HCT CO., LTD.

CERTIFICATION DIVISION
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CERTIFICATE OF COMPLIANCE

FCC PART 24 Certification

Applicant Name:

SAMSUNG Electronics Co., Ltd.
416, Maetan-3dong, Yeongtong-gu, Suwon-si,
Gyeonggi-do, Korea

Date of Issue: August 17, 2011
Test Site/Location:
HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon,
Icheon-si, Kyunggi-Do, Korea
Test Report No.: HCTR1108FR14

FCC ID	:	**A3LSMM-2LD0581902**
APPLICANT	:	**SAMSUNG Electronics Co., Ltd.**

EUT Type	: Remote Radio Head
Manufacturer	: SAMSUNG Electronics Co., Ltd
Model name	: SMM-2LD0581900
Frequency of Operation	: 1 930 MHz ~ 1 995 MHz
TX Output Power	: 160W
FCC Rule Part(s)	: FCC Part 24 Subpart E
Emission Designator	: 4M79G7D(QPSK/16QAM), 4M80W7D(64QAM),
Test Procedure(s)	: ANSI/TIA-603C-2004
Application Type	: Original Equipment
Data of issue	: August 17, 2011

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of FCC Part 24 of the FCC Rules under normal use and maintenance.

Chang Seok Choi

Report prepared by
: Chang Seok Choi
Test engineer of RF Team

Approved by
: Sang Jun Lee
Manager of RF Team

Revision

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1108FR14	August 17, 2011	First Approval Report

C O N T E N T S

1. GENERAL INFORMATION

1.1. CLIENT INFORMATION

Company	**Samsung Electronics Co., Ltd.**
Contact Point	**416, Maetan-3dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea**
Contact person	**Name: HWAN CHUL RYU / Senior Research Engineer** **E-mail : ryu0022@samsung.com** **Tel: +82-31-279-1023** **Fax: +82-31-279-7676**

1.2. PRODUCT INFORMATION

EUT TYPE	Remote Radio Head
EMISSION DESIGNATOR	4M79G7D (QPSK, 16QAM), 4M80W7D(64QAM)
OPERATING FREQUENCY	1 930 MHz ~ 1 995 MHz
TX OUTPUT POWER	160W
CHANNEL BANDWIDTH	5.0 MHz
MODULATION TYPE	QPSK, 16QAM, 64QAM
MAXIMUM NUMBER OF CARRIERS/SECTORS	5Carrier 3Sector @ 5MHz channel BW
SYSTEM INPUT VOLTAGE	DC - 48 V

1.3. INTRODUCTION OF EUT

"Smart MBS System" is multi-mode base station that will satisfy such needs of mobile telecommunication market by integrating Voice(1X), Data(EVDO), LTE(4G) into a single base station equipment.
Smart MBS System mounts common DU(Digital Unit) Platform, and RRH (per each frequency bandwidth) that operator can decide to configure it with either single or multiple mobile technology. Smart MBS System provides CDMA(w/ FDD), LTE(w/FDD), and TD-LTE(w/TDD).

Smart MBS System supports the following telecommunication technologies.

- CDMA2000 1X/1X Advanced
  Having CDMA2000 1X as a reference, integrate the system (w/ EVRC-B, RLIC, QOF, New RC algorithm) and the terminal(w/ (e)QLIC, MRD, New RC algorithm) to support 1X Advanced. As a result, voice capacity enhancement will be provided.

- CDMA2000 1xEV-DO Rev.A/Rev.B
  Smart MBS supports CDMA2000 1xEV-DO Rev.A/Rev.B service and data service of CDMA network.

- LTE (Long Term Evolution)
  Samsung LTE System is a wireless network system that supports 3GPP LTE(Long Term Evolution)(a.k.a. LTE). It improves the existing 3GPP mobile telecommunication system(low data throughput, but high in cost) to a next generation wireless network system which provides a high speed data service with minimal cost. Samsung LTE System supports "Downlink OFDMA"(Orthogonal Frequency Division Multiple Access) with either FDD(Frequency Division Duplex) or TDD(Time Division Duplex), "Uplink SC(Single Carrier) FDMA", and "Scalable Bandwidth(for various spectrum allocation)" to provide high speed data service. Also, high-end hardware is implemented to improve system performance and capacity that various high speed data feature/service can be provided.

2. TEST SUMMARY

2.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24 Subpart E

SECTION	TEST ITEMS	RESULTS
2.1046, 24.232	Conducted Output Power	Compliant
2.1049	Occupied Bandwidth	Compliant
2.1051, 2.1057, 24.238	Spurious Emissions at Antenna Terminals	Compliant
2.1055, 24.235	Frequency Stability over Temperature variation	Compliant
2.1055, 24.235	Frequency stability over Voltage variation	Compliant

2.2. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.
During all testing, system components were manipulated within the confines of typical usage to maximize each emission. All Modulation (QPSK,16QAM and 64QAM) modes were tested.
The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	**+ 15 ℃ to + 35 ℃**
Relative humidity:	**30 % to 60 %**
Air pressure	**860 mbar to 1060 mbar**

4. TEST EQUIPMENT

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	296	09/23/2011
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	147	04/13/2012
Schwarzbeck	VULB 9168 / TRILOG Antenna	9168-200	02/19/2013
HD	MA240 / Antenna Position Tower	556	N/A
EMCO	1050 / Turn Table	114	N/A
HD GmbH	HD 100 / Controller	13	N/A
HD GmbH	KMS 560 / SlideBar	12	N/A
MITEQ	AMF-6D-001180-35-20P/AMP	990893	05/02/2012
EMCO	6502/Loop Antenna	9009-2536	01/13/2012
Agilent	N9020A /Signal Analyzer	MY51110020	04/16/2012
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	639	11/12/2011

5. CONDUCTED OUTPUT POWER

5.1. Applicable Standard

According to FCC §2.1046 & 24.232

(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

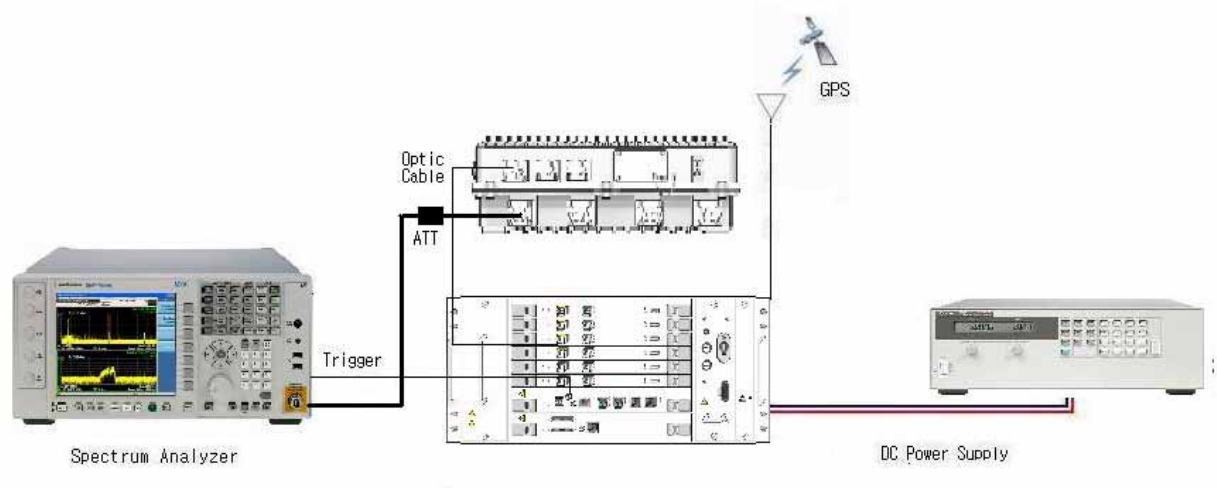
5.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	MY51110020	04/16/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	639	11/12/2011
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012

5.3. Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. According to FCC §2.1046 (a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

1) The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The lost of the cables the test system is calibrated to correct the reading.
2) The spectrum analyzer was set to RMS Detector function and Average mode.
3) The resolution banswidth of the spectrum analyzer was comparable to the emission bandwidth.
4) The conducted emission level is meaured at each antenna port and then summed mathmatically to determine the total emission level from the device.
   (160 W = 4 x 40 W / Port)



5.4. Test Result

: PASS (Power boost mode was tested on.)

[1 Carrier / 1 Port]

5.4.1. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1932.5	39.95	9.8855
	Middle	1962.5	39.93	9.8401
	High	1992.5	40.04	10.0925
16QAM	Low	1932.5	40.51	11.2460
	Middle	1962.5	40.04	10.0925
	High	1992.5	40.12	10.2802
64QAM	Low	1932.5	40.05	10.1158
	Middle	1962.5	39.95	9.8855
	High	1992.5	40.14	10.3276

5.4.2. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			DBm	W
QPSK	Low	1932.5	40.22	10.5196
	Middle	1962.5	40.15	10.3514
	High	1992.5	40.73	11.8304
16QAM	Low	1932.5	40.25	10.5925
	Middle	1962.5	39.92	9.8175
	High	1992.5	40.88	12.2462
64QAM	Low	1932.5	40.22	10.5196
	Middle	1962.5	40.06	10.1391
	High	1992.5	40.65	11.6145

5.4.3. Test Data at Output Port 2

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1932.5	39.89	9.7499
	Middle	1962.5	39.93	9.8401
	High	1992.5	40.02	10.0462
16QAM	Low	1932.5	39.79	9.5280
	Middle	1962.5	40.03	10.0693
	High	1992.5	40.09	10.2094
64QAM	Low	1932.5	39.78	9.5060
	Middle	1962.5	40.00	10.0000
	High	1992.5	40.02	10.0462

5.4.4. Test Data at Output Port 3

Modulation	Channel	Frequency	Measured Output Power	
			DBm	W
QPSK	Low	1932.5	40.13	10.3039
	Middle	1962.5	39.71	9.3541
	High	1992.5	40.07	10.1625
16QAM	Low	1932.5	40.54	11.3240
	Middle	1962.5	39.76	9.4624
	High	1992.5	40.07	10.1625
64QAM	Low	1932.5	40.52	11.2720
	Middle	1962.5	39.80	9.5499
	High	1992.5	39.94	9.8628

[4 Carriers / 1 Port]

5.4.5. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Middle	1962.5	45.92	39.0841
16QAM			45.92	39.0841
64QAM			45.94	39.2645

5.4.6. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Middle	1962.5	46.10	40.7380
16QAM			46.10	40.7380
64QAM			46.07	40.4576

5.4.7. Test Data at Output Port 2

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Middle	1962.5	46.22	41.8794
16QAM			46.23	41.9759
64QAM			46.26	42.2669

5.4.8. Test Data at Output Port 3

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Middle	1962.5	45.74	37.4973
16QAM			45.76	37.6704
64QAM			45.77	37.7572

5.4.9. Measure and sum data

Modulation	Channel	Frequency	Measured Output Power
			W
QPSK	Middle	1962.5	159.1988
16QAM			159.4684
64QAM			159.7462

5.5.1. Plot Data for 1 Carrier , Output Port 0

(QPSK Low Channel)

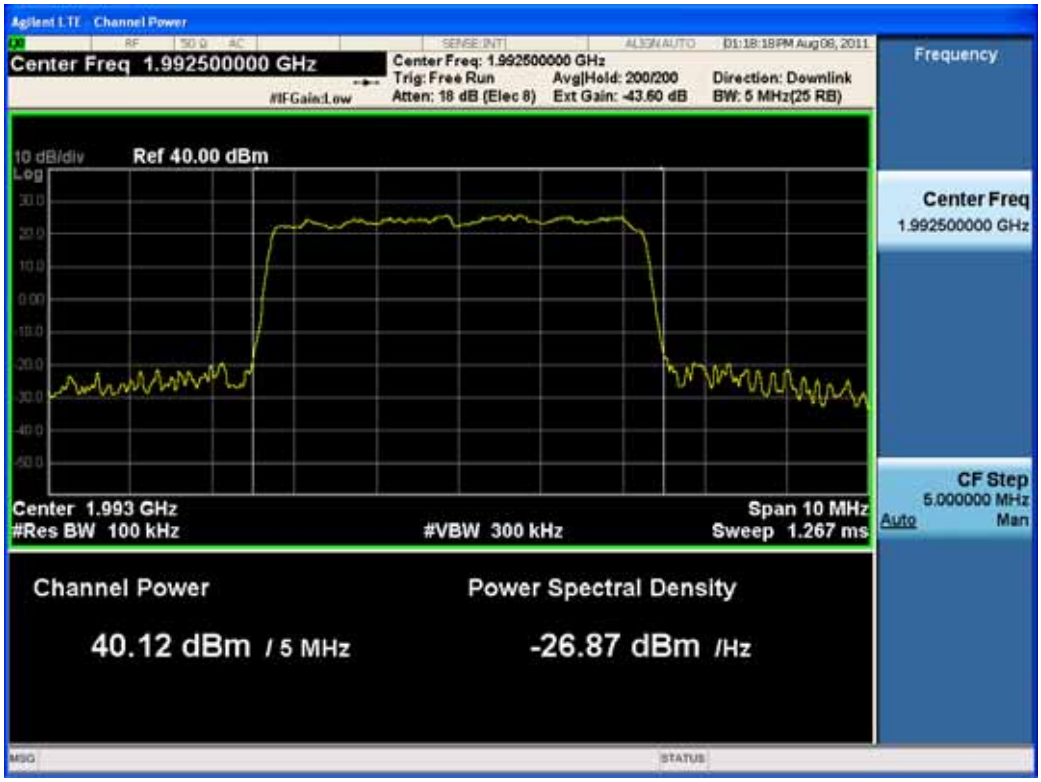
(QPSK Middle Channel)

(QPSK High Channel)

(16QAM Low Channel)

(16QAM Middle Channel)

(16QAM High Channel)



(64QAM Low Channel)

(64QAM Middle Channel)

(64QAM High Channel)

5.5.2. Plot Data for 1 Carrier , Output Port 1

(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)

(16QAM Low Channel)

(16QAM Middle Channel)

(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)

(64QAM High Channel)

5.5.3. Plot Data for 1 Carrier , Output Port 2

(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)

(16QAM Low Channel)

(16QAM Middle Channel)

(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)

(64QAM High Channel)

5.5.4. Plot Data for 1 Carrier , Output Port 3

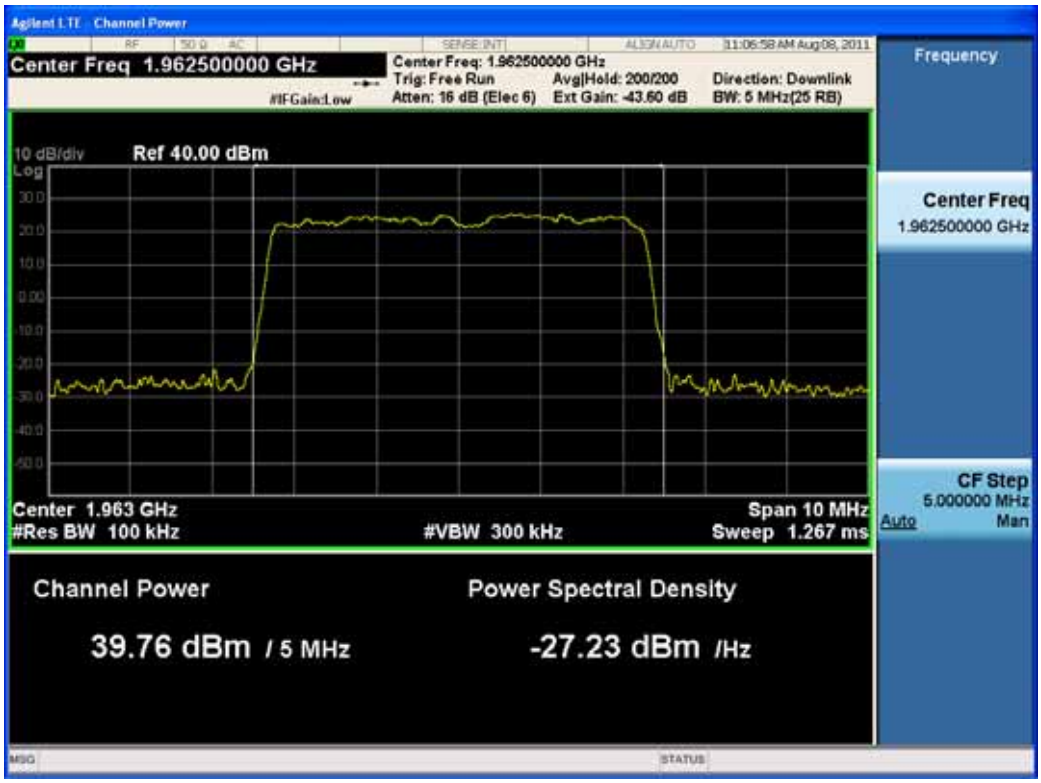
(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)

(16QAM Low Channel)

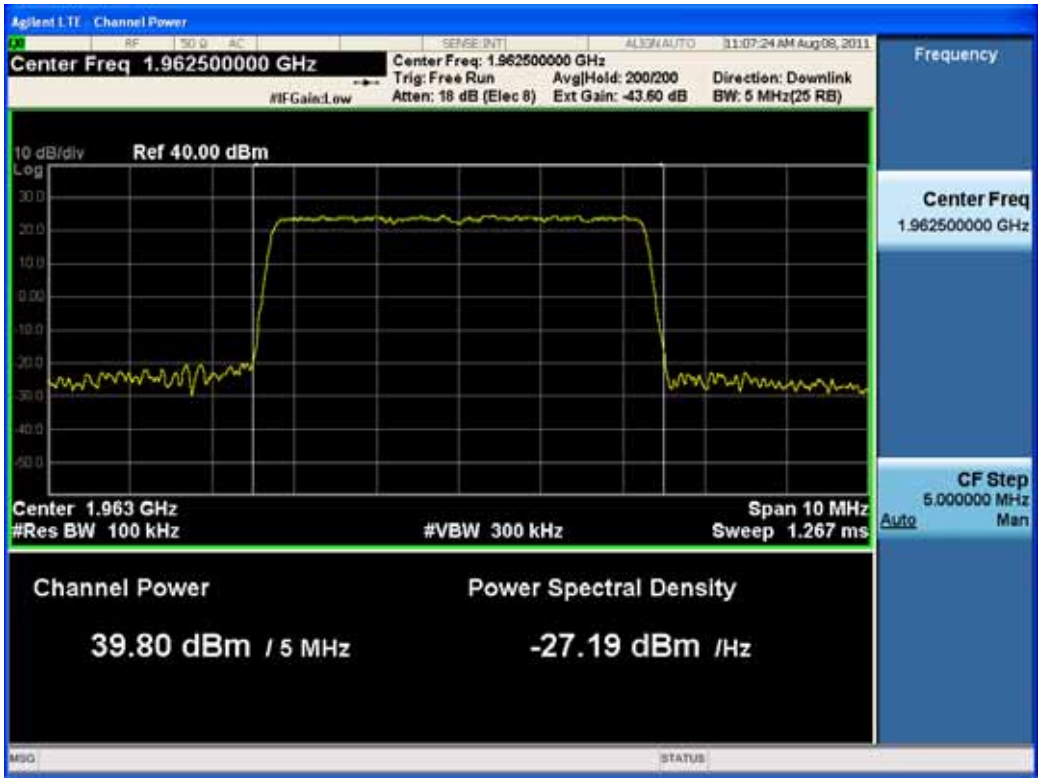
(16QAM Middle Channel)



(16QAM High Channel)

(64QAM Low Channel)

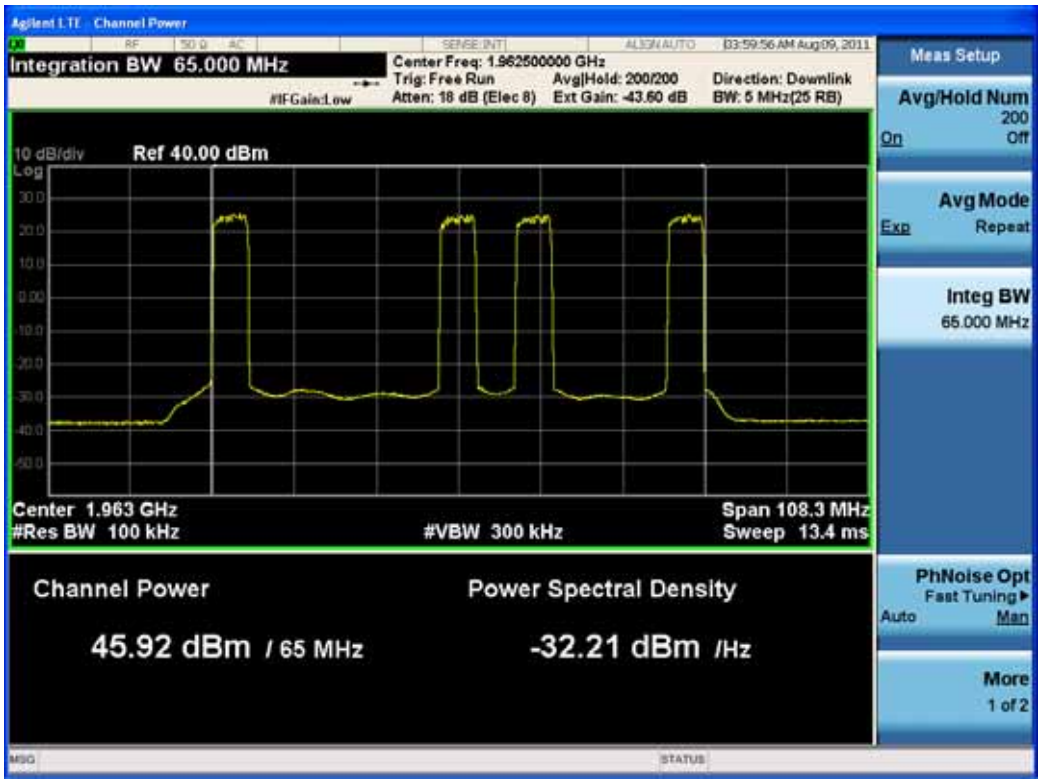
(64QAM Middle Channel)



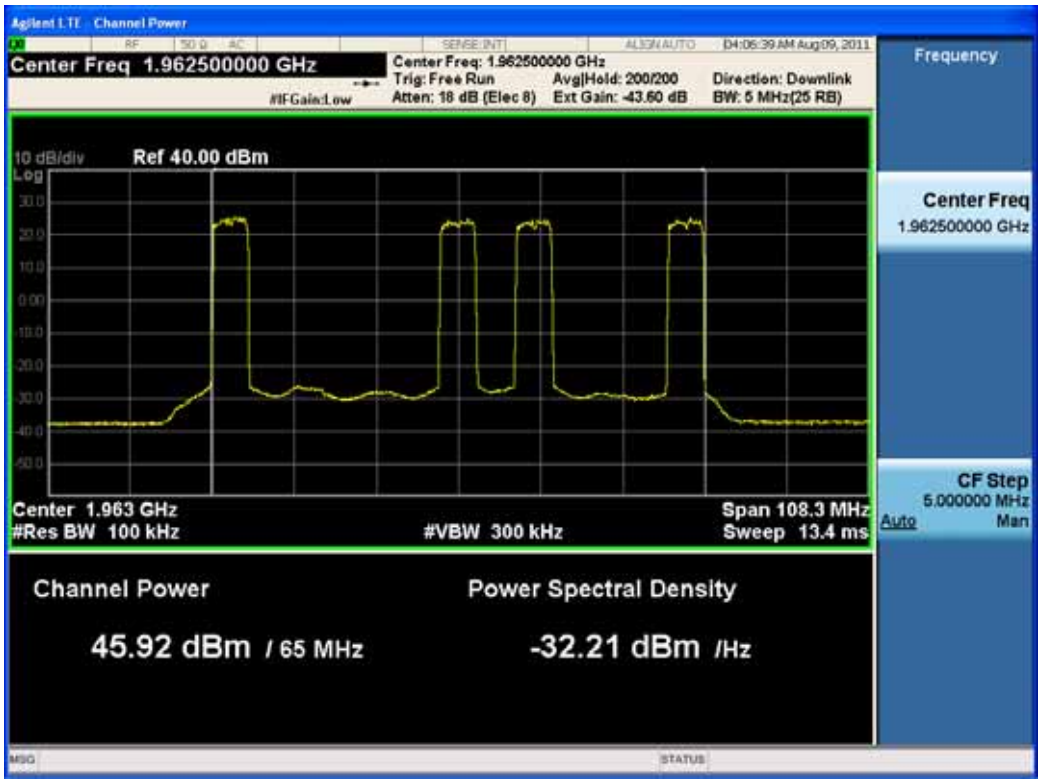
(64QAM High Channel)

5.5.5. Plot Data for 4 Carriers , Output Port 0

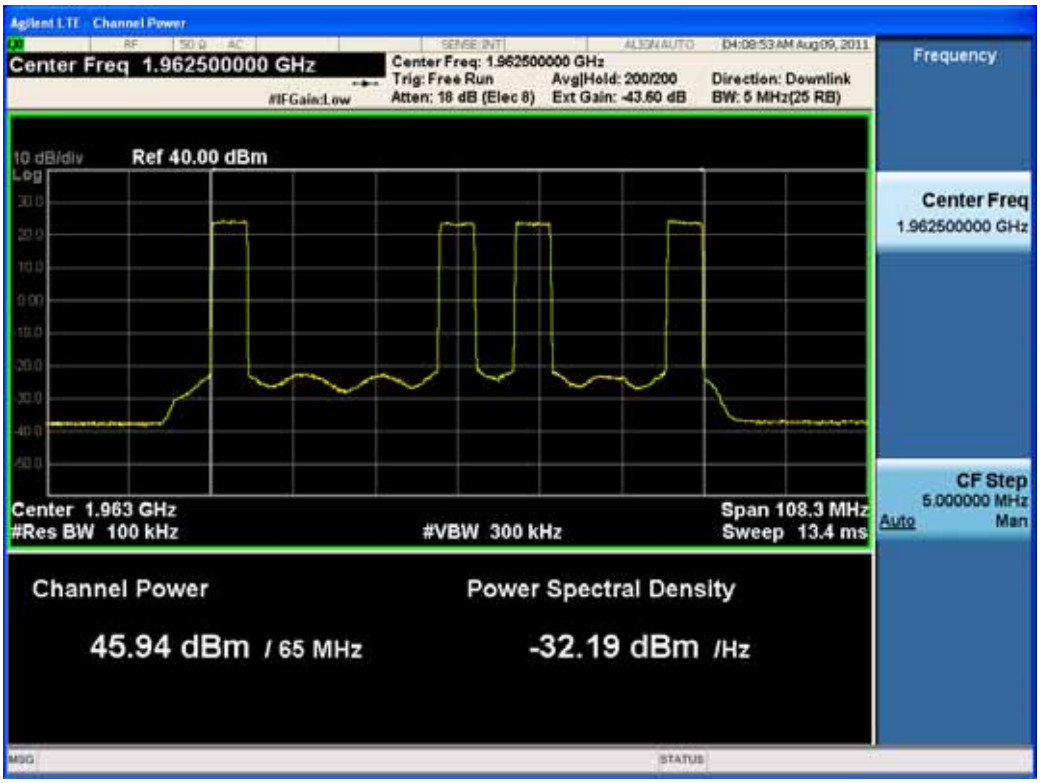
(QPSK Channel)



(16QAM Channel)



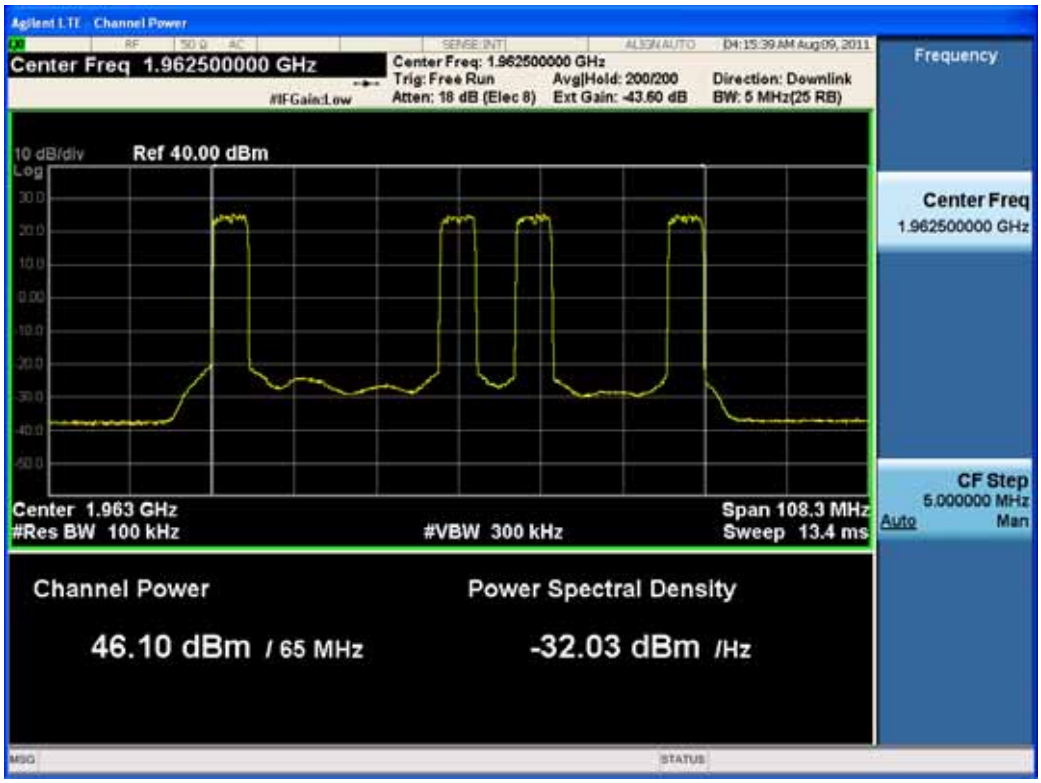
(64QAM Channel)



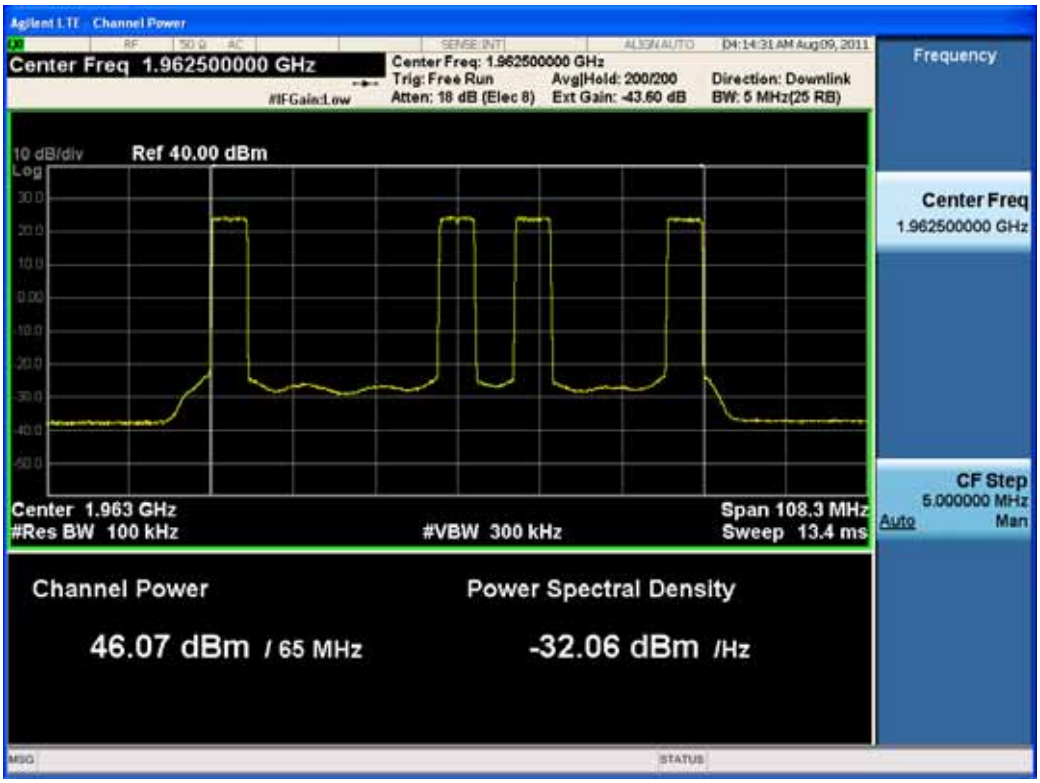
5.5.6. Plot Data for 4 Carriers , Output Port 1

(QPSK Channel)

(16QAM Channel)



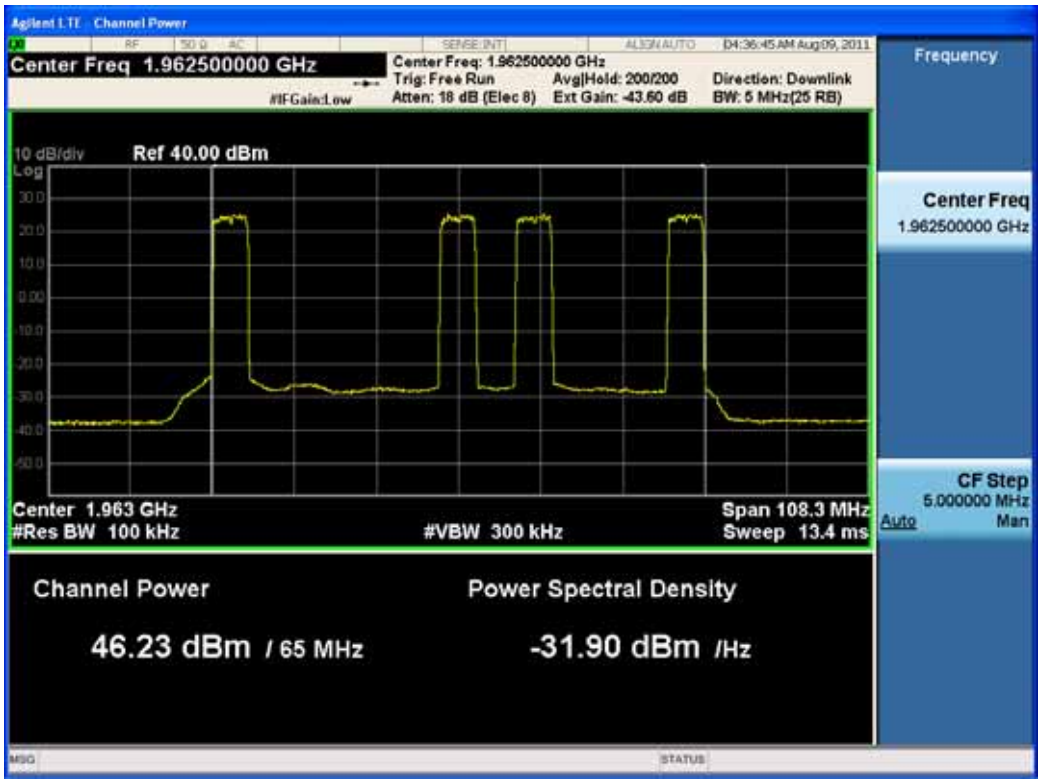
(64QAM Channel)



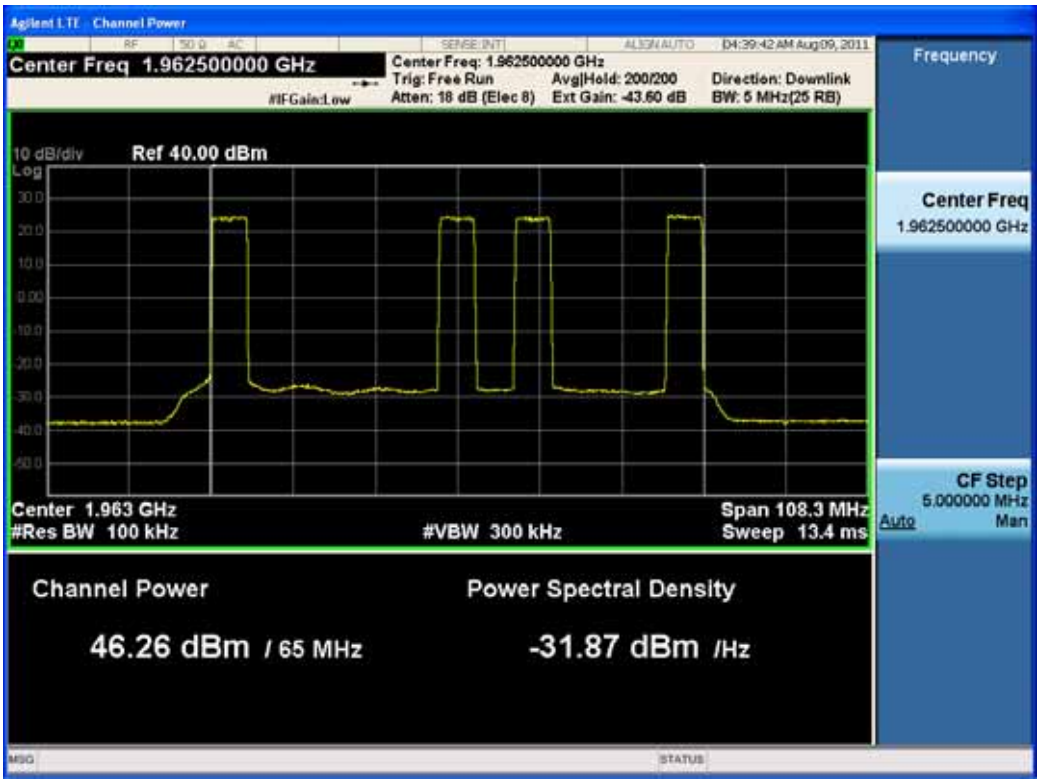
5.5.7. Plot Data for 4 Carriers , Output Port 2

(QPSK Channel)

(16QAM Channel)

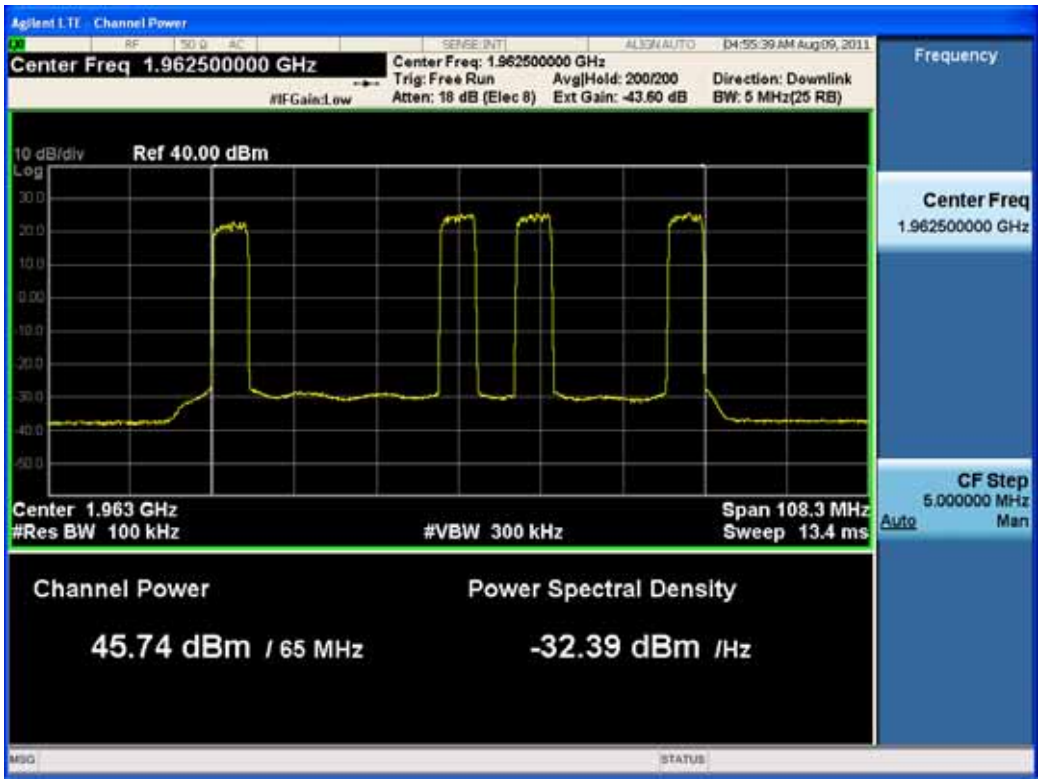


(64QAM Channel)

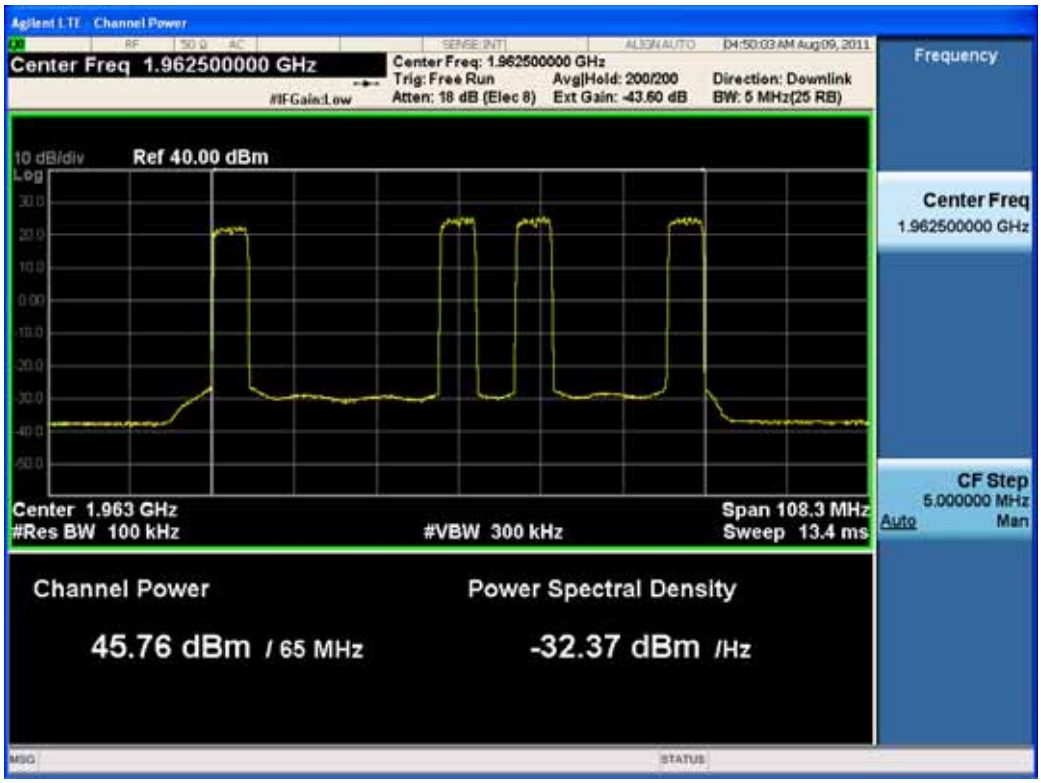


5.5.8. Plot Data for 4 Carriers , Output Port 3

(QPSK Channel)



(16QAM Channel)



(64QAM Channel)

6. OCCUPIED BANDWIDTH

6.1. Applicable Standard

According to FCC §2.1049

The OBW, 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 under the following conditions as applicable:

(g) Transmitter in which the modulating baseband comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer ’s maximum rated condition

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user

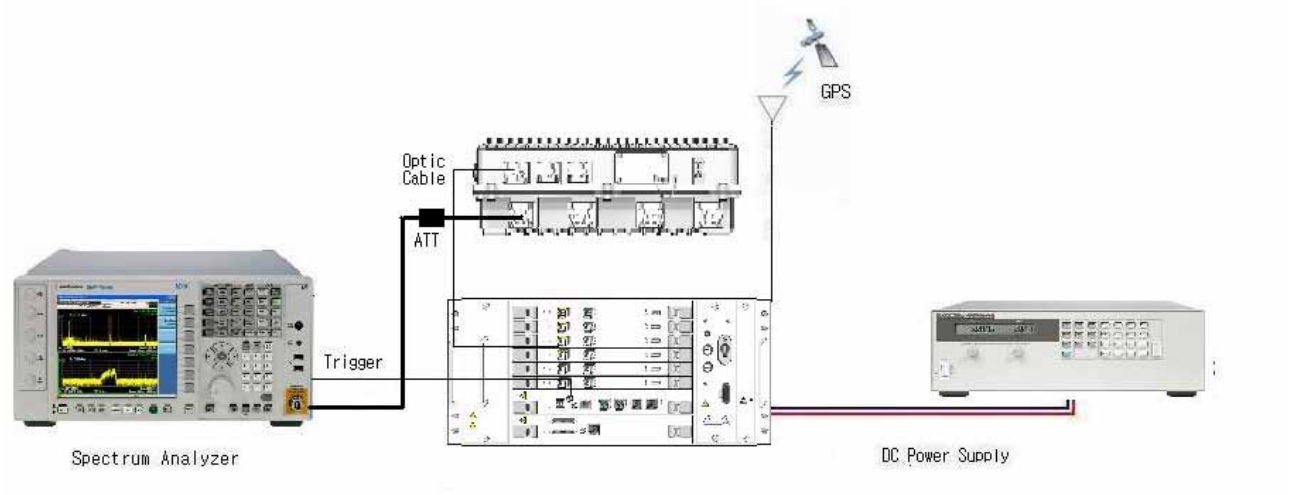
6.2.Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	MY51110020	04/16/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	639	11/12/2011
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012

6.3. Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The EUT was connected to a spectrum analyzer enabled with an occupied bandwidth function via its antenna port. Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels. The occupied bandwidth was measured using the built in occupied bandwidth function of the spectrum analyzer. It was set to measure the bandwidth where 99% of the signal power was contained. The analyzer automatically configures the measurement bandwidths to make an accurate measurement based on the channel bandwidth and channel spacing of the EUT.



6.4. Test Result

: PASS (Power boost mode was tested on.)

[1 Carrier / 1 Port]

6.4.1. Test Data at Output Port 0

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.765
	Middle	1962.5	4.747
	High	1992.5	4.754
16QAM	Low	1932.5	4.781
	Middle	1962.5	4.763
	High	1992.5	4.771
64QAM	Low	1932.5	4.790
	Middle	1962.5	4.792
	High	1992.5	4.797

6.4.2. Test Data at Output Port 1

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.767
	Middle	1962.5	4.757
	High	1992.5	4.753
16QAM	Low	1932.5	4.772
	Middle	1962.5	4.793
	High	1992.5	4.788
64QAM	Low	1932.5	4.794
	Middle	1962.5	4.791
	High	1992.5	4.796

6.4.3. Test Data at Output Port 2

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.763
	Middle	1962.5	4.759
	High	1992.5	4.776
16QAM	Low	1932.5	4.770
	Middle	1962.5	4.776
	High	1992.5	4.776
64QAM	Low	1932.5	4.795
	Middle	1962.5	4.786
	High	1992.5	4.795

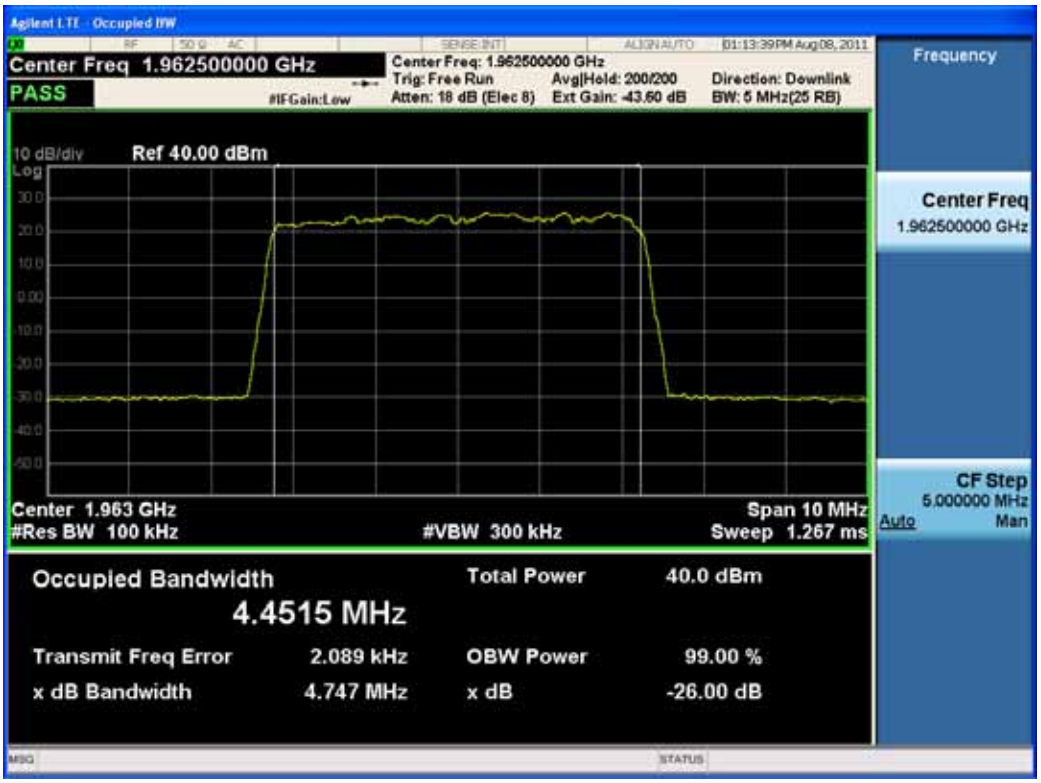
6.4.4. Test Data at Output Port 3

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.767
	Middle	1962.5	4.771
	High	1992.5	4.770
16QAM	Low	1932.5	4.765
	Middle	1962.5	4.769
	High	1992.5	4.785
64QAM	Low	1932.5	4.801
	Middle	1962.5	4.787
	High	1992.5	4.778

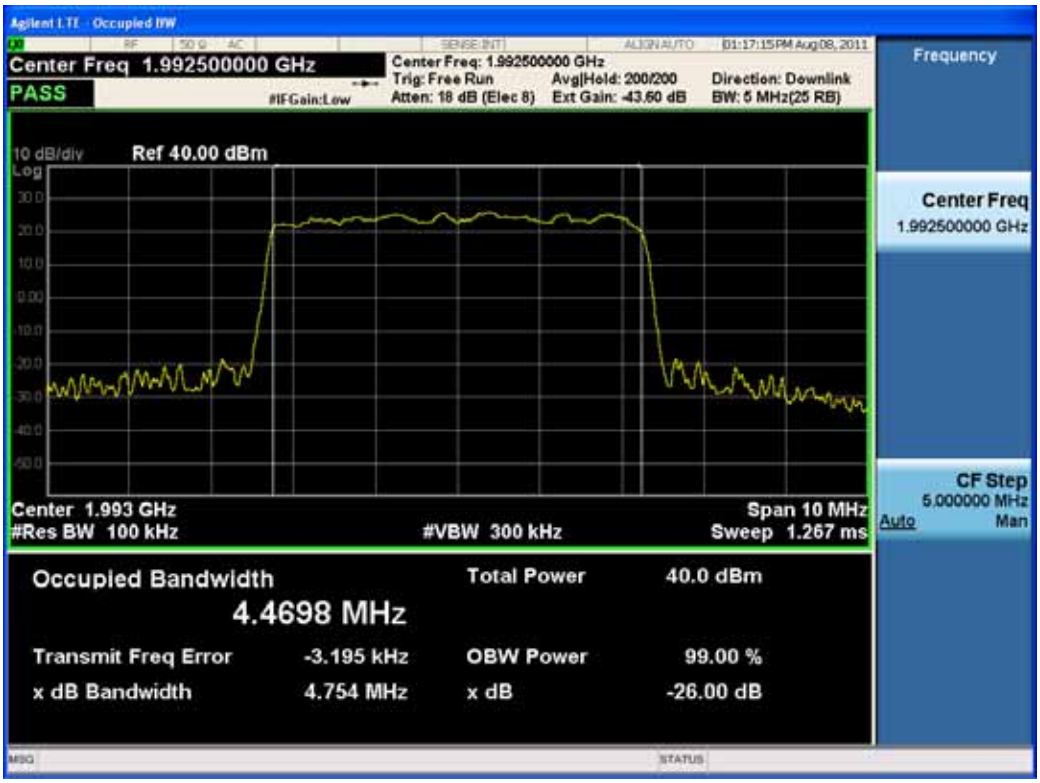
6.5.1. Plot Data for 1 Carrier , Output Port 0

(QPSK Low Channel)

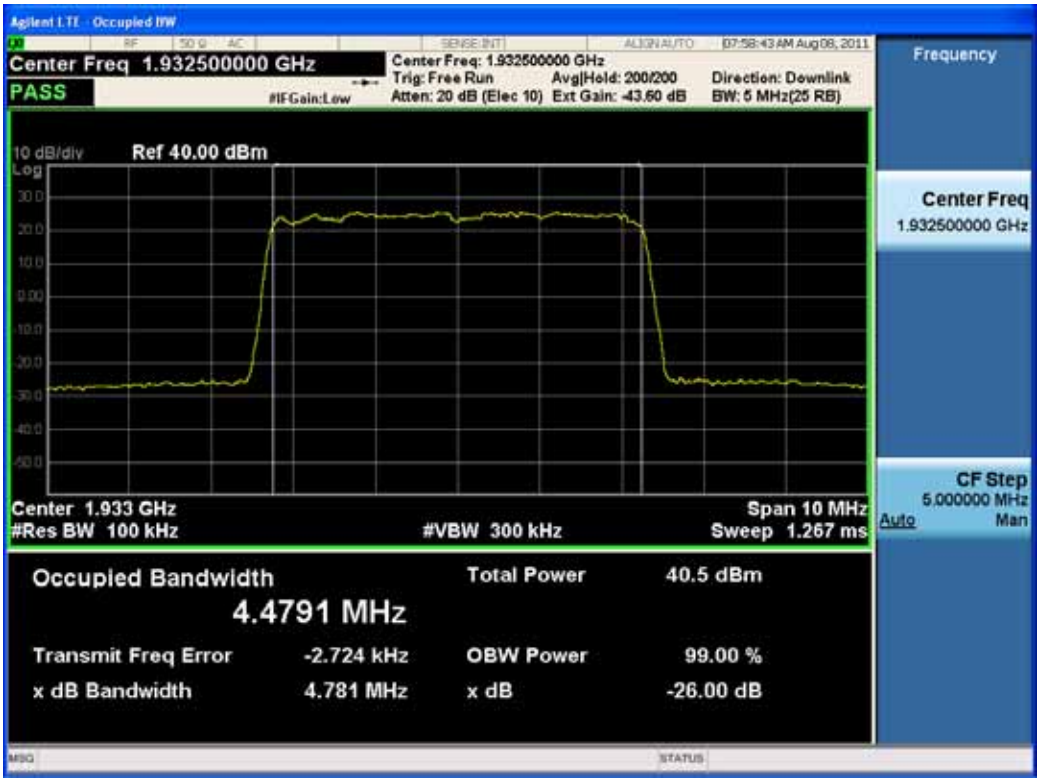
(QPSK Middle Channel)



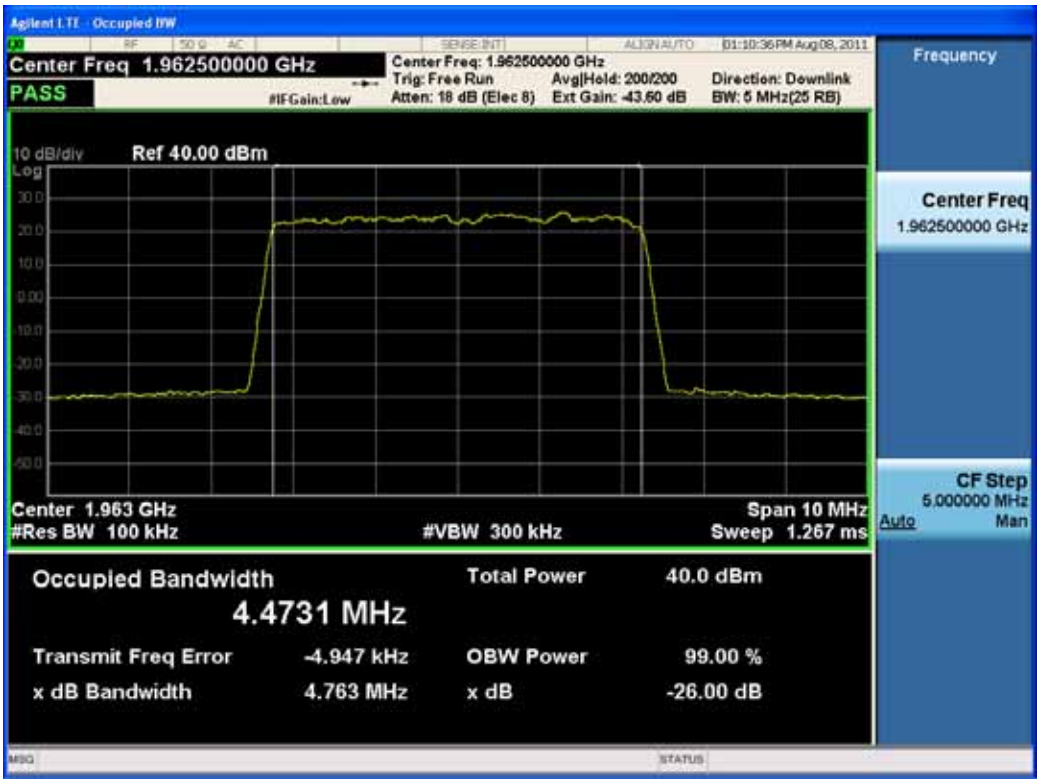
(QPSK High Channel)



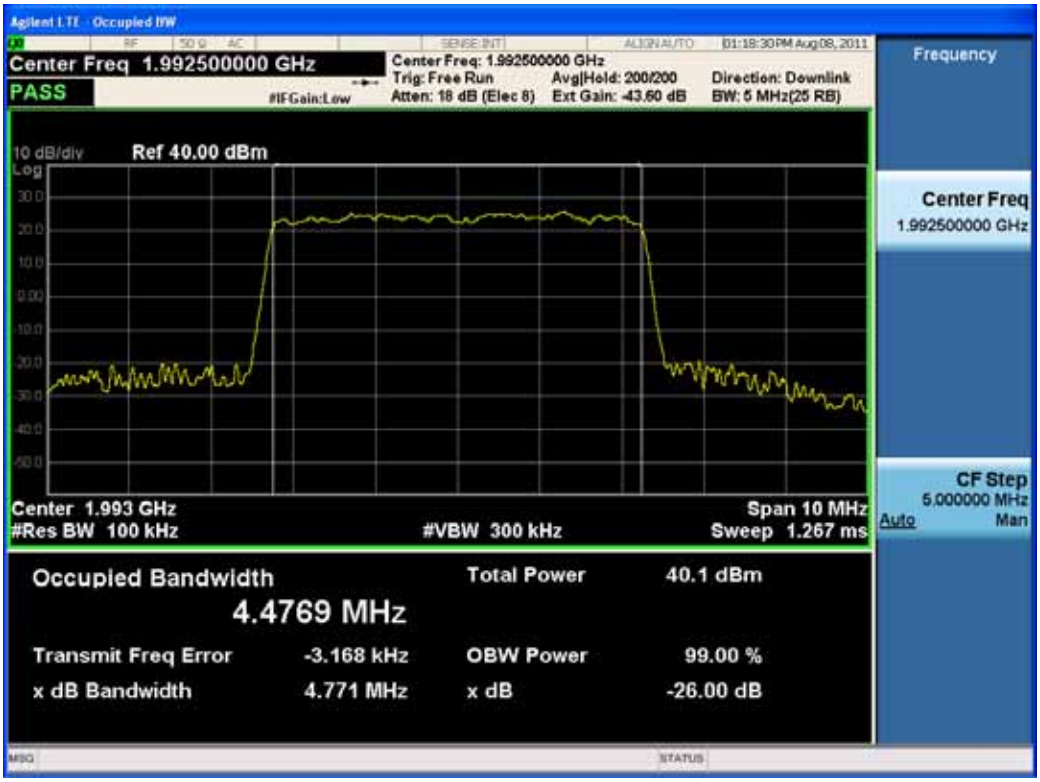
(16QAM Low Channel)



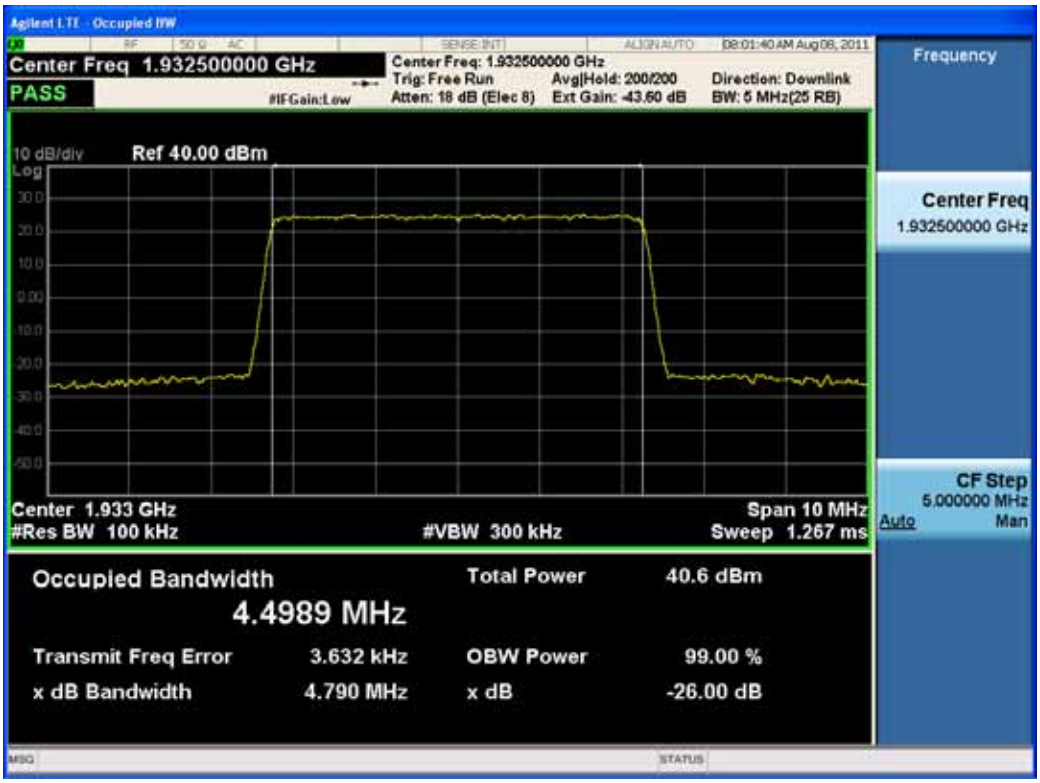
(16QAM Middle Channel)



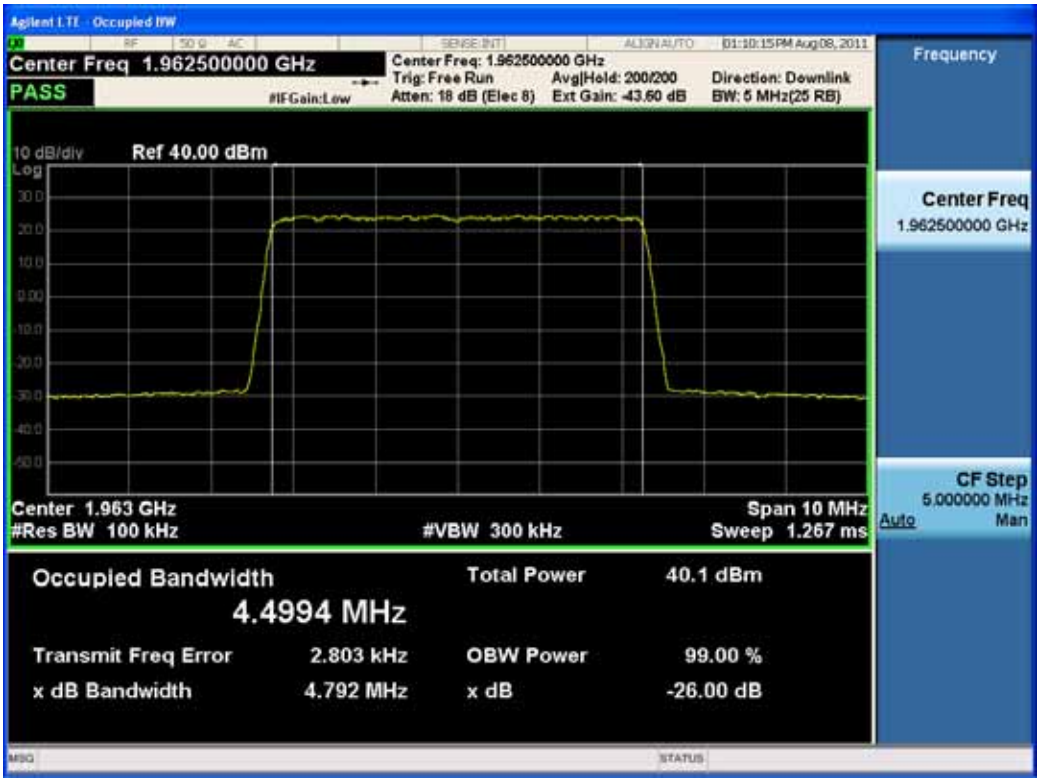
(16QAM High Channel)



(64QAM Low Channel)



(64QAM Middle Channel)



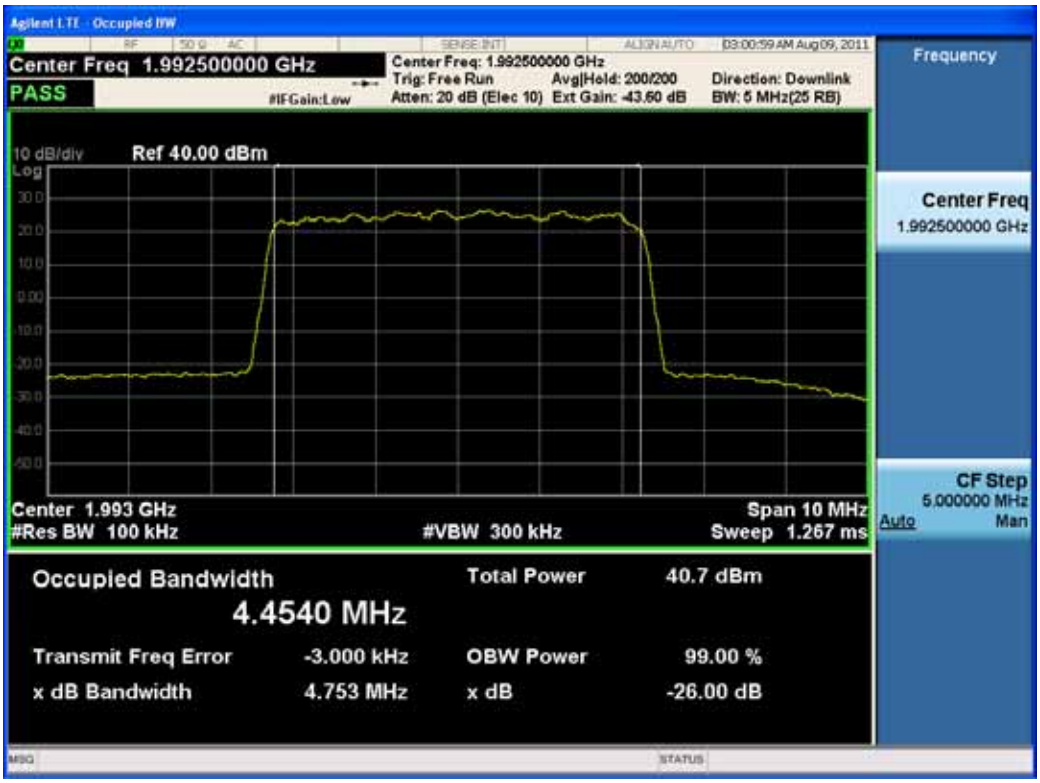
(64QAM High Channel)

6.5.2. Plot Data for 1 Carrier , Output Port 1

(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)



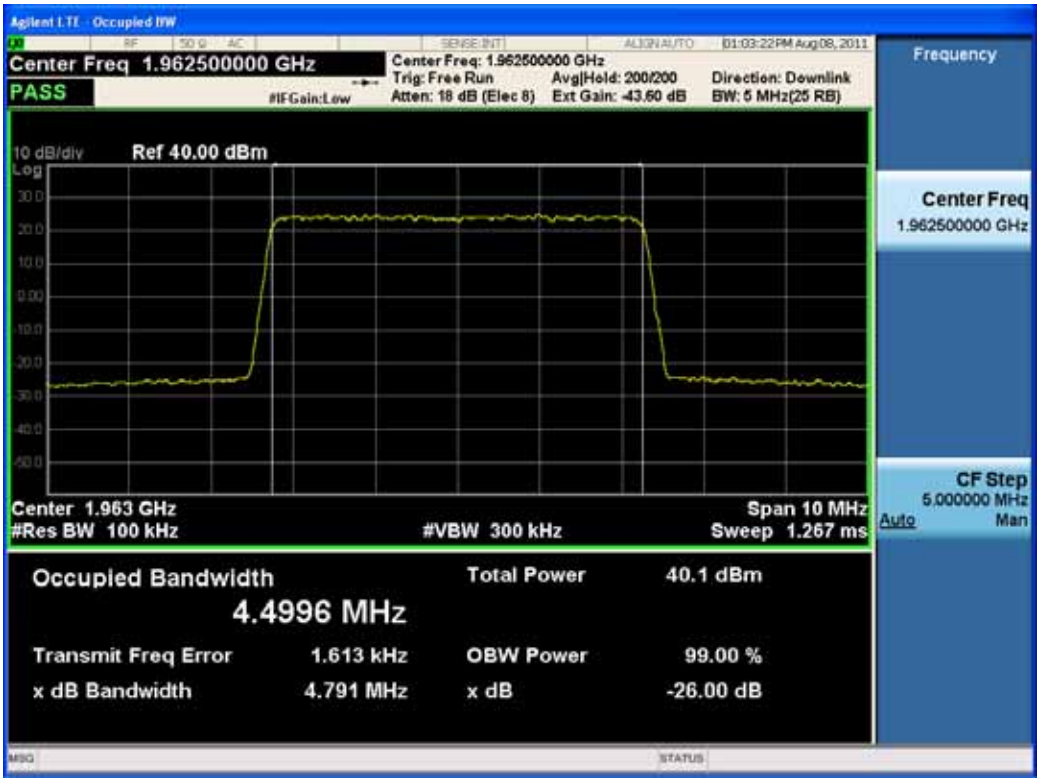
(16QAM Low Channel)

(16QAM Middle Channel)

(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)



(64QAM High Channel)

6.5.3. Plot Data for 1 Carrier , Output Port 2

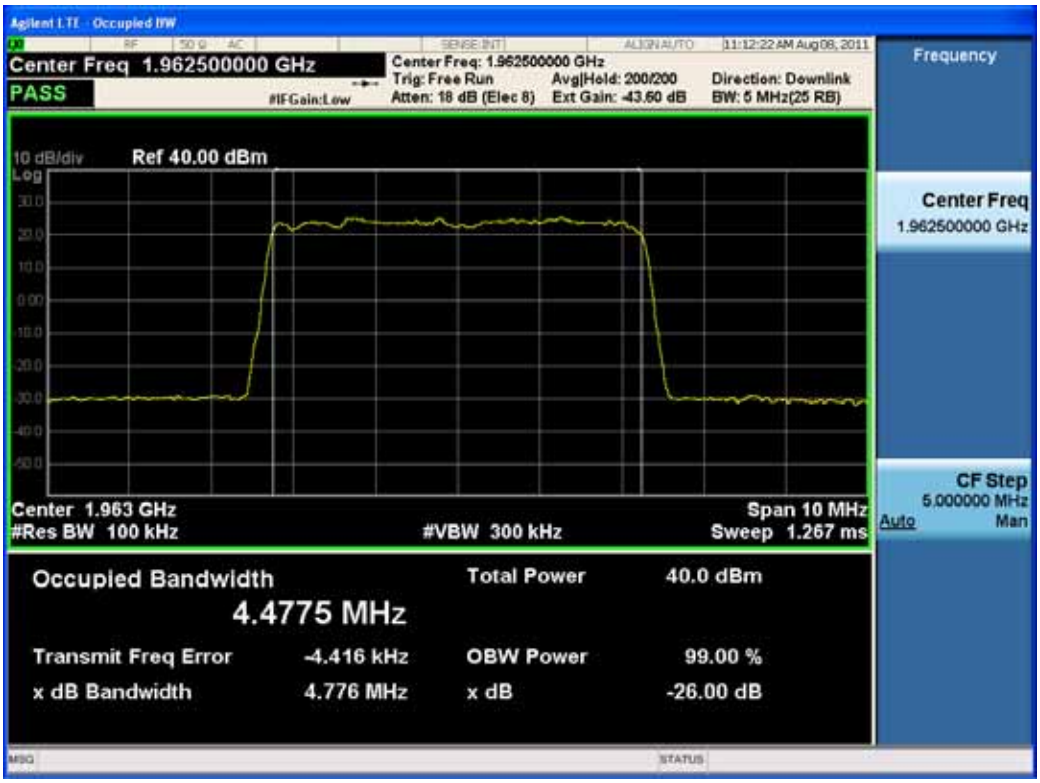
(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)

(16QAM Low Channel)

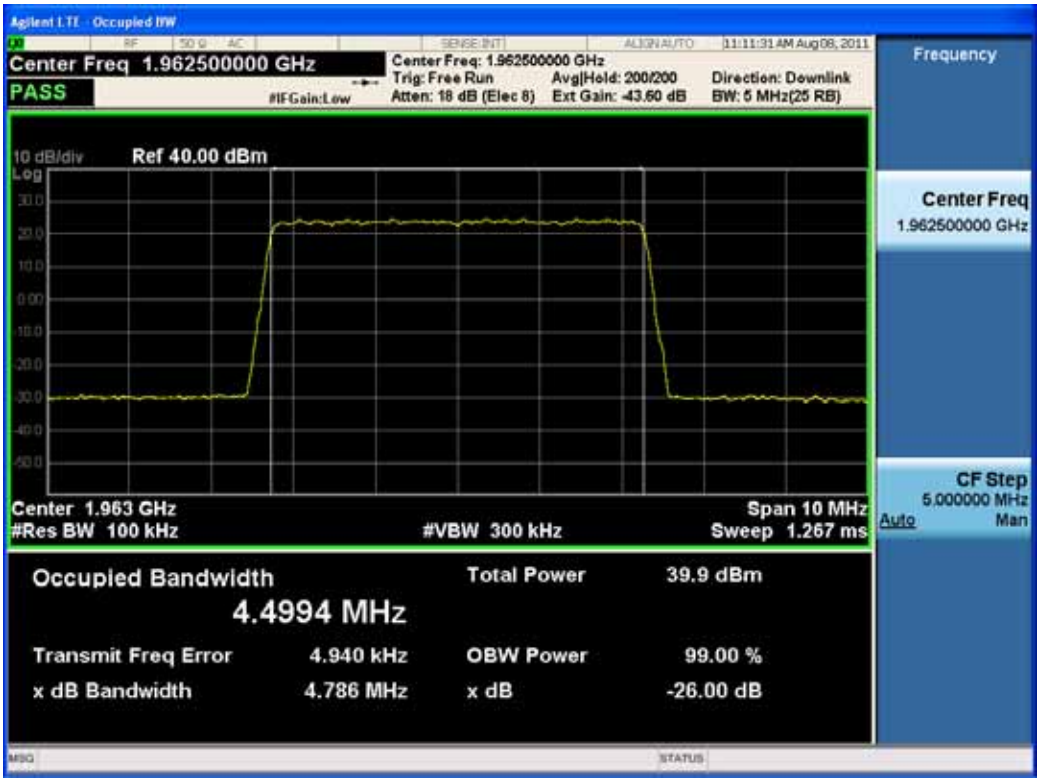
(16QAM Middle Channel)



(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)



(64QAM High Channel)

6.5.4. Plot Data for 1 Carrier , Output Port 3

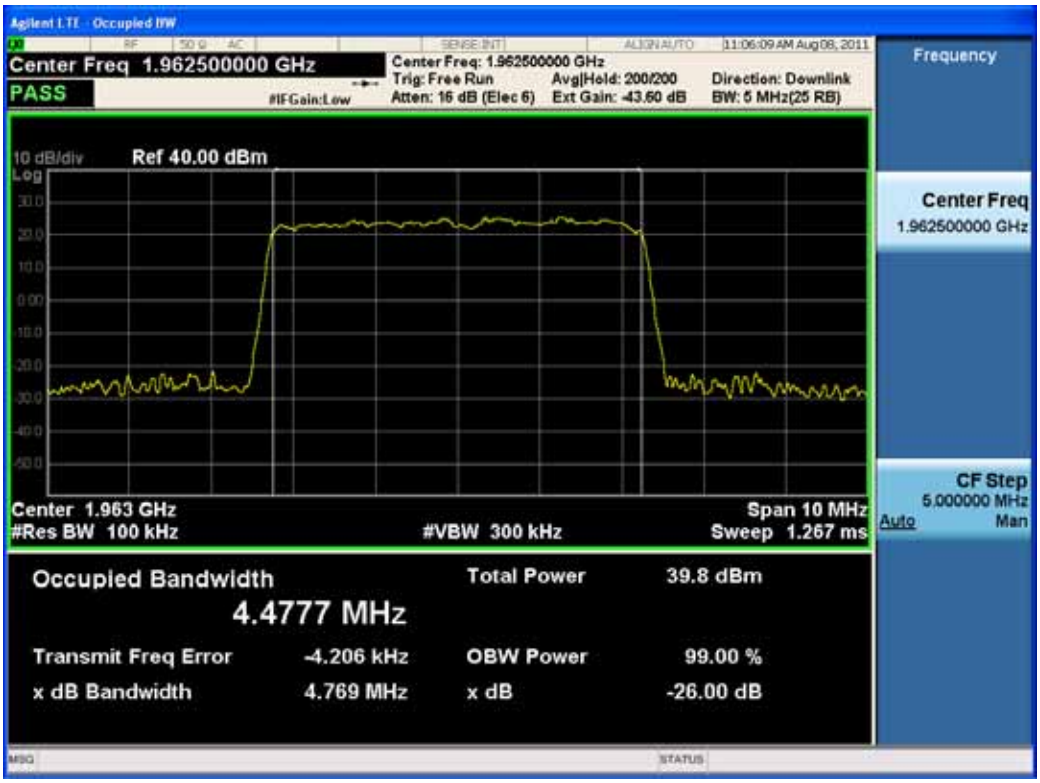
(QPSK Low Channel)

(QPSK Middle Channel)

(QPSK High Channel)

(16QAM Low Channel)

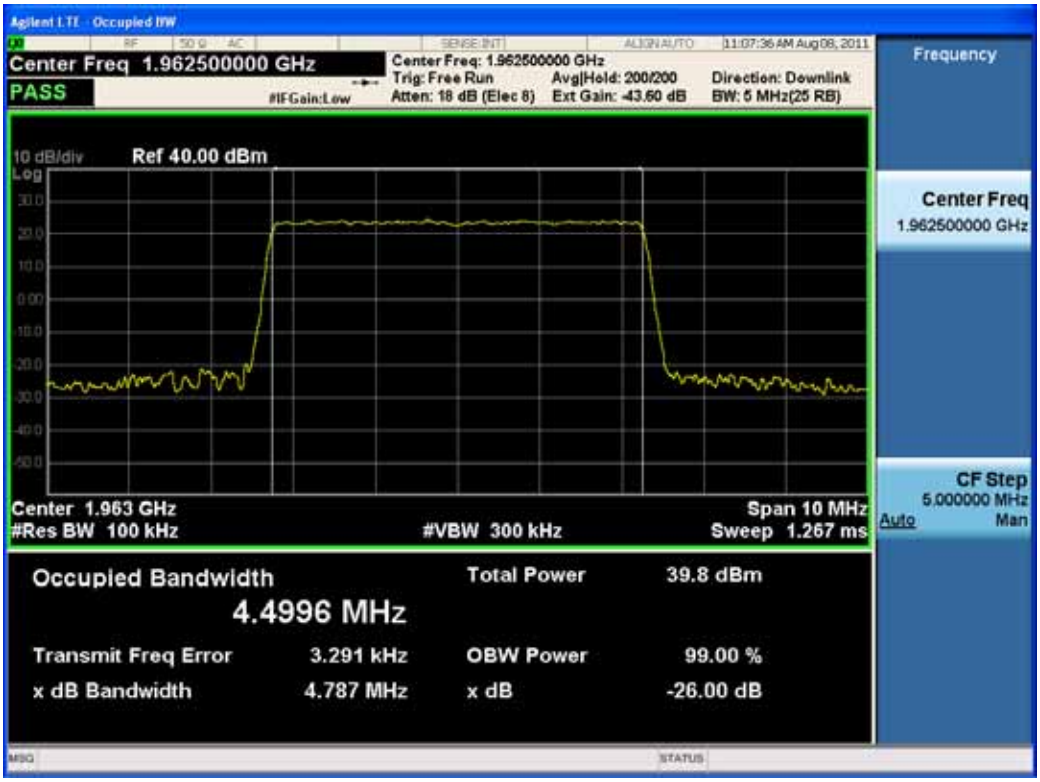
(16QAM Middle Channel)



(16QAM High Channel)

(64QAM Low Channel)

(64QAM Middle Channel)



(64QAM High Channel)