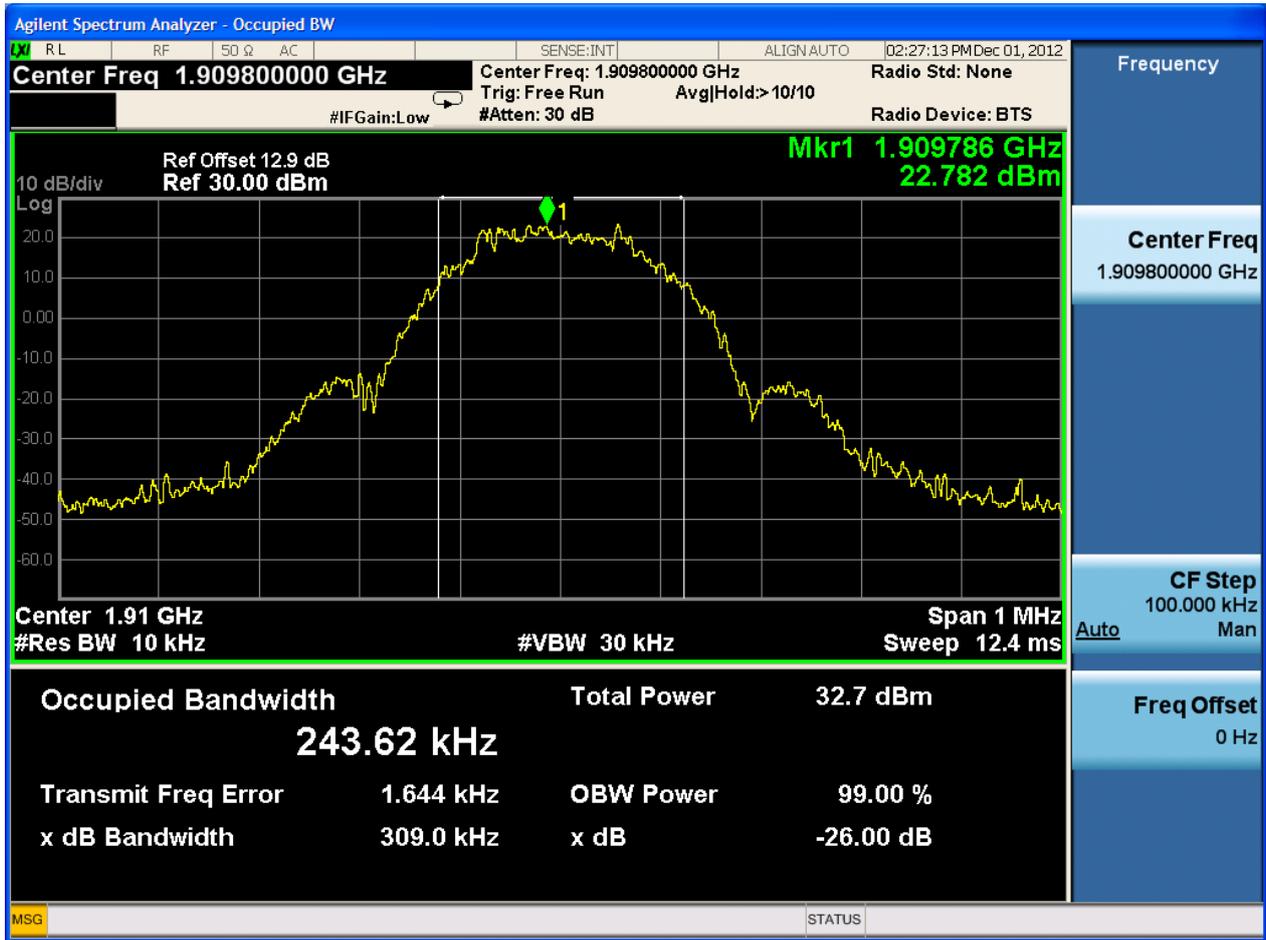


2.1.2.2.2 Test Channel = MCH





2.1.2.2.3 Test Channel = HCH



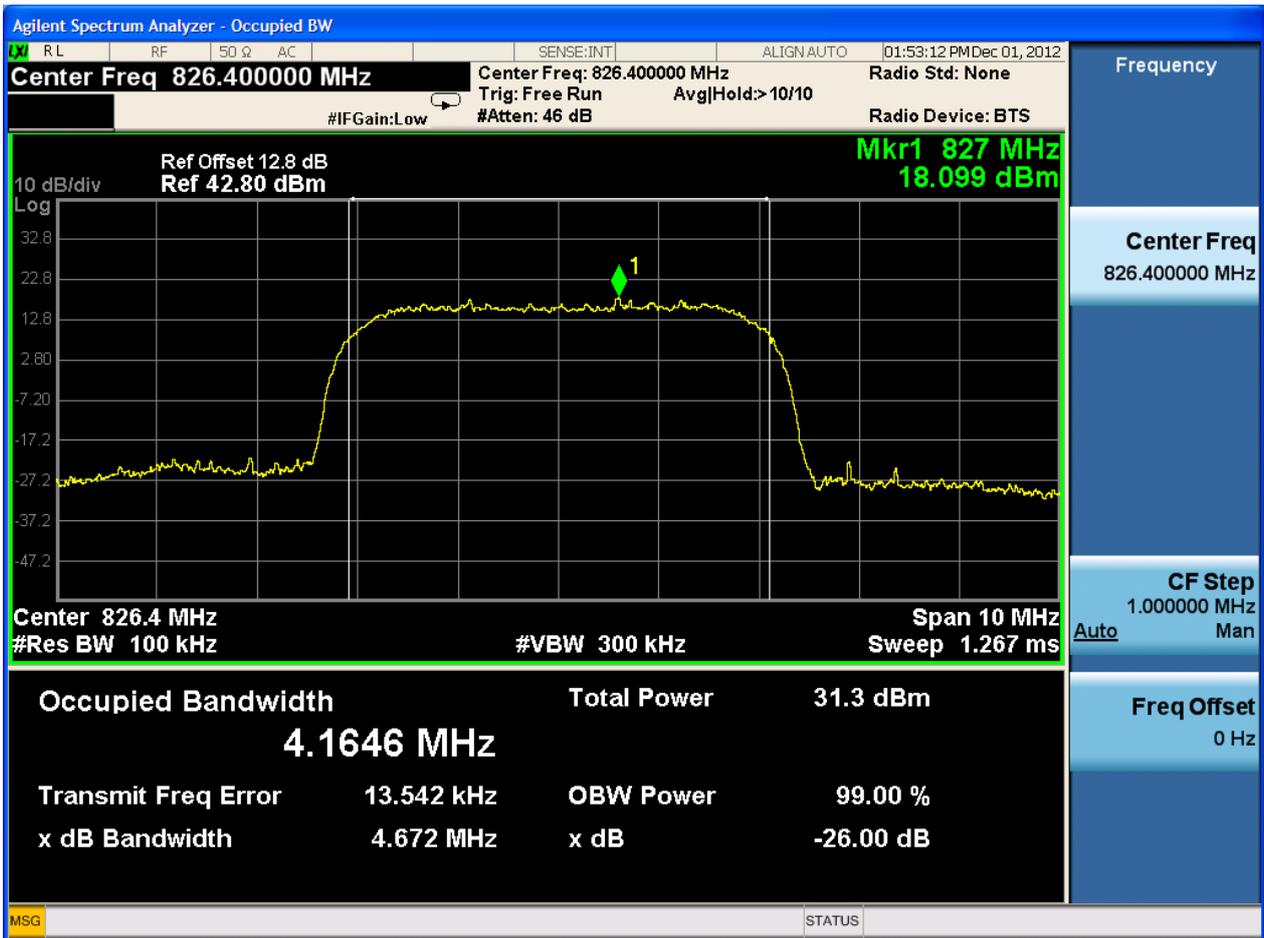


2.2 For UMTS

2.2.1 Test Band = WCDMA850

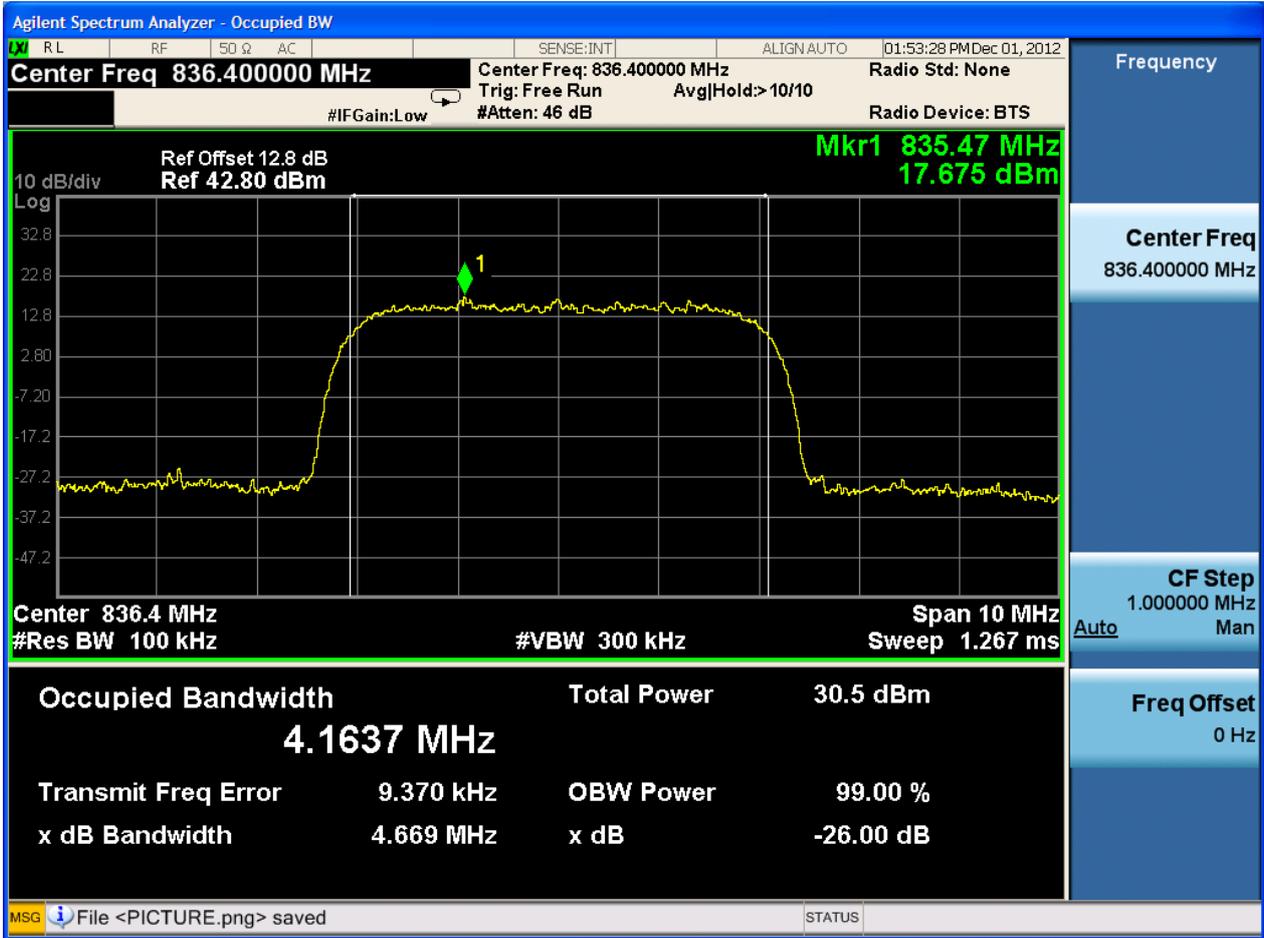
2.2.1.1 Test Mode = UMTS/TM1

2.2.1.1.1 Test Channel = LCH



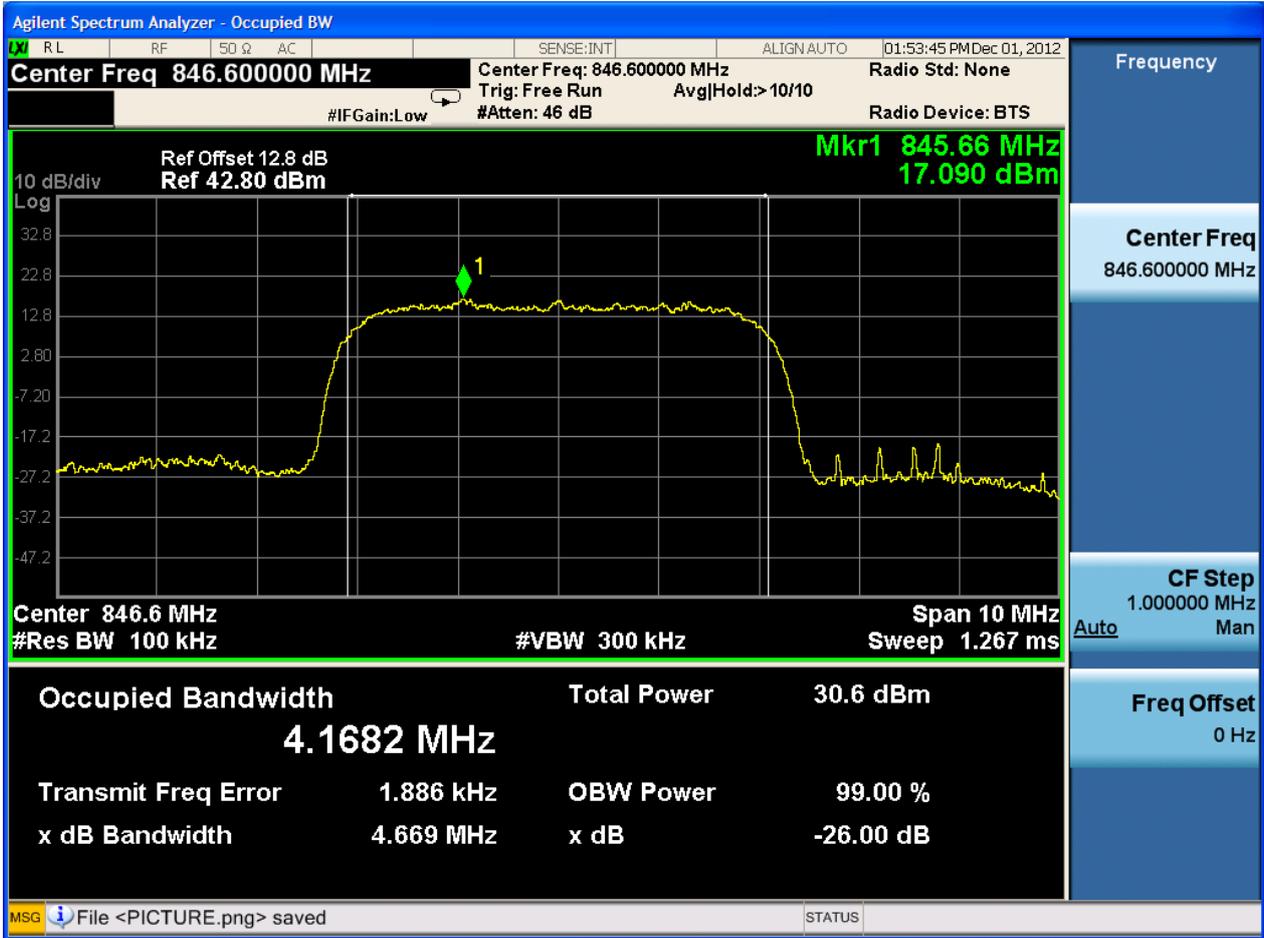


2.2.1.1.2 Test Channel = MCH





2.2.1.1.3 Test Channel = HCH

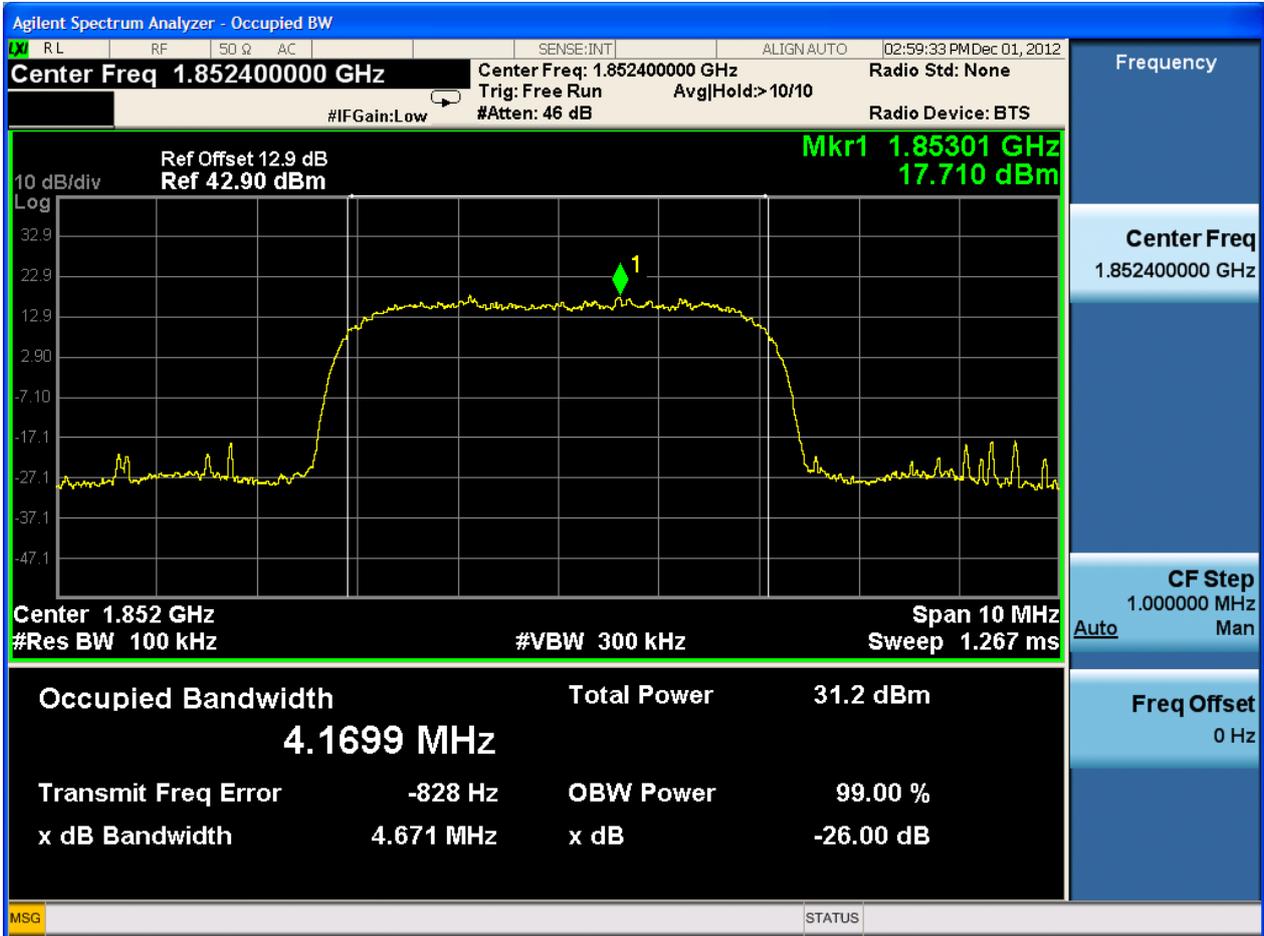




2.2.2 Test Band = WCDMA1900

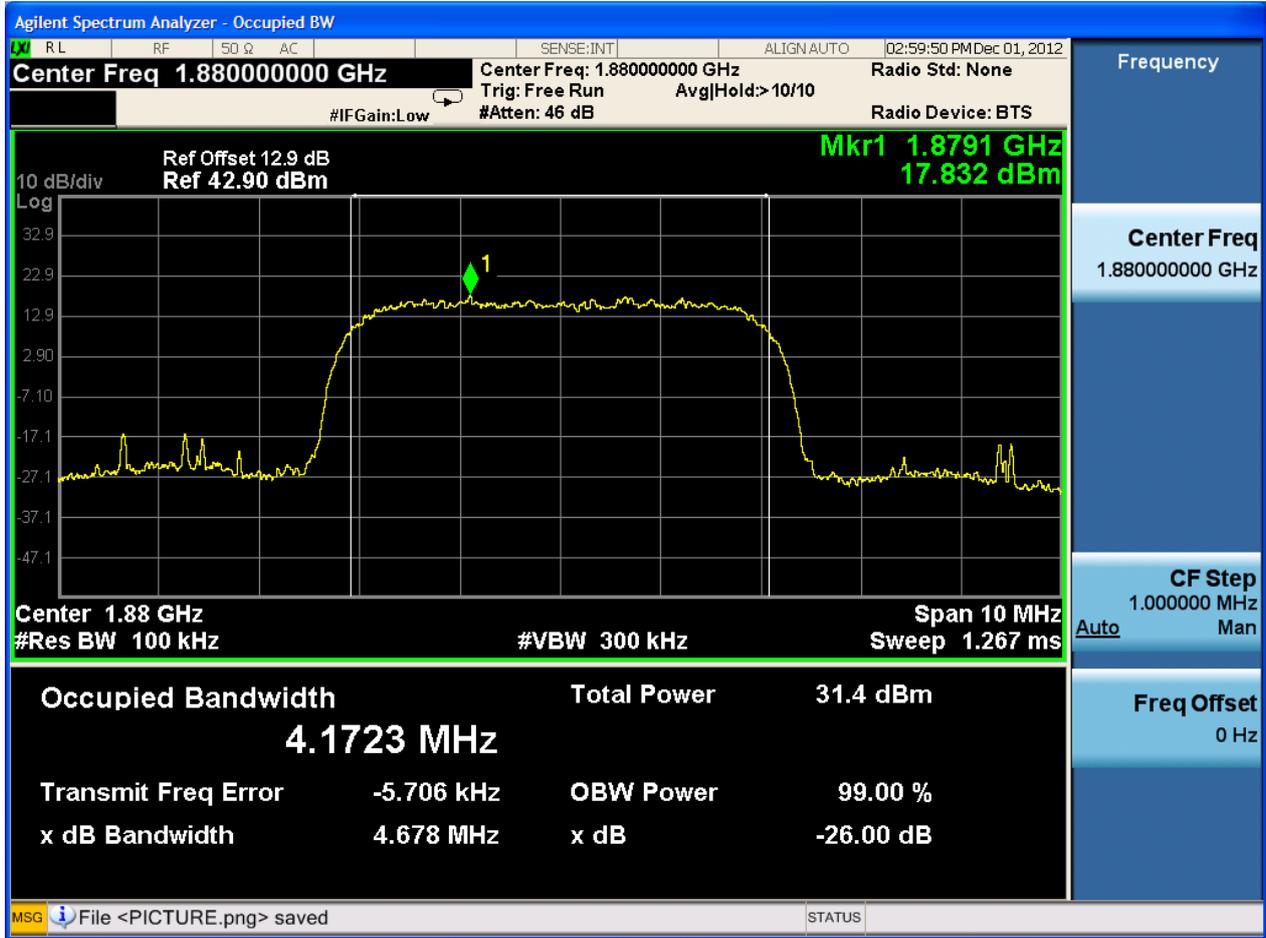
2.2.2.1 Test Mode = UMTS/TM1

2.2.2.1.1 Test Channel = LCH



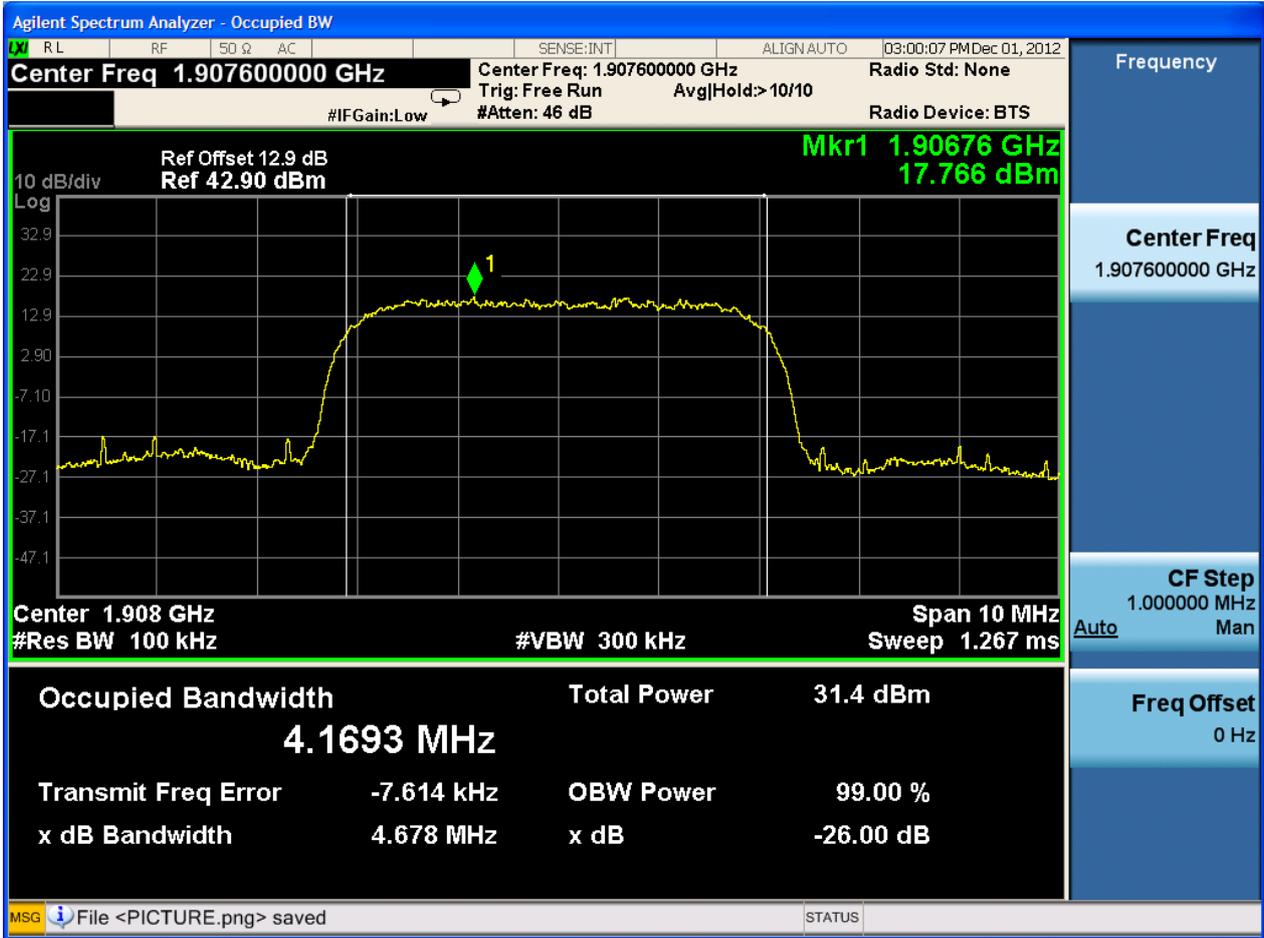


2.2.2.1.2 Test Channel = MCH





2.2.2.1.3 Test Channel = HCH

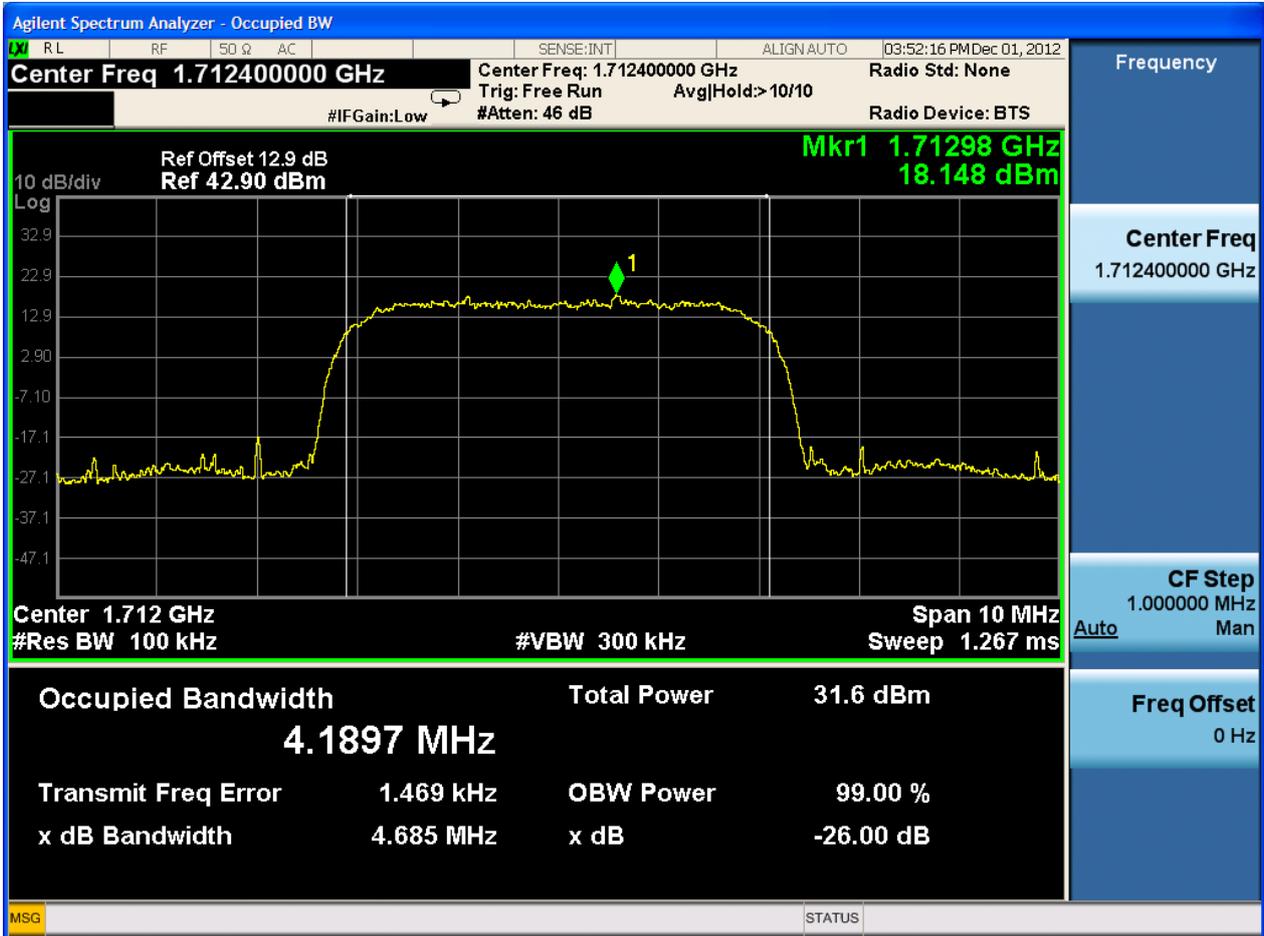




2.2.3 Test Band = WCDMA1700

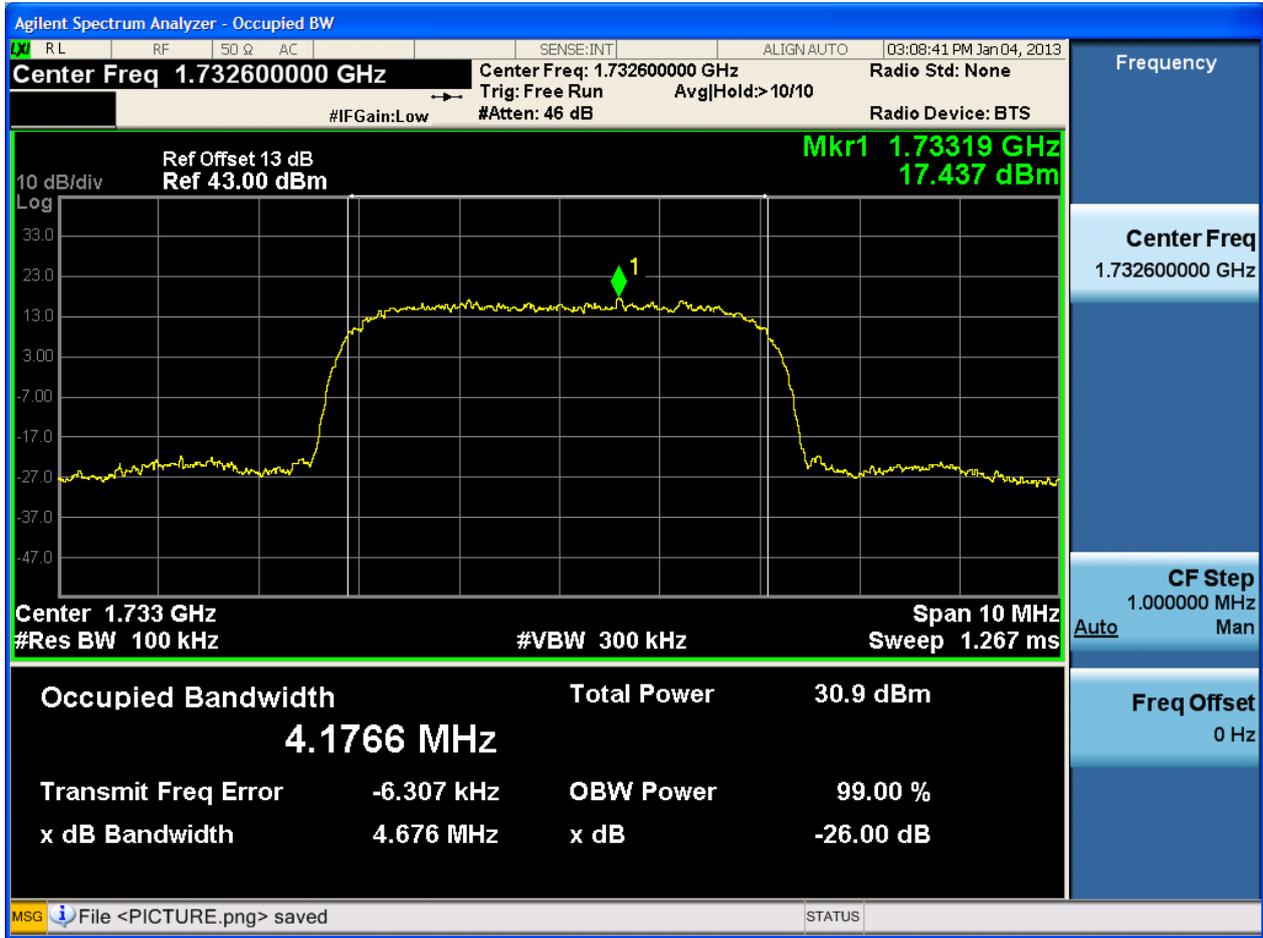
2.2.3.1 Test Mode = UMTS/TM1

2.2.3.1.1 Test Channel = LCH



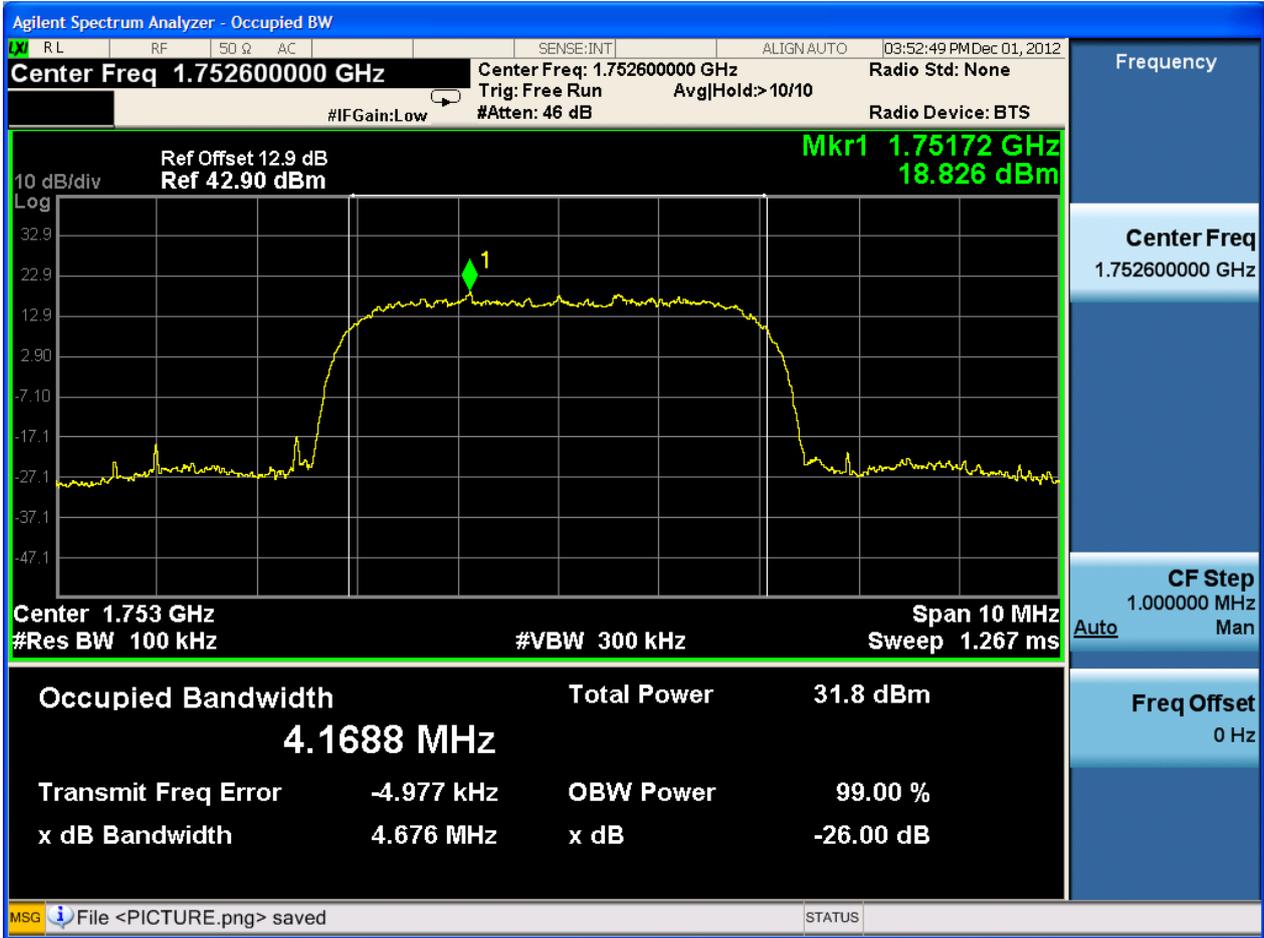


2.2.3.1.2 Test Channel = MCH





2.2.3.1.3 Test Channel = HCH





Appendix C: Band Edges Compliance

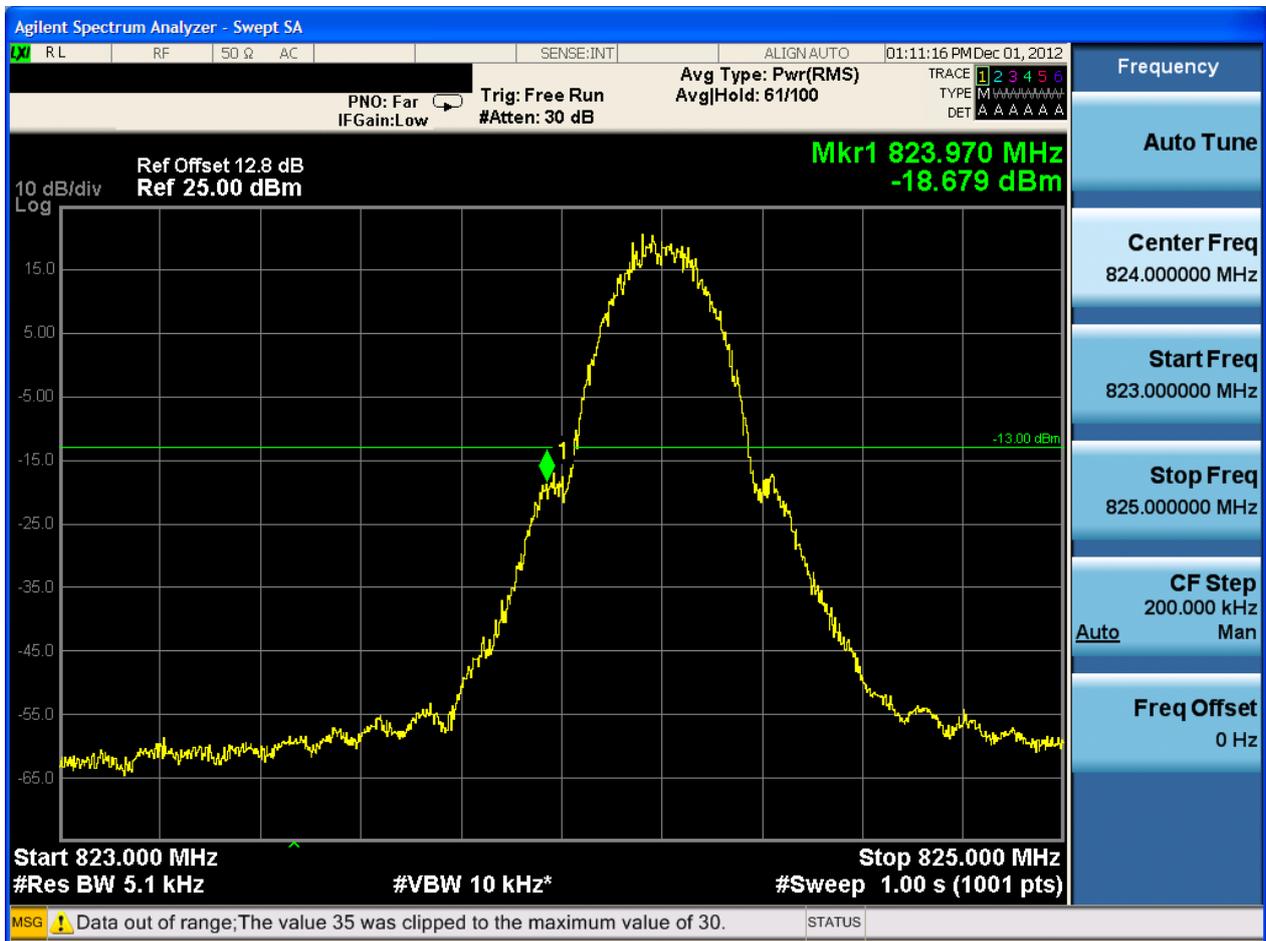
Part I - Test Plots

3.1 For GSM

3.1.1 Test Band = GSM850

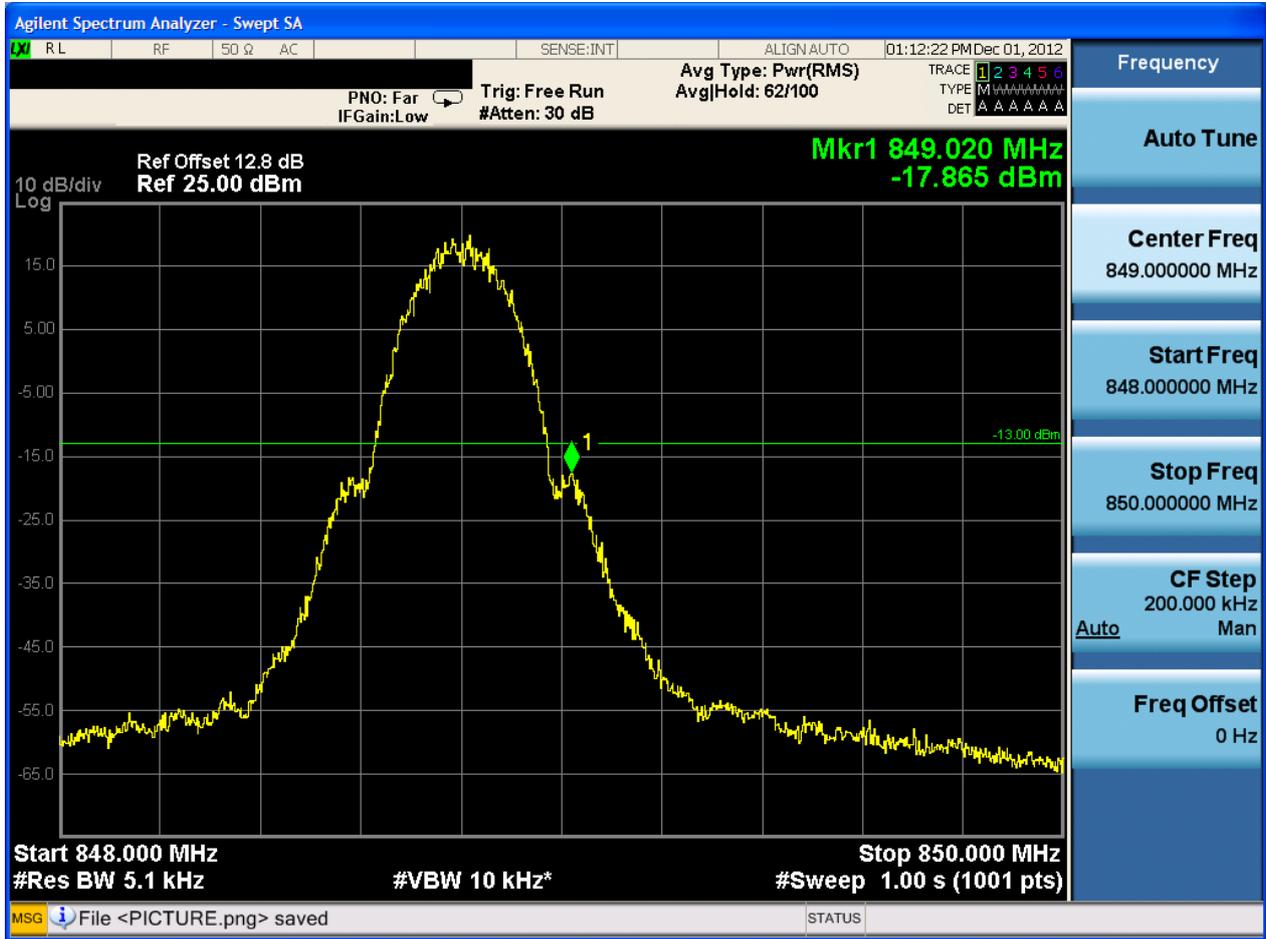
3.1.1.1 Test Mode = GSM/TM1

3.1.1.1.1 Test Channel = LCH



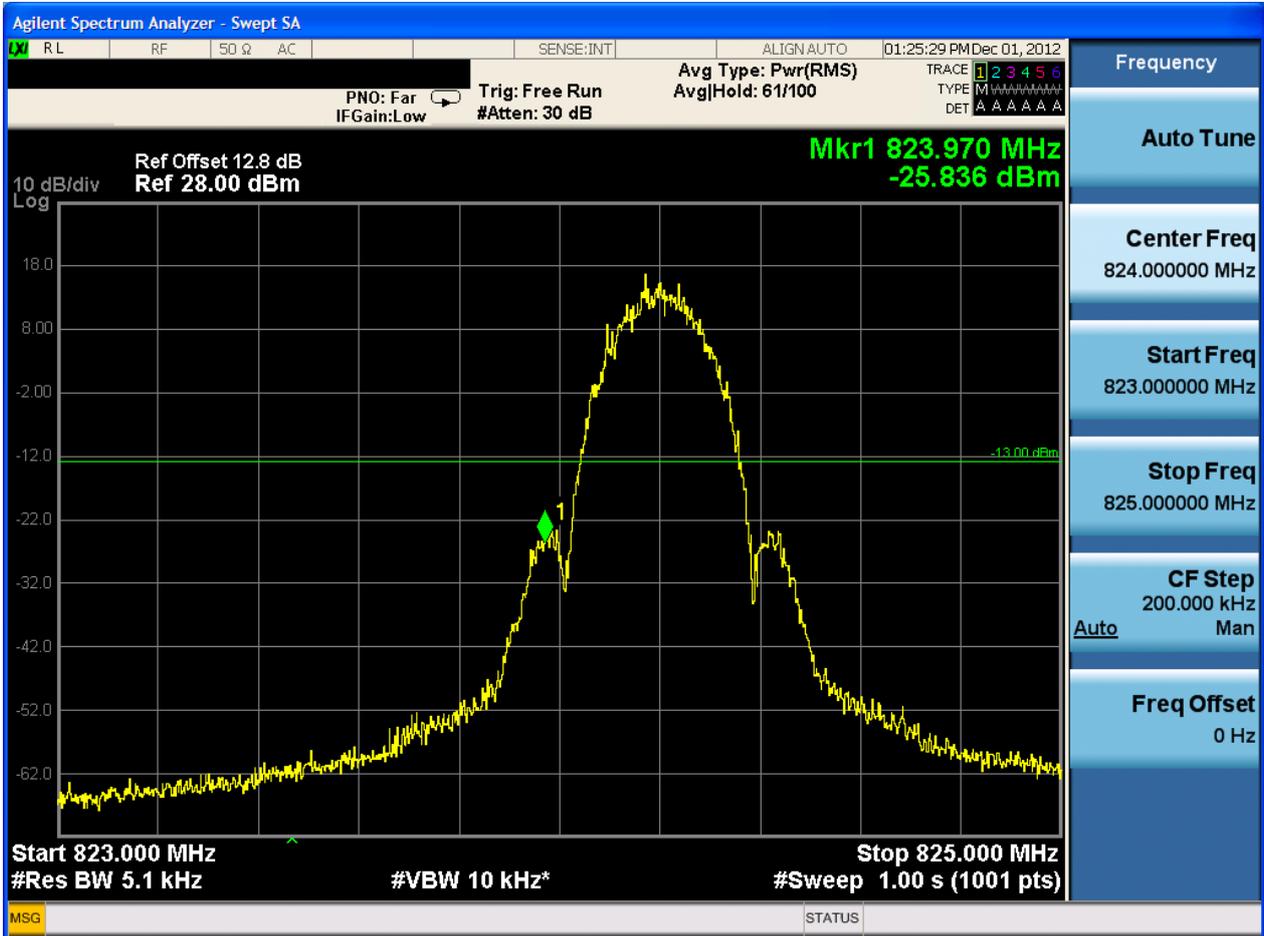


3.1.1.1.2 Test Channel = HCH



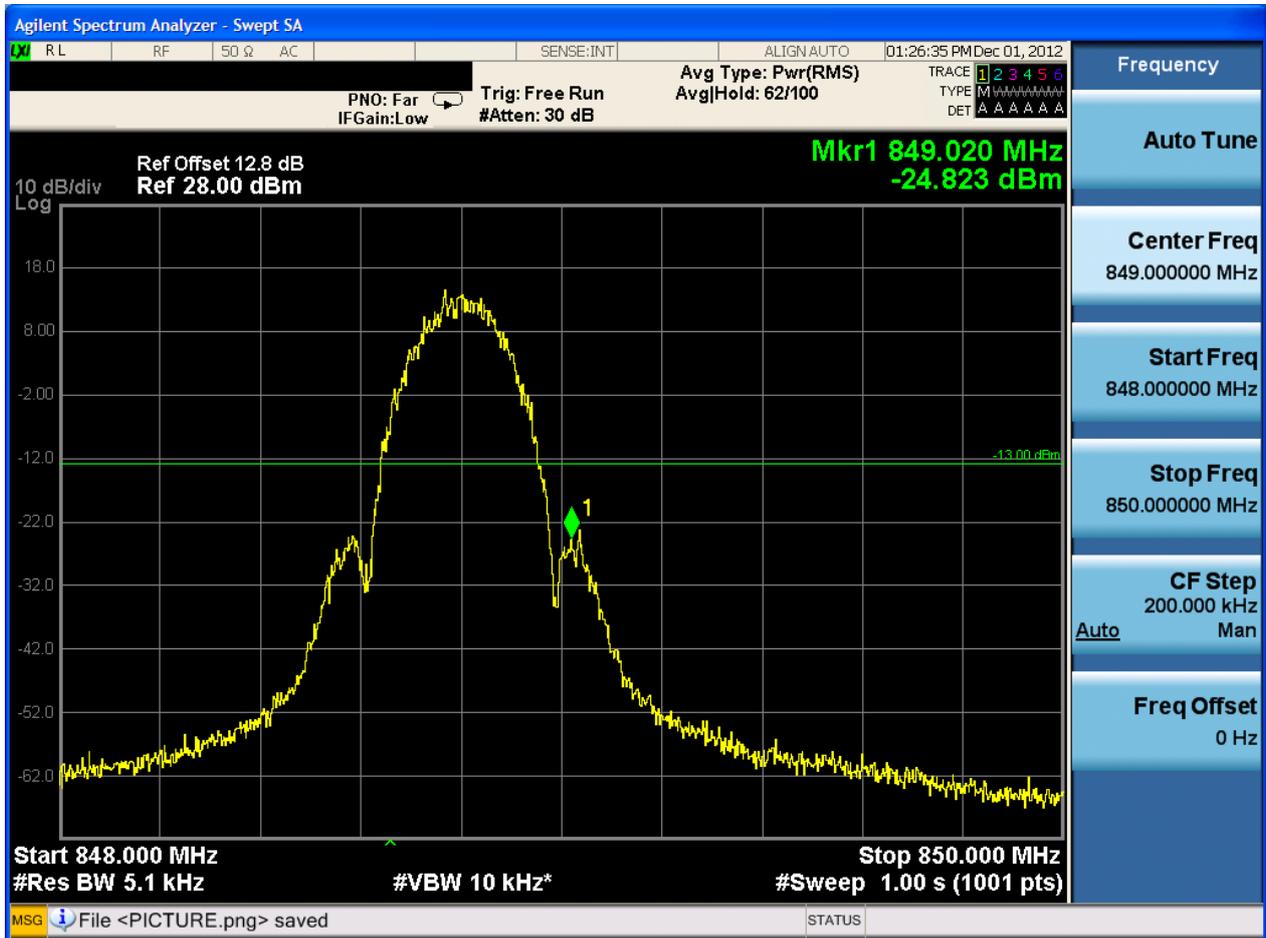
3.1.1.2 Test Mode = GSM/TM2

3.1.1.2.1 Test Channel = LCH





3.1.1.2.2 Test Channel = HCH

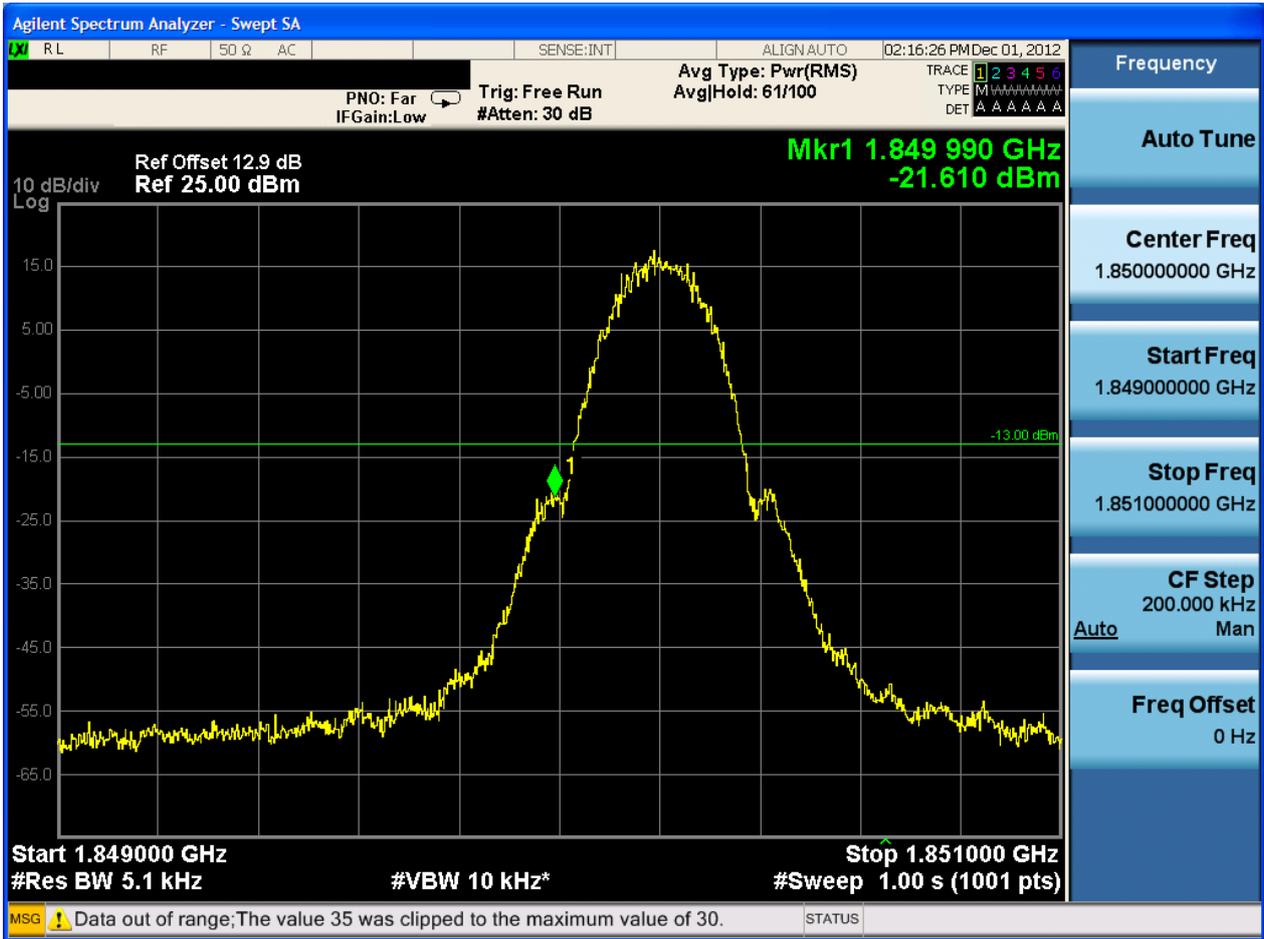




3.1.2 Test Band = GSM1900

3.1.2.1 Test Mode = GSM/TM1

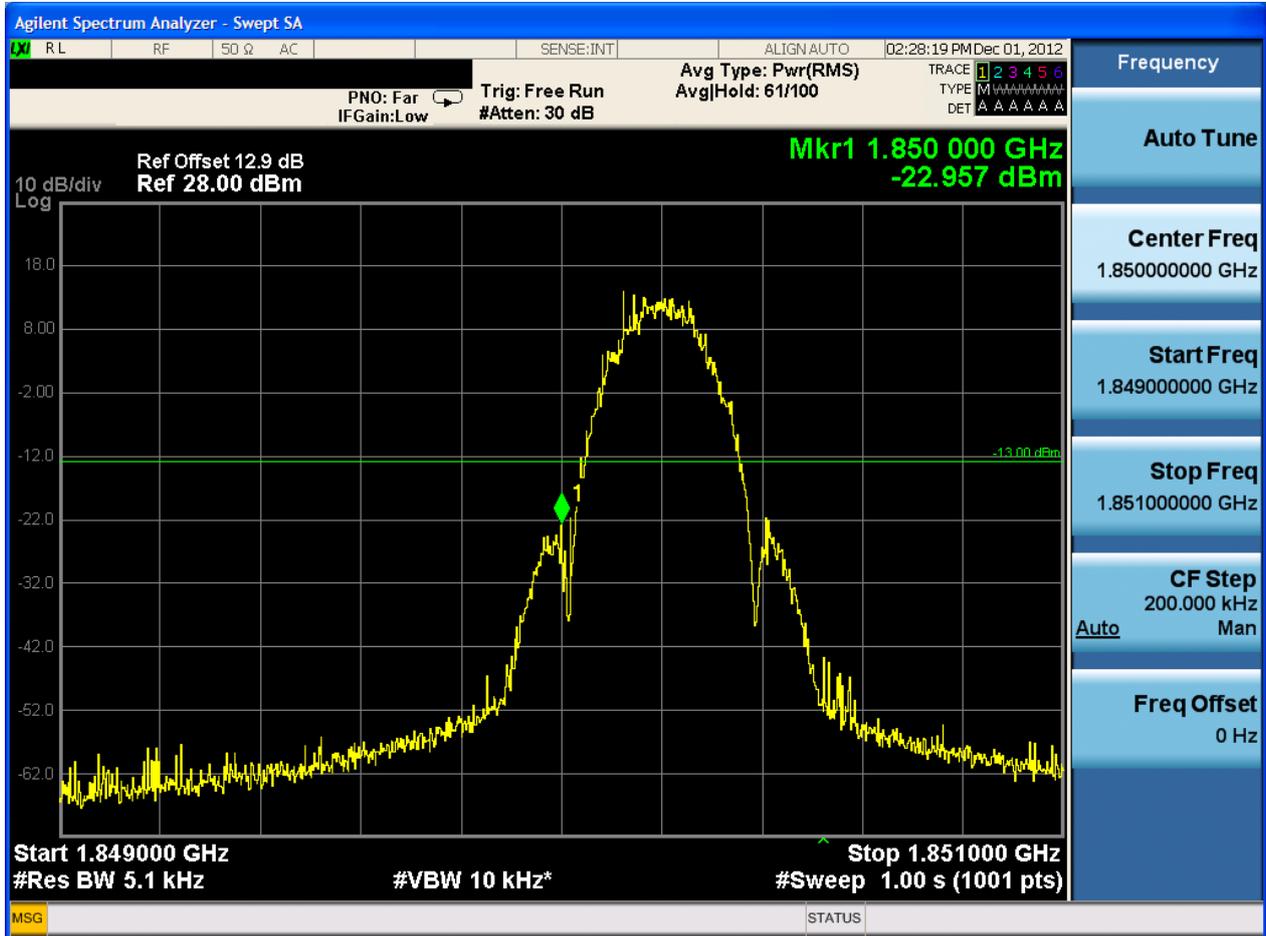
3.1.2.1.1 Test Channel = LCH



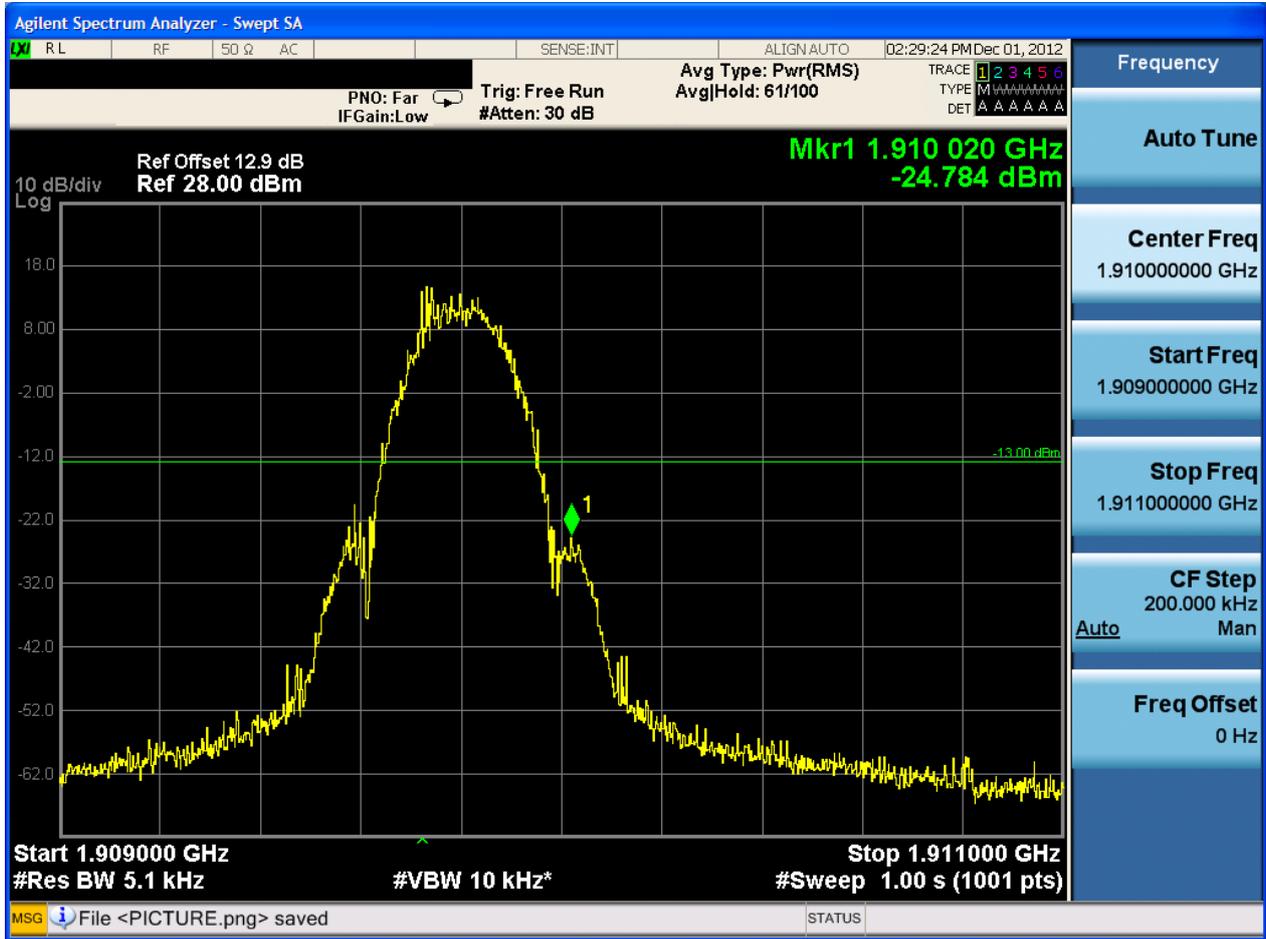


3.1.2.2 Test Mode = GSM/TM2

3.1.2.2.1 Test Channel = LCH



3.1.2.2.2 Test Channel = HCH





3.2.1.1.2 Test Channel = HCH





3.2.2 Test Band = WCDMA1900

3.2.2.1 Test Mode = UMTS/TM1

3.2.2.1.1 Test Channel = LCH



3.2.2.1.2 Test Channel = HCH





Appendix D: Spurious Emission at Antenna Terminal



NOTE: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of $< RBW/2$ so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = $k * (Span / RBW)$ " with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

Part I - Test Plots

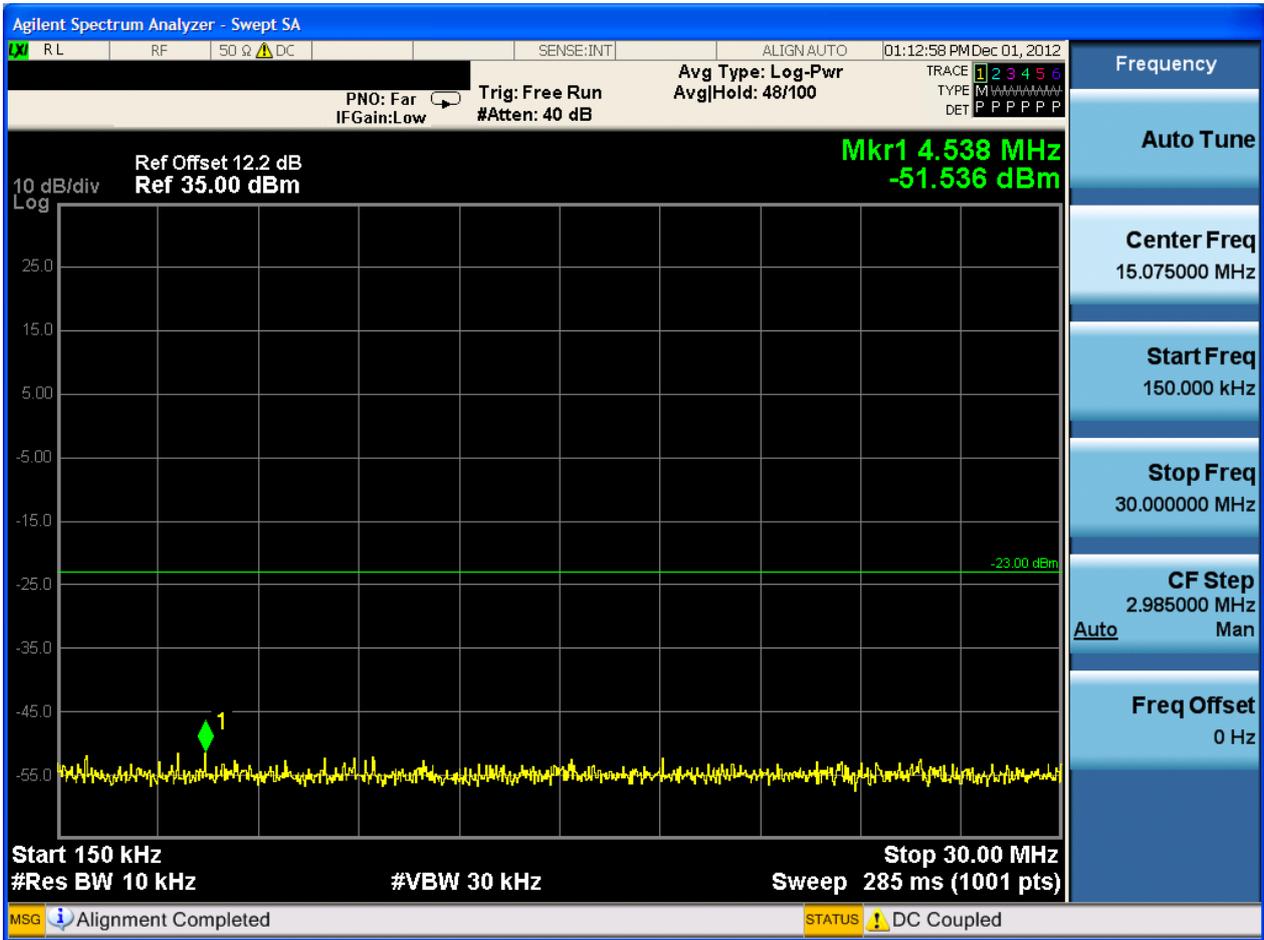
4.1 For GSM

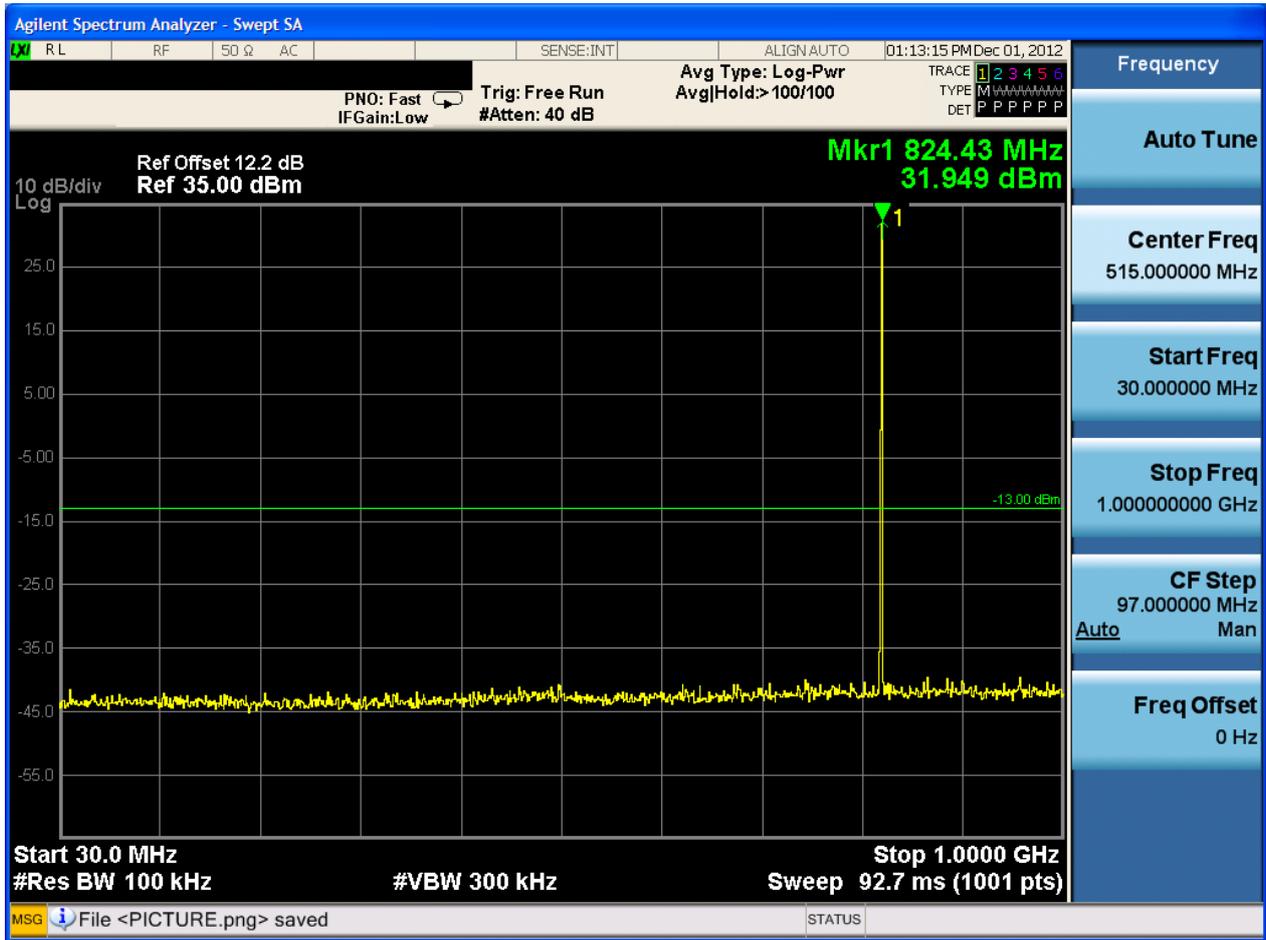
4.1.1 Test Band = GSM850

4.1.1.1 Test Mode = GSM/TM1

4.1.1.1.1 Test Channel = LCH



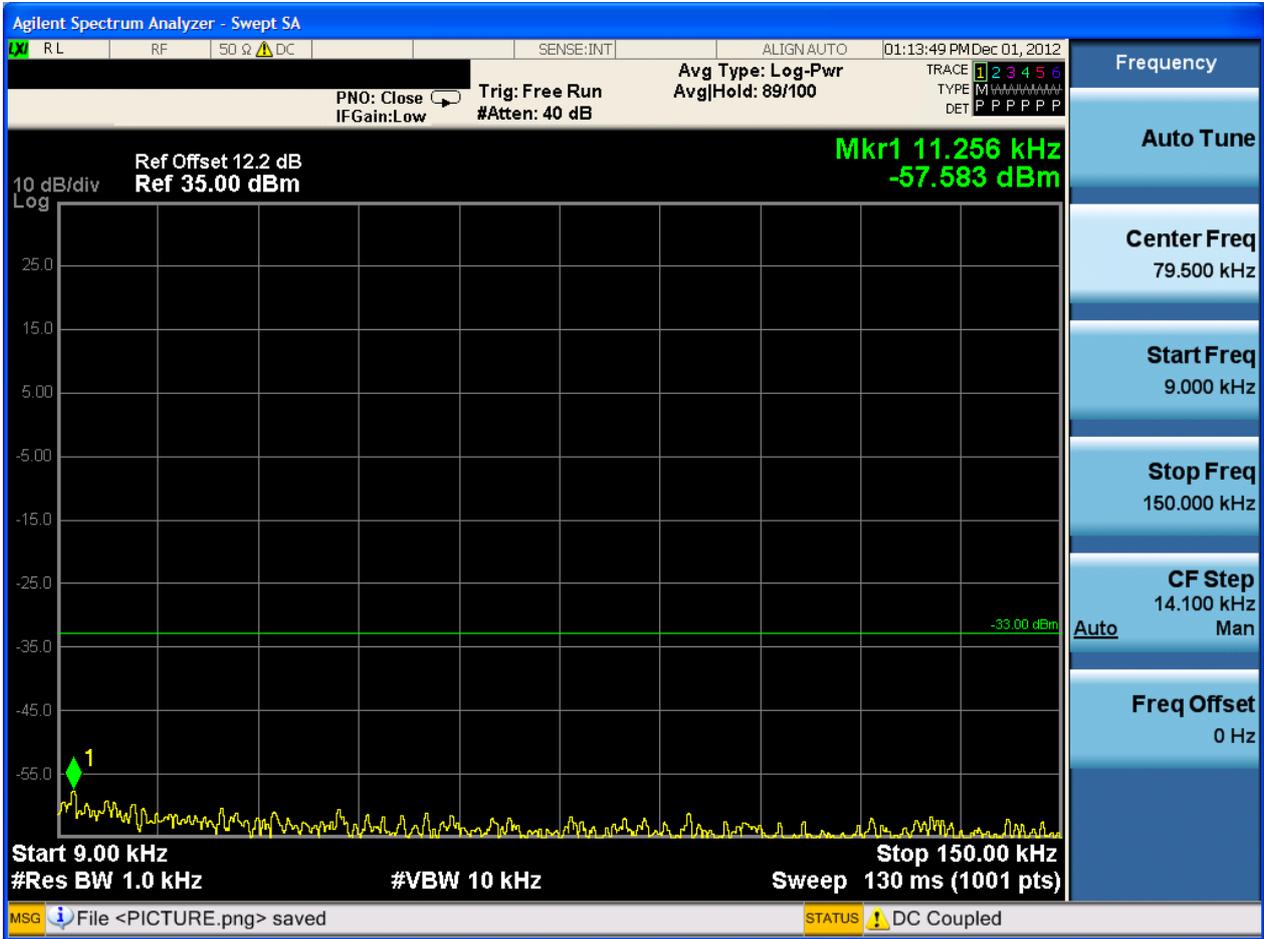


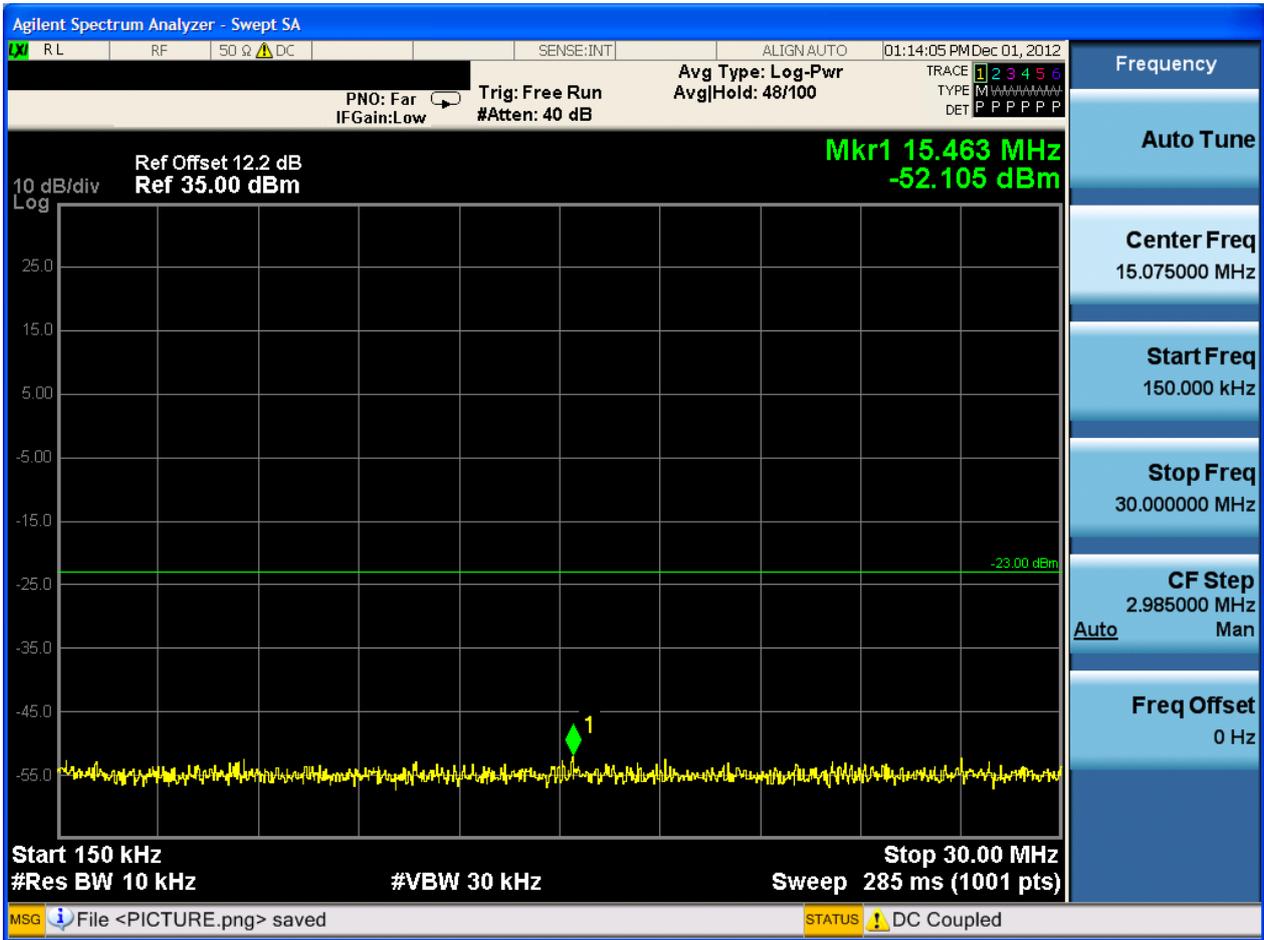


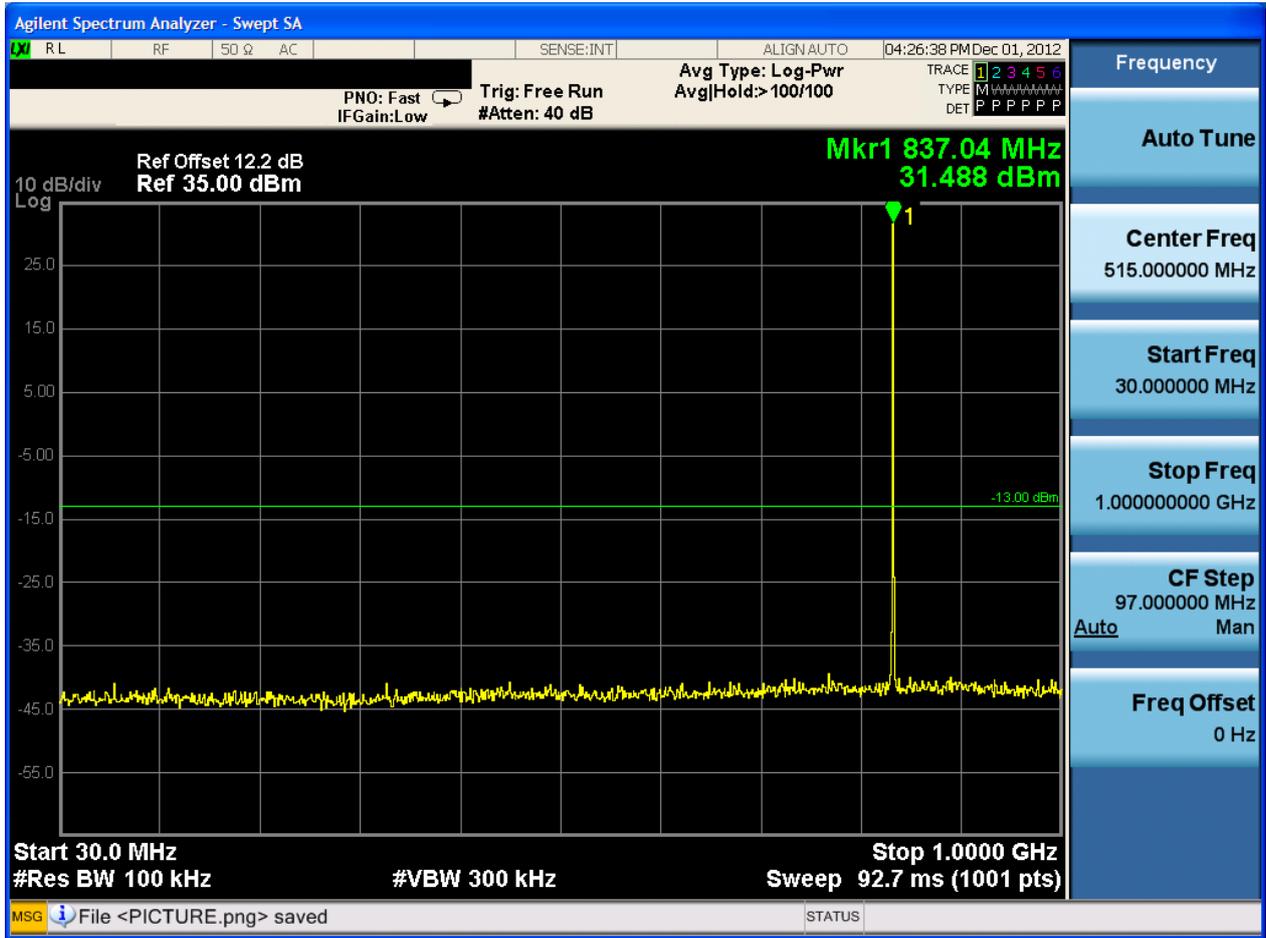




4.1.1.1.2 Test Channel = MCH





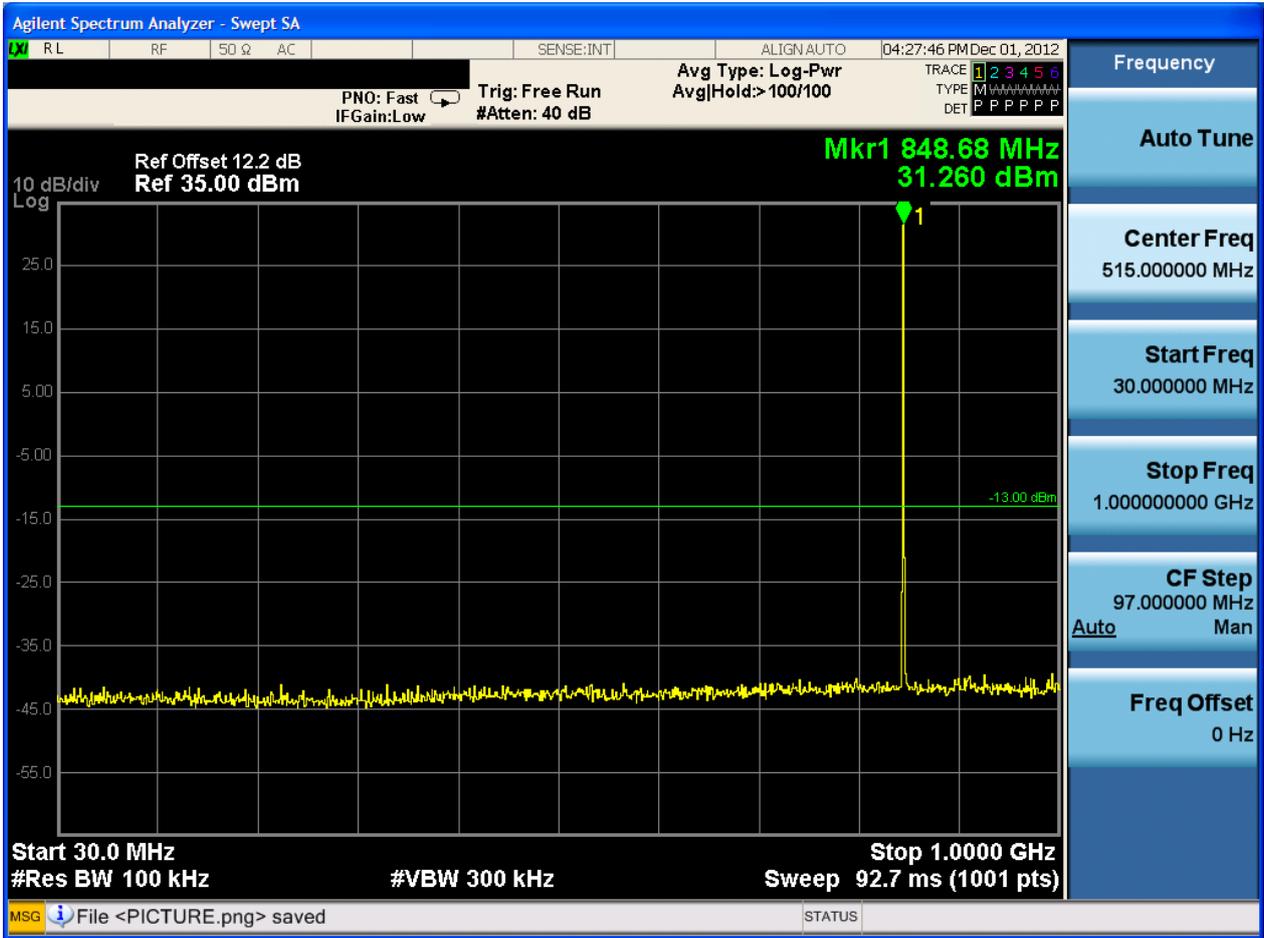


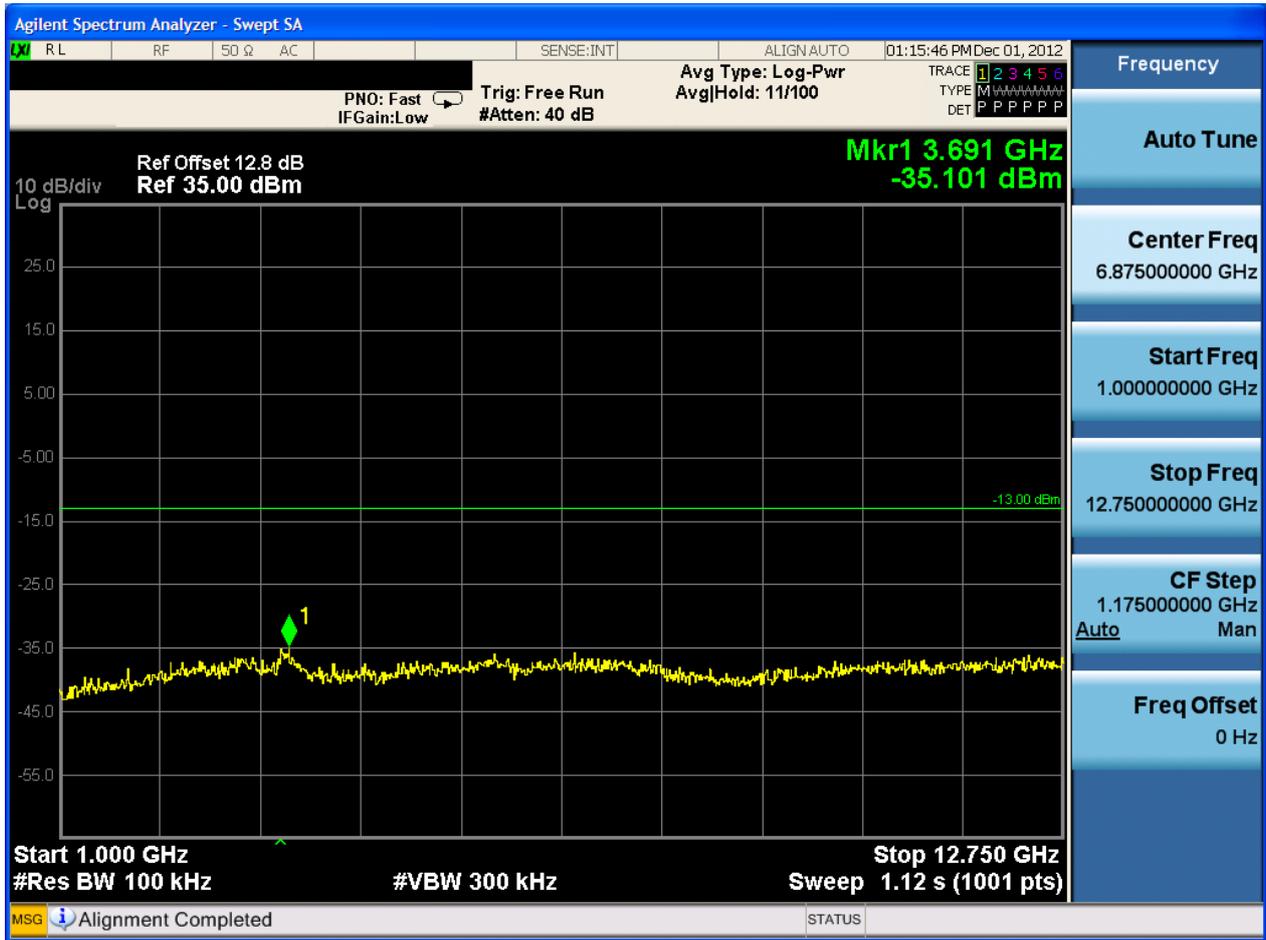




4.1.1.1.3 Test Channel = HCH





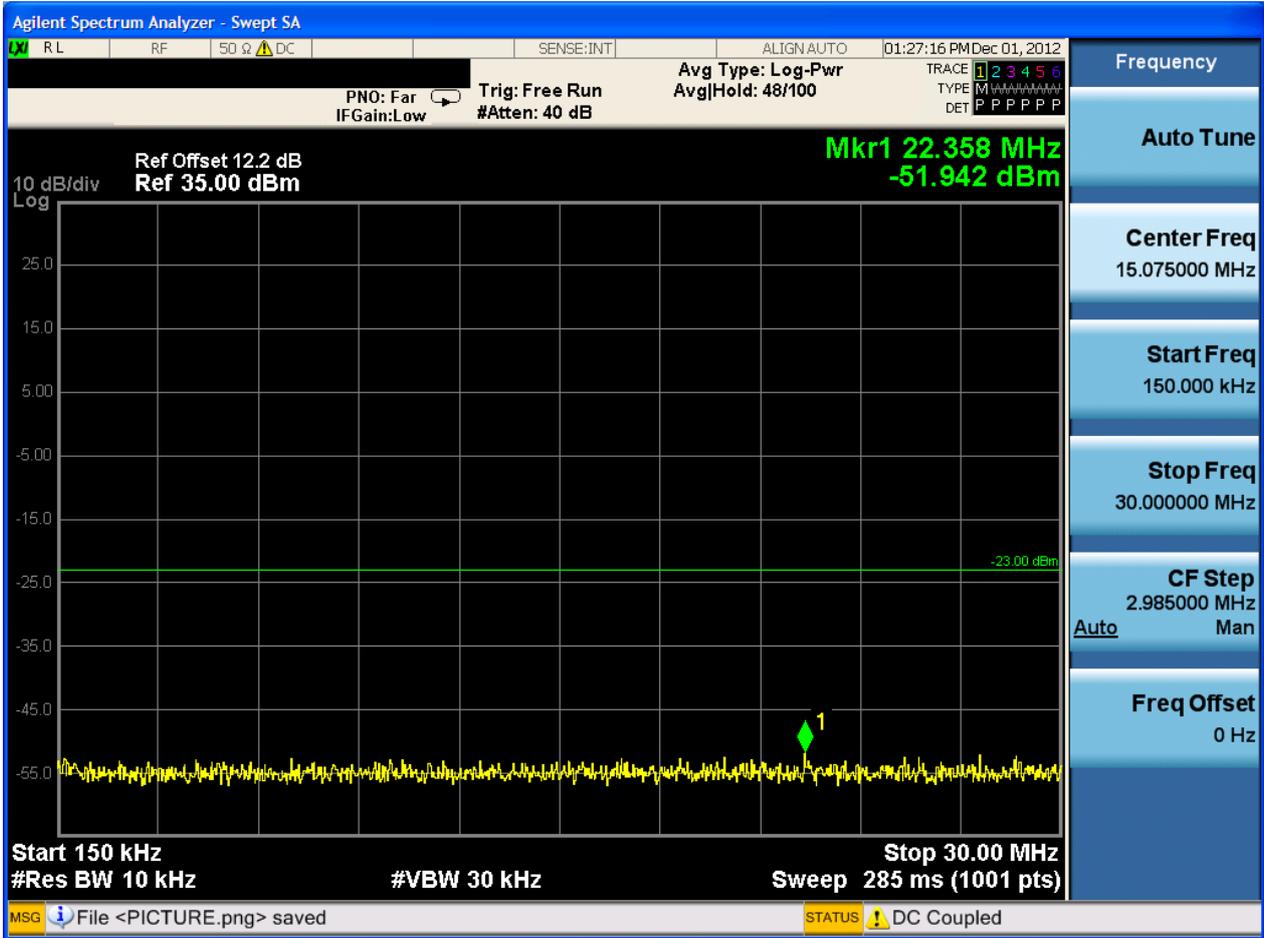


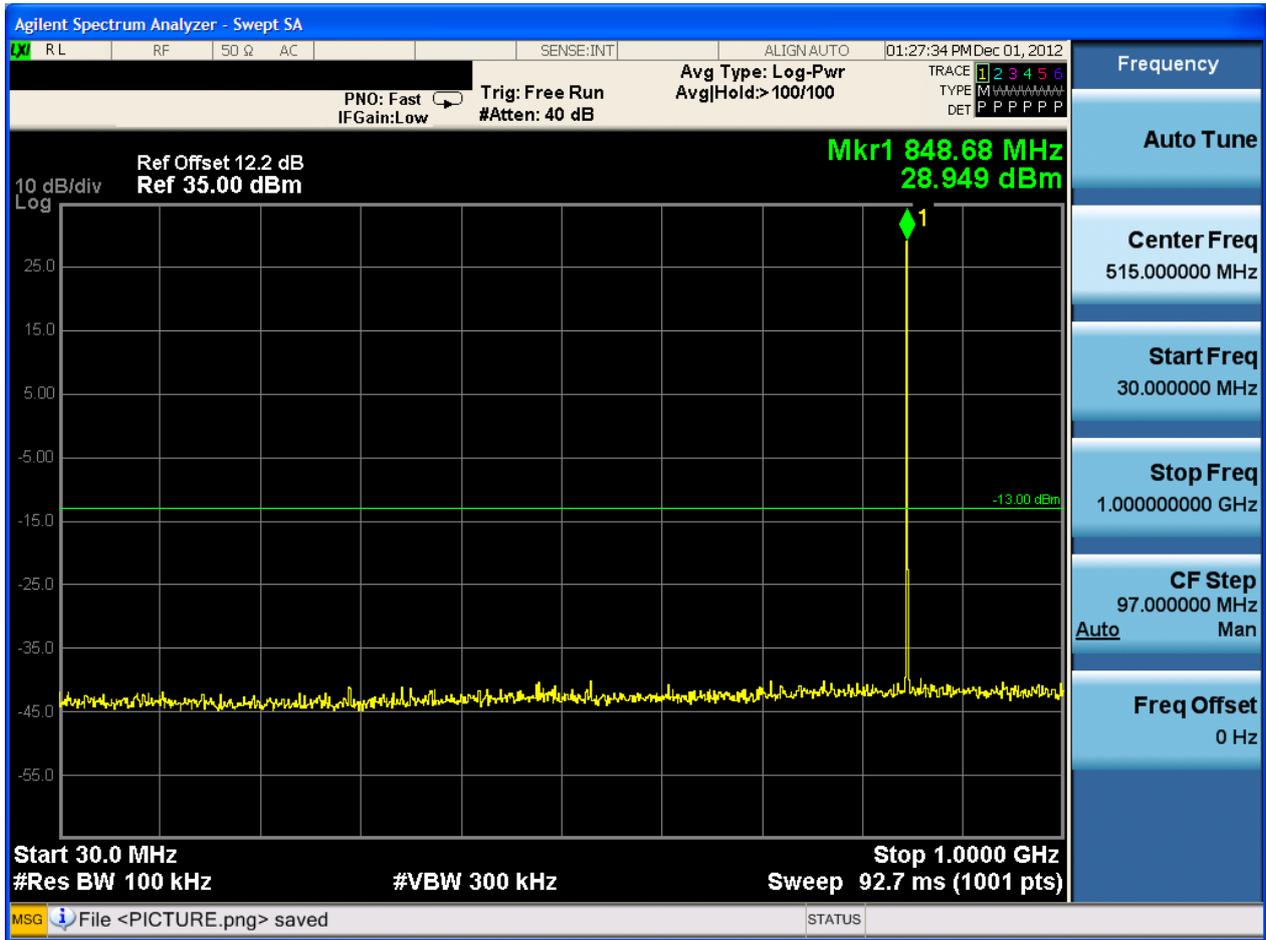


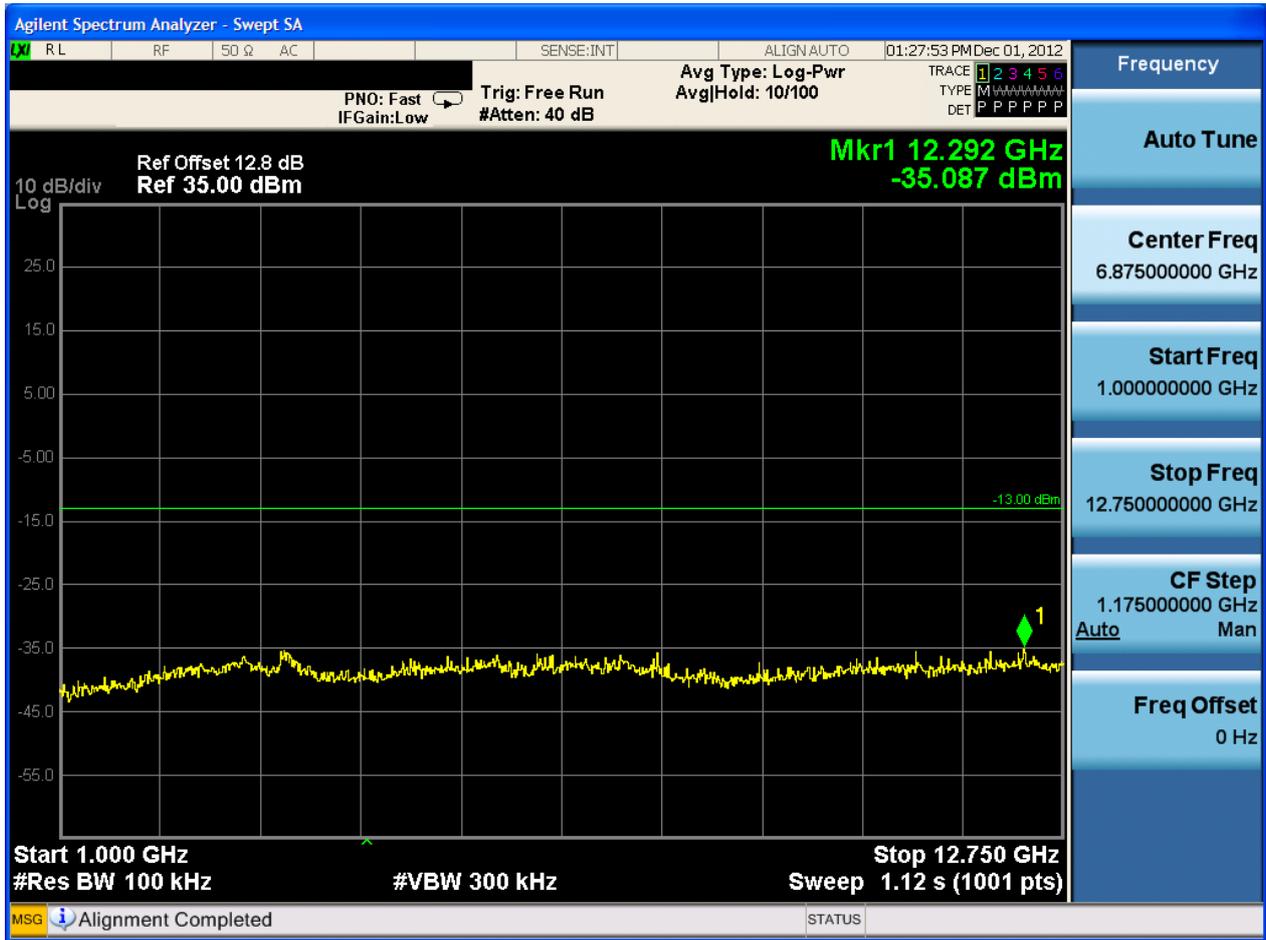
4.1.1.2 Test Mode = GSM/TM2

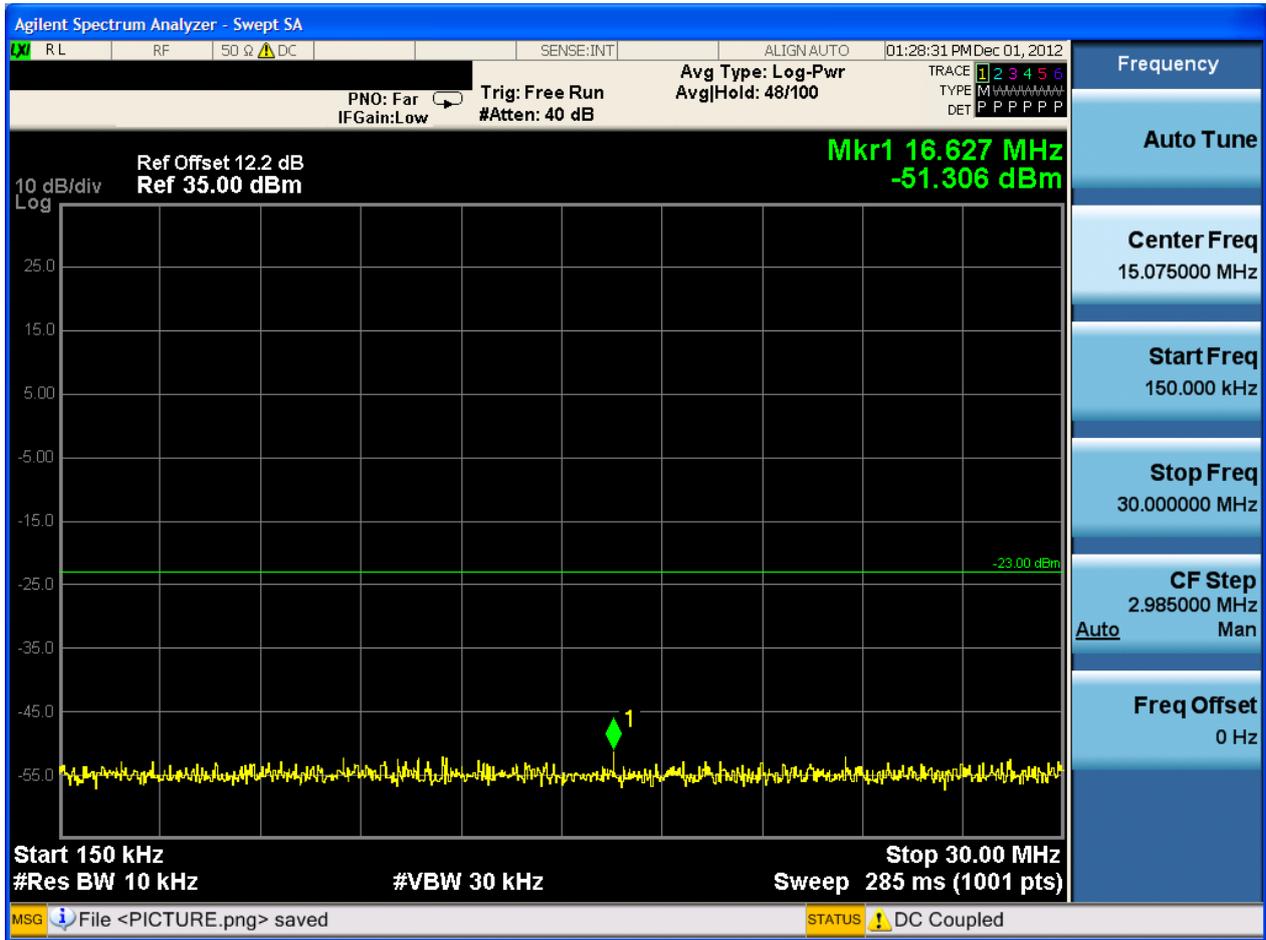
4.1.1.2.1 Test Channel = LCH







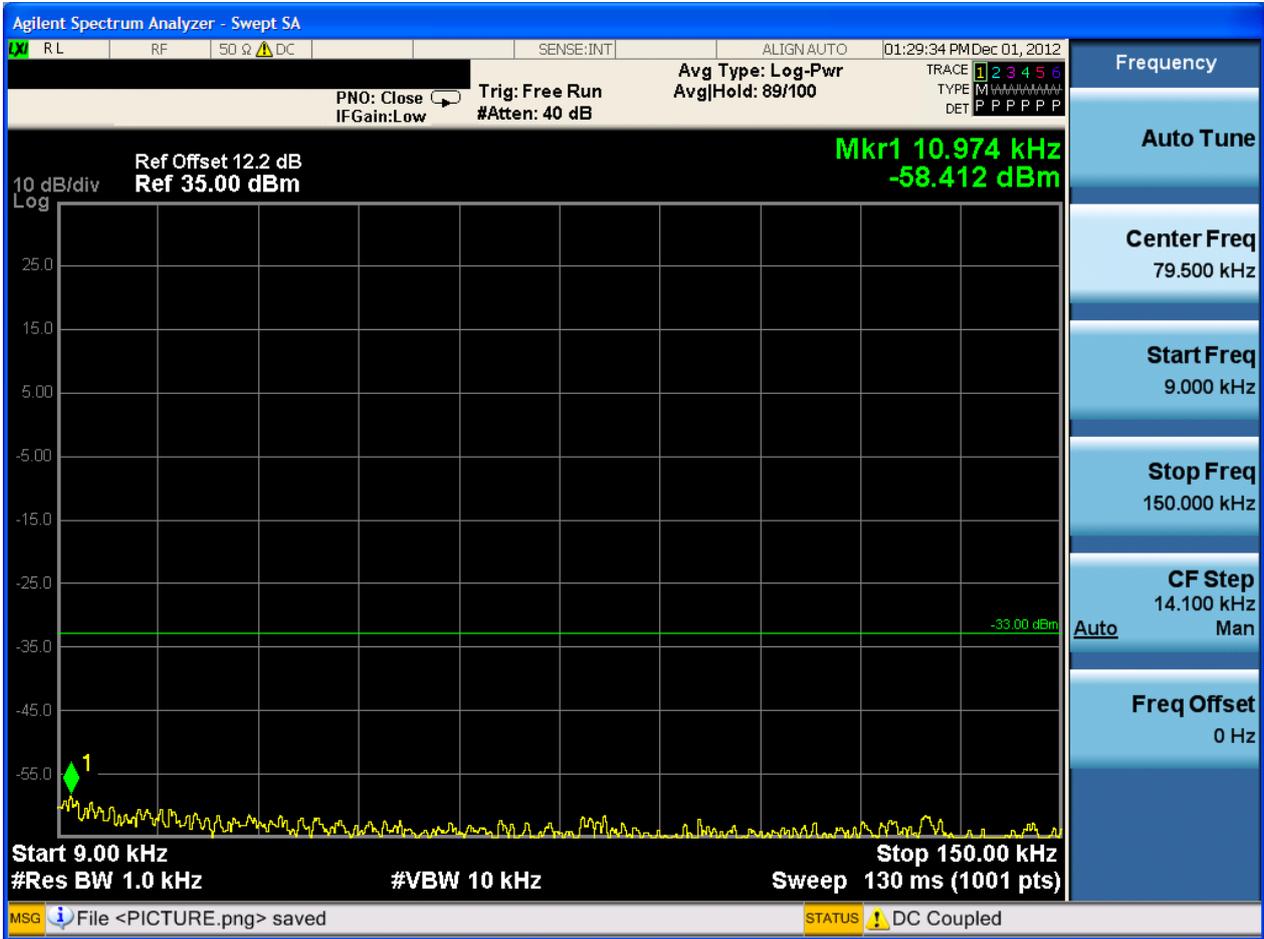


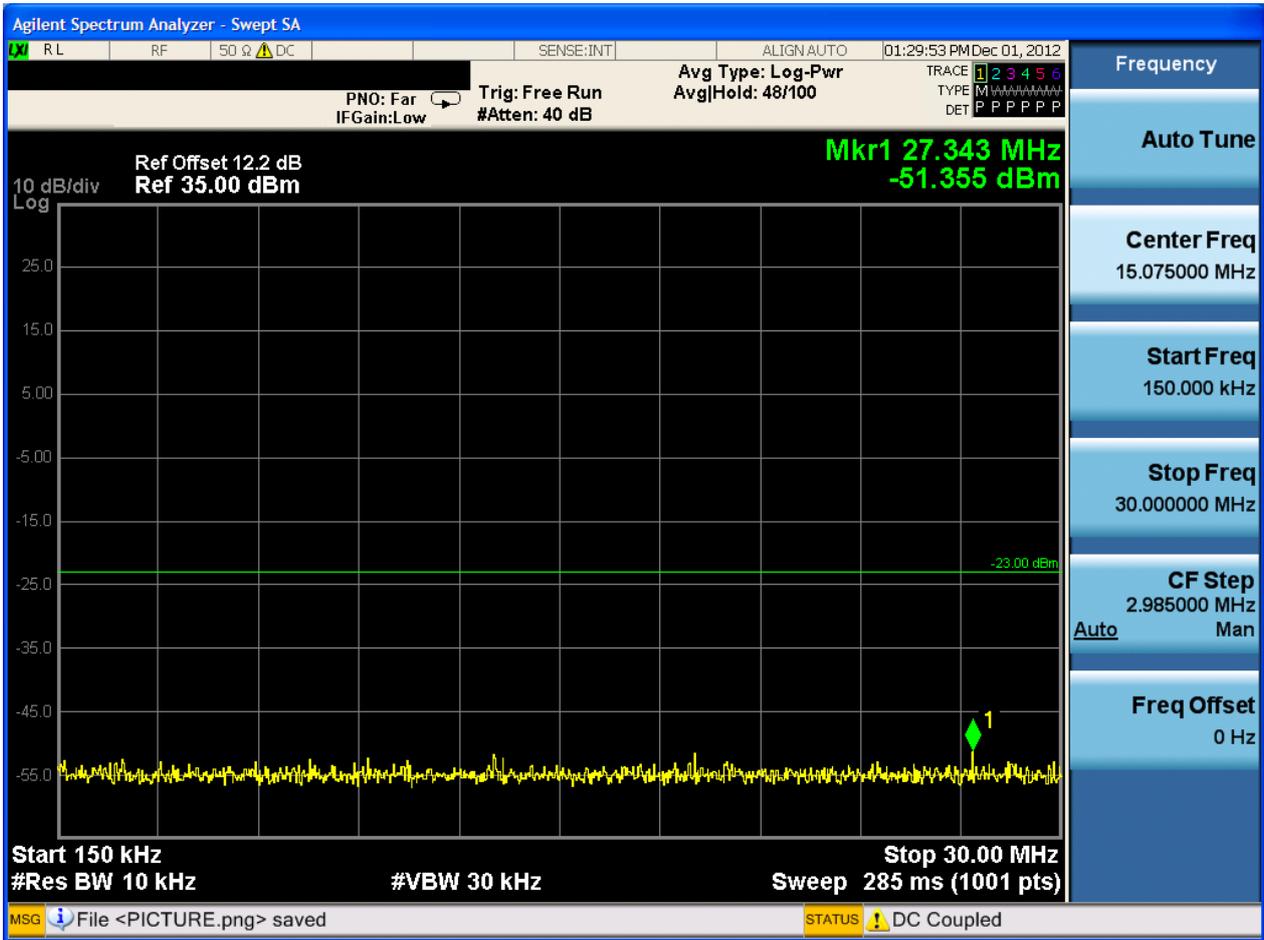


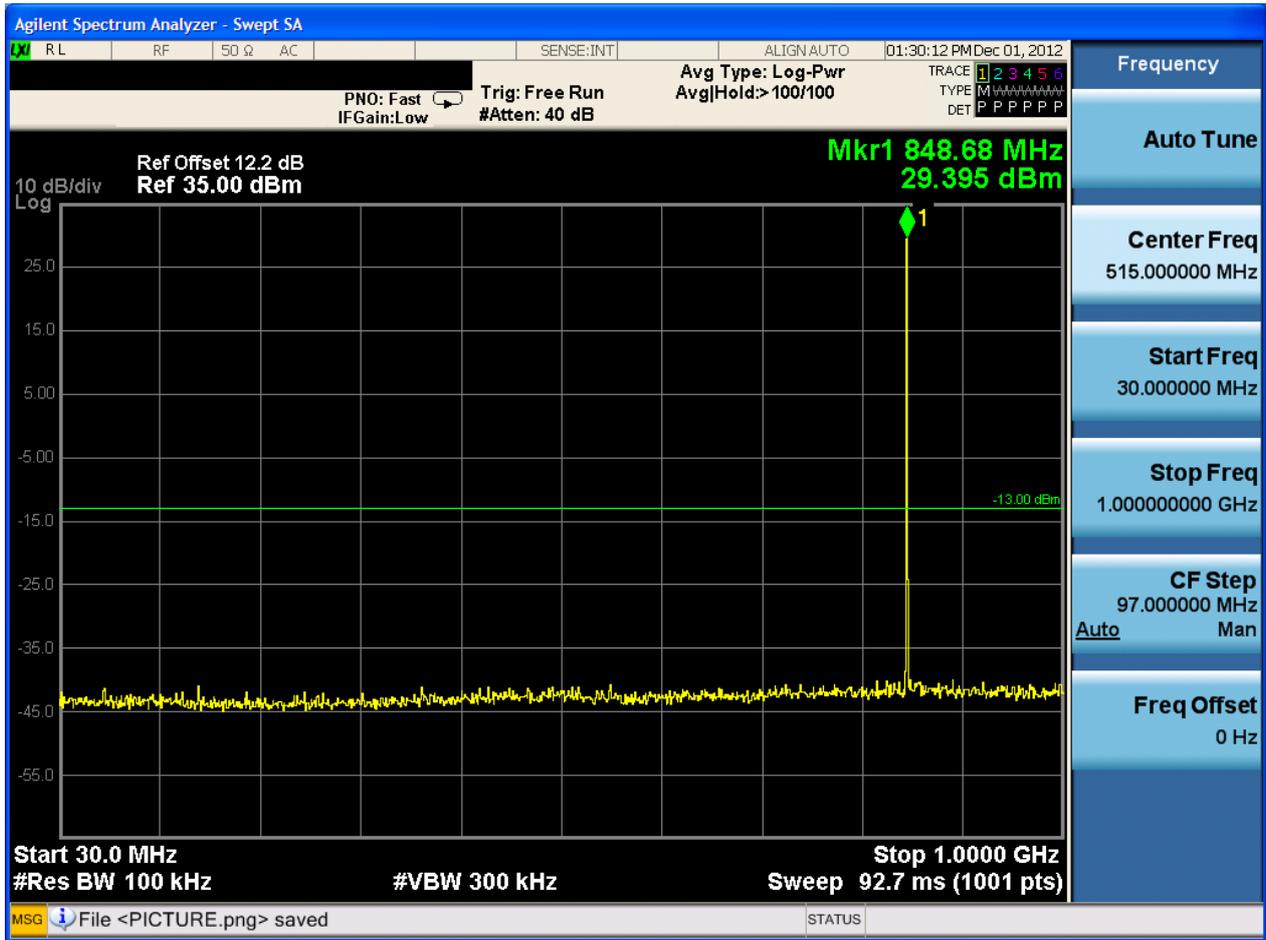


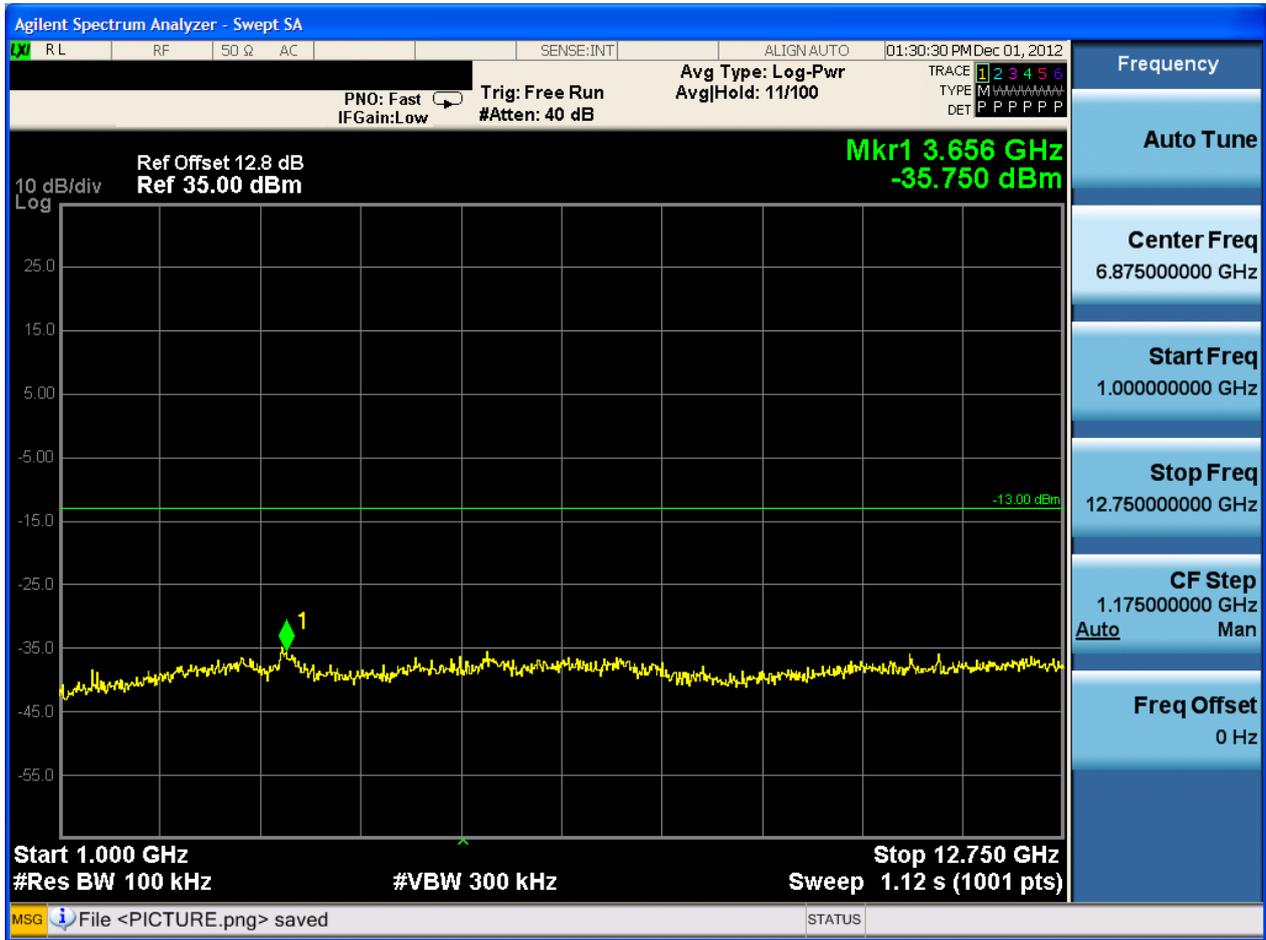


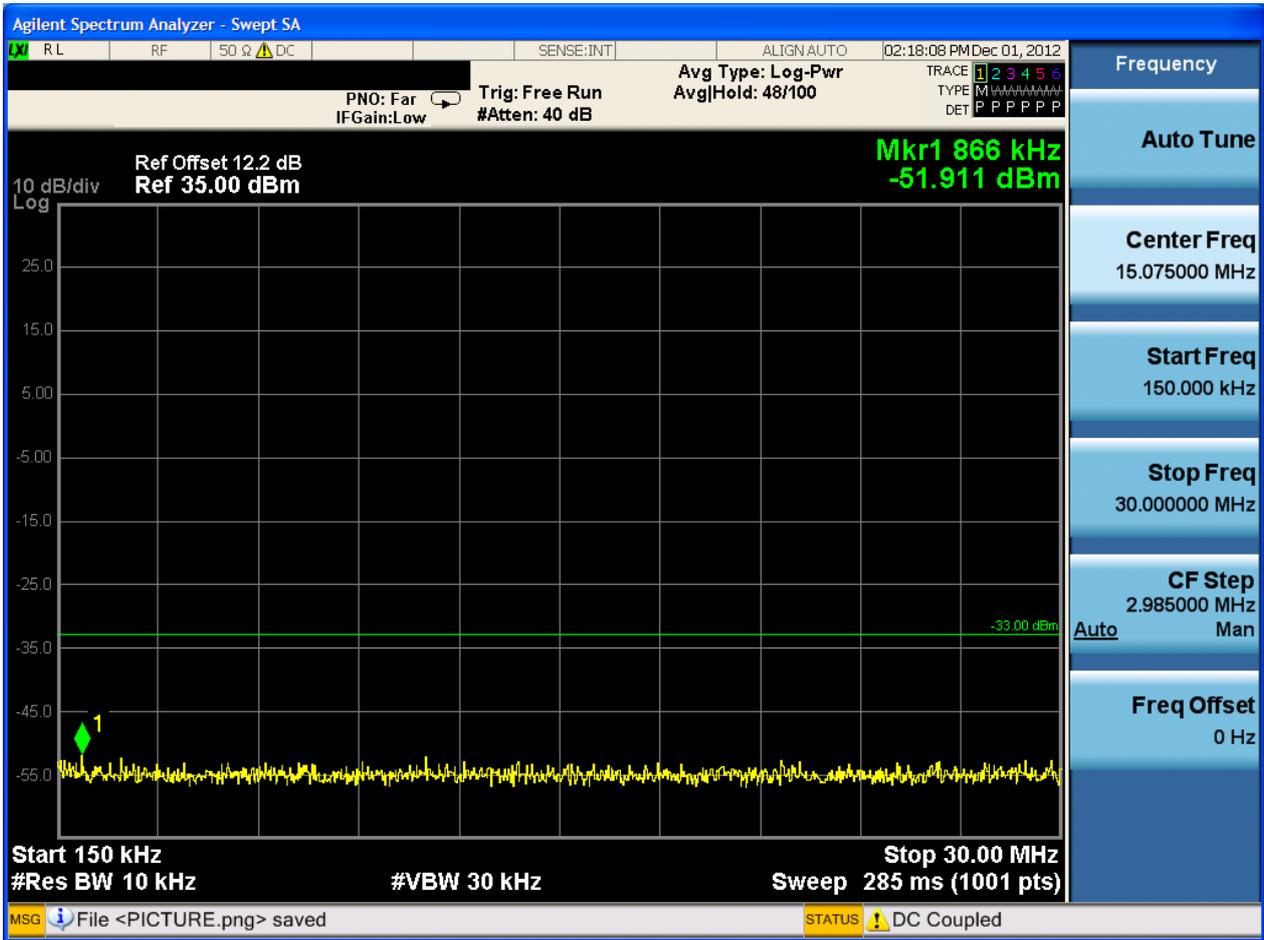
4.1.1.2.3 Test Channel = HCH







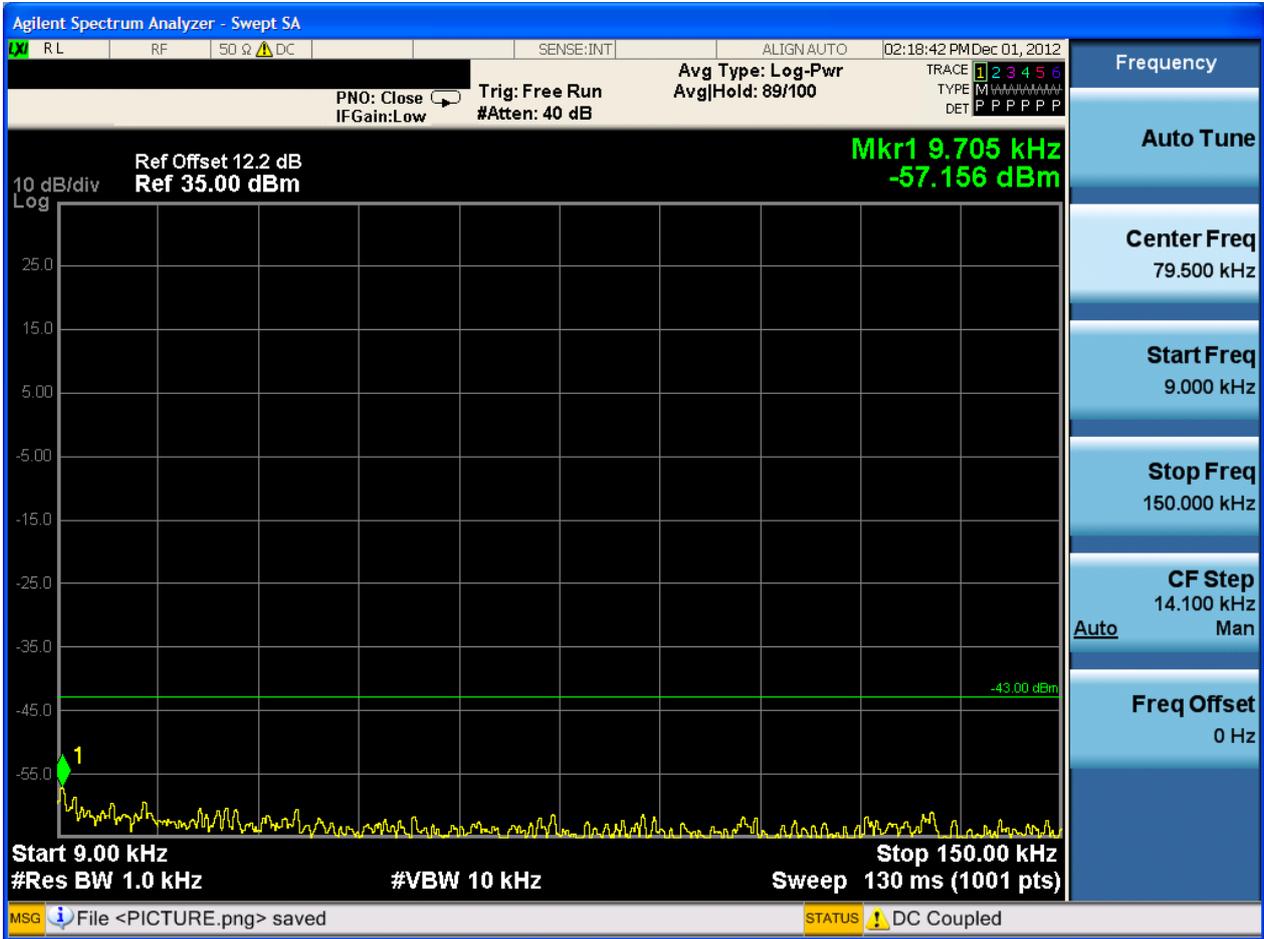


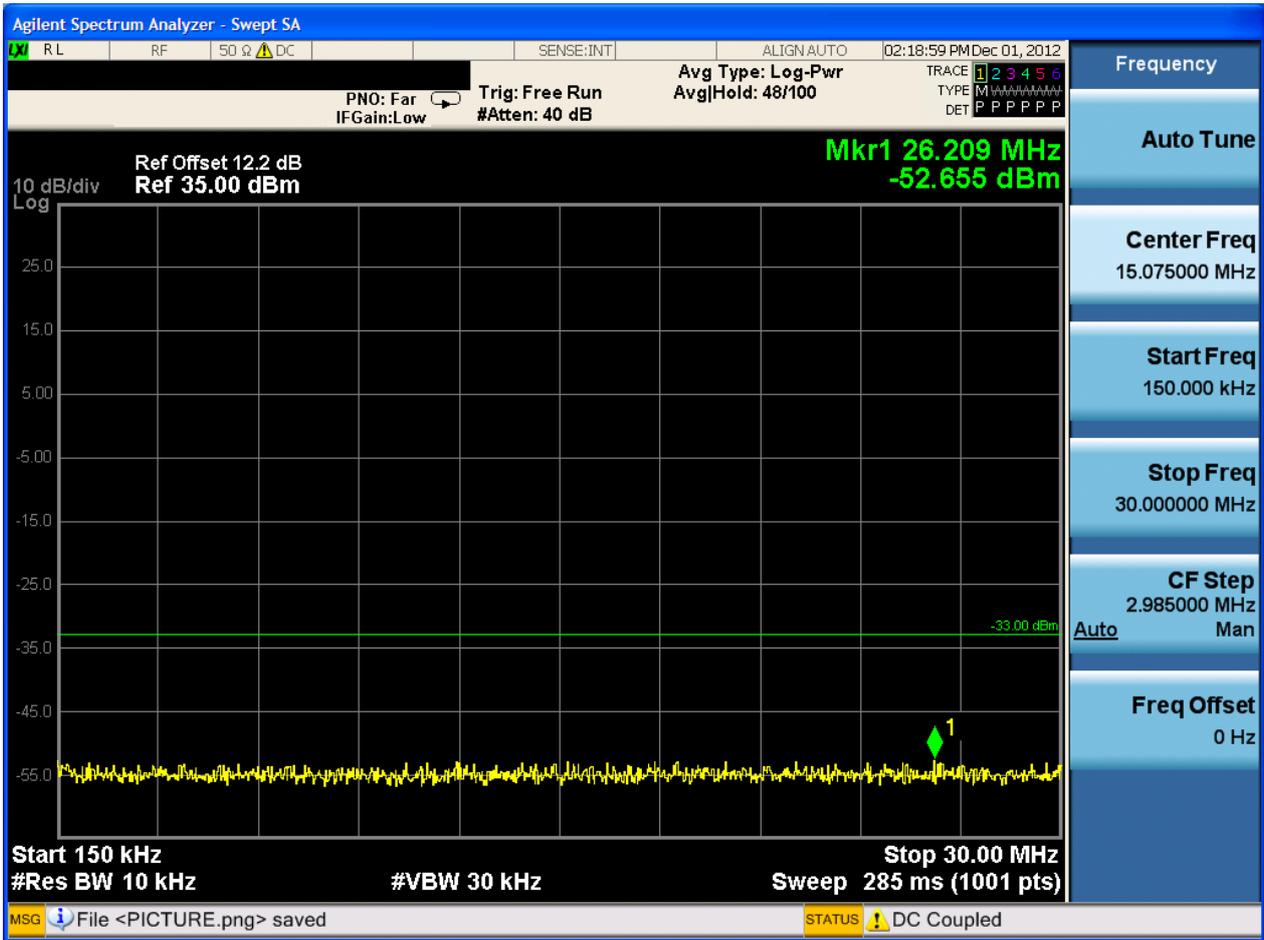






4.1.2.1.2 Test Channel = MCH









4.1.2.1.3 Test Channel = HCH

