



HCT CO., LTD.

CERTIFICATION DIVISION

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

TEL : +82 31 645 6300 FAX : +82 31 645 6401 www.hct.co.kr

CERTIFICATE OF COMPLIANCE

FCC PART 24 Certification

Applicant Name:

(Maetan-dong) 129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 443-742,
Republic of Korea

Date of Issue: July 12, 2013

Test Site/Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-
myeon, Icheon-si, Gyeonggi-do Korea

Test Report No.: HCTR1307FR01-2

FCC ID : **A3LL7IU-B1C**

APPLICANT : **SAMSUNG Electronics Co., Ltd.**

EUT Type : Indoor Pico
Manufacturer : SAMSUNG Electronics Co., Ltd
Model name : L7IU-B1C
Frequency of Operation : 1 930 MHz ~ 1 995 MHz
TX Output Power : 500 mW (250 mW * 2)
FCC Rule Part(s) : FCC Part 24 Subpart E
Emission Designator : 4M53G7W(QPSK), 4M53D7W(16QAM/64QAM)
Test Procedure(s) : ANSI/TIA-603C-2004
Application Type : Original Equipment
Data of issue : July 11, 2013

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.

Report prepared by
: Yong Hyun Lee
Test engineer of RF Team

Approved by
: Chang Seok Choi
Manager of RF Team

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Revision

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1307FR01	July 01,2013	First Approval Report
HCTR1307FR01-1	July 03,2013	Update Calibration day
HCTR1307FR01-2	July 12, 2013	Band Edge : RBW change 47 kHz => 100 kHz

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1. GENERAL INFORMATION

1.1. CLIENT INFORMATION

Company	Samsung Electronics Co., Ltd.
Contact Point	(Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea
Contact person	Name: Hwan-Chul Ryu / Principal Research Engineer E-mail : <u>ryu0022@samsung.com</u> Tel: +82-31-279-1023 Fax: +82-31-279-7676

1.2. PRODUCT INFORMATION

EUT TYPE	Indoor Pico
EMISSION DESIGNATOR	4M53G7W(QPSK), 4M53D7W(16QAM/64QAM)
OPERATING FREQUENCY	1 930 MHz ~ 1 995 MHz
TX OUTPUT POWER	500 mW (250 mW * 2 Ports)
CHANNEL BANDWIDTH	LTE : 5 MHz
MODULATION TYPE	QPSK, 16QAM, 64QAM
MAXIMUM NUMBER OF CARRIERS/SECTORS	Max 1Carrier
SYSTEM INPUT VOLTAGE	External AC adapter (100~254 VAC)
Antenna Specification	ACE Technology / AEB-00012 DIPOLE ANTENNA : peak gain 2.5 dBi

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1.3. INTRODUCTION OF EUT

Indoor Pico Cell, an LTE eNB, is located between the UE and the EPC. It provides mobile communications services to subscribers according to the LTE air interface standard.

The Indoor Pico Cell transmits/receives radio signals to/from the UE and processes the modulation and demodulation of packet traffic signals. The Indoor Pico Cell is also responsible for packet scheduling and radio bandwidth allocation and performs handover via interface with the EPC.

The Indoor Pico Cell can be installed vertically or horizontally; and it can be installed on the wall, pole or rack by using the installation brackets. The Indoor Pico Cell is an all-in-one unit. If a fault occurs, the unit must be replaced with new one.

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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.

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3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+ 15 °C to + 35 °C
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	937	10/17/2013
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	296	02/20/2014
Schwarzbeck	VULB 9160 / TRILOG Antenna	3150	12/17/2014
REOHDE&SCHWARZ	FSV40/Spectrum Analyzer	1307.9002K40-100931-NK	06/10/2014
Wainwright	WHK3.3/18G-10EF/H.P.F	1	04/25/2014
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	09/11/2013
EMCO	6502/Loop Antenna	9009-2536	01/11/2014
Agilent	N9020A /Signal Analyzer	US46220219	04/25/2014
DAE YOUNG ELECTRIC & TECHNOLOGY	DFSS60 / AC Power Source	1003030-1	04/16/2014
HEWLETT PACKARD	8394C / Fixed Attenuator	10342	05/06/2014

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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

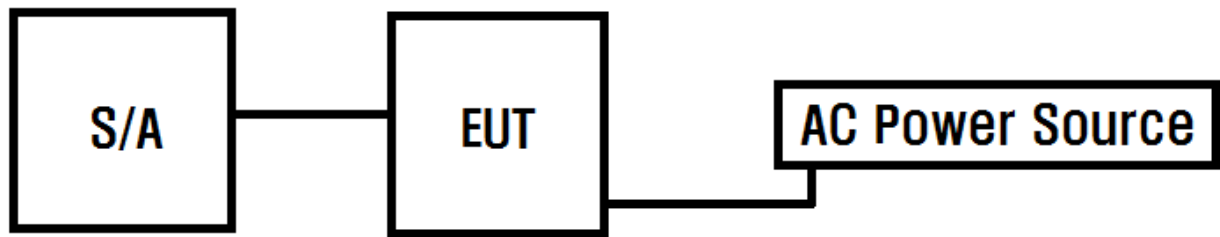
Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	04/25/2014
DAE YOUNG ELECTRIC & TECHNOLOGY	DFSS60 / AC Power Source	1003030-1	04/16/2014
HEWLETT PACKARD	8394C / Fixed Attenuator	10342	05/06/2014

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 loss 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 bandwidth of the spectrum analyzer was comparable to the emission bandwidth.
- 4) The conducted emission level is measured at each antenna port and then summed mathematically to determine the total emission level from the device. ($500 \text{ mW} = 250 \text{ mW} * 2 \text{ Ports}$)

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5.4. Test Result
: PASS

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[LTE 5 MHz : 1 Carrier / 1 Port]

. Test Data at Output Port 0

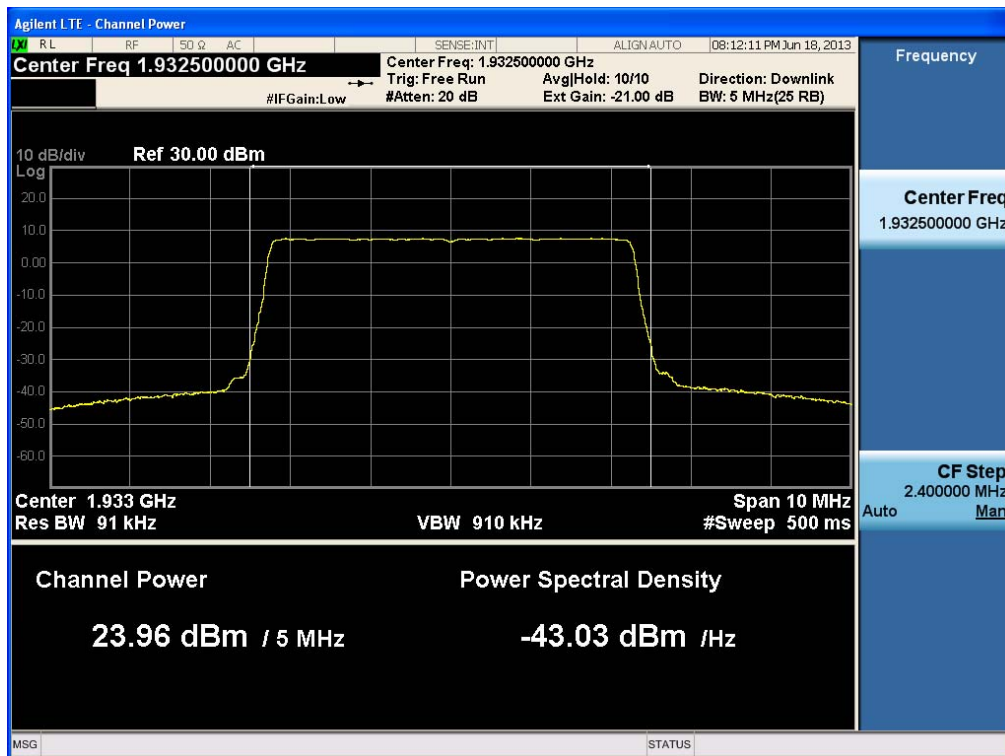
Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1932.5	23.96	0.249
	Middle	1962.5	24.08	0.256
	High	1992.5	23.92	0.247
16QAM	Low	1932.5	24.00	0.251
	Middle	1962.5	23.98	0.250
	High	1992.5	23.82	0.241
64QAM	Low	1932.5	23.99	0.251
	Middle	1962.5	24.02	0.252
	High	1992.5	24.02	0.252

. Test Data at Output Port 1

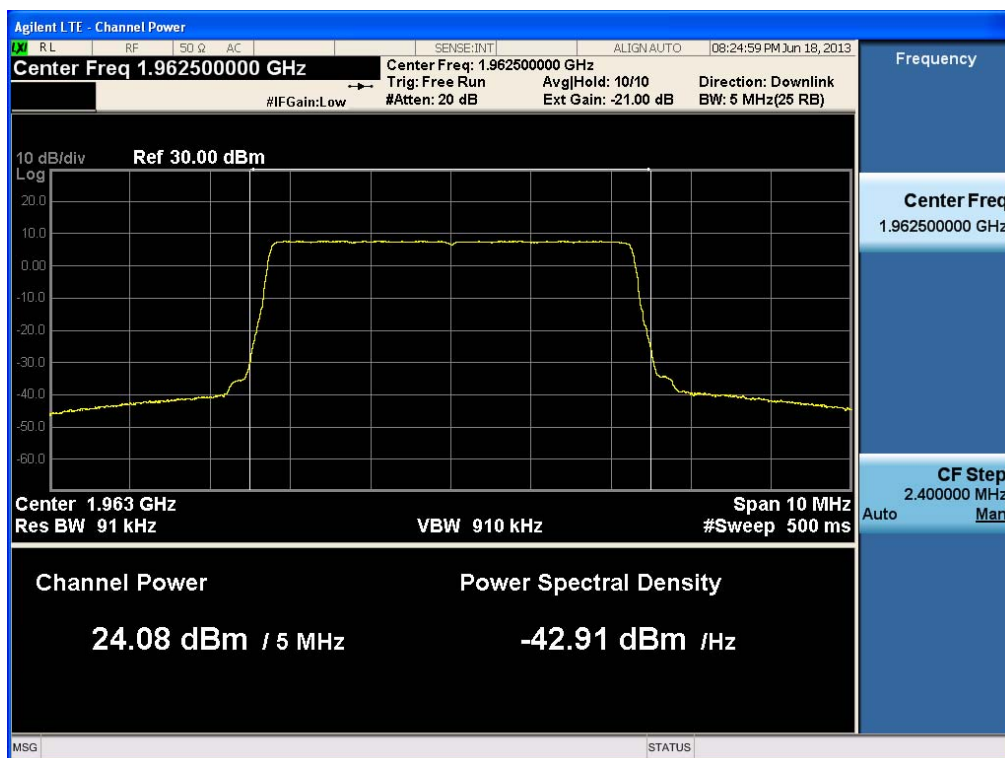
Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1932.5	23.77	0.238
	Middle	1962.5	23.95	0.248
	High	1992.5	23.78	0.239
16QAM	Low	1932.5	23.90	0.245
	Middle	1962.5	23.95	0.248
	High	1992.5	23.85	0.243
64QAM	Low	1932.5	23.98	0.250
	Middle	1962.5	23.98	0.250
	High	1992.5	23.94	0.248

. Plot Data for LTE 5 MHz : 1 Carrier , Output Port 0

(QPSK Low Channel)

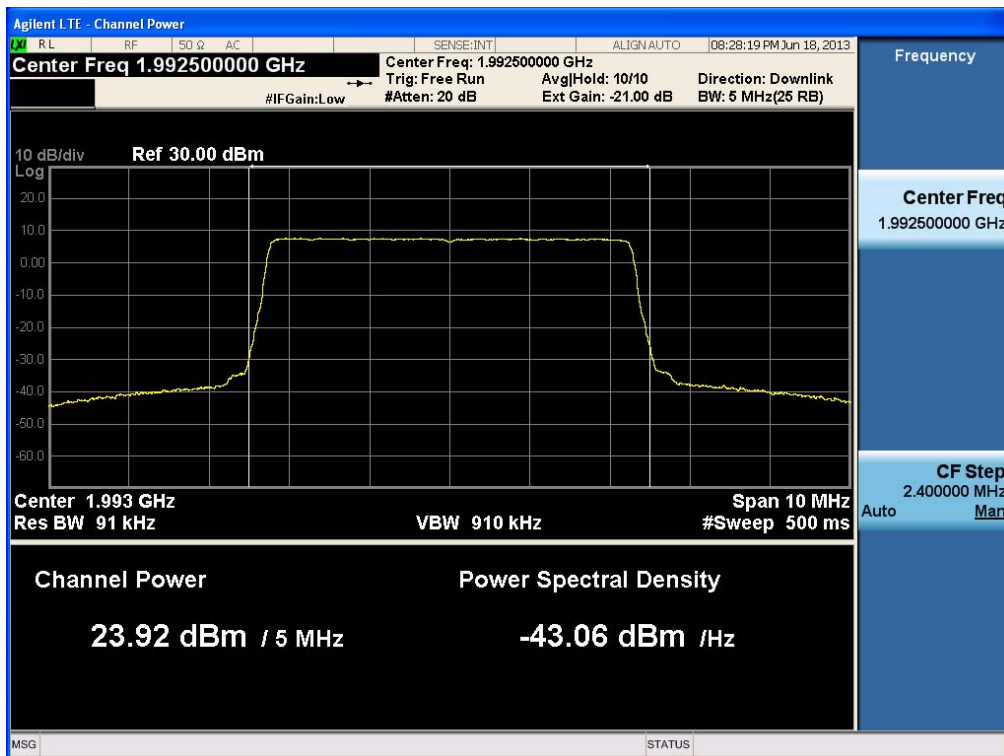


(QPSK Middle Channel)



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(QPSK High Channel)

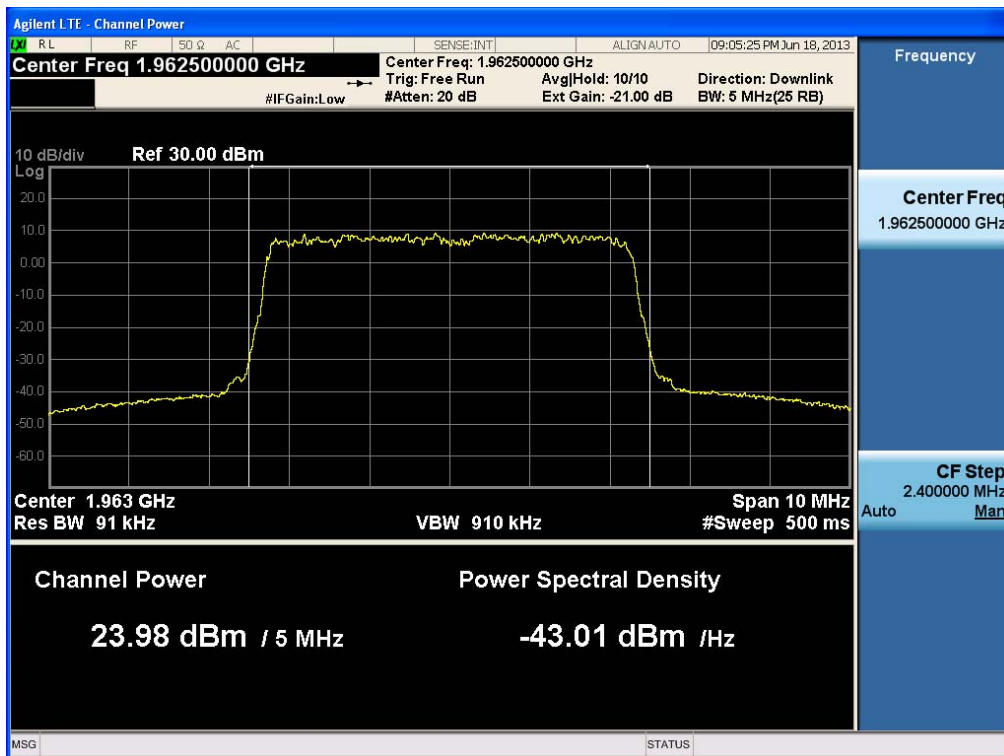


(16QAM Low Channel)

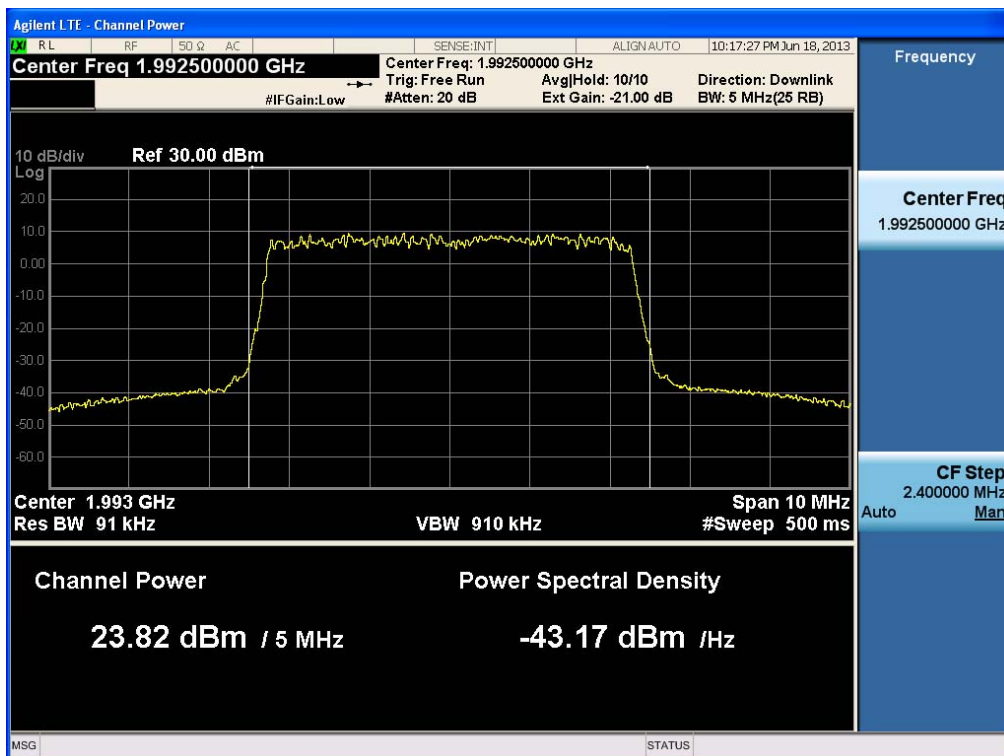


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(16QAM Middle Channel)

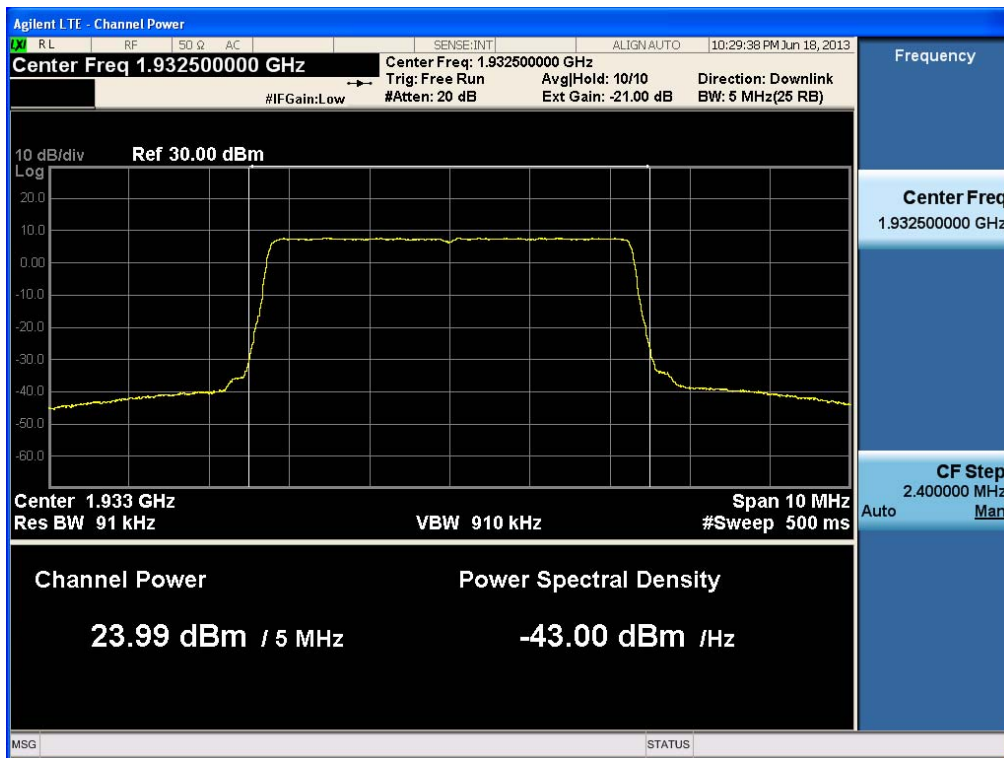


(16QAM High Channel)

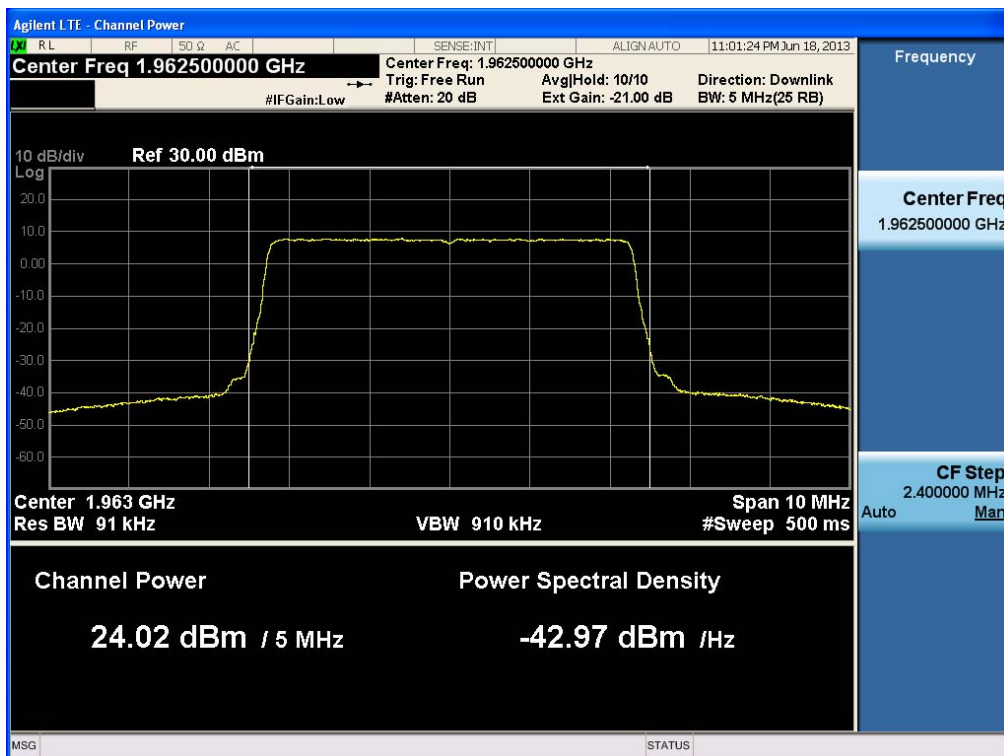


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(64QAM Low Channel)

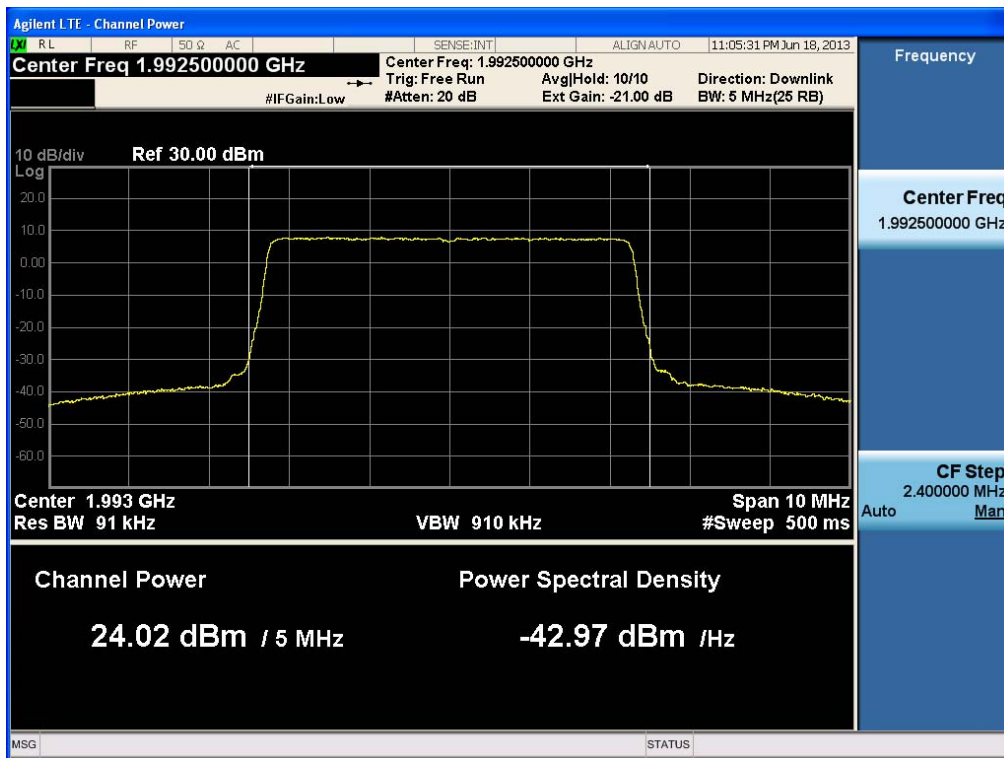


(64QAM Middle Channel)



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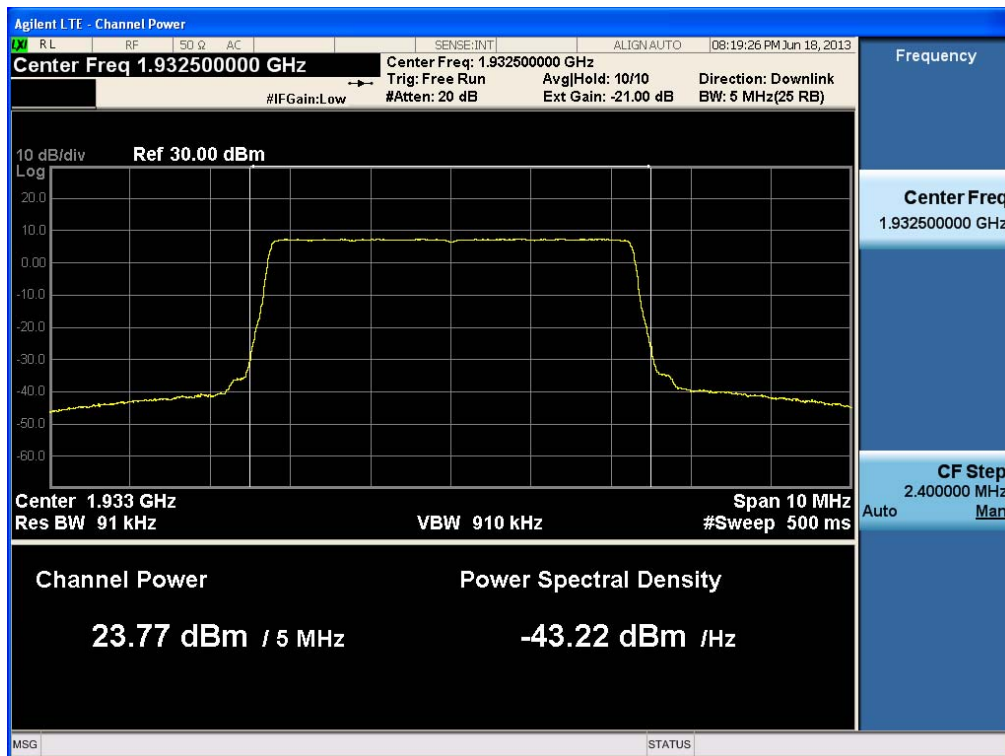
(64QAM High Channel)



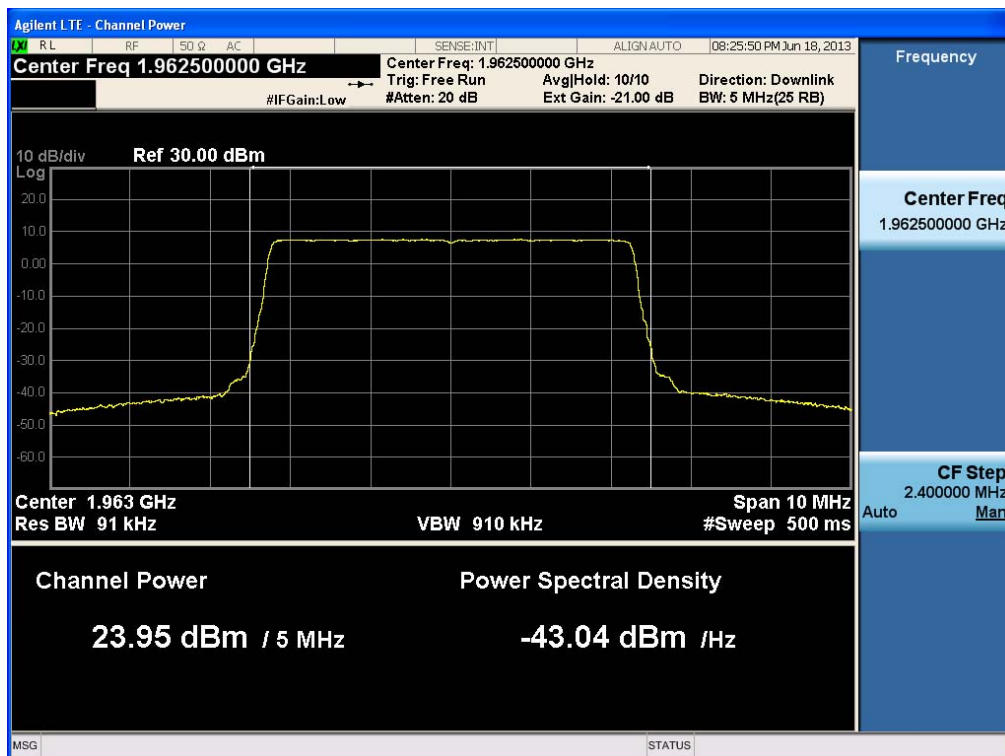
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. Plot Data for LTE 5 MHz : 1 Carrier , Output Port 1

(QPSK Low Channel)

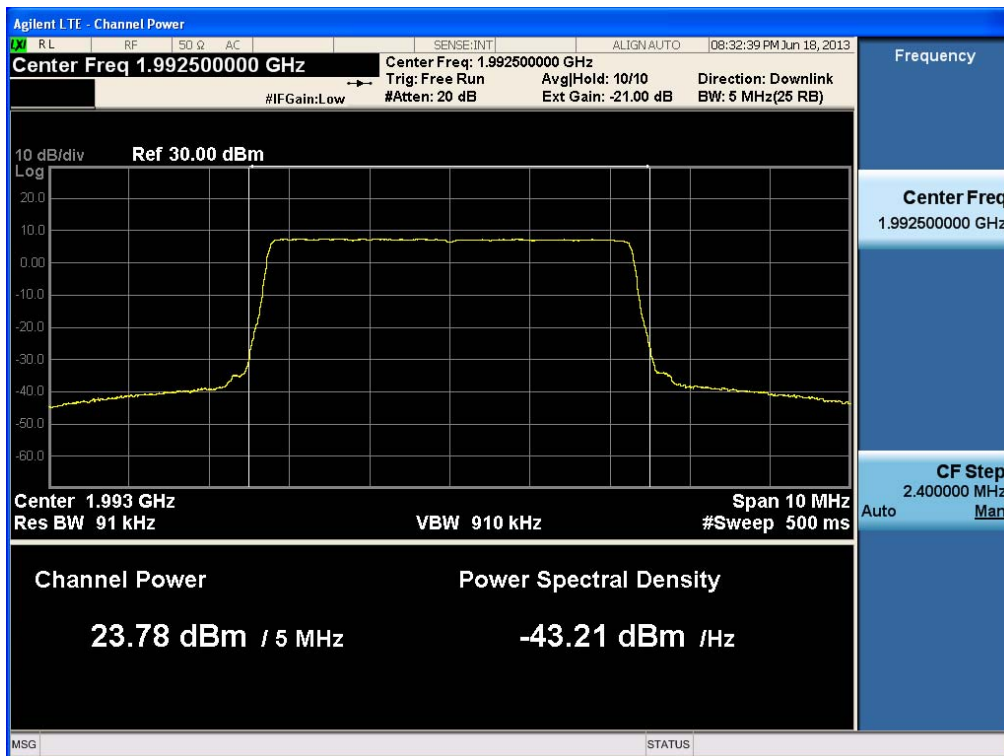


(QPSK Middle Channel)

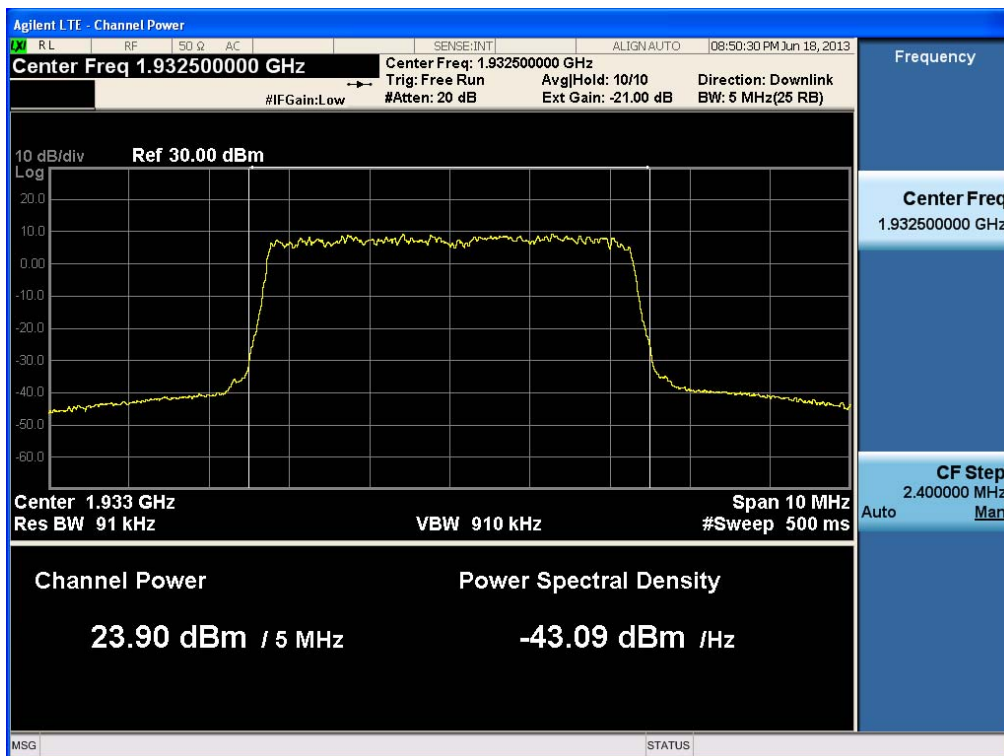


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(QPSK High Channel)

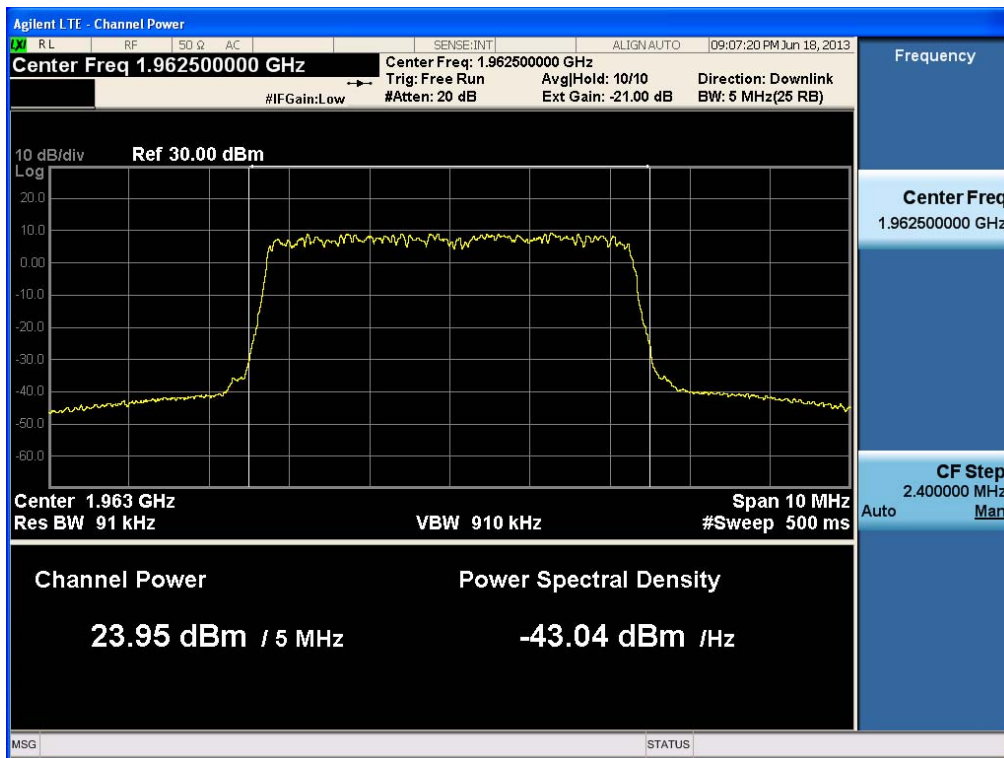


(16QAM Low Channel)

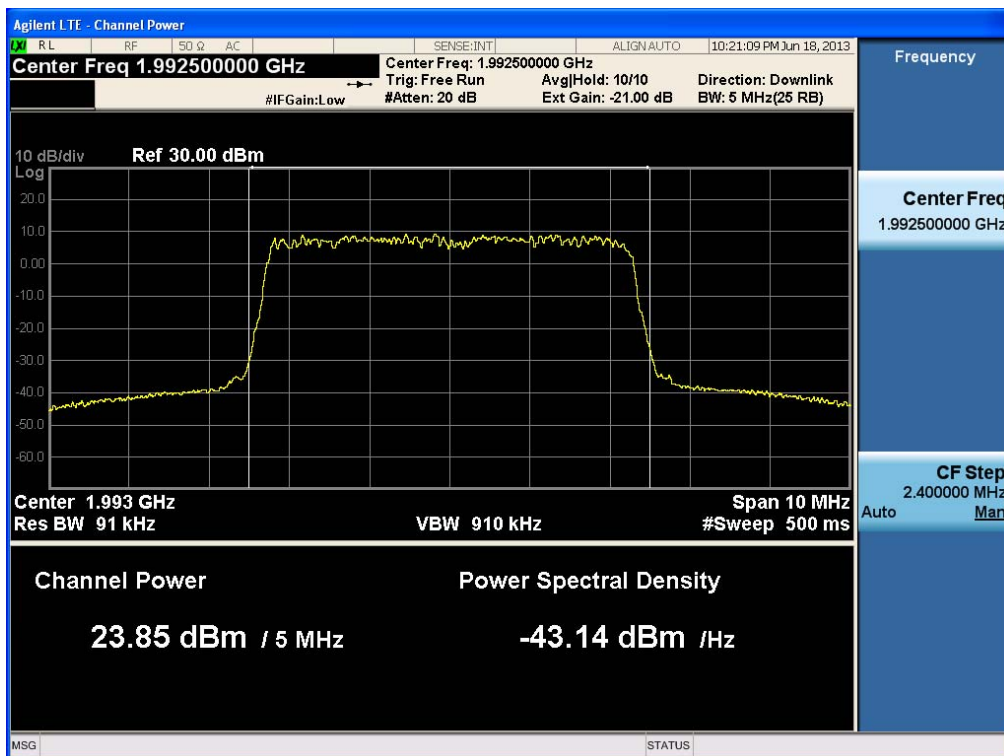


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(16QAM Middle Channel)

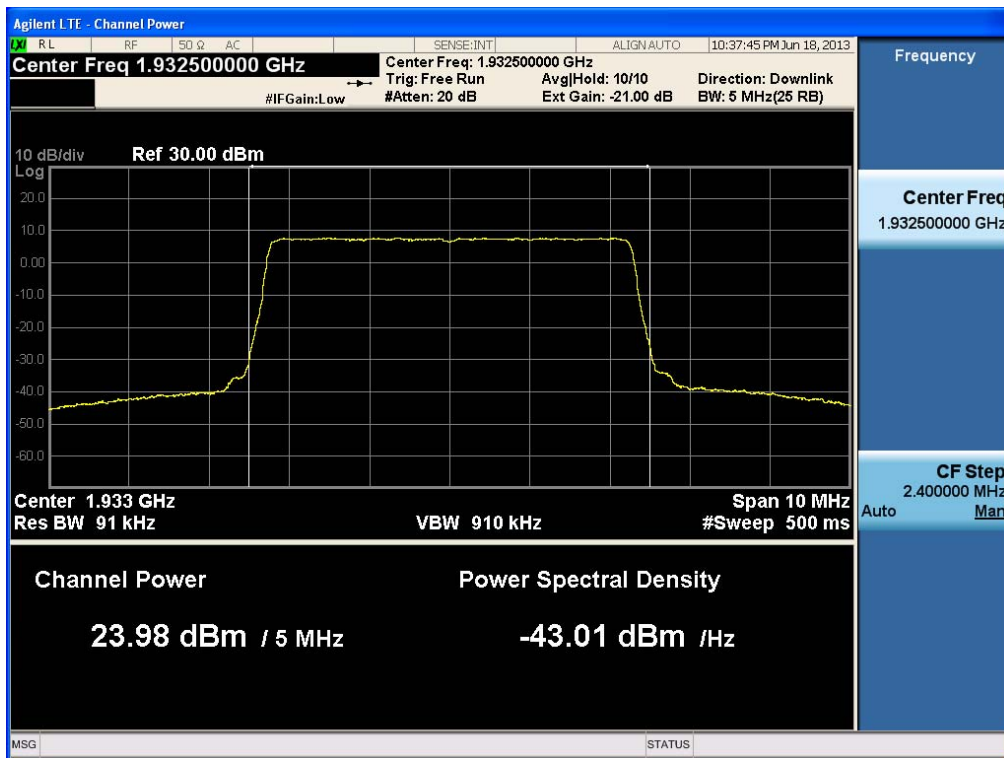


(16QAM High Channel)

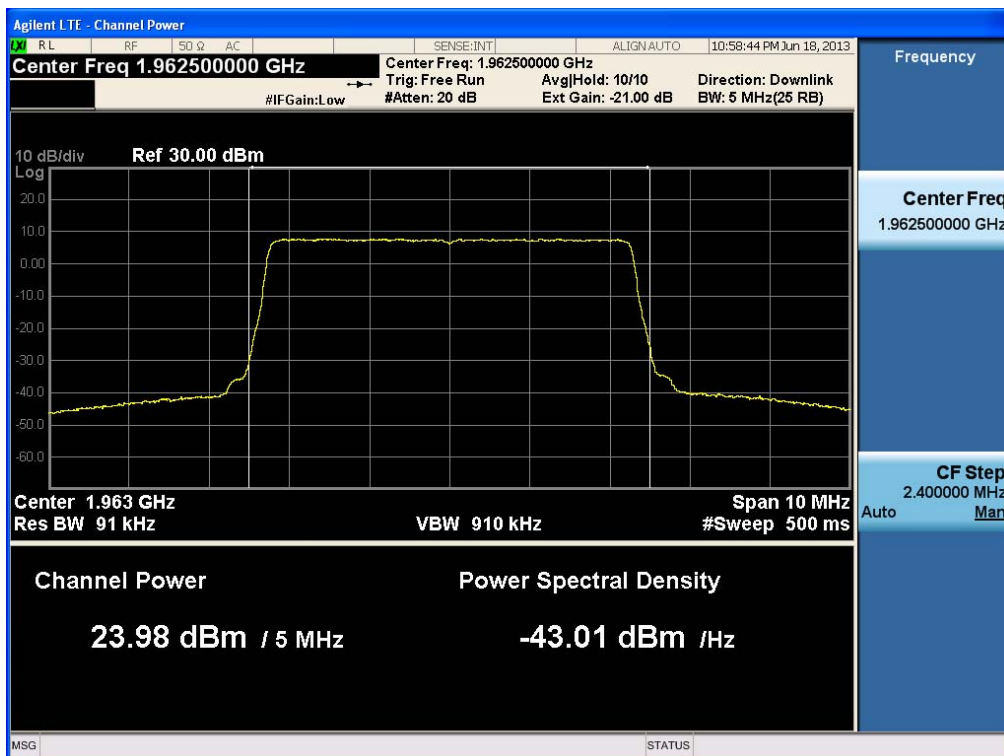


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(64QAM Low Channel)

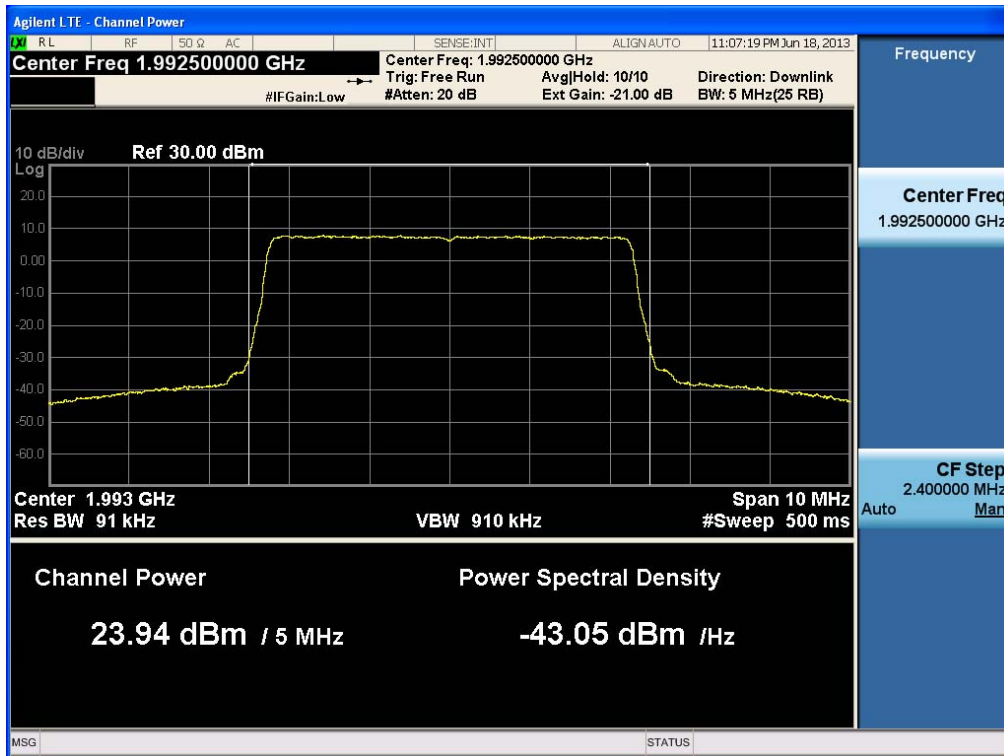


(64QAM Middle Channel)



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(64QAM High Channel)



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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.

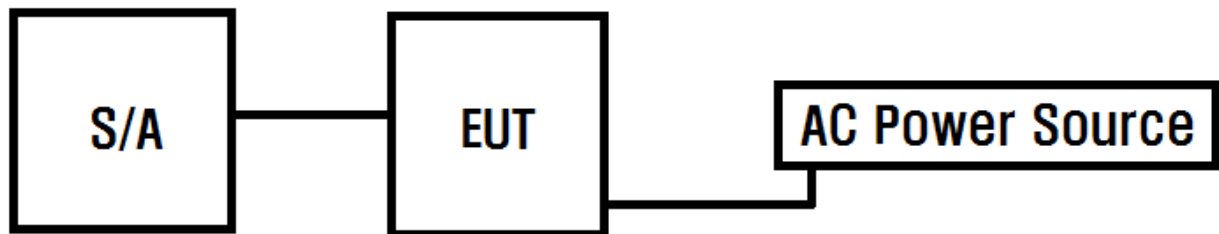
6.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	04/25/2014
DAE YOUNG ELECTRIC & TECHNOLOGY	DFSS60 / AC Power Source	1003030-1	04/16/2014
HEWLETT PACKARD	8394C / Fixed Attenuator	10342	05/06/2014

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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

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[LTE 5 MHz : 1 Carrier / 1 Port]

. Test Data at Output Port 0

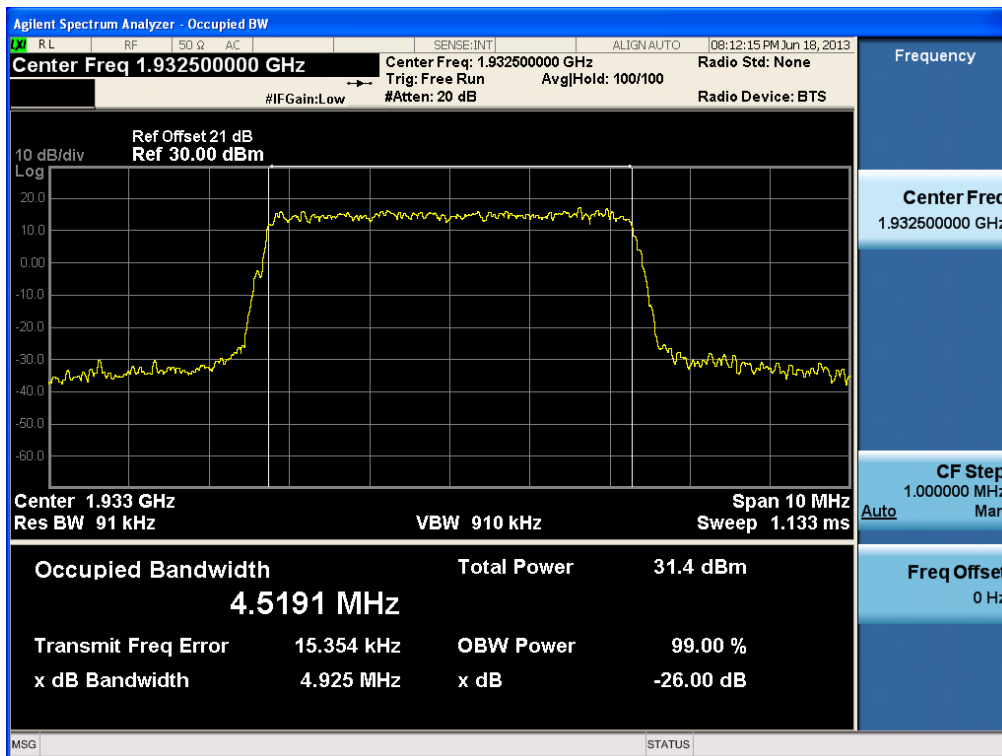
Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.5191
	Middle	1962.5	4.5277
	High	1992.5	4.5022
16QAM	Low	1932.5	4.4777
	Middle	1962.5	4.5082
	High	1992.5	4.4937
64QAM	Low	1932.5	4.5179
	Middle	1962.5	4.5318
	High	1992.5	4.4921

. Test Data at Output Port 1

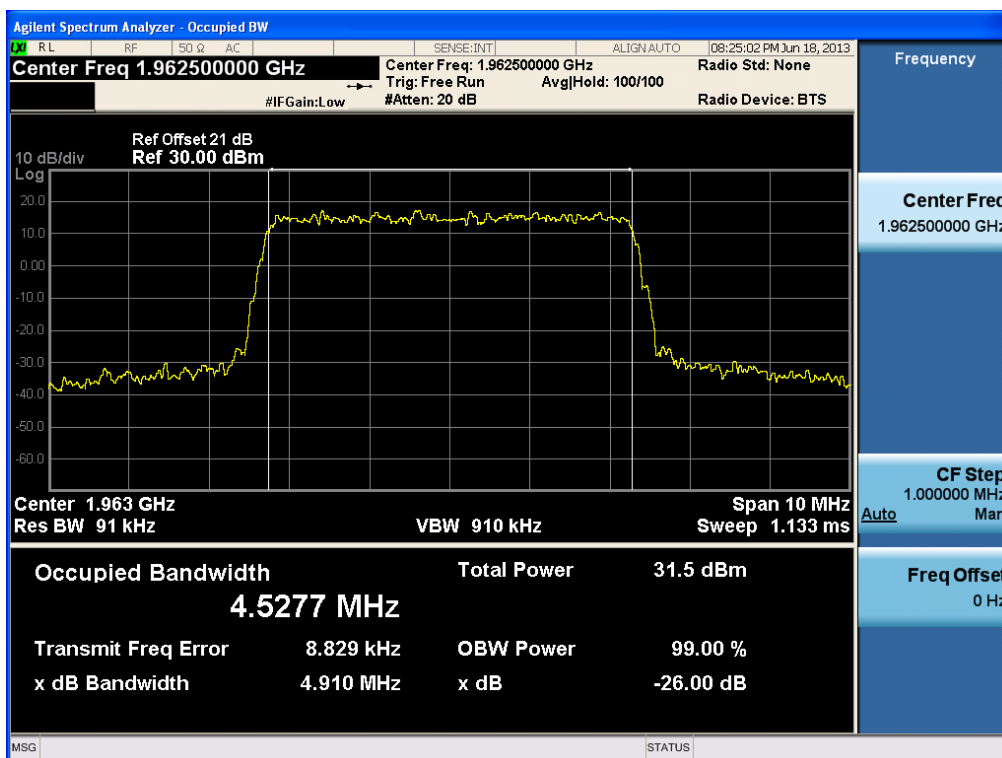
Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.5133
	Middle	1962.5	4.5008
	High	1992.5	4.4849
16QAM	Low	1932.5	4.4883
	Middle	1962.5	4.4996
	High	1992.5	4.5066
64QAM	Low	1932.5	4.5305
	Middle	1962.5	4.5103
	High	1992.5	4.5043

. Plot Data for LTE 5 MHz : 1 Carrier , Output Port 0

(QPSK Low Channel)

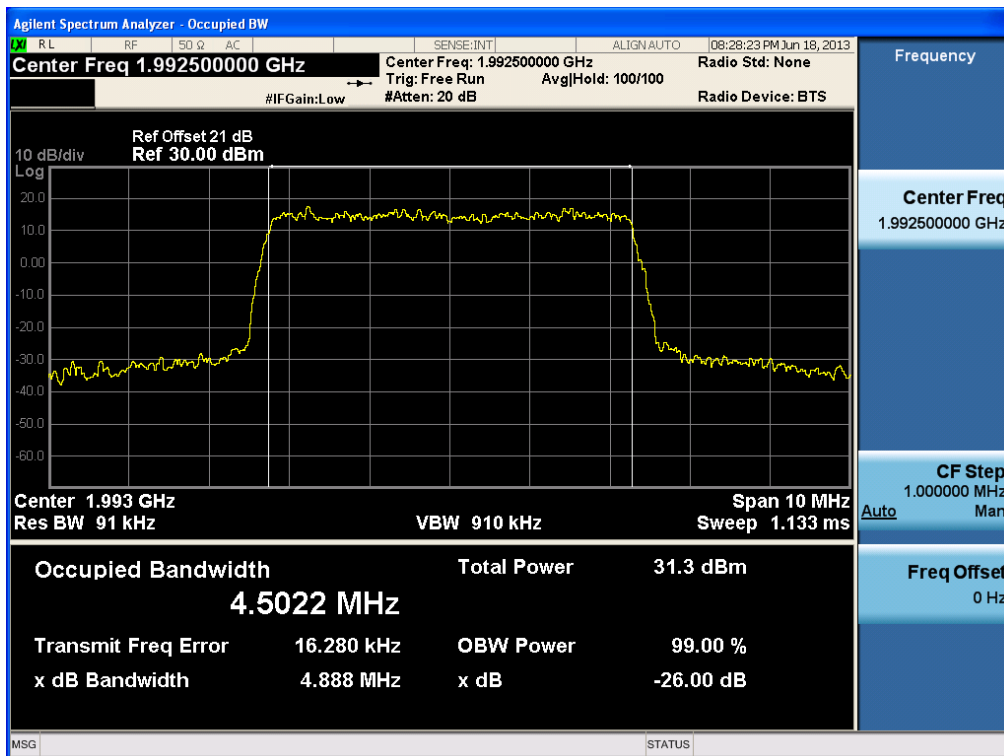


(QPSK Middle Channel)

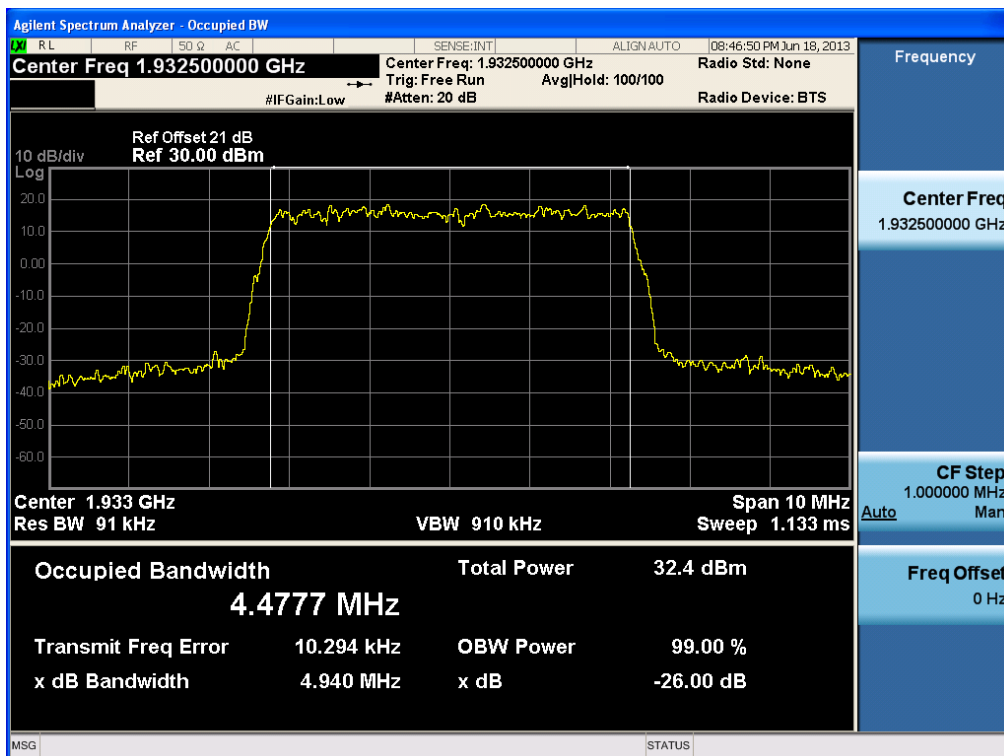


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(QPSK High Channel)

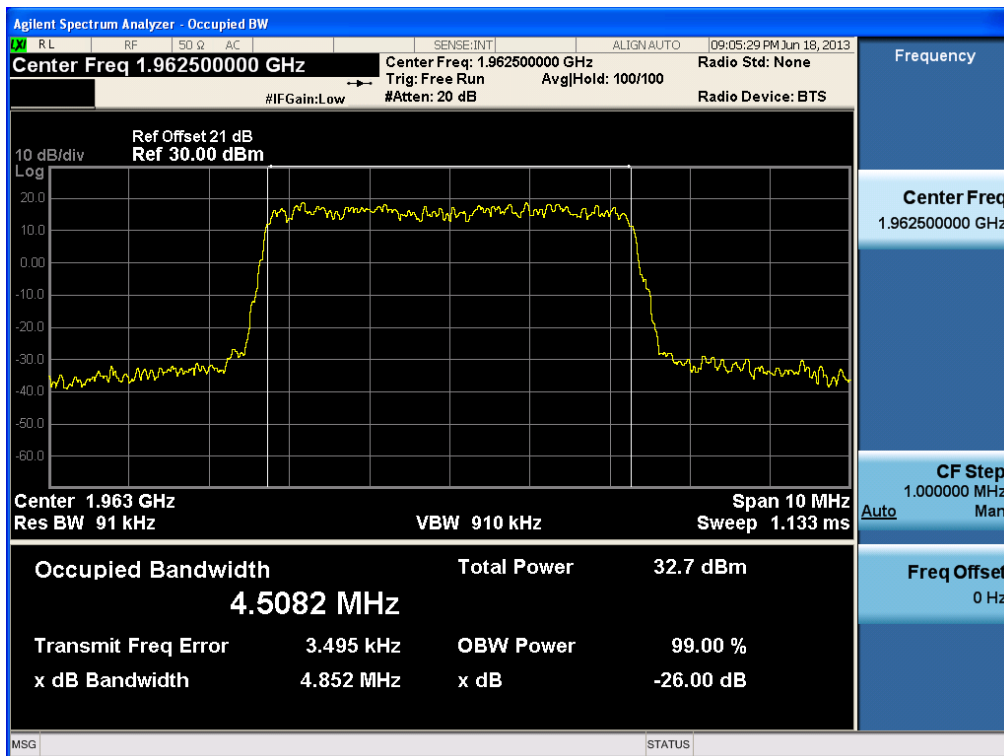


(16QAM Low Channel)

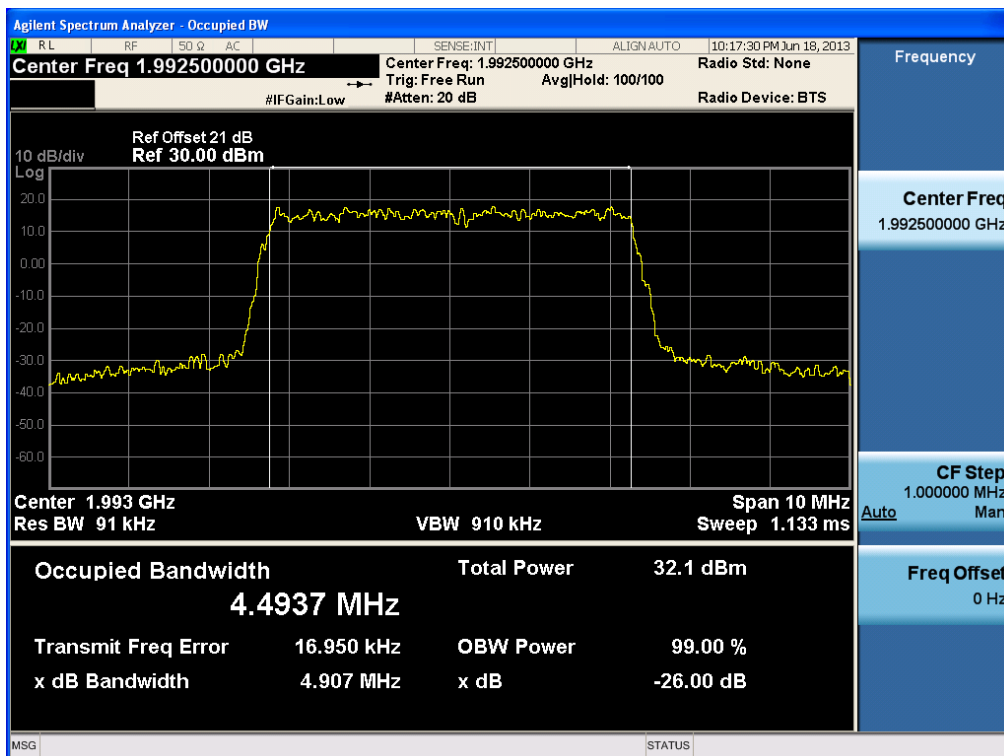


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(16QAM Middle Channel)

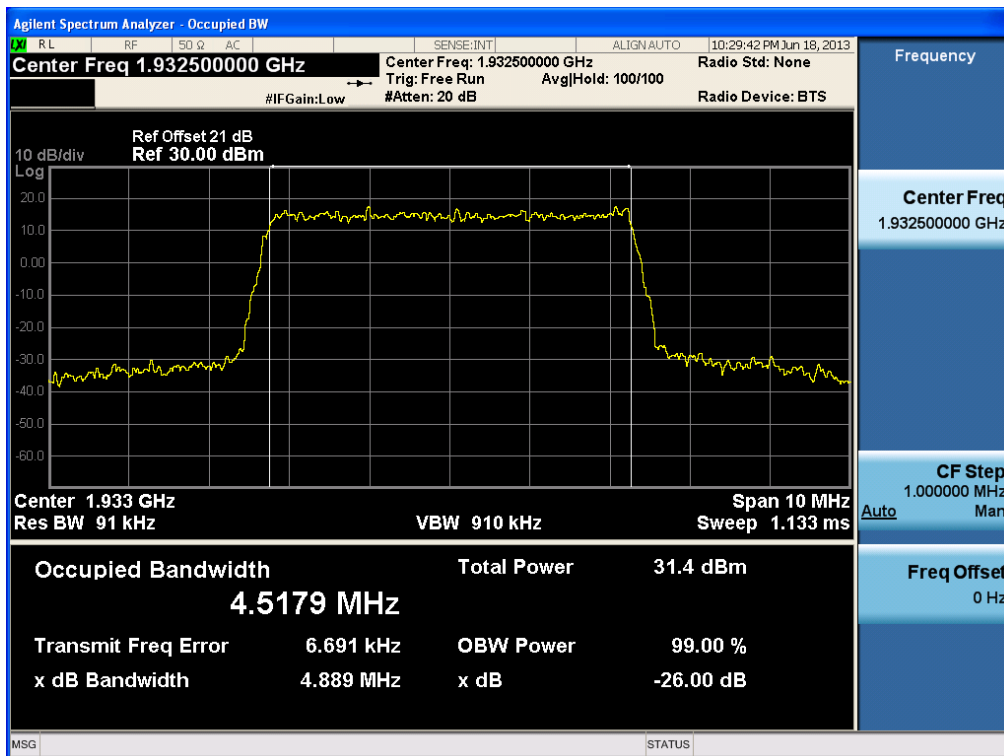


(16QAM High Channel)

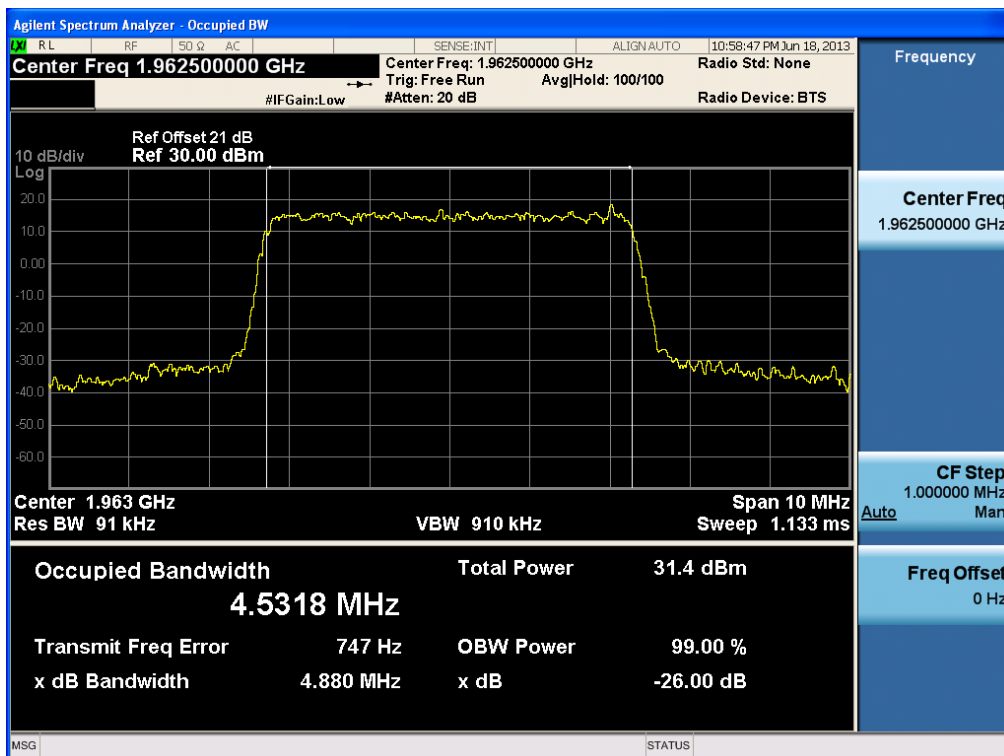


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(64QAM Low Channel)

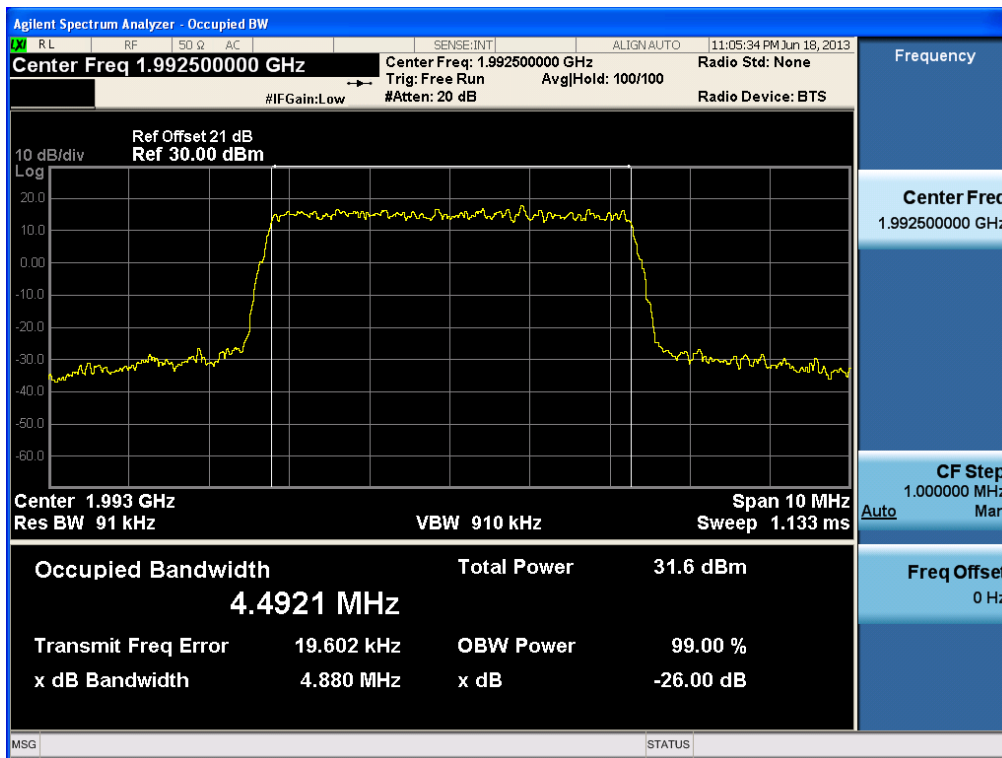


(64QAM Middle Channel)



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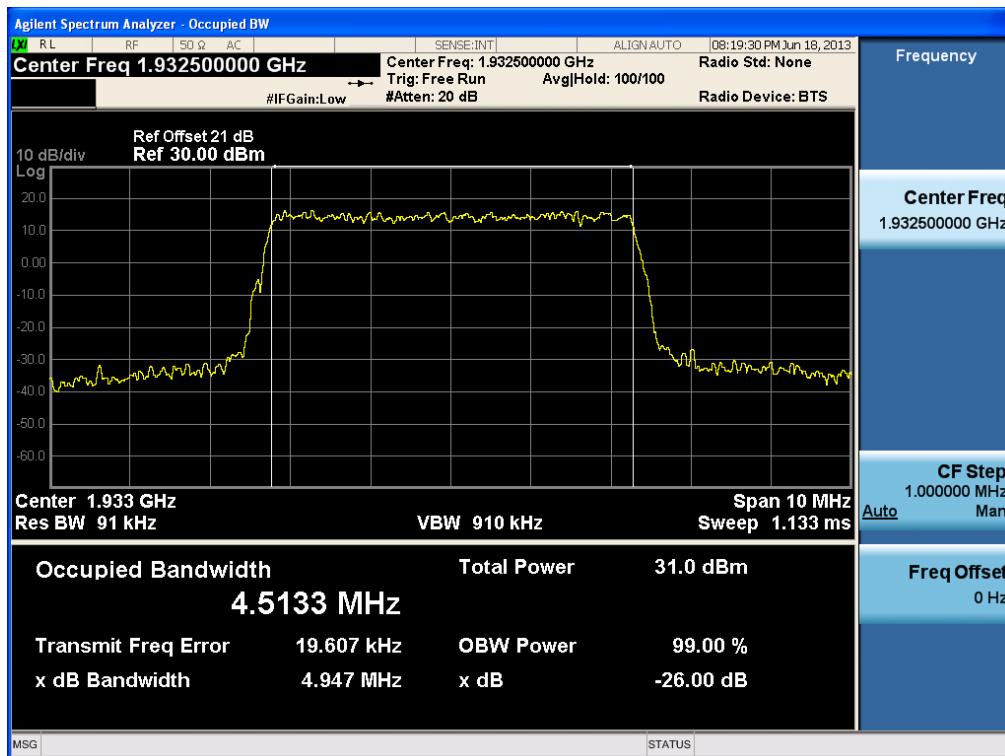
(64QAM High Channel)



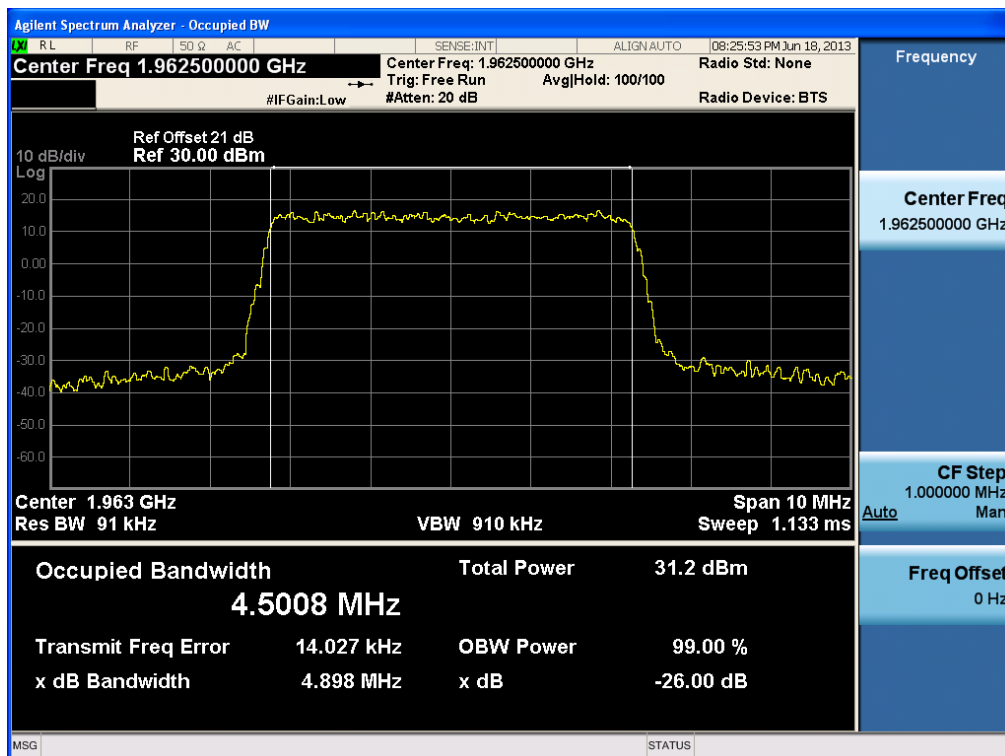
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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. Plot Data for LTE 5 MHz : 1 Carrier , Output Port 1

(QPSK Low Channel)

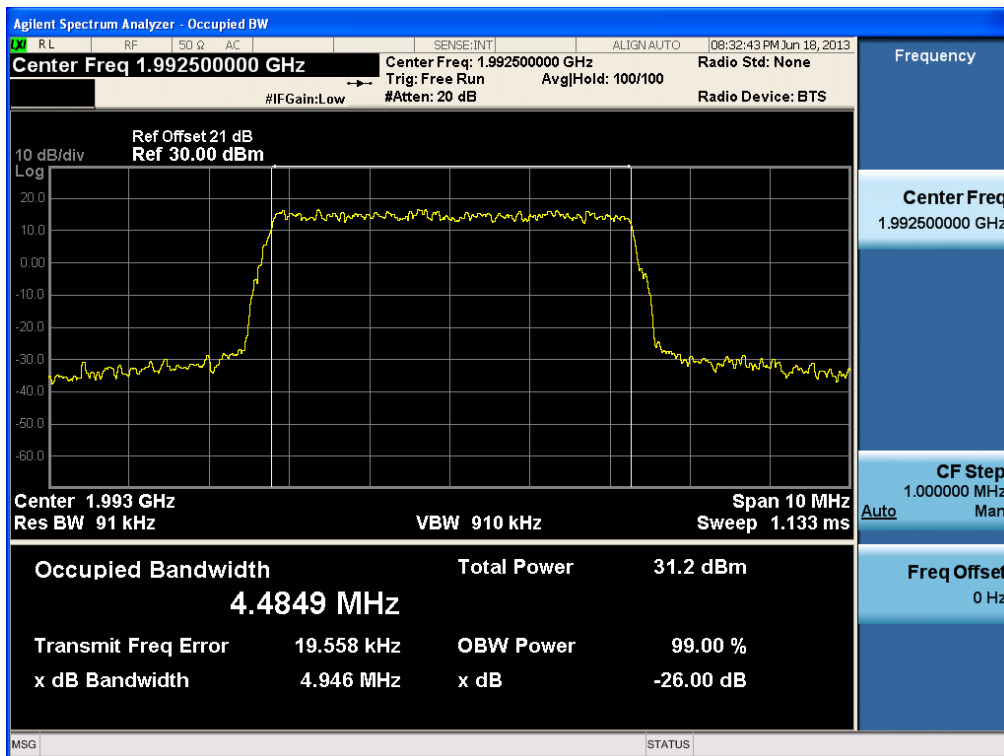


(QPSK Middle Channel)

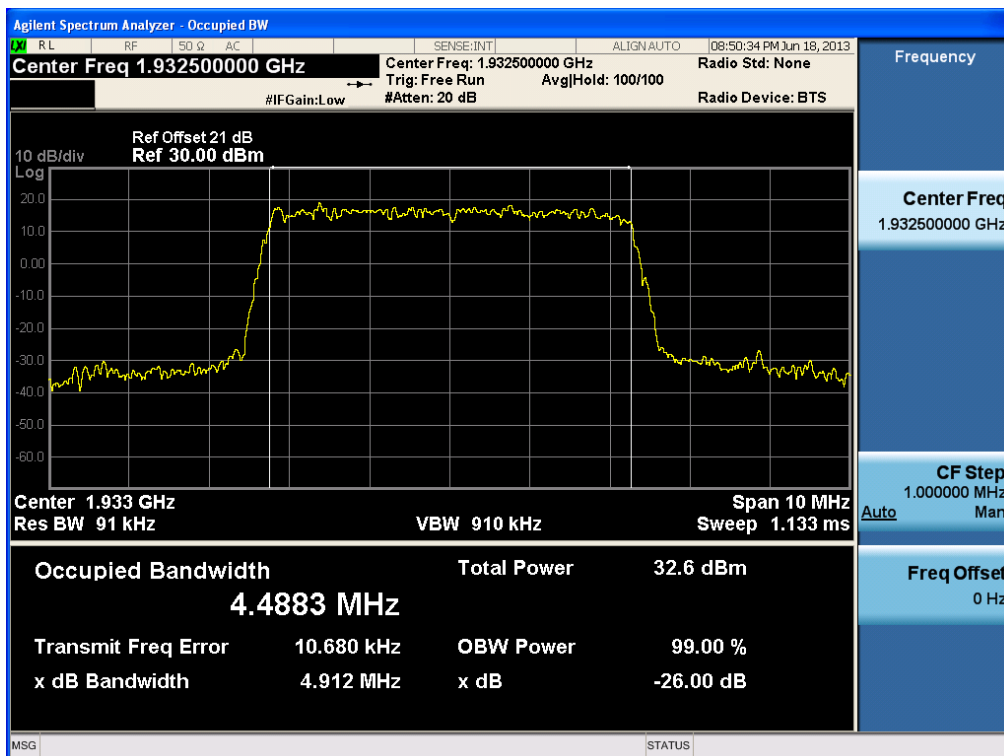


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(QPSK High Channel)

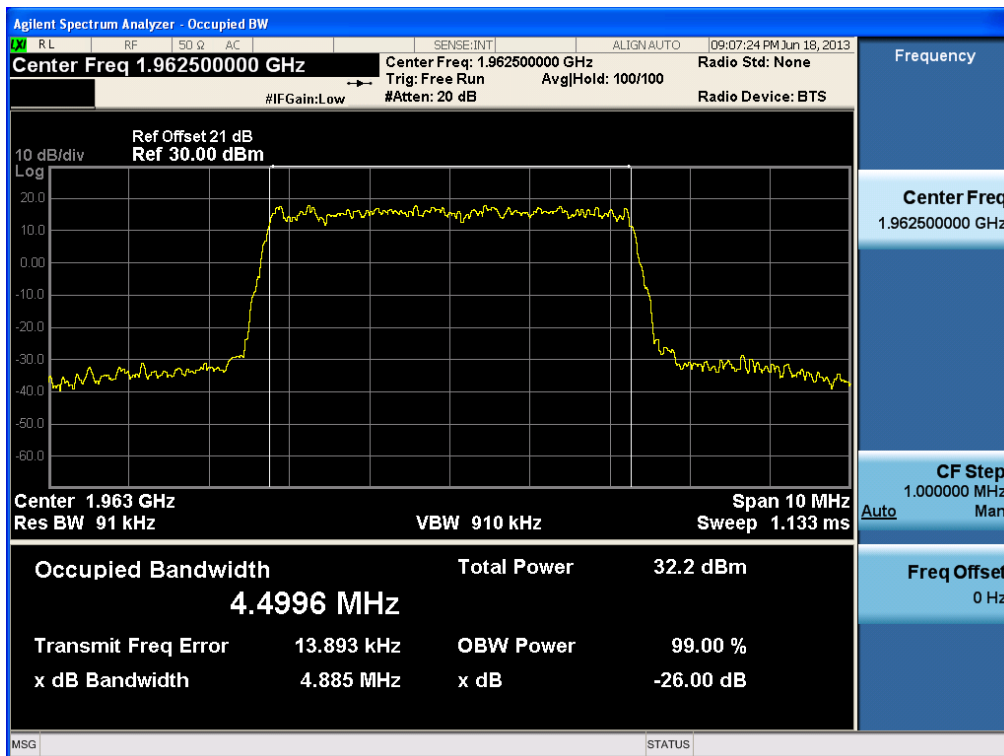


(16QAM Low Channel)

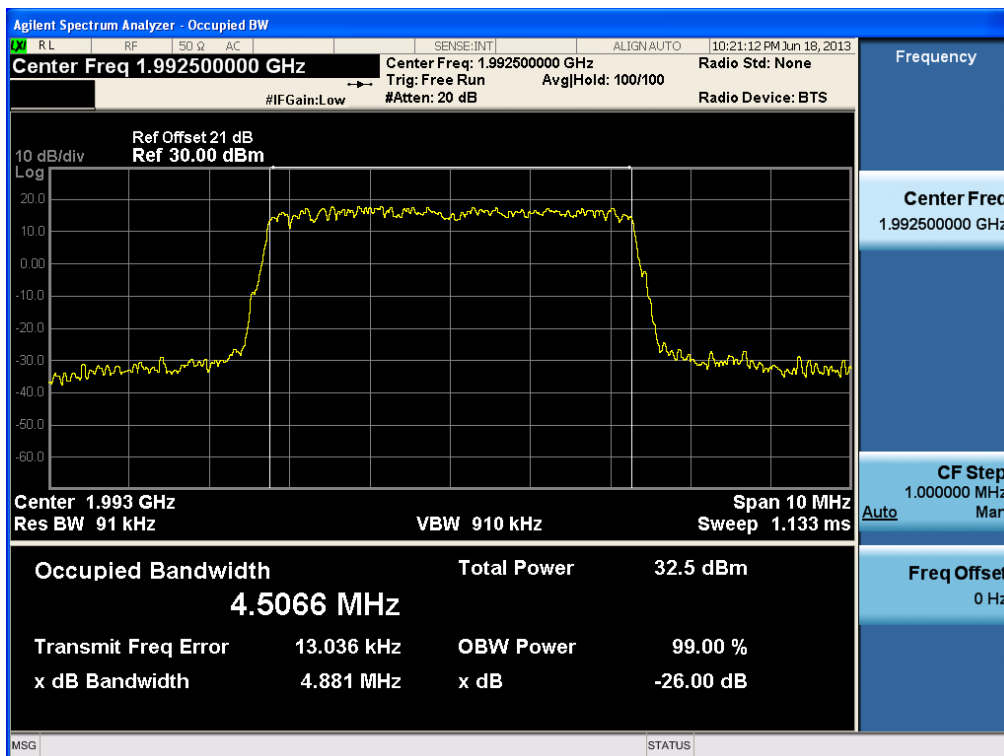


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(16QAM Middle Channel)

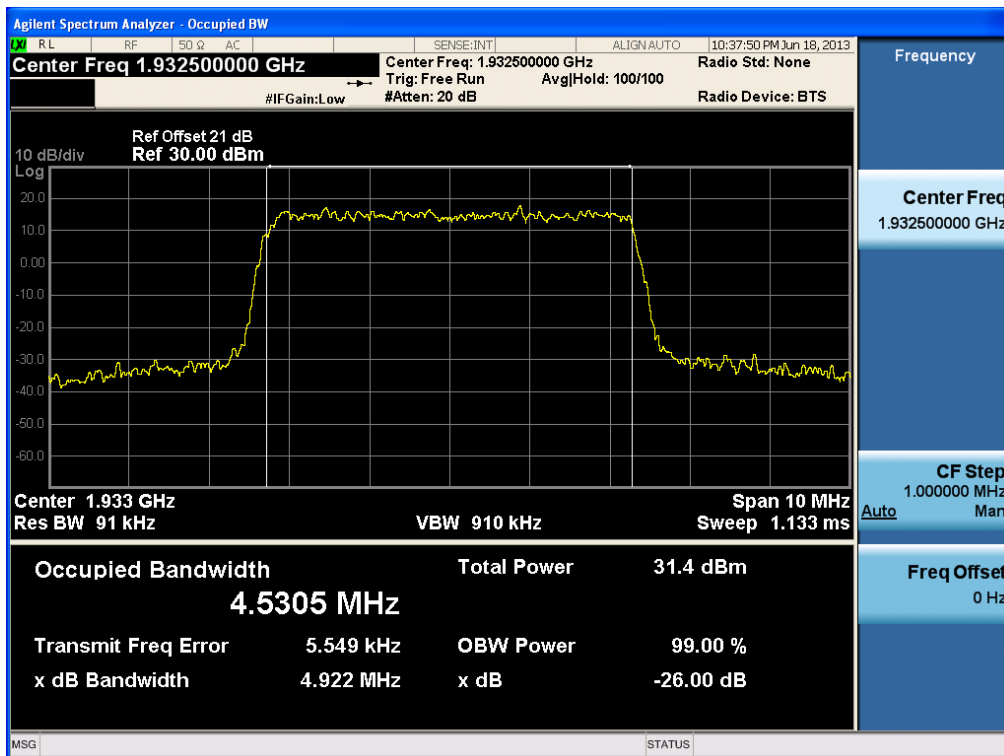


(16QAM High Channel)

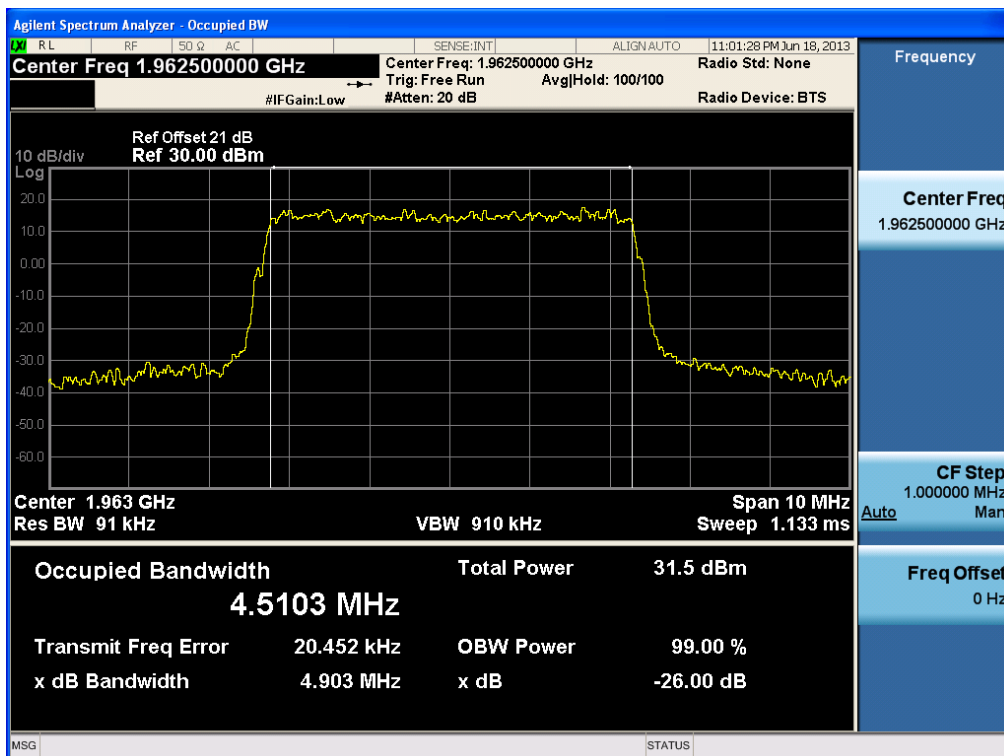


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(64QAM Low Channel)

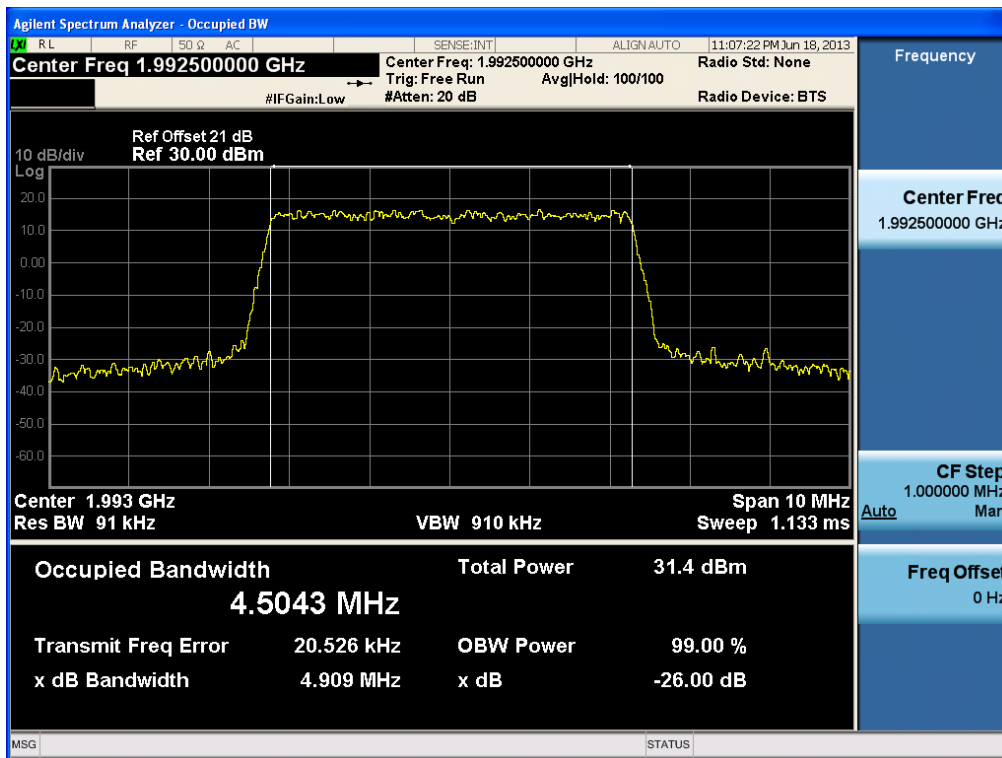


(64QAM Middle Channel)



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(64QAM High Channel)



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7. SPURIOUS EMISSION AT ANTENNA TERMINAL

7.1. Applicable Standard

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1051

According to FCC § 24.238, (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmit power (P) by a factor of at least $43+10 \cdot \log P$ dB.

7.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	04/25/2014
DAE YOUNG ELECTRIC & TECHNOLOGY	DFSS60 / AC Power Source	1003030-1	04/16/2014
HEWLETT PACKARD	8394C / Fixed Attenuator	10342	05/06/2014

7.3. Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

The conducted emission level is measured at each antenna port and then summed mathmatically to determine the total emission level from the device.

7.4. Test Result

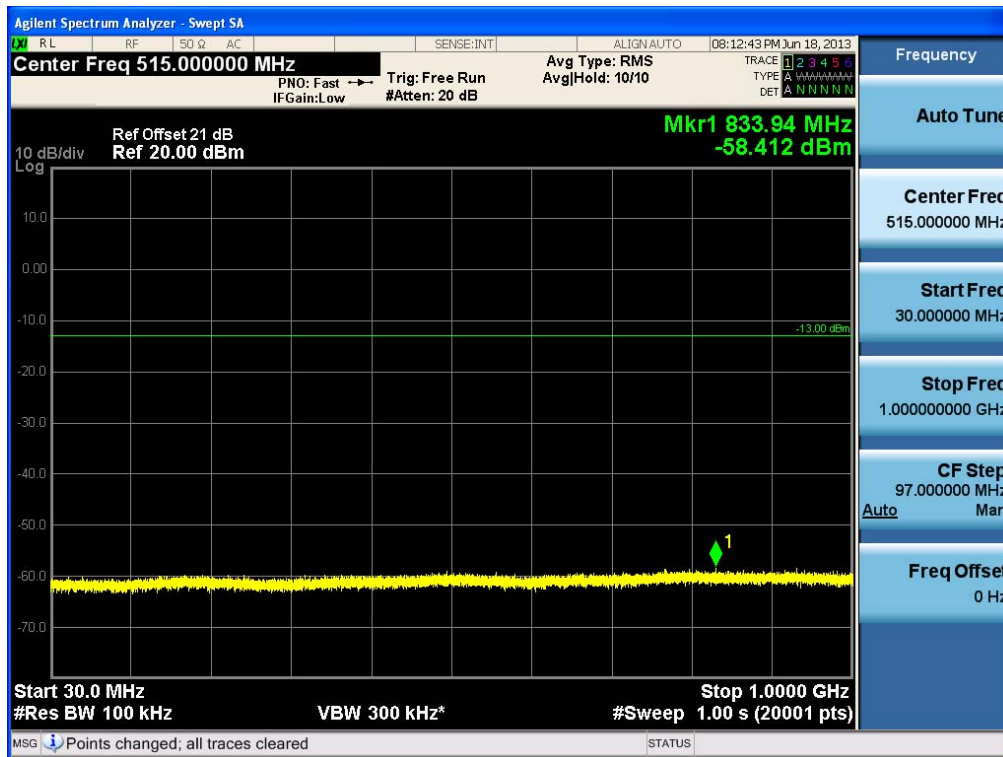
: Pass

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. Plot Data for LTE 5 MHz : 1 Carrier , Output Port 0

(QPSK Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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