



**HCT CO., LTD.**

CERTIFICATION DIVISION  
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**CERTIFICATE OF COMPLIANCE**

**FCC PART 24 Certification**

<b>Applicant Name:</b> SAMSUNG Electronics Co., Ltd. 416, Maetan-3dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea	<b>Date of Issue:</b> May 22, 2013 <b>Test Site/Location:</b> HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Gyeonggi-Do, Korea <b>Test Report No.:</b> HCTR1305FR15
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<b>FCC ID</b>	:	<b>A3LSMM-2LD0581902</b>
<b>APPLICANT</b>	:	<b>SAMSUNG Electronics Co., Ltd.</b>

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	: 80W (40 W * 2)
FCC Rule Part(s)	: FCC Part 24 Subpart E
Emission Designator	: 4M52G7W(QPSK), 4M51D7W(16QAM/64QAM)
Test Procedure(s)	: ANSI/TIA-603C-2004
Application Type	: Class II Permissive Change
Data of issue	: May 22, 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
HCTR1305FR15	May 22, 2013	First Approval Report

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# 1. GENERAL INFORMATION

## 1.1. CLIENT INFORMATION

<b>Company</b>	<b>Samsung Electronics Co., Ltd.</b>
<b>Contact Point</b>	<b>416, Maetan-3dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea</b>
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## 1.2. PRODUCT INFORMATION

EUT TYPE	Remote Radio Head
EMISSION DESIGNATOR	4M52G7W(QPSK), 4M51D7W(16QAM/64QAM)
OPERATING FREQUENCY	1 930 MHz ~ 1 995 MHz
TX OUTPUT POWER	80W (40 W * 2 Ports)
CHANNEL BANDWIDTH	CDMA : 1.25 MHz LTE : 10 MHz
MODULATION TYPE	CDMA : BPSK, QPSK, 16QAM LTE : QPSK, 16QAM, 64QAM
MAXIMUM NUMBER OF CARRIERS/SECTORS	CDMA 1X / EVDO : Max 8Carrier LTE (FDD) : Max 4Carrier @ 5 MHz
SYSTEM INPUT VOLTAGE	DC - 48 V

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### 1.3. INTRODUCTION OF EUT

Smart MBS is the Basestation of Samsung Multi-Modal System. It is managed by packet core (either BSC or EPC), and makes call to terminal to create CDMA/LTE links.

Smart MBS interfaces with UE via either CDMA(3GPP2 CDMA2000 1X Advanced and 1xEV-DO Rev.0/Rev.A), or LTE(3GPP LTE Rel.8/9). It provides broadband high speed data service and multimedia services.

In order to implement this, Smart MBS can perform Modulation/Demodulation (for voice or packet traffic), assign Scheduling and Wireless Bandwidth (for efficient use of RF resources and to guarantee QoS), handle ARQ(Automatic Repeat request), perform ranging feature, provide connection control feature (for sending Smart MBS information and enable/maintain/disable the call), Synchronize BSC/ EPC, provides Power Control, and executes system operation management.

By Fast Ethernet/Gigabit Ethernet backhaul, Smart MBS synchronize the control station to transceive reliable control signal and traffic signal.

Smart MBS is separated into UADU(Universal Platform Digital Unit, an indoor DU) and the RRH(Remote Radio Head, a combined RF unit). UADU is mounted in the outdoor DU cabinet(along with the rectifier) to support outdoor environment.

UADU is a digital component for 19" shelf. It can be mounted onto either indoor or outdoor 19 inch commercial rack, and one UADU can provide the following maximum capacity. Based on operator's setup, it can be operated as omni type or sector type.

- CDMA 1X / EVDO : Max 8Carrier
- LTE (FDD) : Max 4Carrier @ 5 MHz

RRH is RF component that is built into a single module. It can be mounted onto Walls, Poles, or Stands in outdoor environments.

Depending on Frequency bandwidth and duplexing type, RRH can be classified into following types.

- RRH-P4 : 1.9GHz PCS band, 4Tx/4Rx RF path

Smart MBS has other features provided as below.

#### Common Platform DU/RRH

Digital boards of each wireless technology, to be mounted in Smart MBS, share the common DU platform.

Therefore, different boards(for multiple technology) may be mounted in a single DU, and operator can mount up to 4 DU in outdoor DU cabinet to implement various configuration.

RRH of Smart MBS can simultaneously support multiple technologies in the same duplexing type with the same bandwidth.

RRH(Remote Radio Head) separated from DU(Digital Unit)

In order to provide ease of installation and various network structure, Smart MBS has separated RRH from DU.

Between RRH and DU, a fiber optic 'Baseband I/Q and C&M' interface, based on CPRI(Common Public Radio Interface), is

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used to send/receive “data traffic signal” and “OAM data”. DU and RRH gets -48VDC from rectifier inside the outdoor DU cabinet.

#### Provide Easy Installation

RRH integrates optic-sync component and RF signal processor, and is a small & light weight single module. RRH can be mounted onto Walls, Poles, or Stands. In addition, distance between RRH and Antenna is minimized that RF signal loss(cause by Feeder Line) is decreased. Therefore, it can provide improved RF performance when compared to Basestation that has Digital Unit and RF Unit altogether.

#### Natural Cooling Mechanism

RRH(Remote Radio Head) may be installed in outdoor environment, and its thermal-dynamic design efficiently dissipates heat without requirement of additional cooling mechanism. Also, no maintenance cost is required for RRH cooling.

#### Feature for Loop-Back Test of the line between DU and RRH

In order to check functionality of the “Base-band I/Q and OAM interface” between DU and RRH, Smart MBS provides Loop-back Test.

#### Provides Remote Firmware Downloading

RRH may be replaced with firmware to enhance service and upgrade new features. At this time, Site visit is not required as firmware can be downloaded from basestation operation server (such as BSM/WSM/LSM-R). Therefore, operator can minimize the site visit, reduce the maintenance cost, and easily operate the system.

#### Provides Monitoring Port.

Through debug port of RRH, operator can monitor the information about the unit.

#### Support for Smooth Migration

Smart MBS can provide migration from CDMA to 4G(LTE )wireless telecommunication by either adding “traffic processor card and channel card” or “software upgrade”.

In case of RRH, in the same frequency band, simple Software upgrade would allow conversion into 4G wireless telecommunication. Also, simultaneous operation of 3G and 4G is possible.

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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 (BPSK, 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.

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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	147	05/15/2014
Schwarzbeck	VULB 9160 / TRILOG Antenna	3150	12/17/2014
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-6B-180265-35-10P / POWER AMP	667624	04/16/2014
EMCO	6502/Loop Antenna	9009-2536	01/11/2014
Agilent	N9020A /Signal Analyzer	US46220219	04/25/2014
Agilent	6674A / DC Power Supply	3501A00901	04/16/2014
WEINSCHTEL	67-30-33 / Attenuator	BU5347	11/07/2013
WEINSCHTEL	67-30-33 / Attenuator	BR0530	11/07/2013
WEINSCHTEL	AF9003-69-31 / Attenuator	11787	11/07/2013
WEINSCHTEL	AF9003-69-31 / Attenuator	5701	11/07/2013

## 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

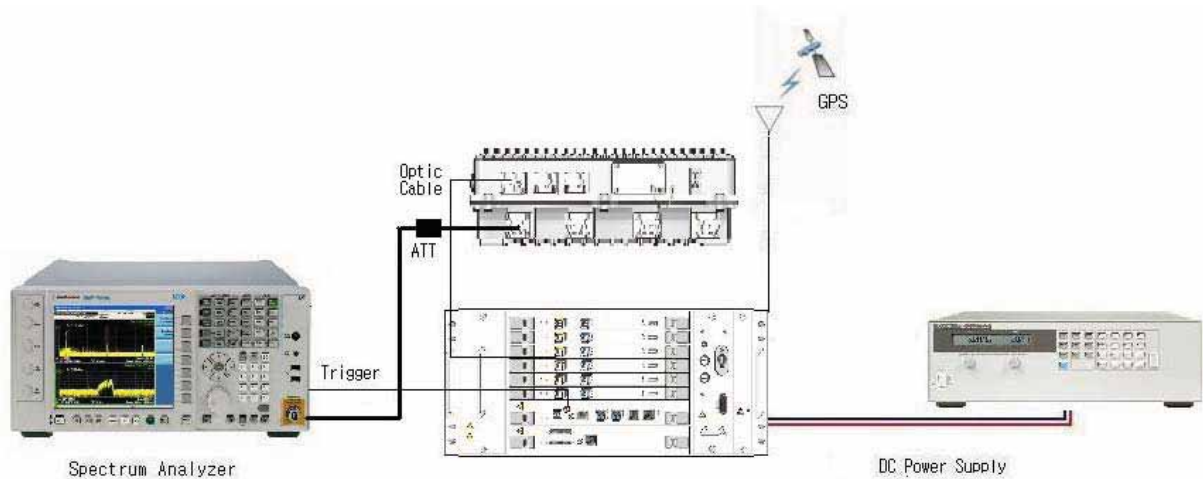
Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	04/25/2014
Agilent	6674A / DC Power Supply	3501A00901	04/16/2014
WEINSCHHEL	67-30-33 / Attenuator	BU5347	11/07/2013
WEINSCHHEL	67-30-33 / Attenuator	BR0530	11/07/2013
WEINSCHHEL	AF9003-69-31 / Attenuator	11787	11/07/2013
WEINSCHHEL	AF9003-69-31 / Attenuator	5701	11/07/2013

### 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. ( $160\text{ W} = 40\text{ W} * 4\text{ Ports}$ )

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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	42.67	18.493
	Middle	1962.5	42.38	17.294
	High	1992.5	42.72	18.724
16QAM	Low	1932.5	42.69	18.587
	Middle	1962.5	42.42	17.458
	High	1992.5	42.69	18.582
64QAM	Low	1932.5	42.66	18.463
	Middle	1962.5	42.42	17.466
	High	1992.5	42.74	18.797

. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1932.5	42.86	19.315
	Middle	1962.5	42.86	19.329
	High	1992.5	42.79	19.011
16QAM	Low	1932.5	42.85	19.280
	Middle	1962.5	42.85	19.280
	High	1992.5	42.82	19.156
64QAM	Low	1932.5	42.87	19.364
	Middle	1962.5	42.89	19.440
	High	1992.5	42.83	19.165

[ LTE 5 MHz : 2 Carriers / 1 Port ]

. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1935.0	45.82	38.230
	Middle	1962.5	45.74	37.480
	High	1990.0	45.86	38.548
16QAM	Low	1935.0	45.83	38.300
	Middle	1962.5	45.59	36.183
	High	1990.0	45.88	38.744
64QAM	Low	1935.0	45.86	38.566
	Middle	1962.5	45.72	37.351
	High	1990.0	45.91	39.003

. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1935.0	46.02	40.013
	Middle	1962.5	46.03	40.077
	High	1990.0	45.86	38.512
16QAM	Low	1935.0	46.08	40.551
	Middle	1962.5	45.99	39.737
	High	1990.0	45.85	38.415
64QAM	Low	1935.0	46.10	40.757
	Middle	1962.5	46.02	39.995
	High	1990.0	45.80	38.054

[ LTE + CDMA ]

. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1933.4	46.16	41.276
	Middle	1960.9	45.92	39.120
	High	1991.6	45.98	39.655
16QAM	Low	1933.4	46.15	41.200
	Middle	1960.9	45.80	37.975
	High	1991.6	45.94	39.219
64QAM	Low	1933.4	46.10	40.719
	Middle	1960.9	45.95	39.355
	High	1991.6	45.99	39.719

. Test Data at Output Port 1

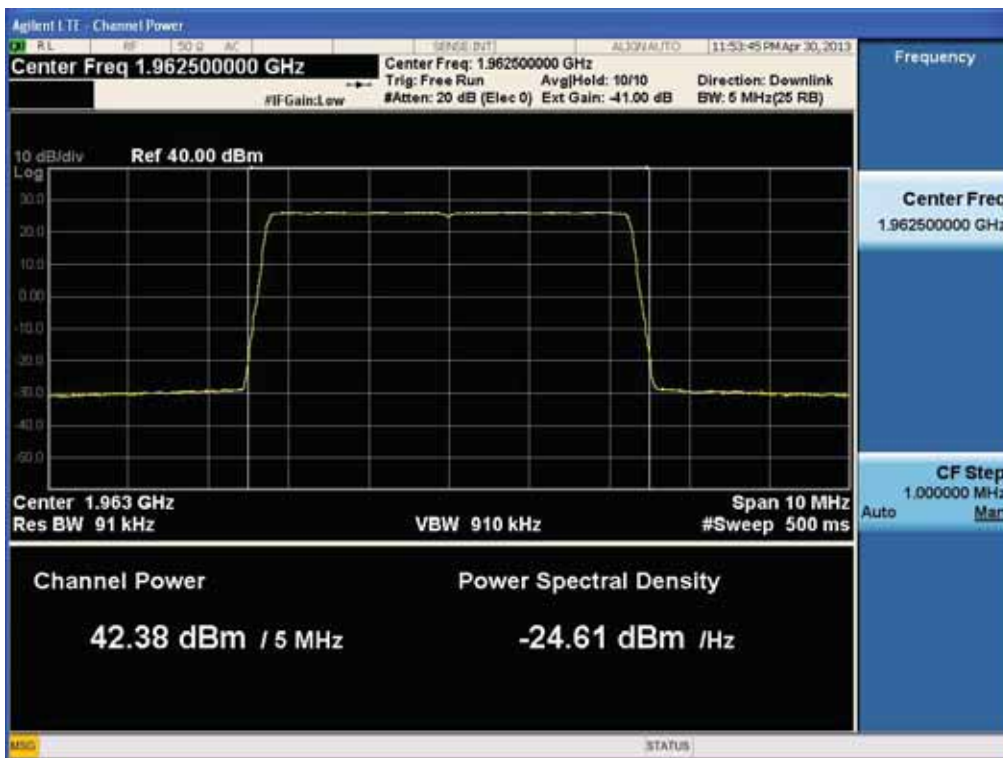
Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
QPSK	Low	1933.4	46.07	40.430
	Middle	1960.9	46.01	39.884
	High	1991.6	45.81	38.072
16QAM	Low	1933.4	46.10	40.710
	Middle	1960.9	46.01	39.912
	High	1991.6	45.96	39.464
64QAM	Low	1933.4	46.09	40.616
	Middle	1960.9	45.98	39.591
	High	1991.6	45.94	39.228

. 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)

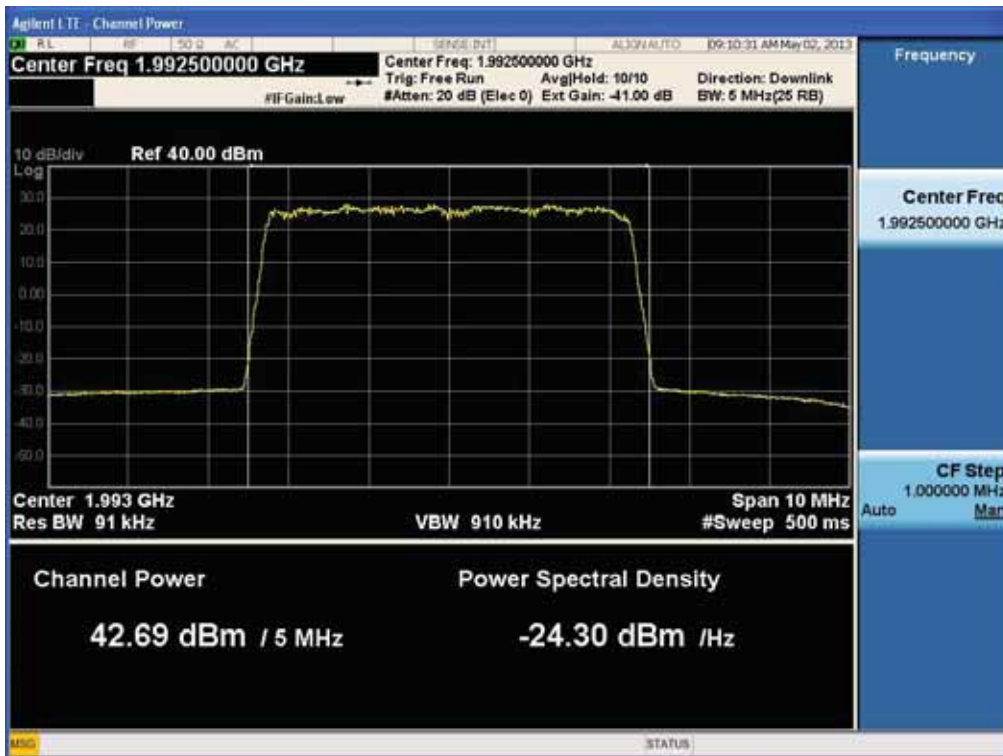


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(16QAM Middle Channel)



(16QAM High Channel)

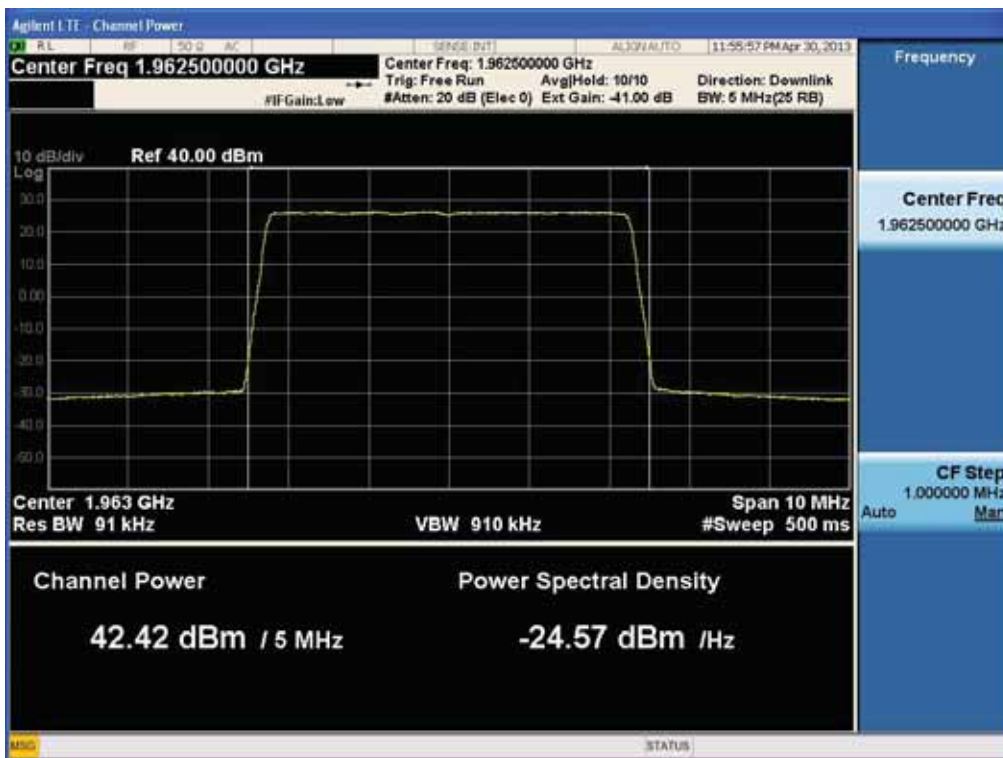


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(64QAM Low Channel)

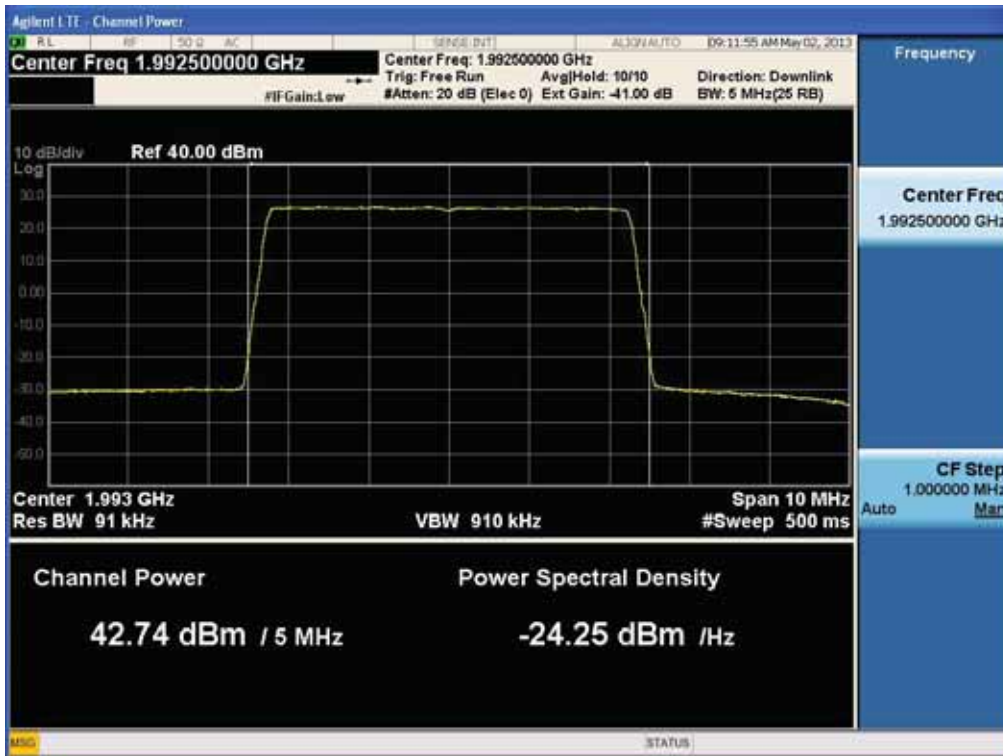


(64QAM Middle Channel)



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(64QAM High Channel)



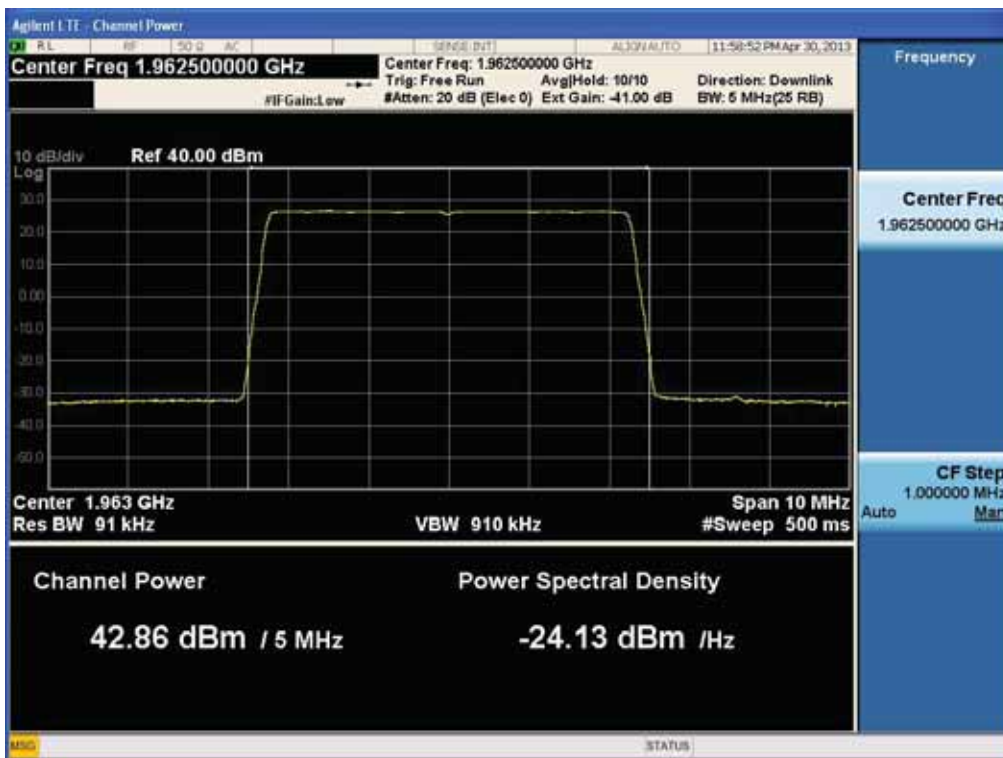
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. Plot Data for LTE 5 MHz : 1 Carrier , Output Port 1

(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)

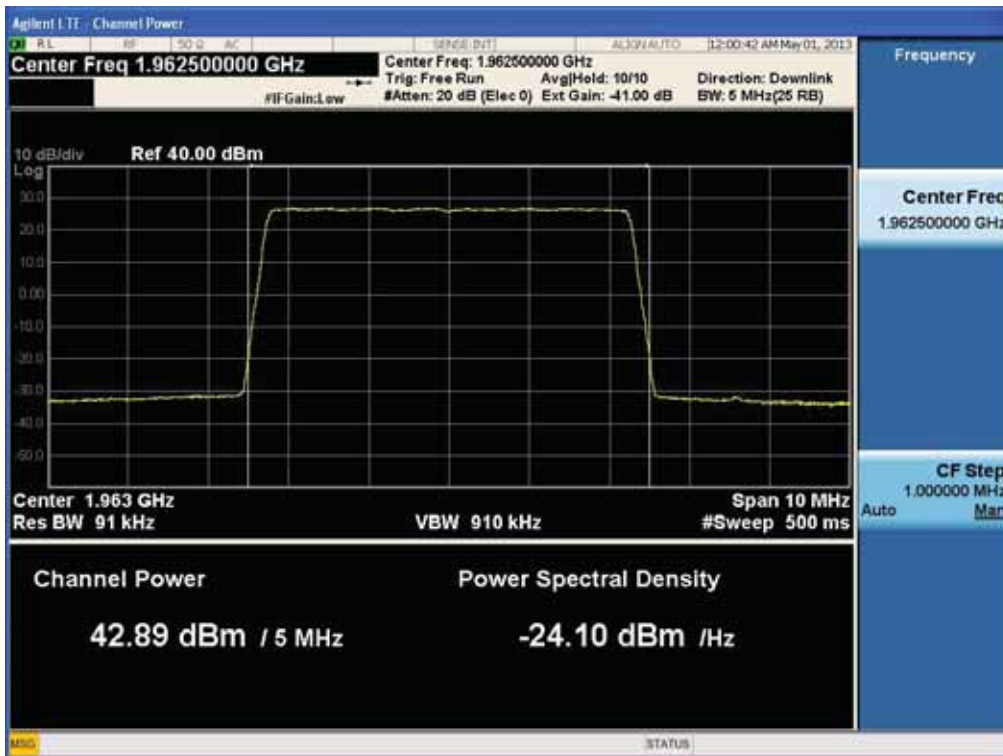


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(64QAM Low Channel)



(64QAM Middle Channel)



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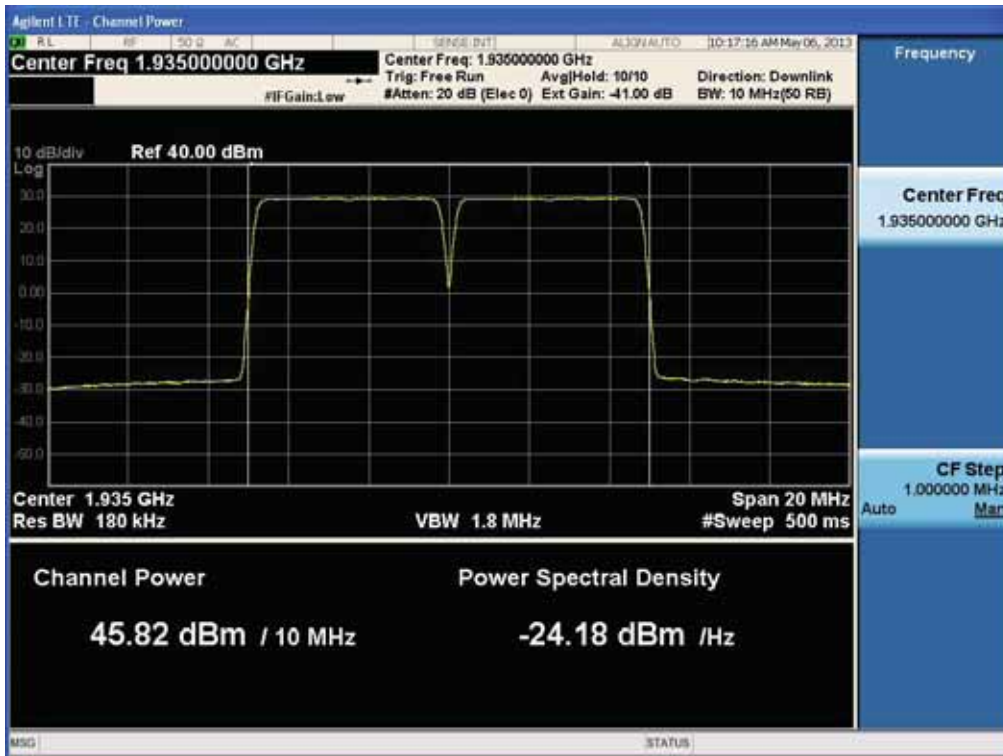
(64QAM High Channel)



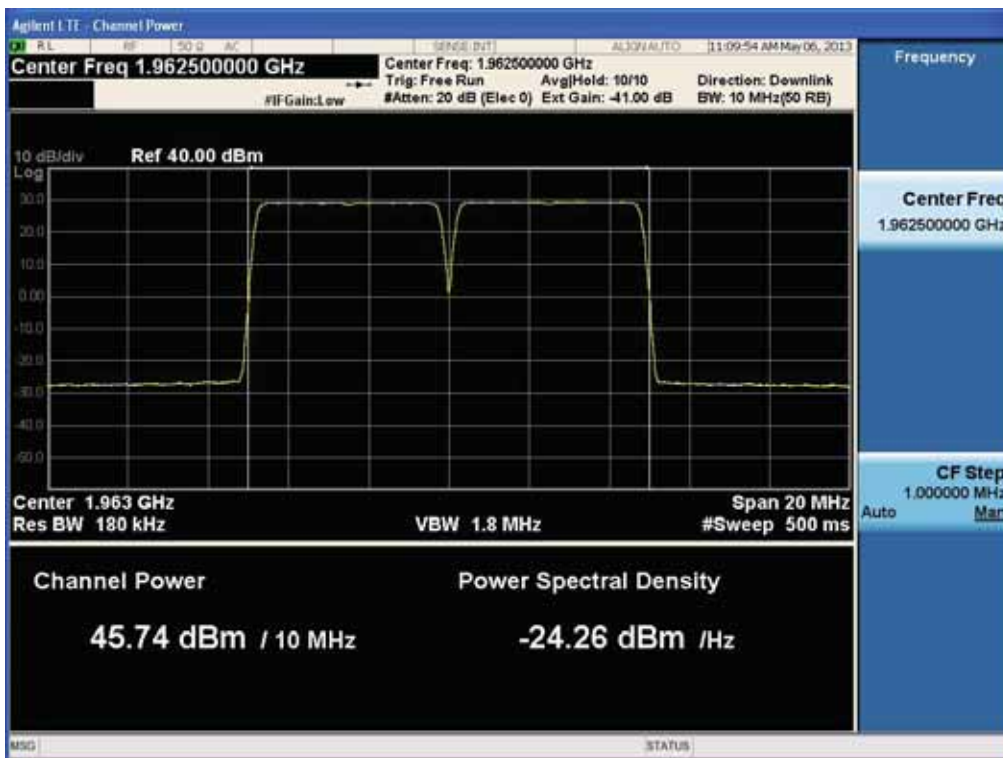
FCC PT.24 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 24 of 156

. Plot Data for LTE 5 MHz : 2 Carrier , Output Port 0

(QPSK Low Channel)

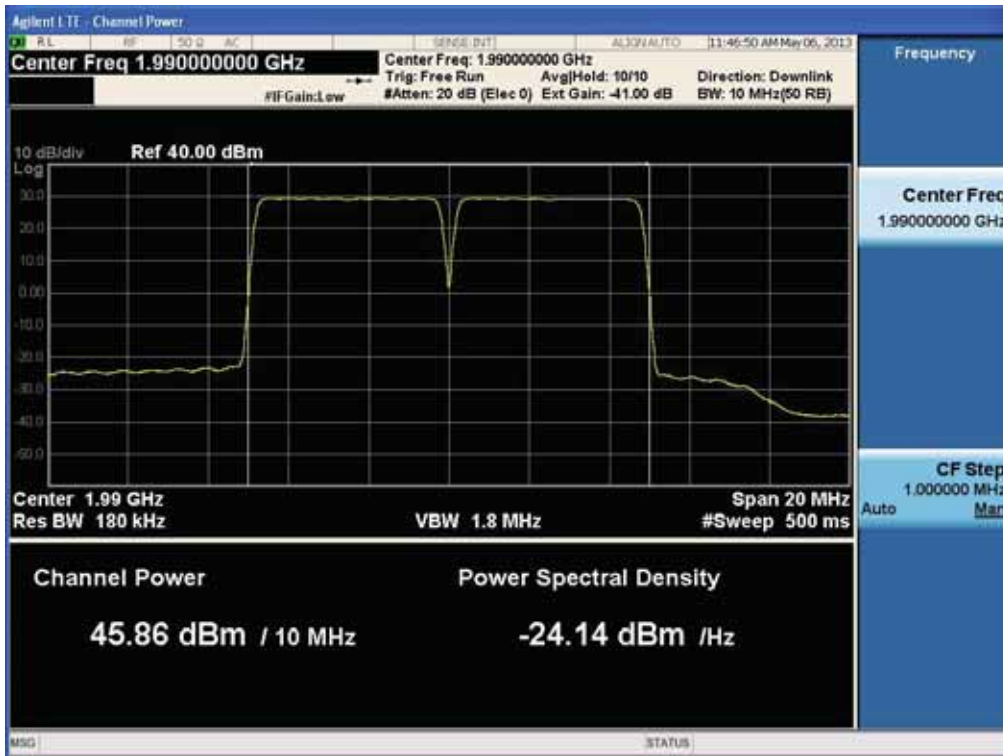


(QPSK Middle Channel)

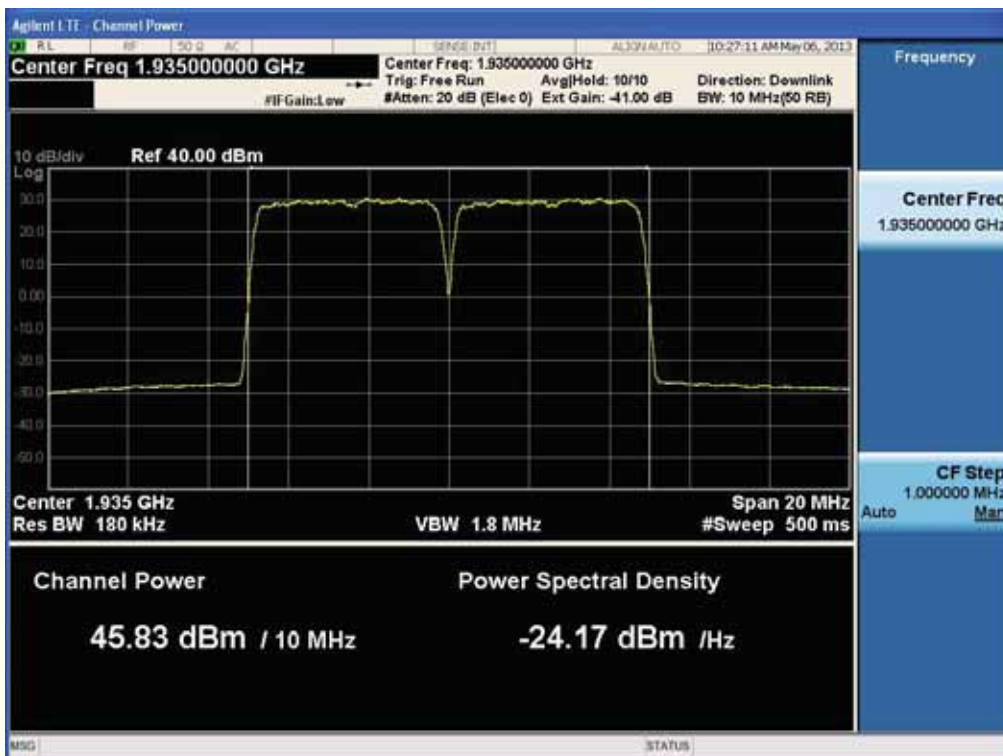


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 25 of 156

(QPSK High Channel)

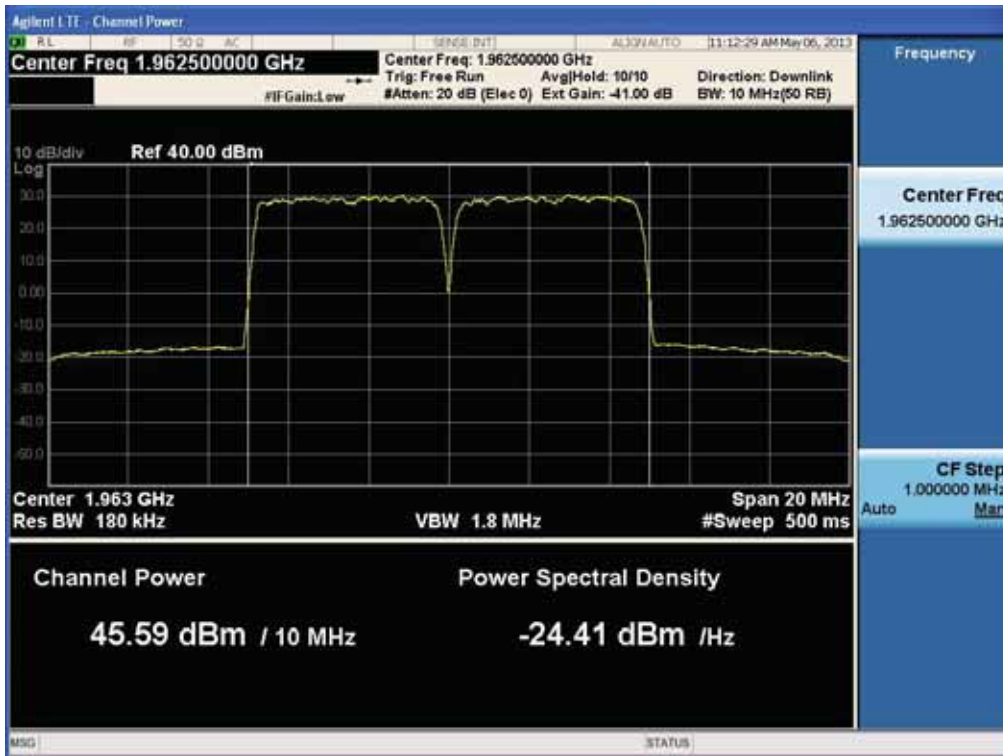


(16QAM Low Channel)

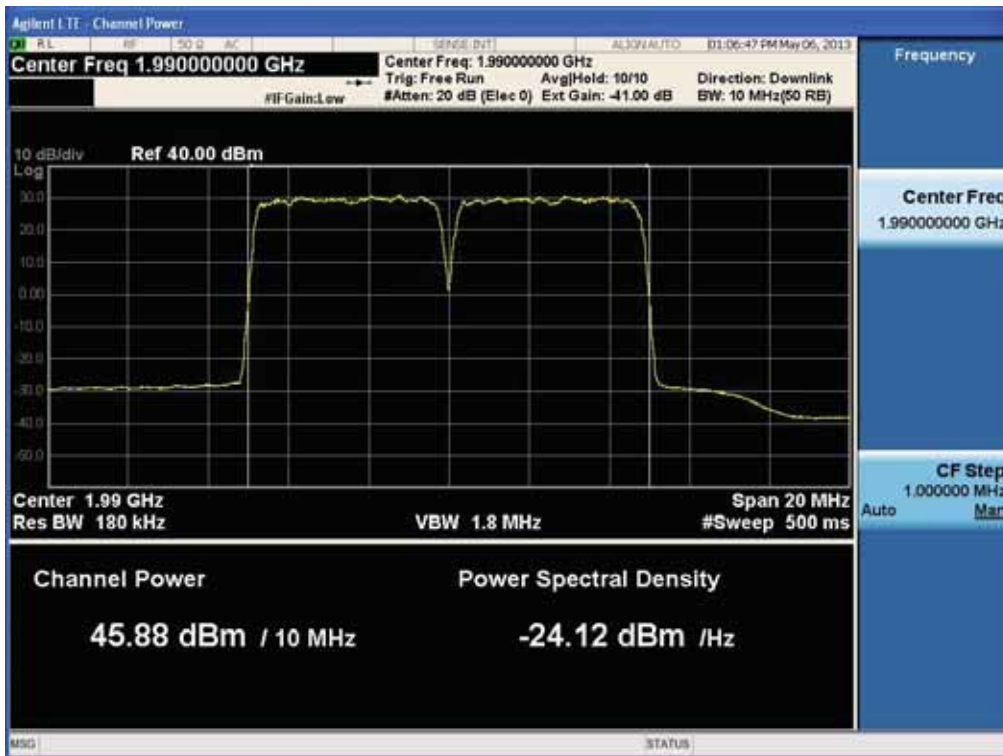


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 26 of 156

(16QAM Middle Channel)

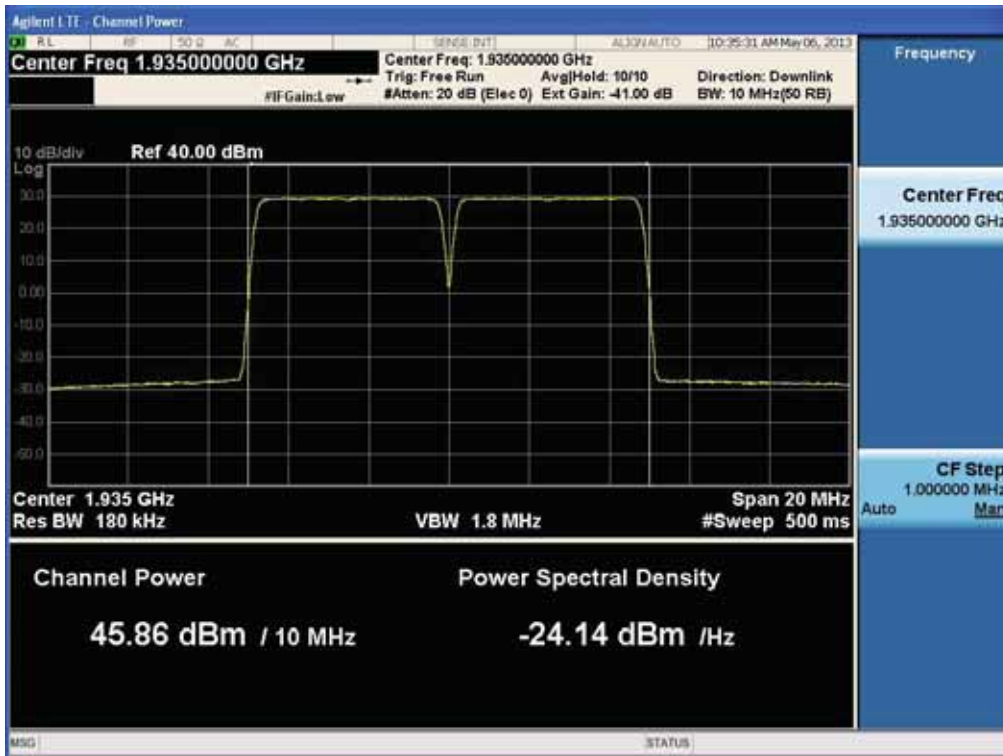


(16QAM High Channel)

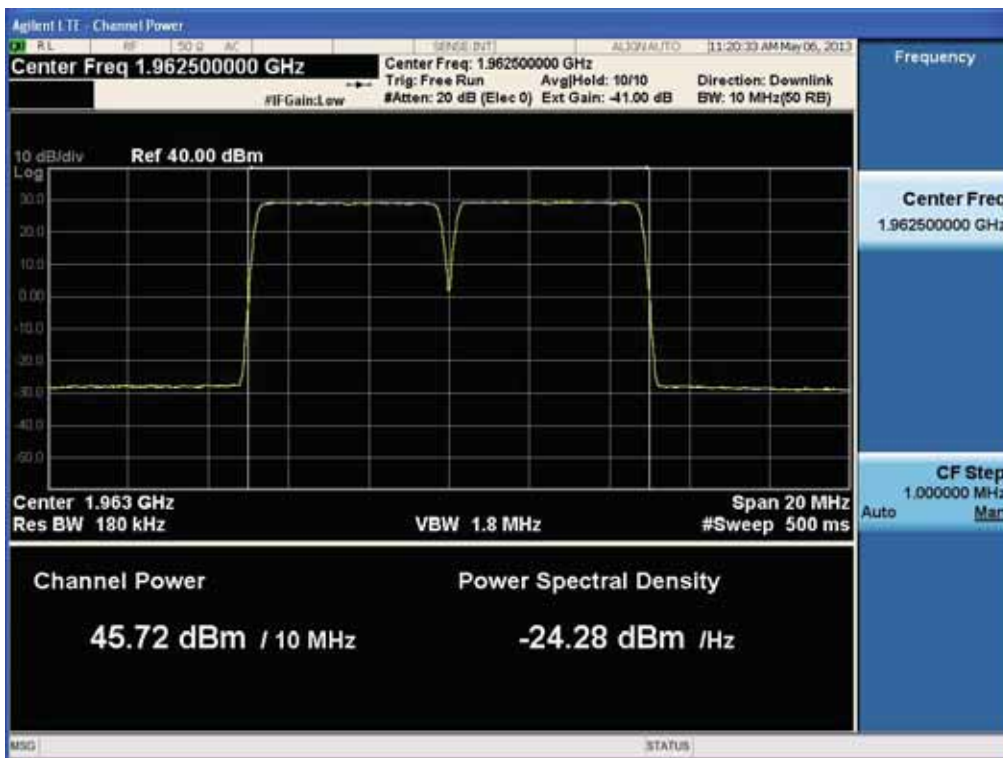


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 27 of 156

(64QAM Low Channel)

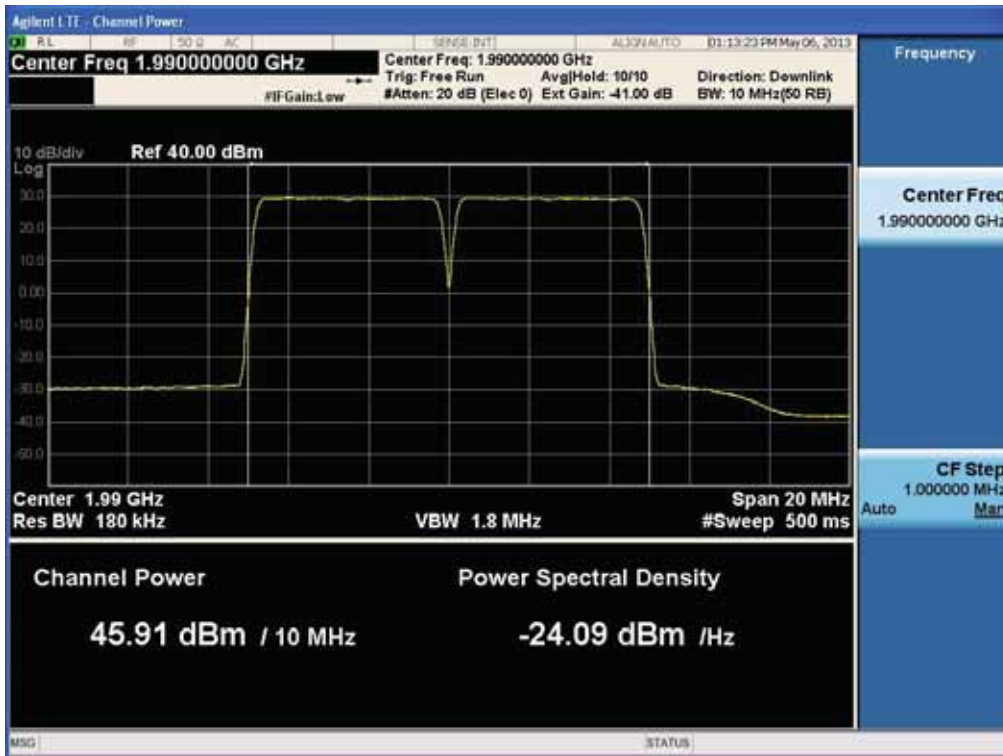


(64QAM Middle Channel)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 28 of 156

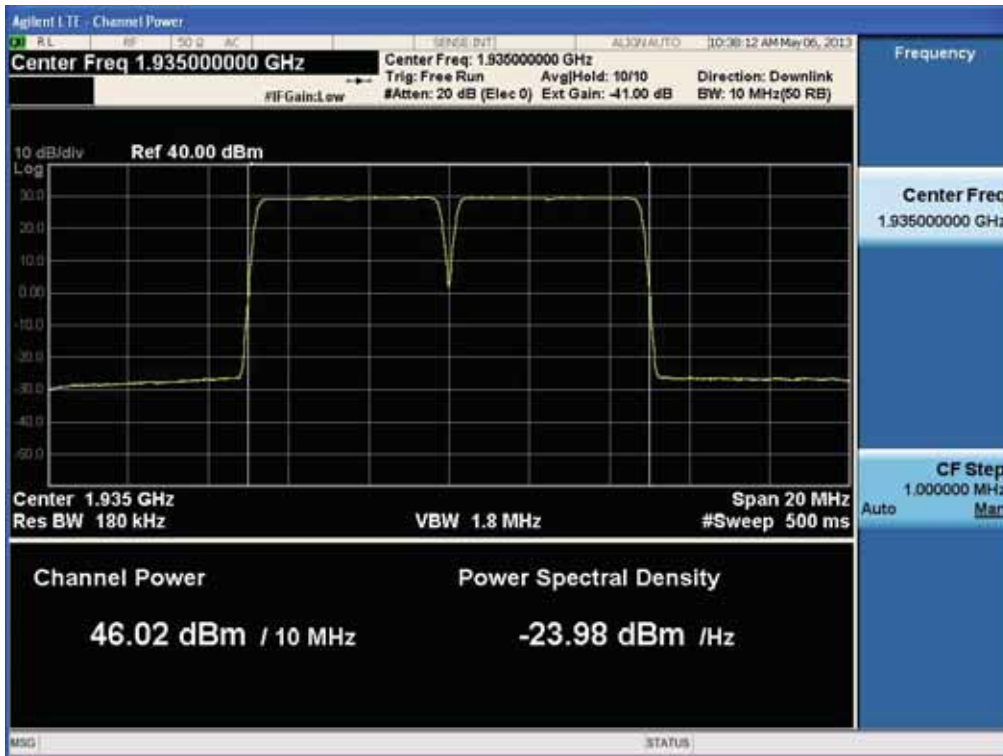
(64QAM High Channel)



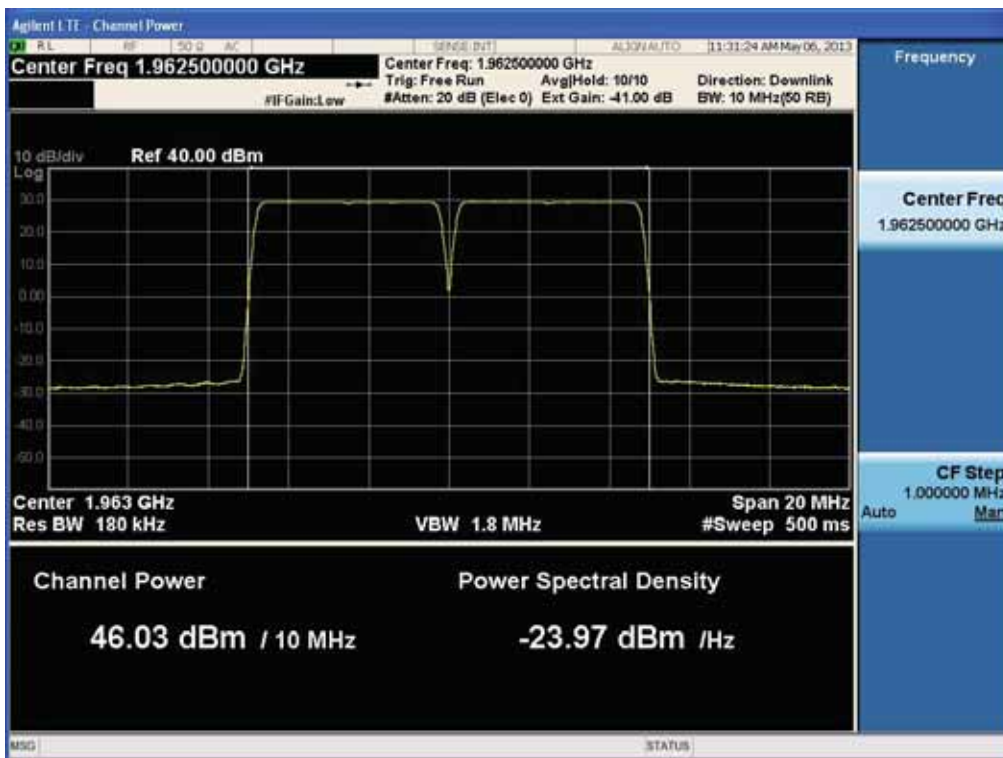
FCC PT.24 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 29 of 156

. Plot Data for LTE 5 MHz : 2 Carrier , Output Port 1

(QPSK Low Channel)

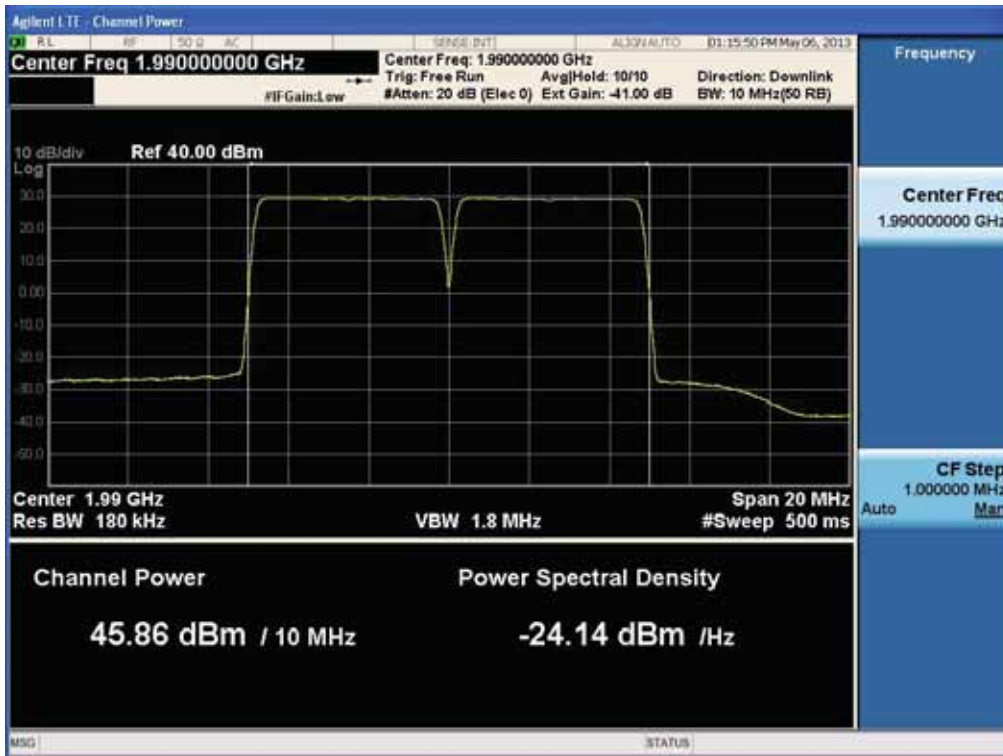


(QPSK Middle Channel)

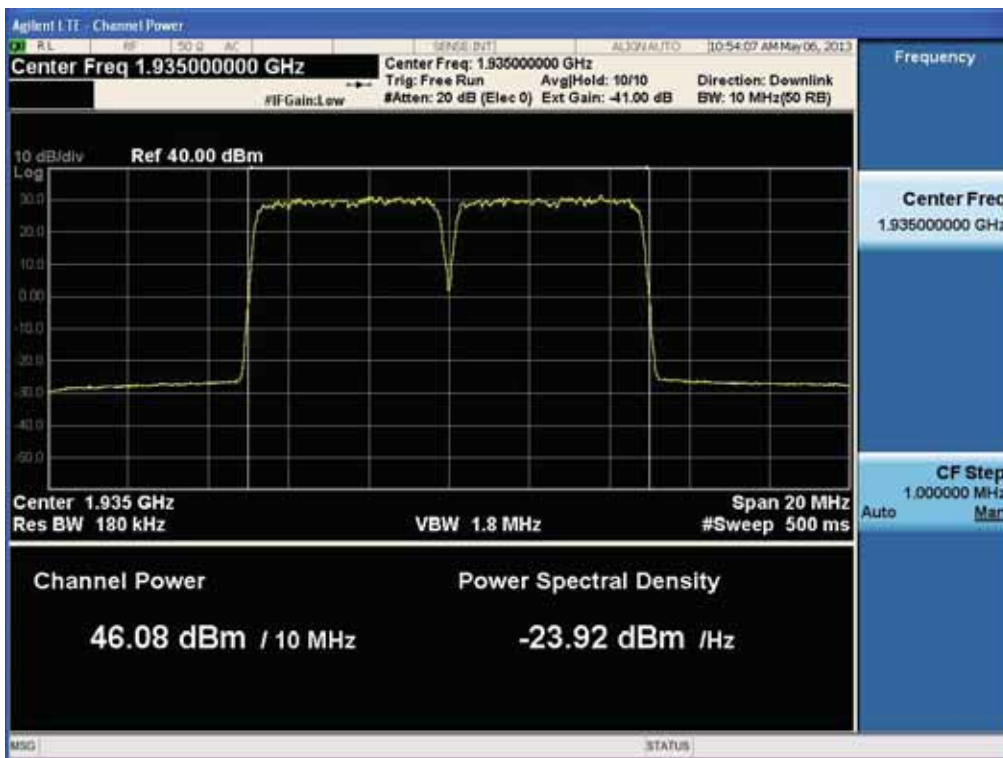


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 30 of 156

(QPSK High Channel)

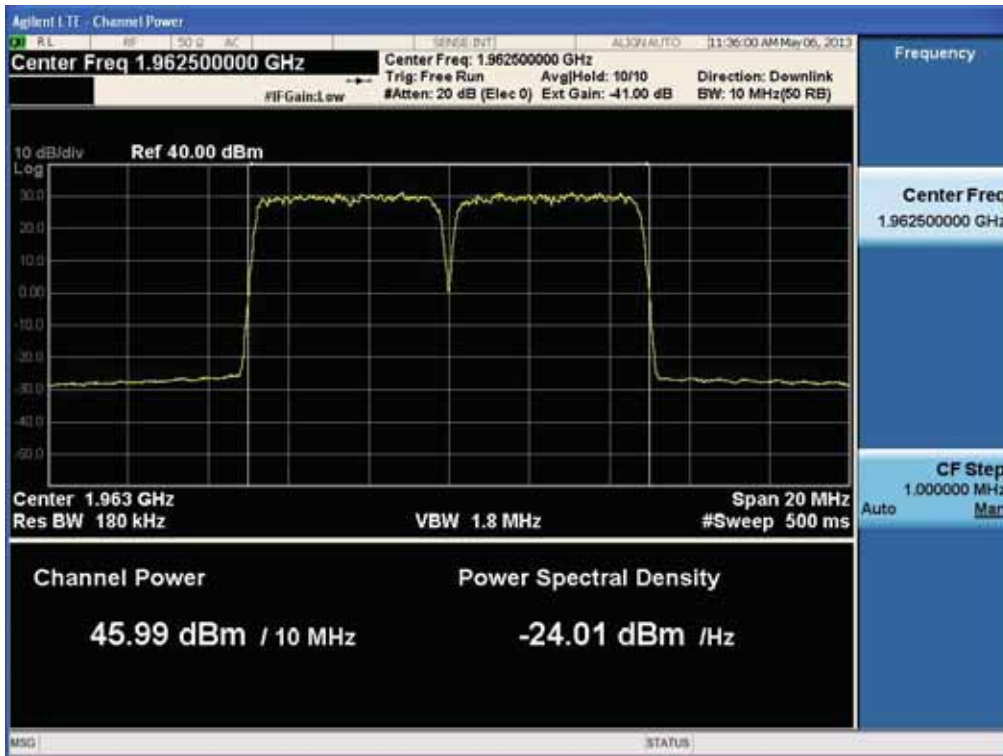


(16QAM Low Channel)

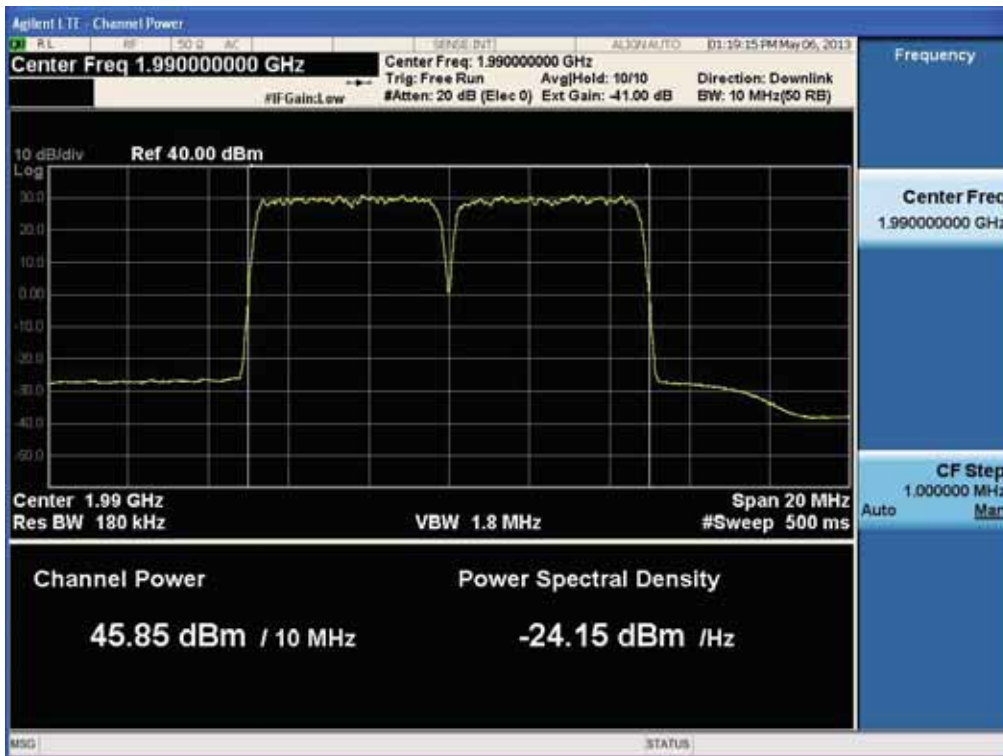


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 31 of 156

(16QAM Middle Channel)

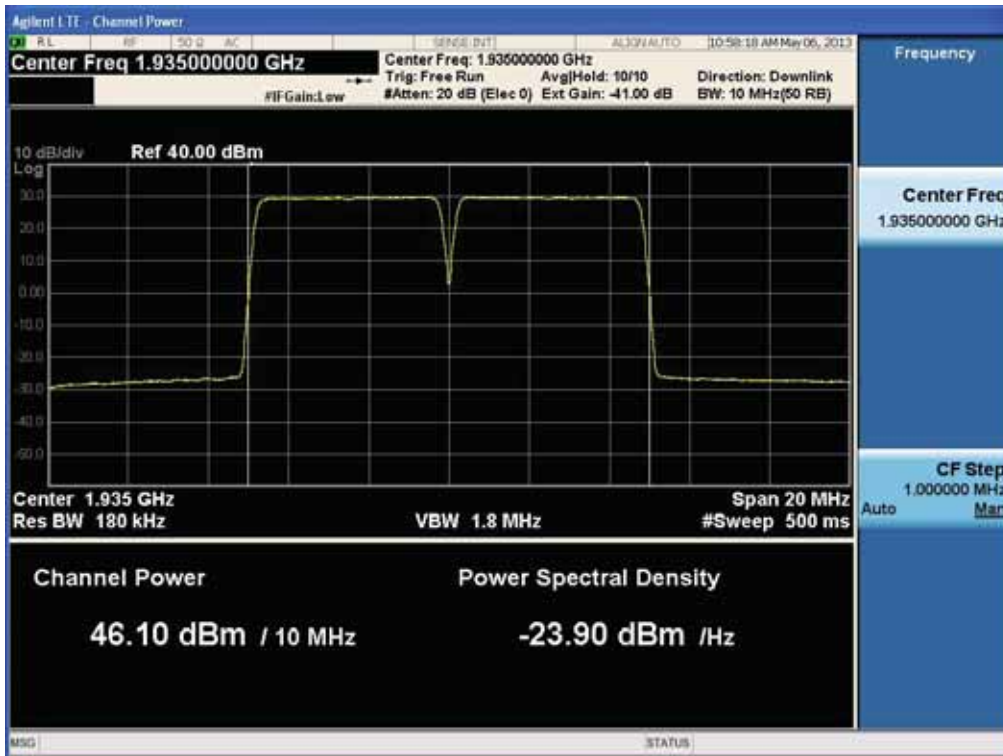


(16QAM High Channel)

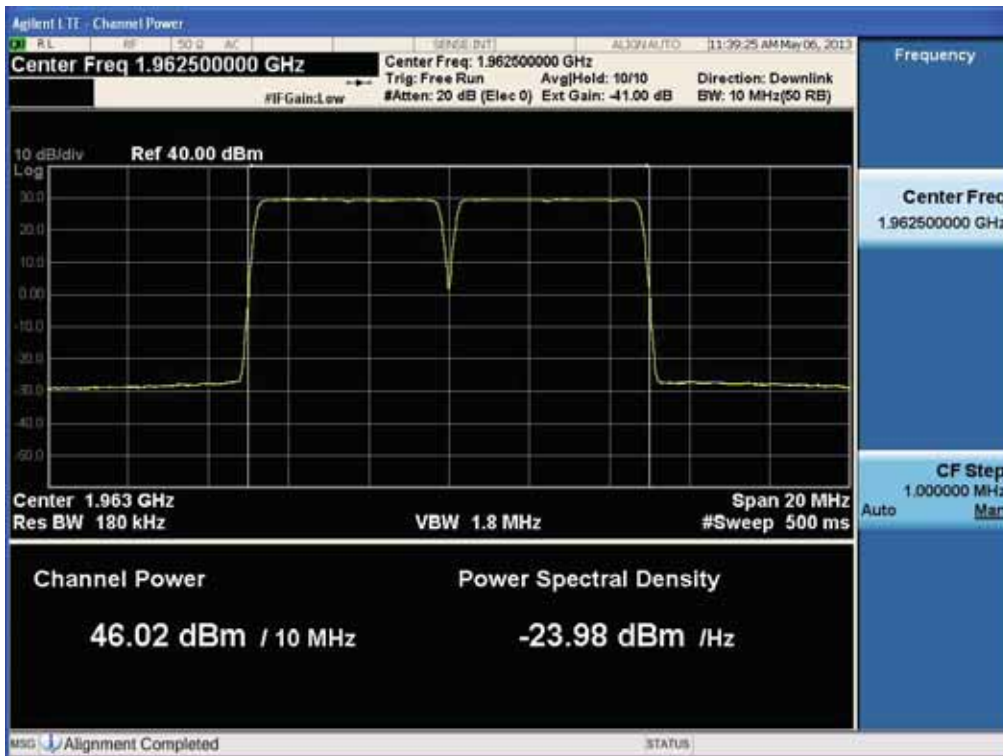


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM Low Channel)

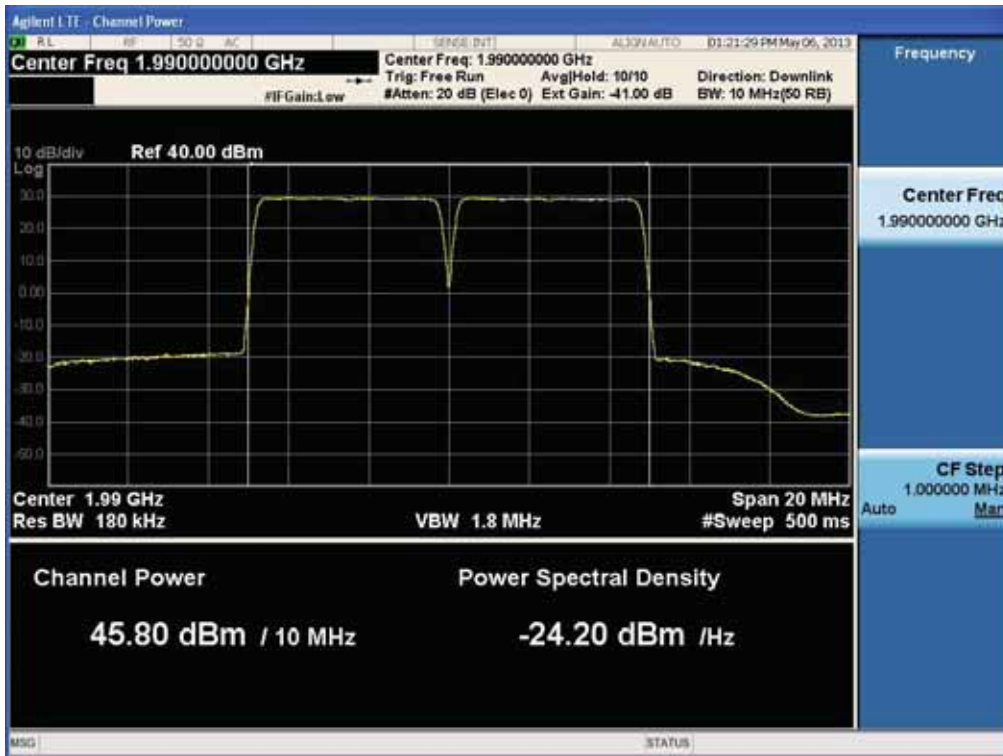


(64QAM Middle Channel)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 33 of 156

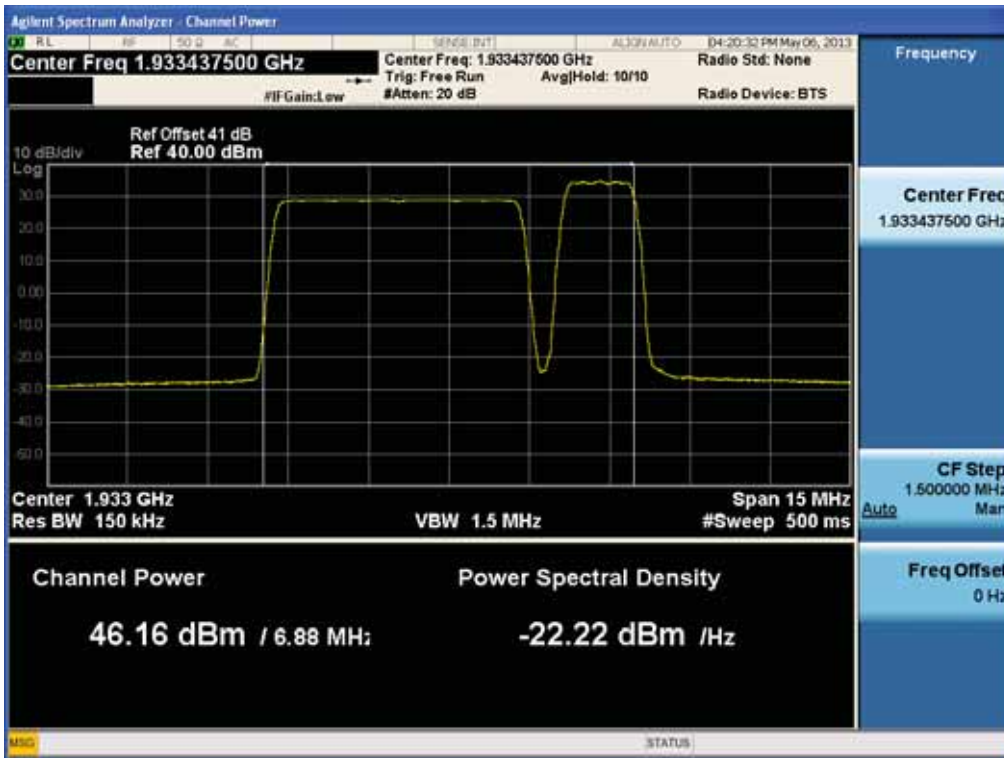
(64QAM High Channel)



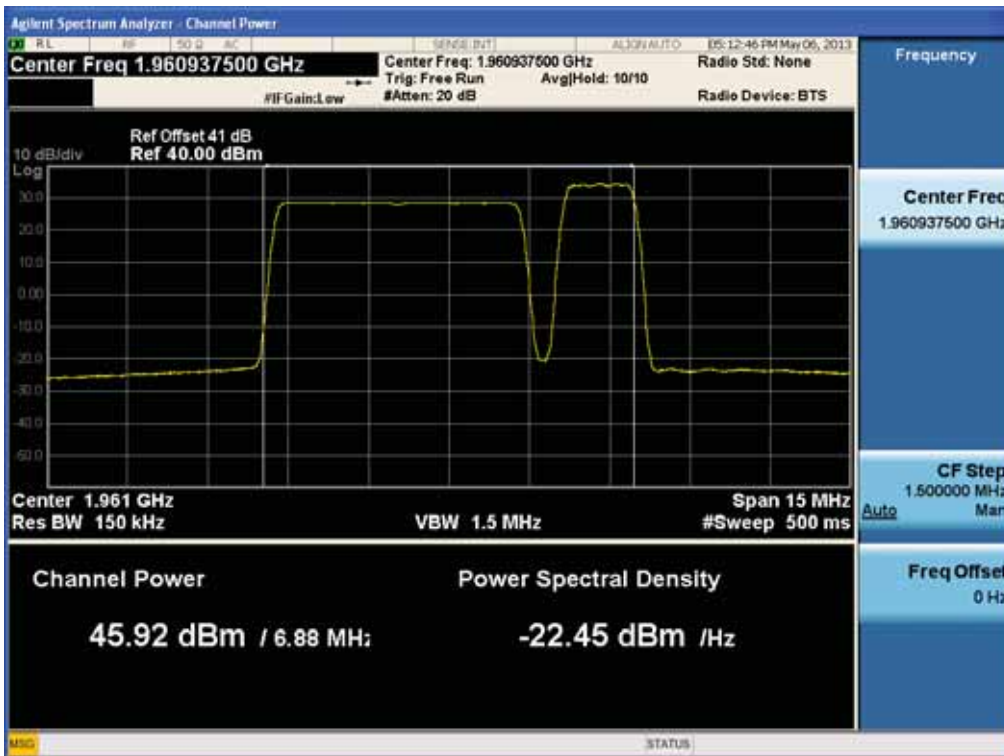
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 34 of 156

. Plot Data for LTE + CDMA, Output Port 0

(QPSK Low Channel)

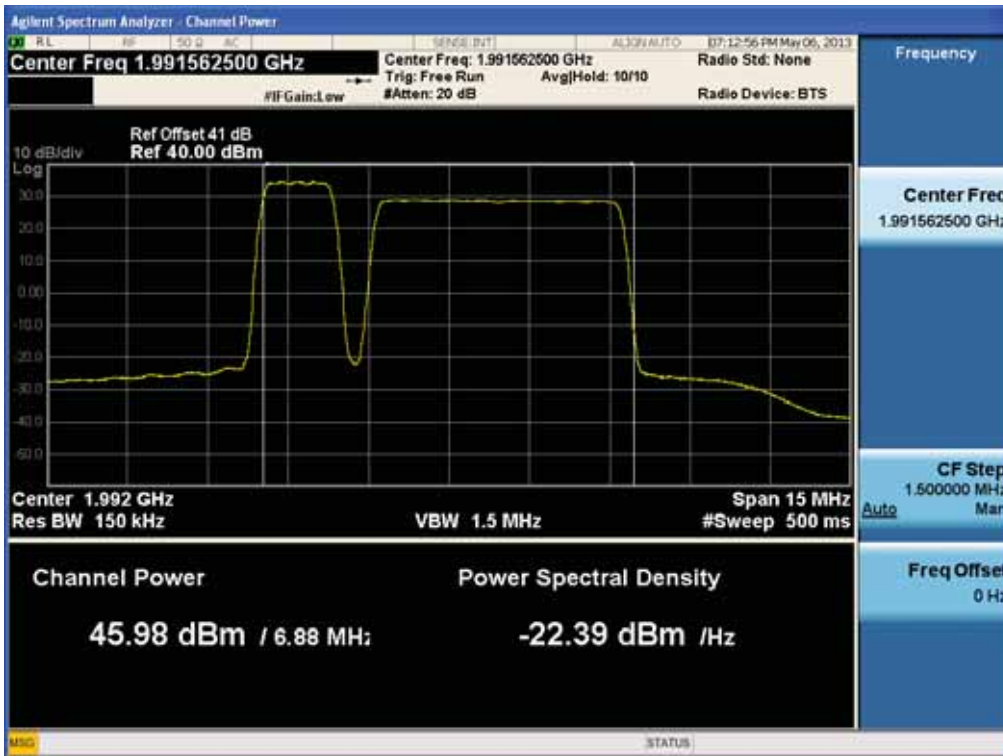


(QPSK Middle Channel)

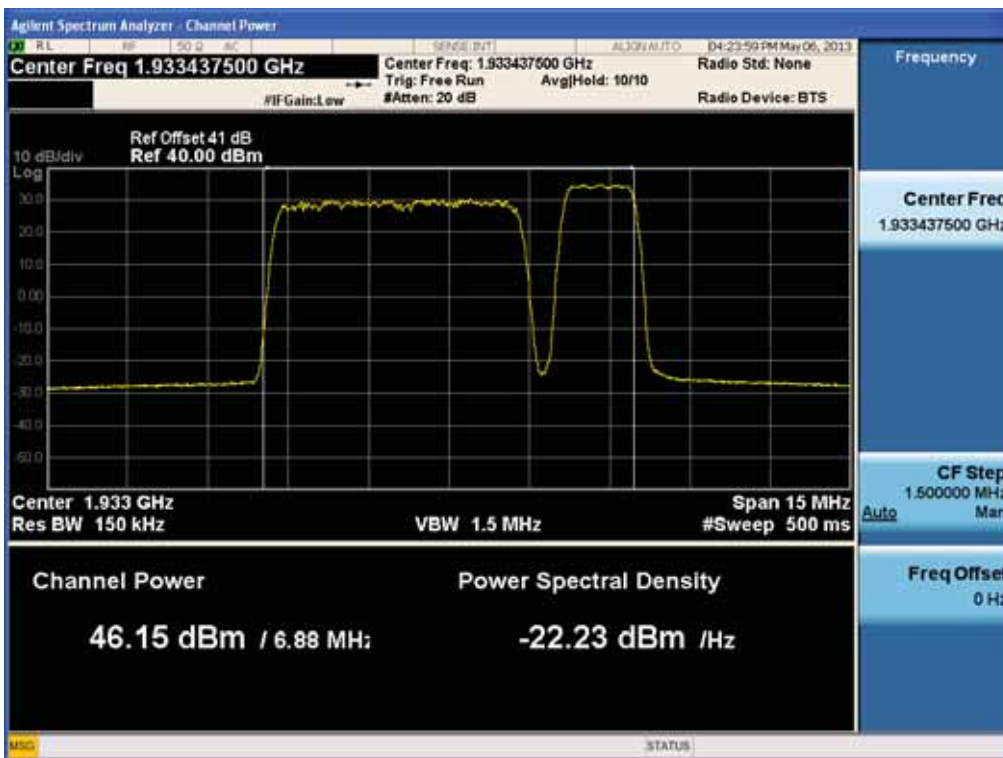


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 35 of 156

(QPSK High Channel)

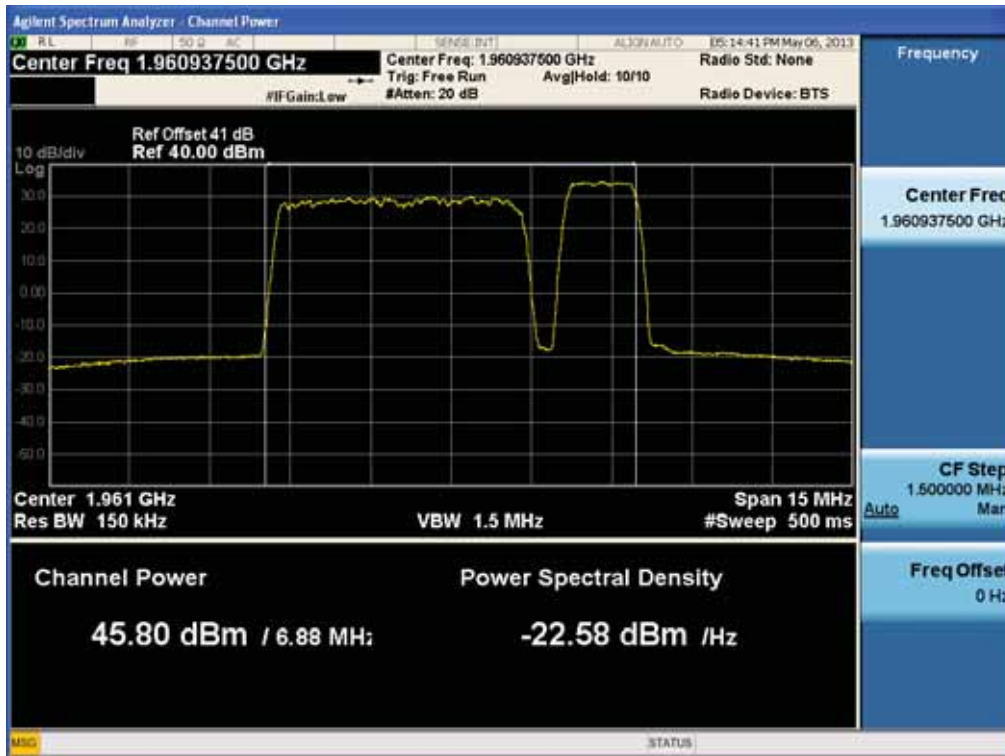


(16QAM Low Channel)

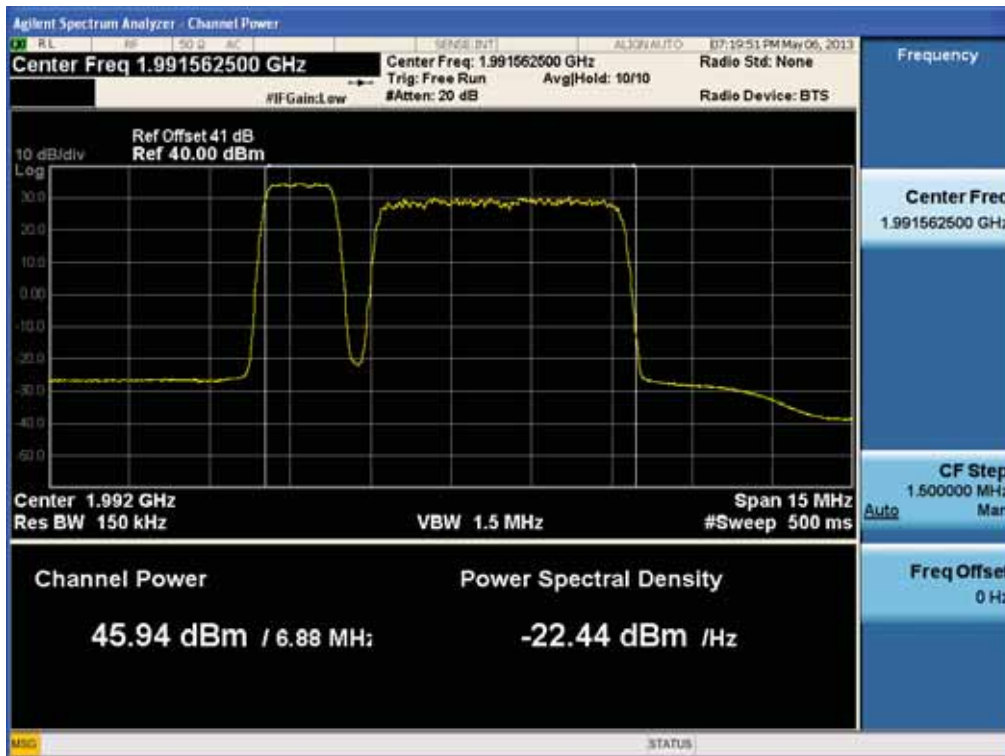


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 36 of 156

(16QAM Middle Channel)

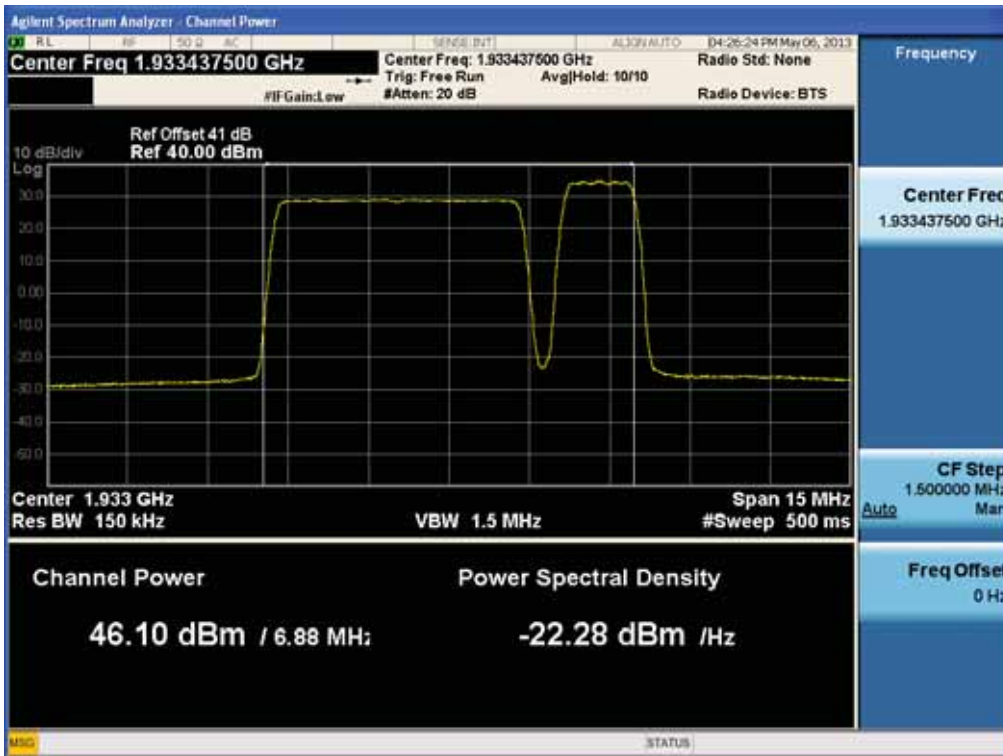


(16QAM High Channel)

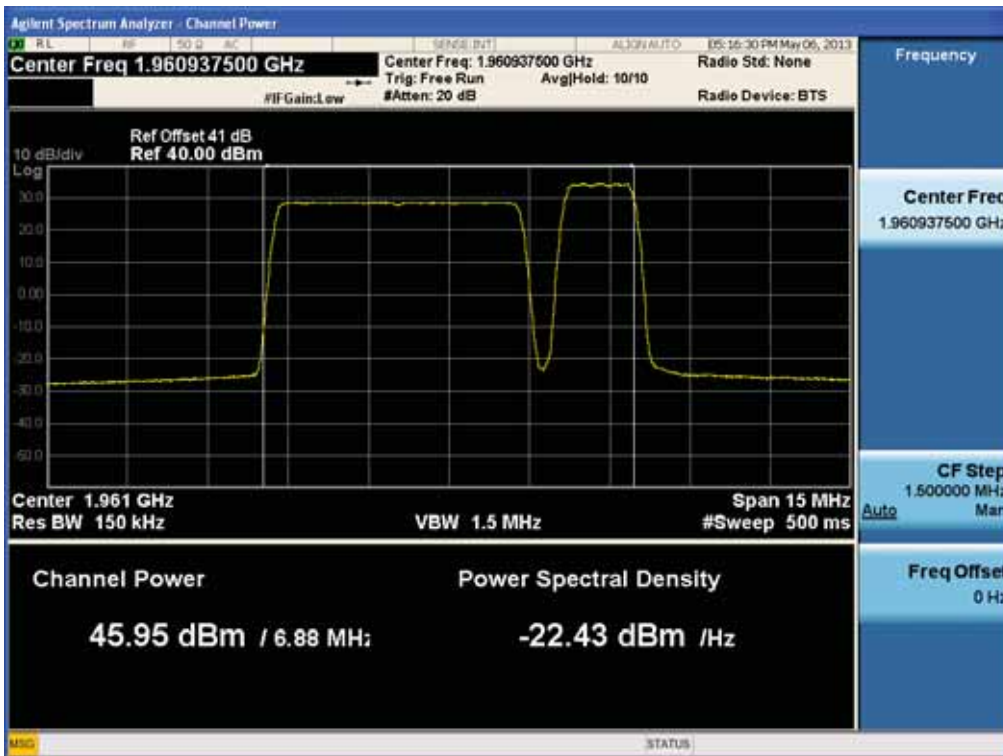


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 37 of 156

(64QAM Low Channel)

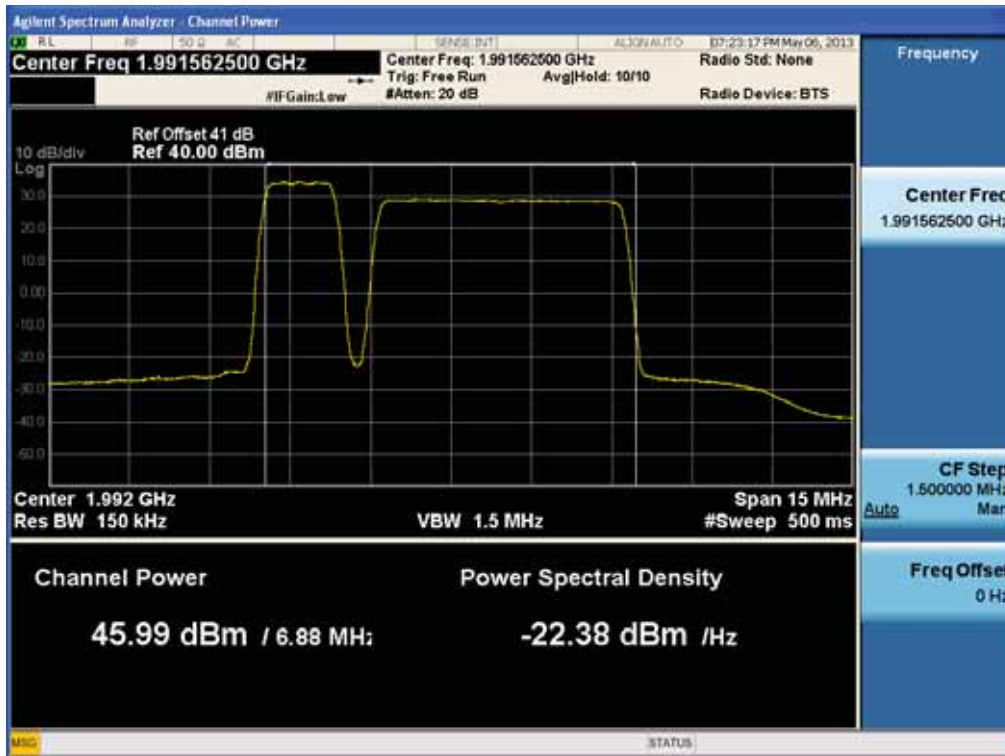


(64QAM Middle Channel)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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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 + CDMA, Output Port 1

(QPSK Low Channel)

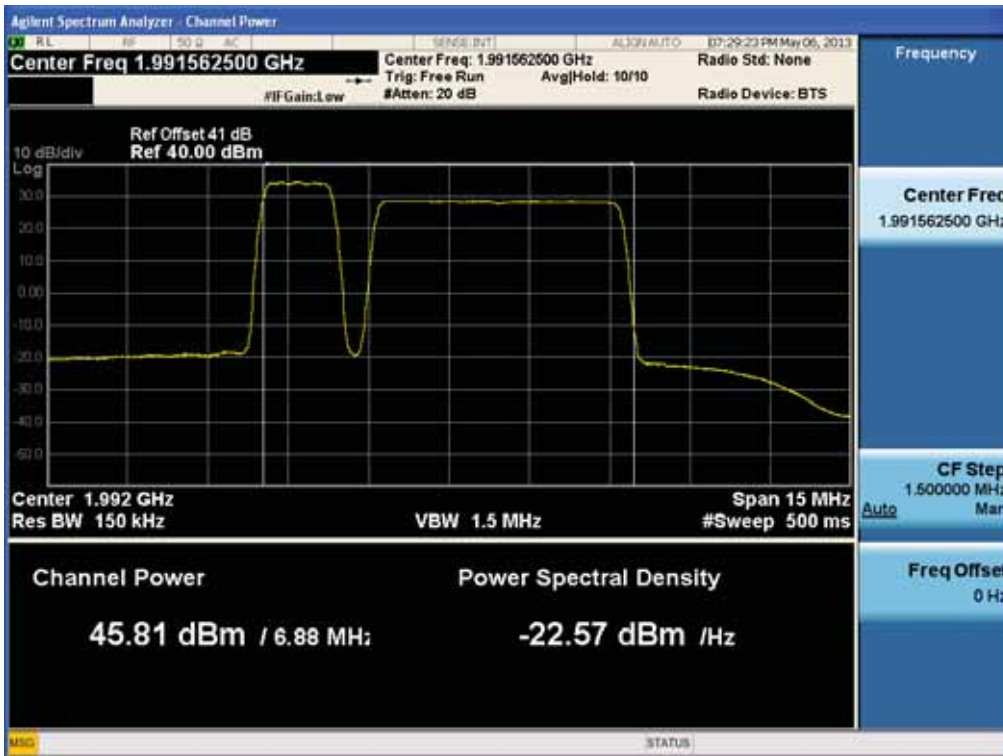


(QPSK Middle Channel)

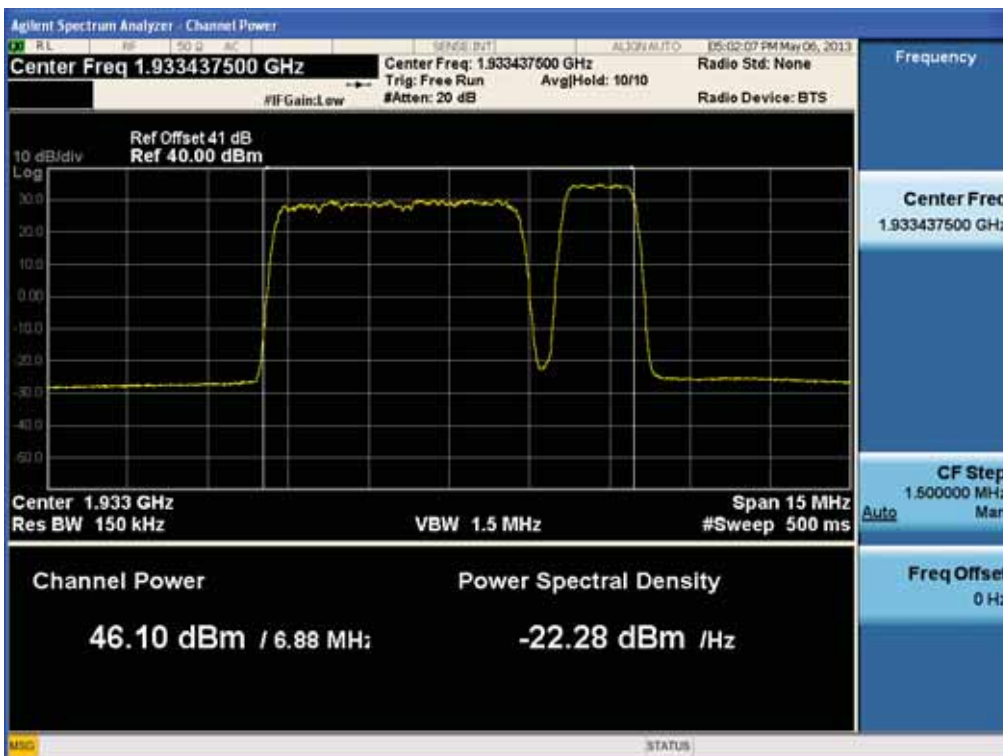


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 40 of 156

(QPSK High Channel)

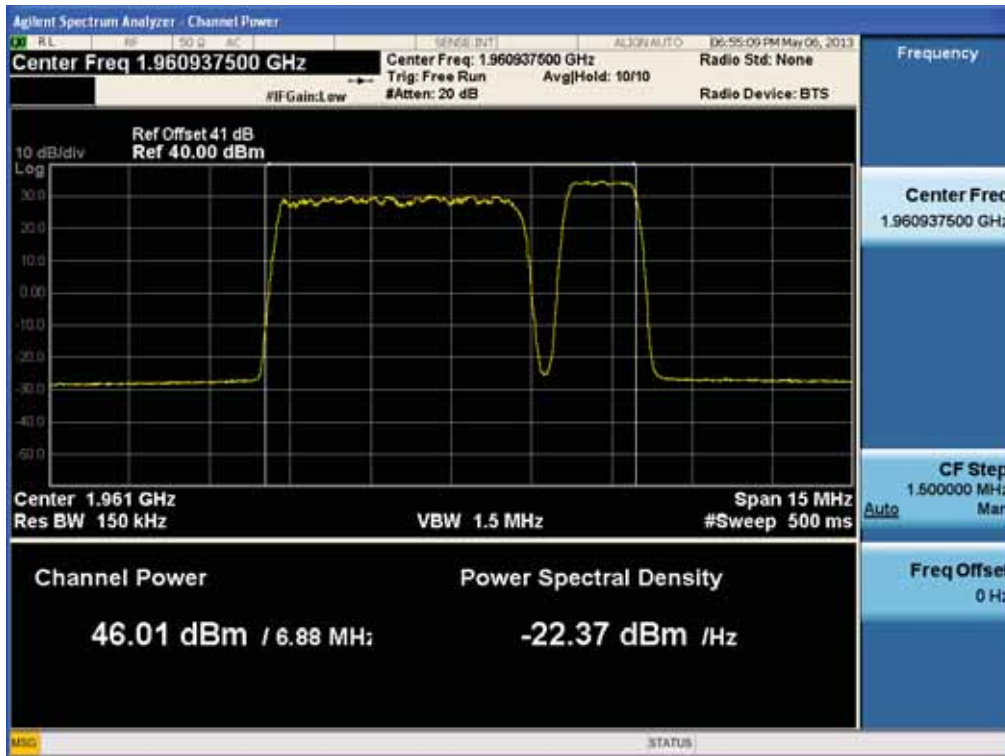


(16QAM Low Channel)

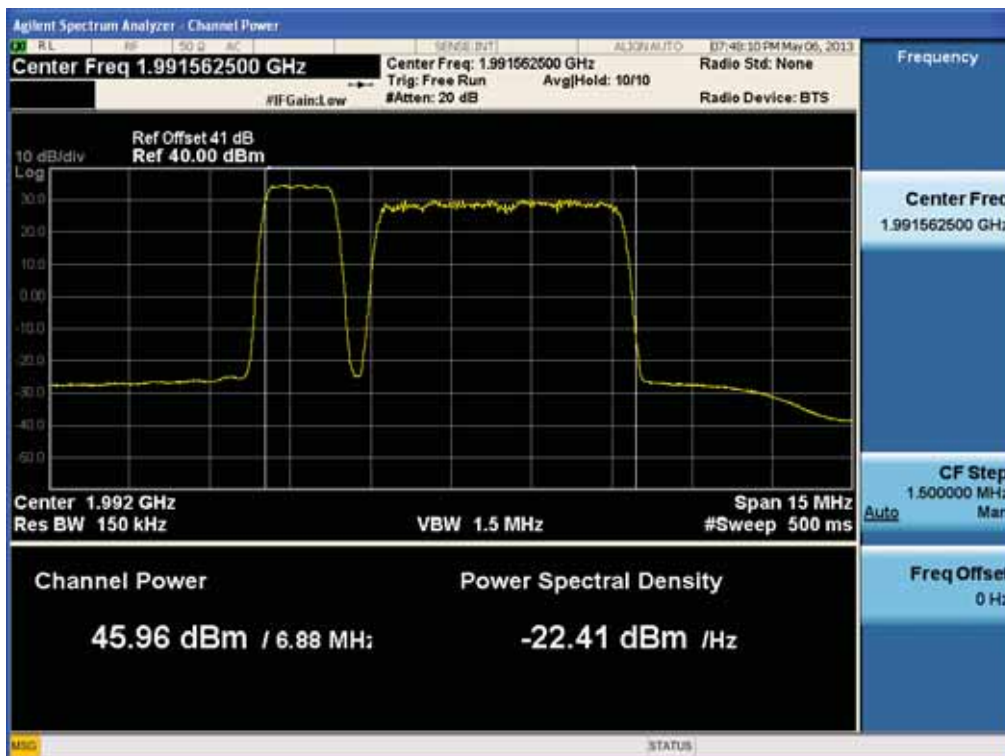


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(16QAM Middle Channel)

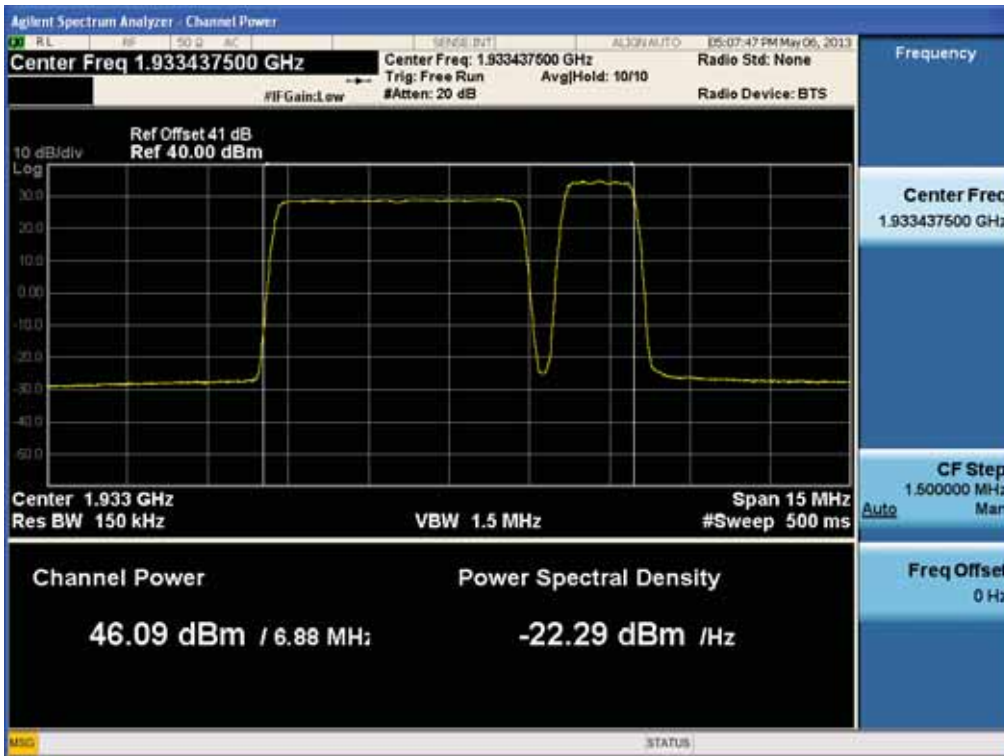


(16QAM High Channel)

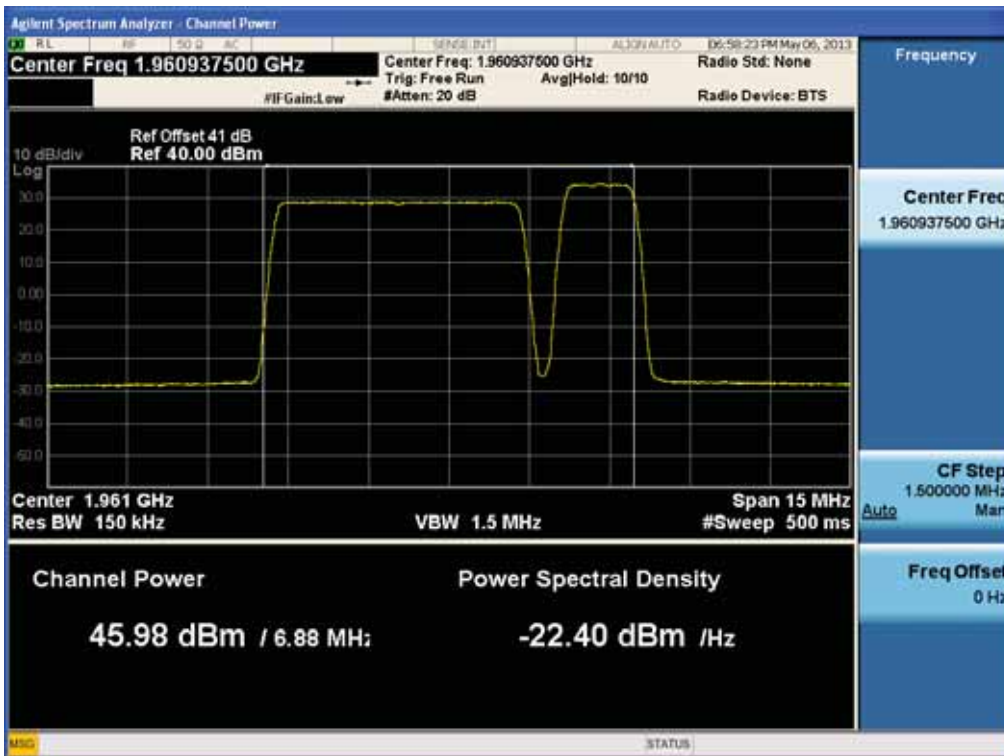


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM Low Channel)

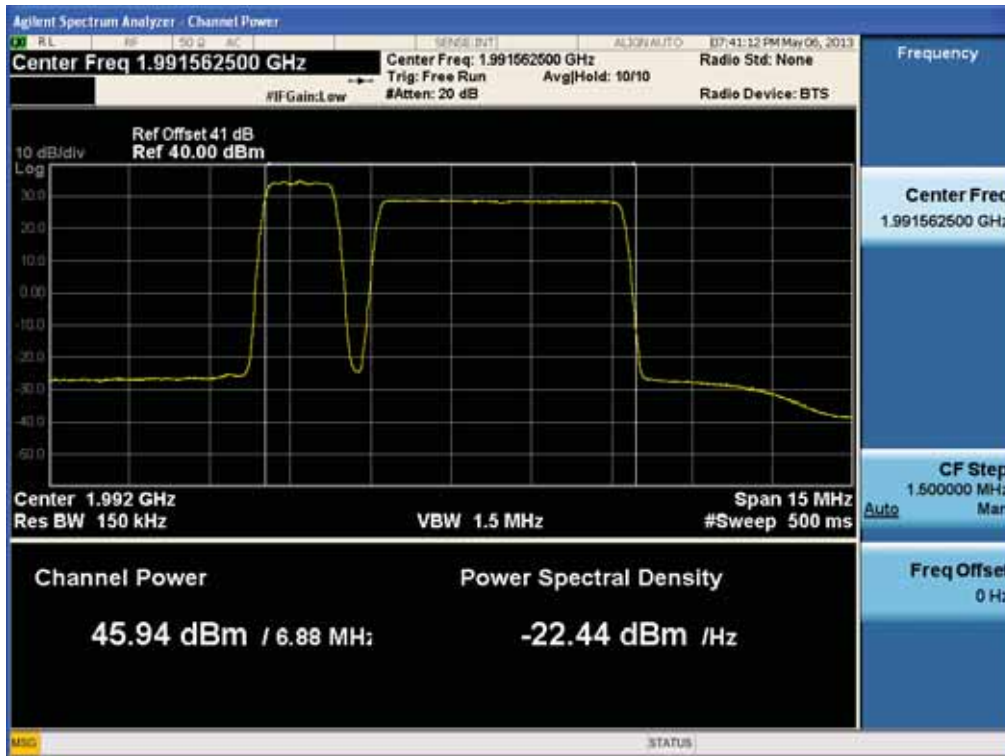


(64QAM Middle Channel)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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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.

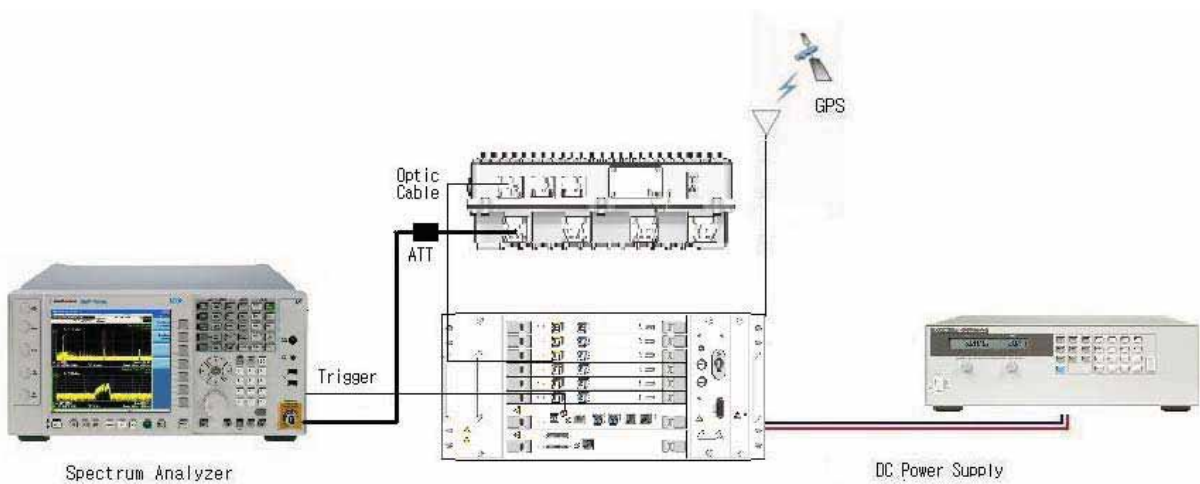
### 6.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	04/25/2014
Agilent	6674A / DC Power Supply	3501A00901	04/16/2014
WEINSCHHEL	67-30-33 / Attenuator	BU5347	11/07/2013
WEINSCHHEL	67-30-33 / Attenuator	BR0530	11/07/2013
WEINSCHHEL	AF9003-69-31 / Attenuator	11787	11/07/2013
WEINSCHHEL	AF9003-69-31 / Attenuator	5701	11/07/2013

<b>FCC PT.24 TEST REPORT</b>	<b>FCC CERTIFICATION REPORT</b>			<a href="http://www.hct.co.kr">www.hct.co.kr</a>
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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

FCC PT.24 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
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[ LTE 5 MHz : 1 Carrier / 1 Port ]

. Test Data at Output Port 0

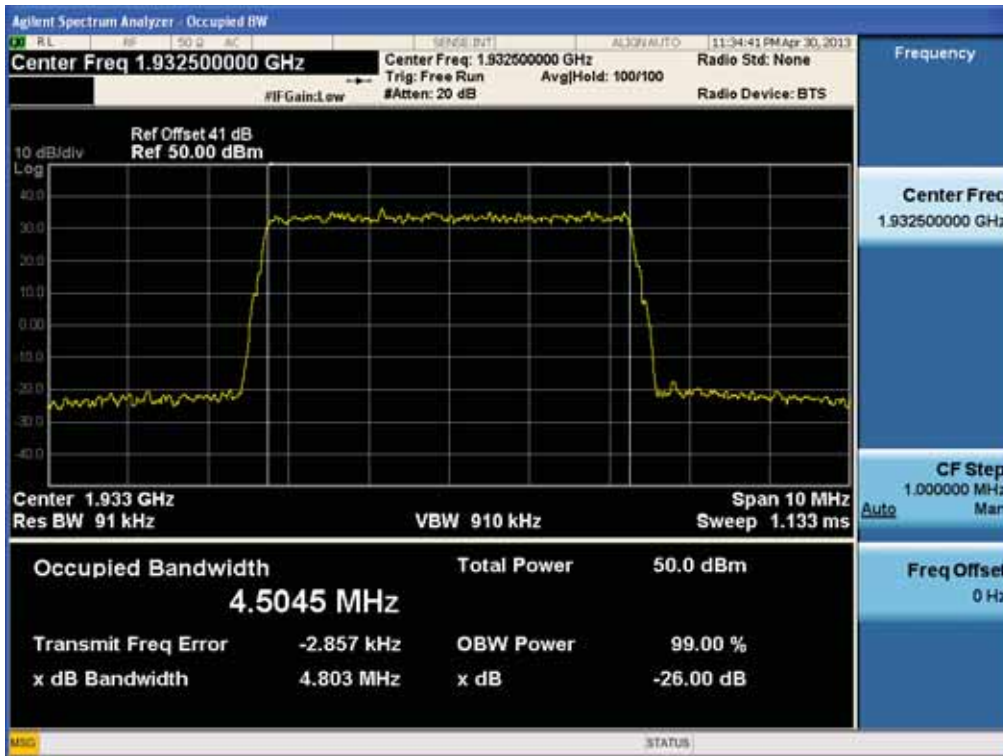
Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.5045
	Middle	1962.5	4.4977
	High	1992.5	4.5149
16QAM	Low	1932.5	4.5024
	Middle	1962.5	4.4745
	High	1992.5	4.4971
64QAM	Low	1932.5	4.5002
	Middle	1962.5	4.5082
	High	1992.5	4.4953

. Test Data at Output Port 1

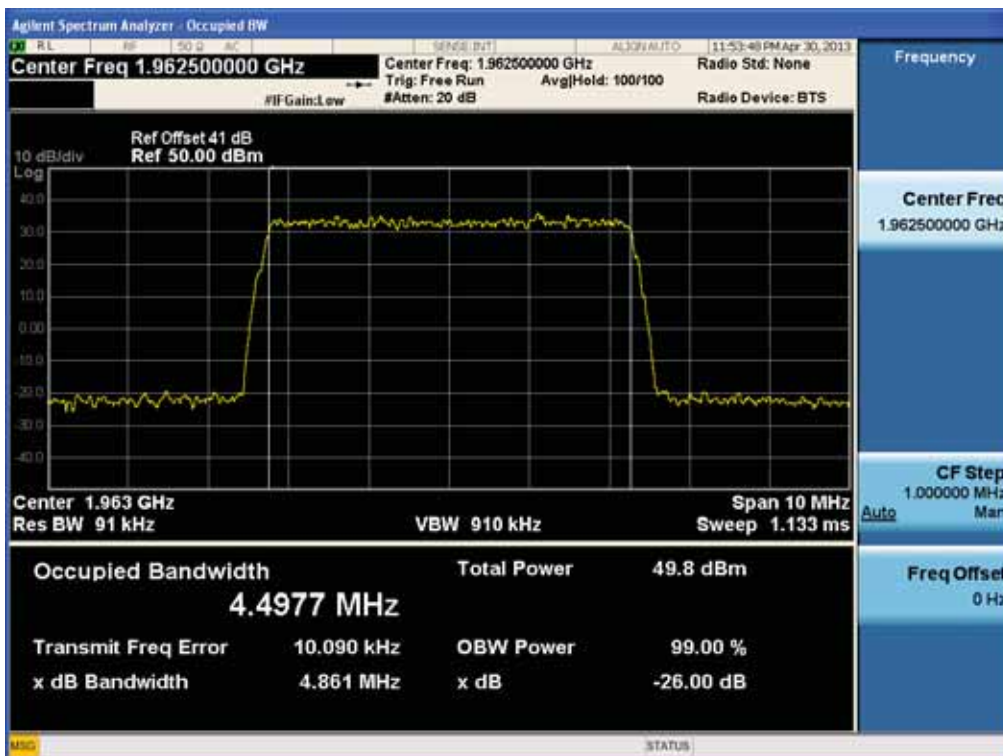
Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
QPSK	Low	1932.5	4.4971
	Middle	1962.5	4.4990
	High	1992.5	4.5092
16QAM	Low	1932.5	4.4685
	Middle	1962.5	4.4866
	High	1992.5	4.4729
64QAM	Low	1932.5	4.4975
	Middle	1962.5	4.5108
	High	1992.5	4.5114

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

(QPSK Low Channel)

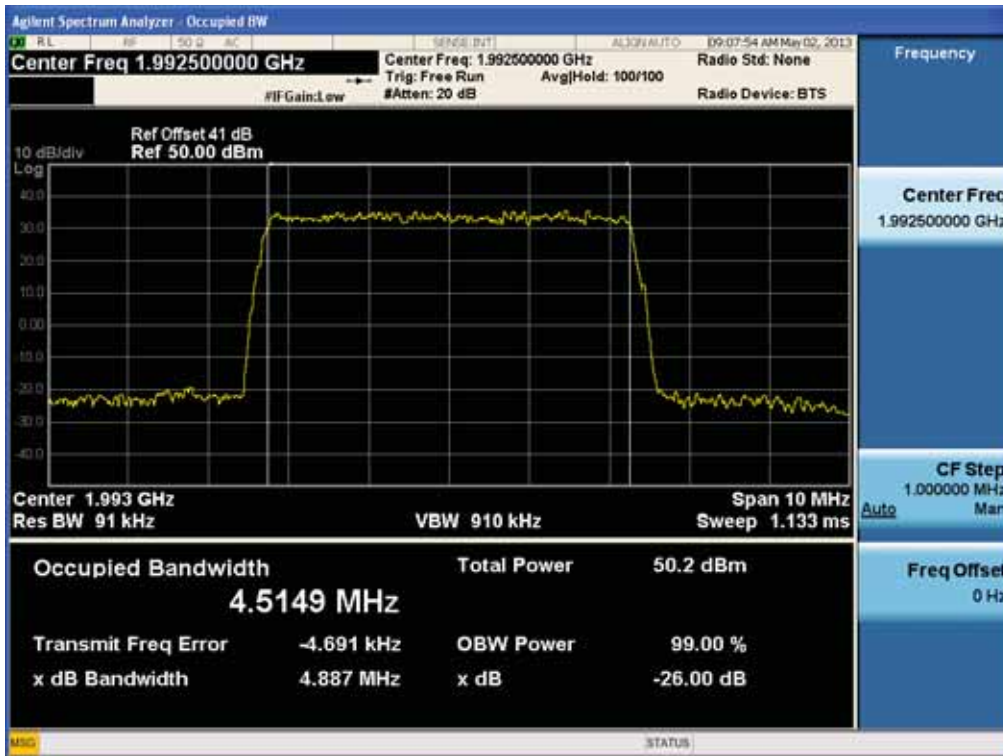


(QPSK Middle Channel)

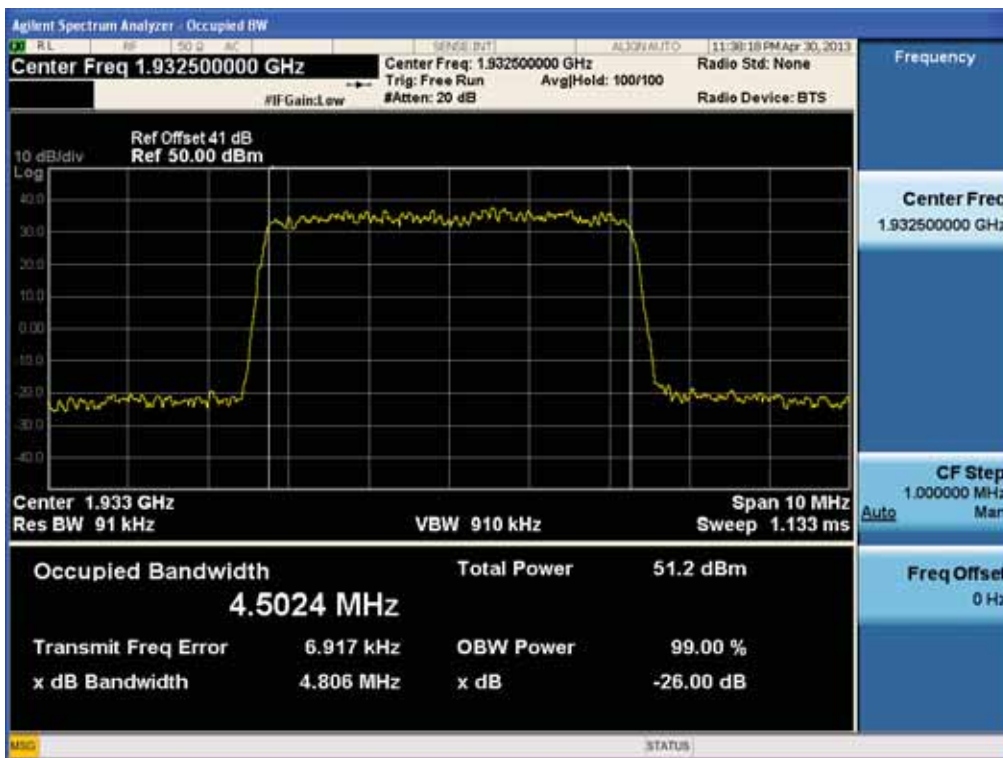


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(QPSK High Channel)

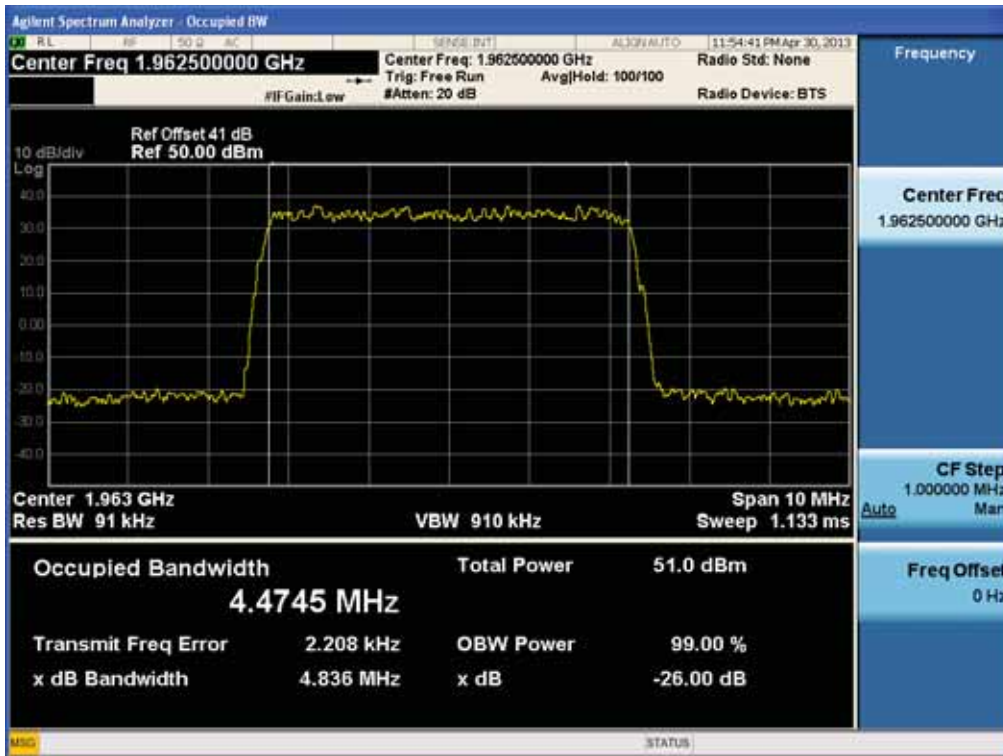


(16QAM Low Channel)

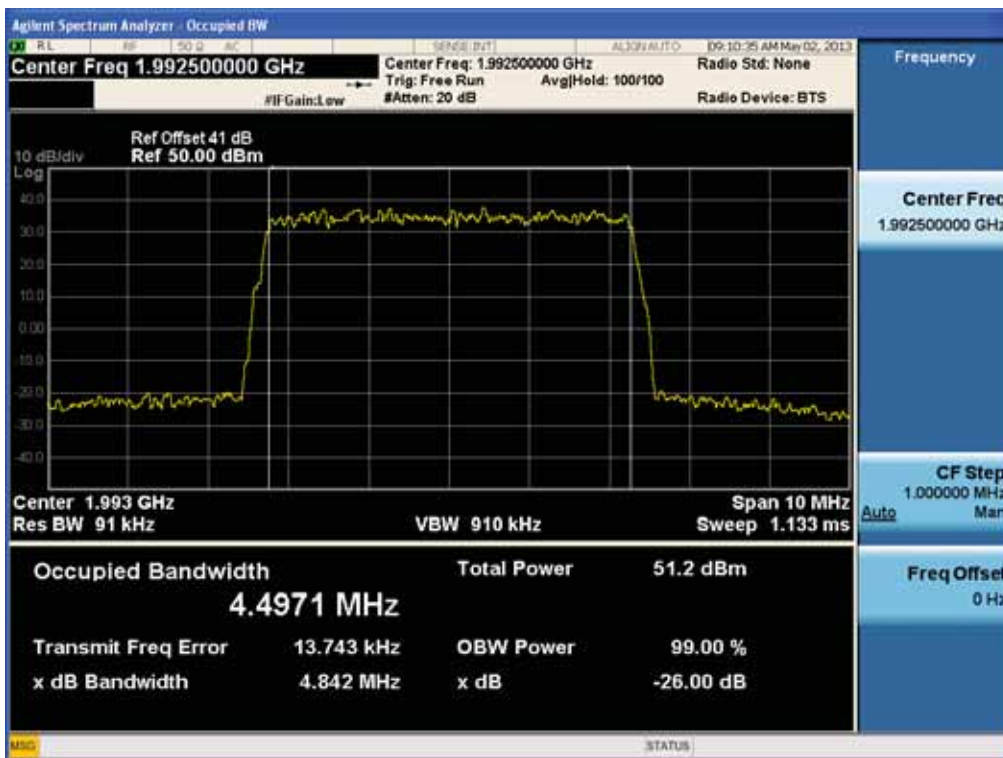


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(16QAM Middle Channel)

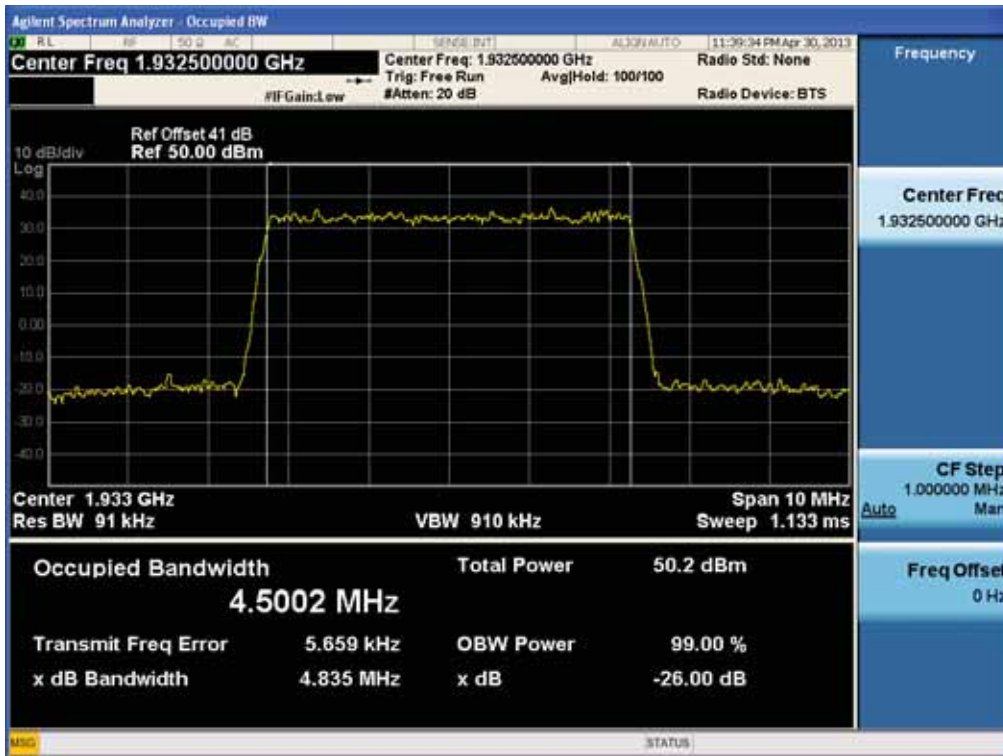


(16QAM High Channel)

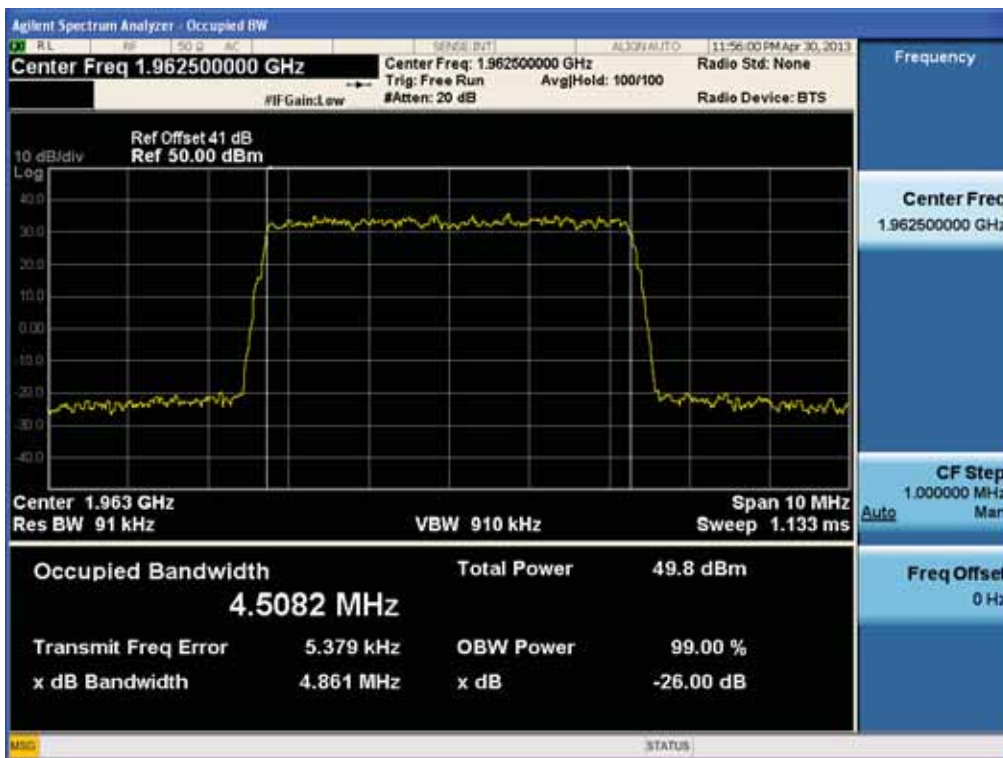


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM Low Channel)

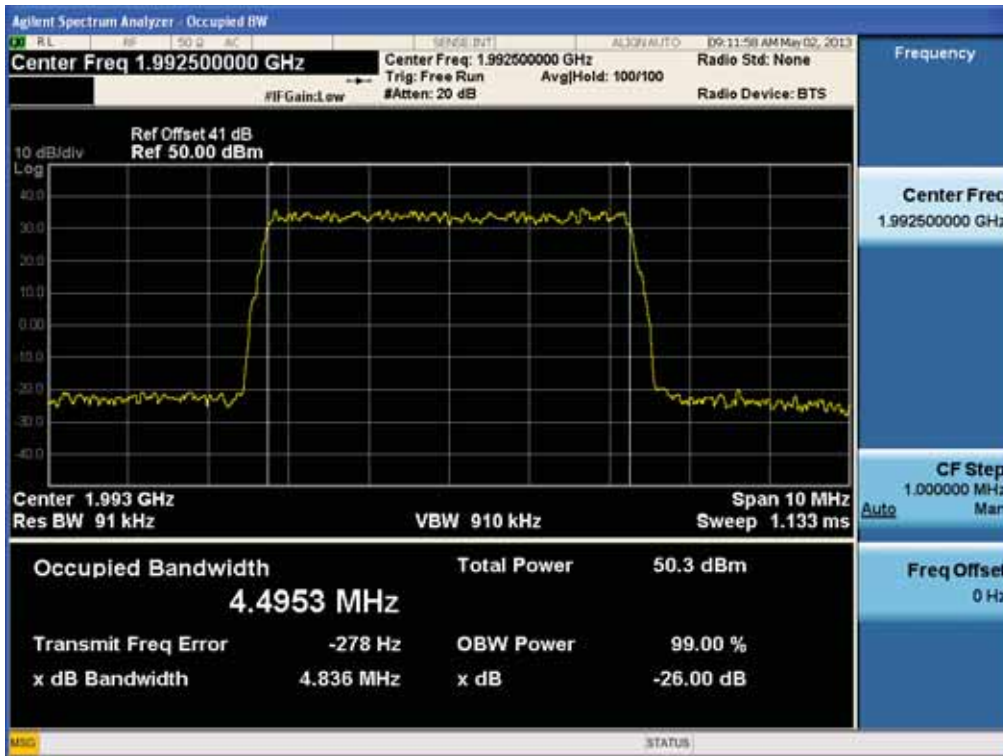


(64QAM Middle Channel)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 51 of 156

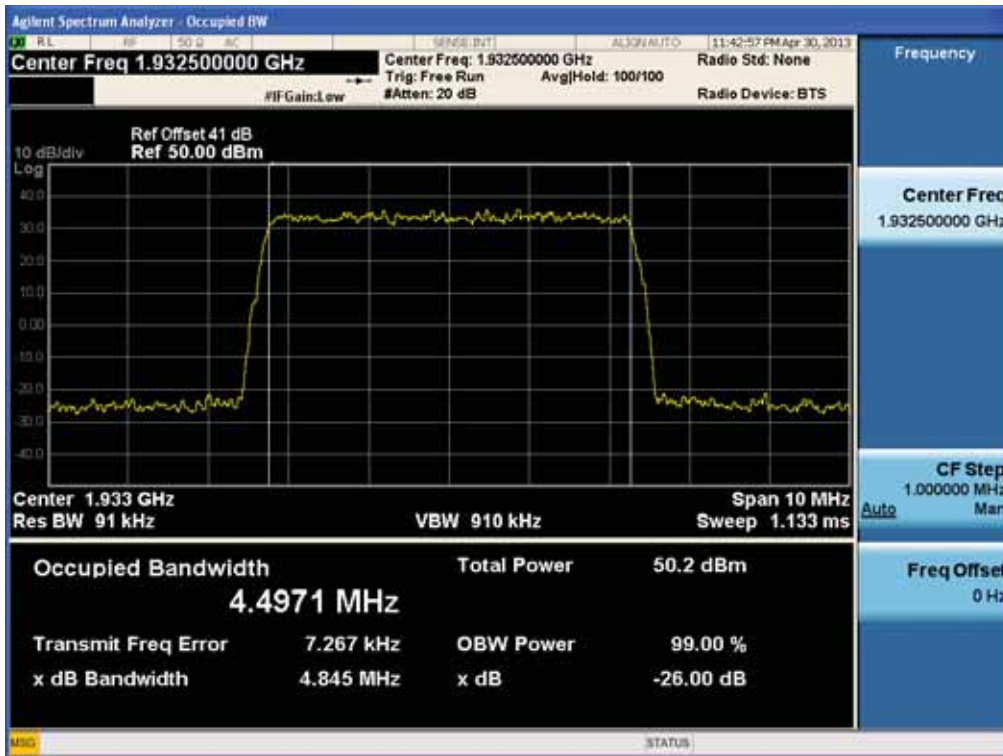
(64QAM High Channel)



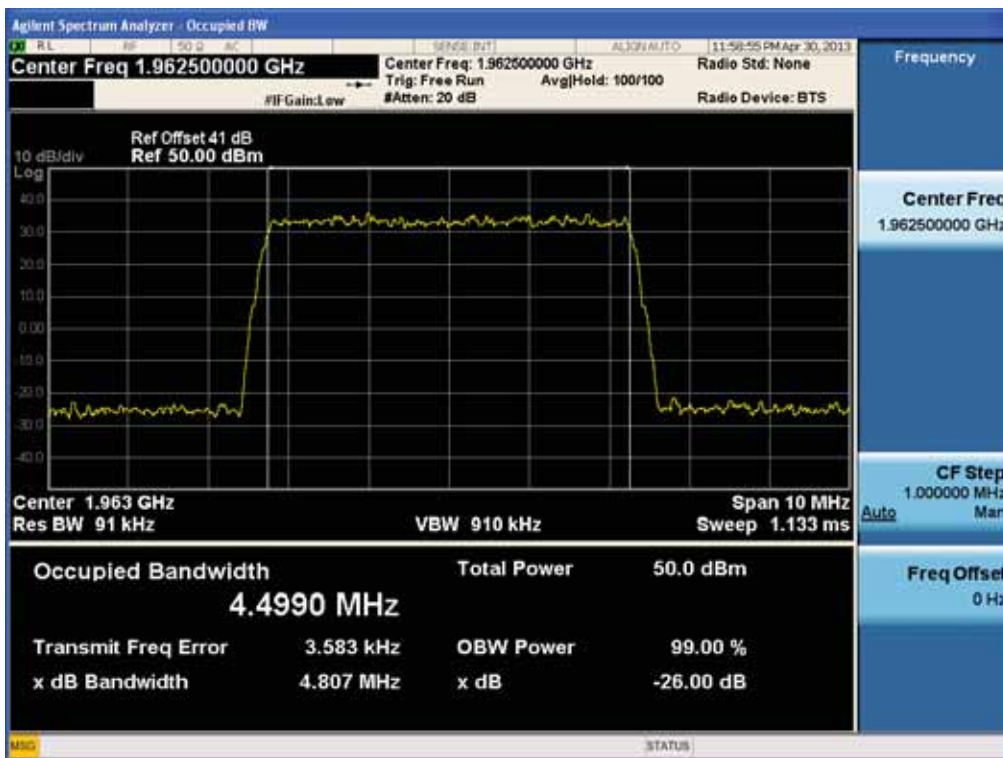
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1305FR15	Date of Issue: May 22, 2013	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 52 of 156

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

(QPSK Low Channel)

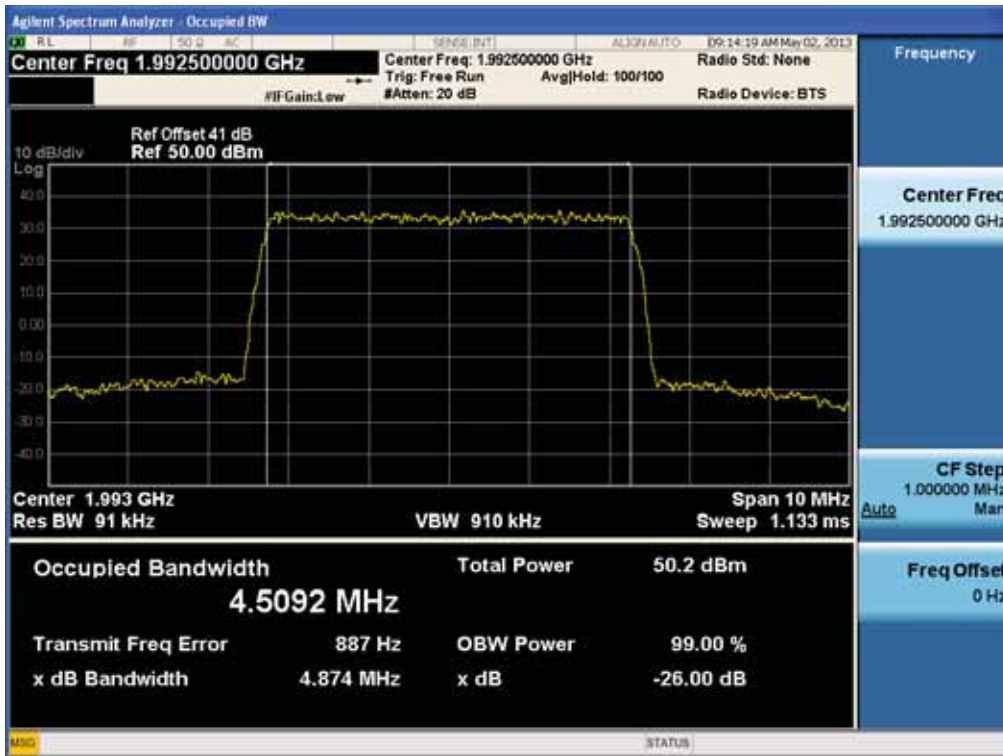


(QPSK Middle Channel)

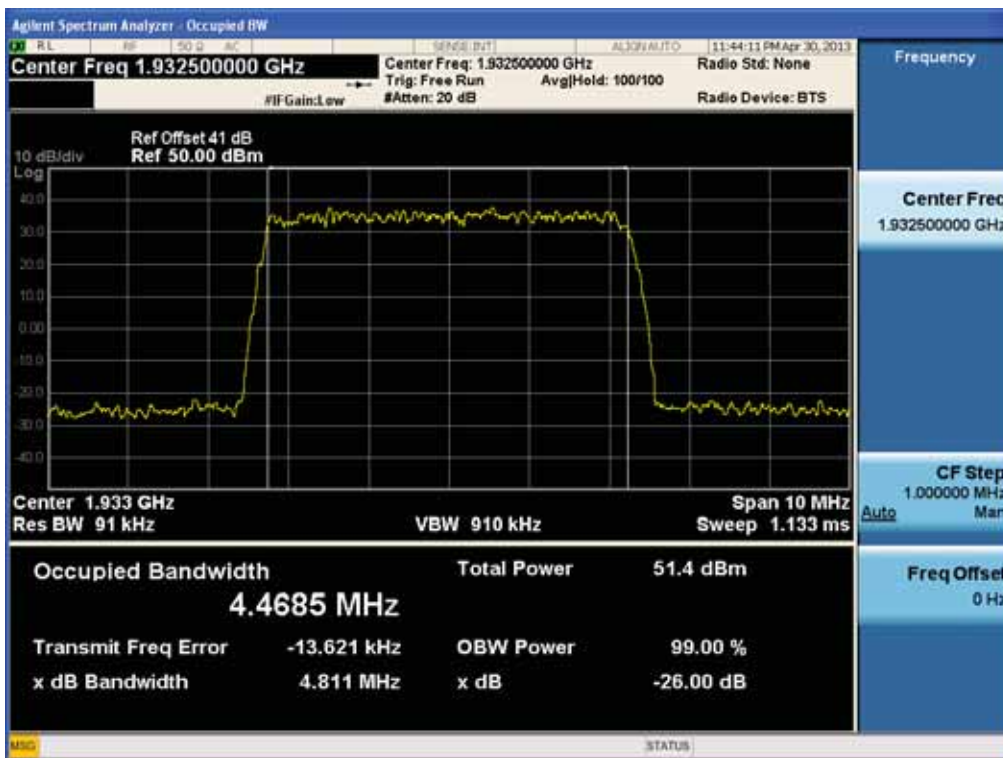


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(QPSK High Channel)

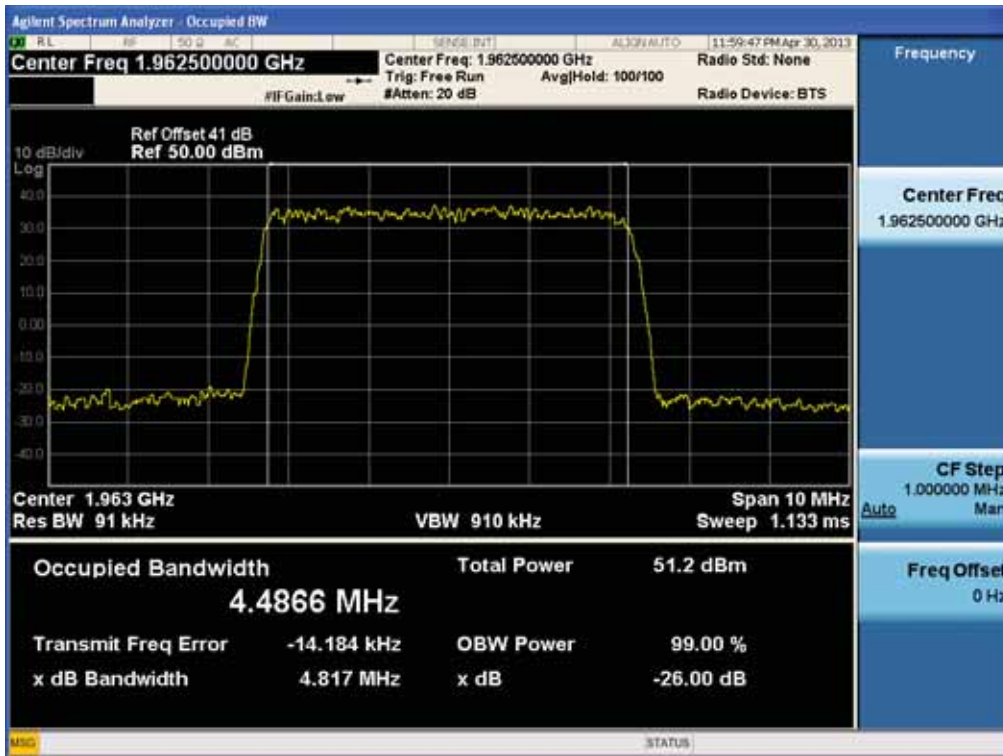


(16QAM Low Channel)

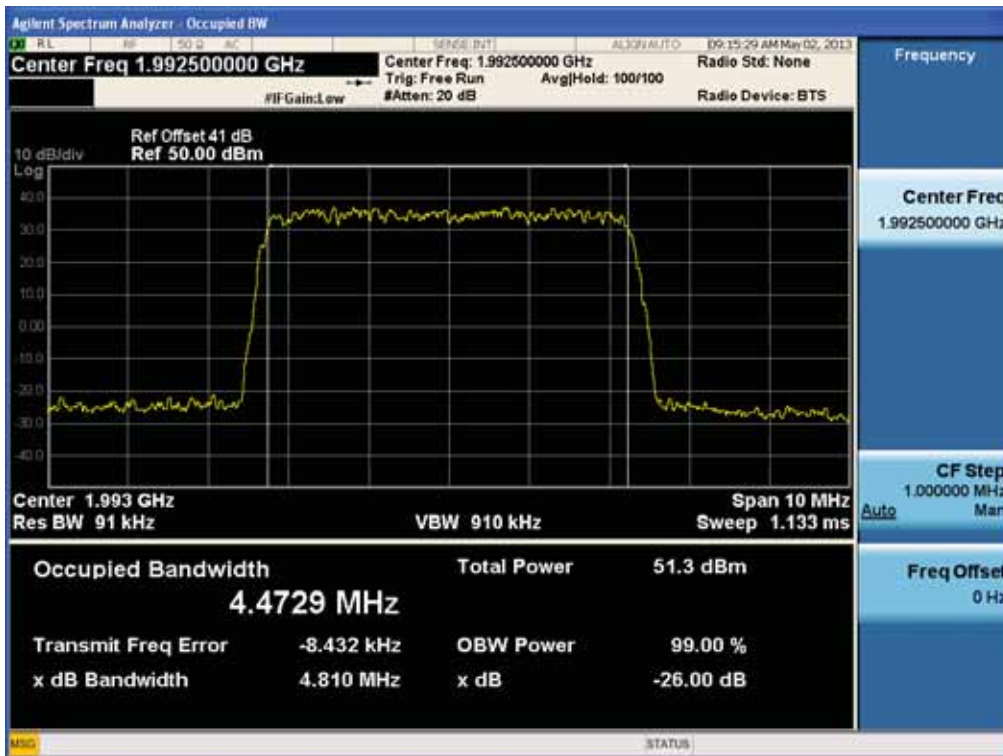


FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(16QAM Middle Channel)

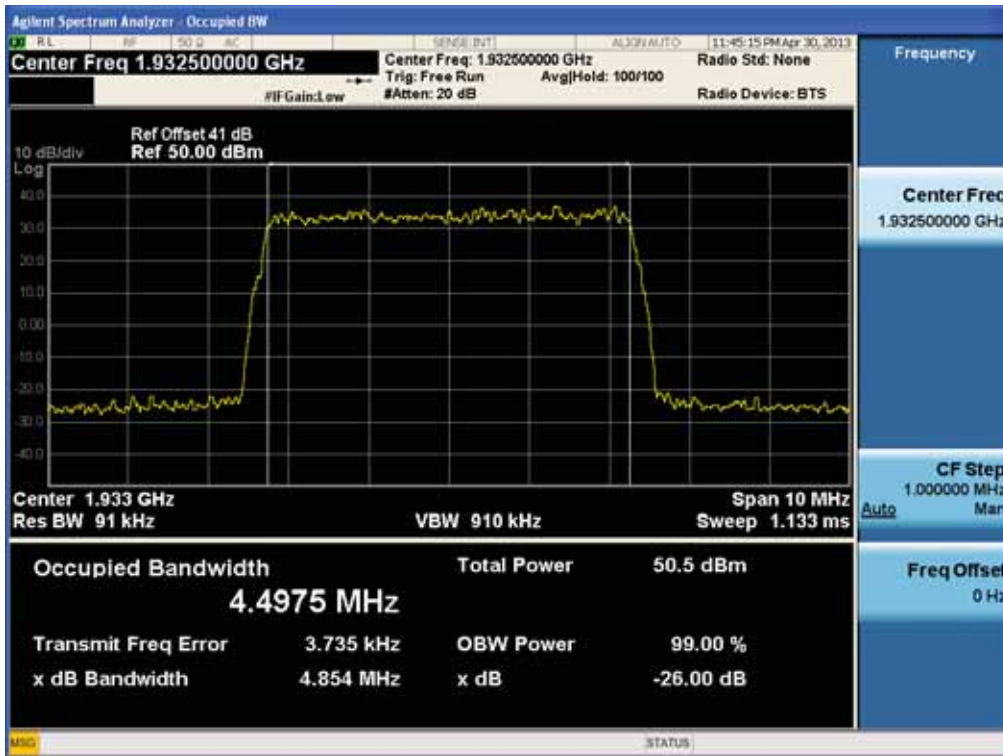


(16QAM High Channel)

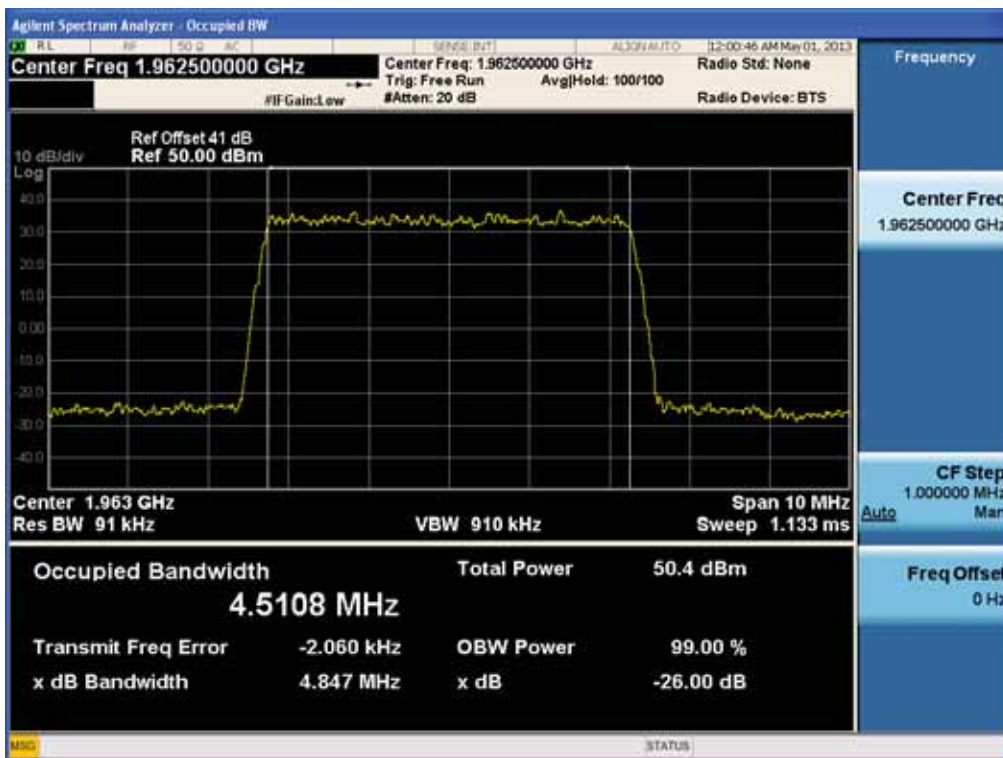


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(64QAM Low Channel)

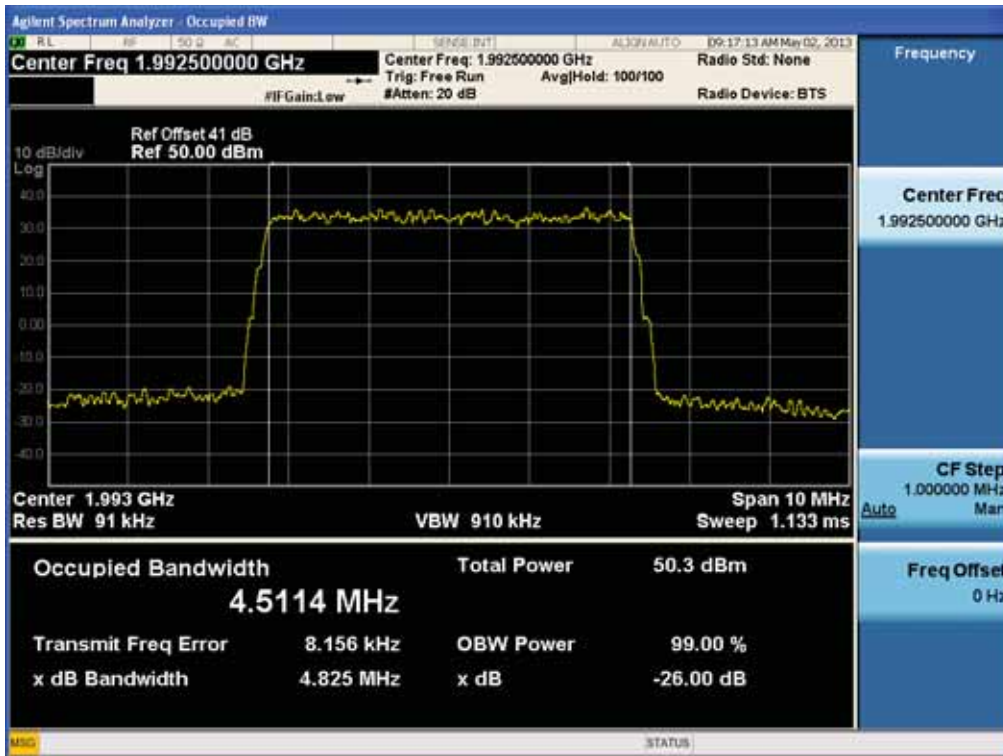


(64QAM Middle Channel)



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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
Agilent	6674A / DC Power Supply	3501A00901	04/16/2014
WEINSCHTEL	67-30-33 / Attenuator	BU5347	11/07/2013
WEINSCHTEL	67-30-33 / Attenuator	BR0530	11/07/2013
WEINSCHTEL	AF9003-69-31 / Attenuator	11787	11/07/2013
WEINSCHTEL	AF9003-69-31 / Attenuator	5701	11/07/2013

### 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)

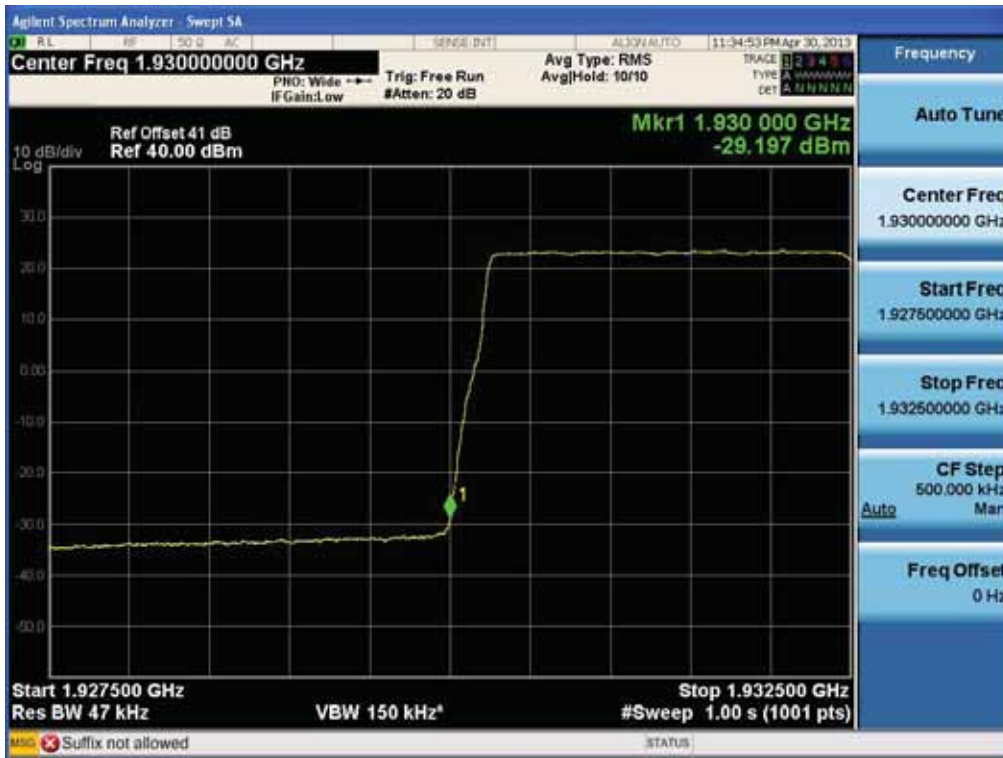


(1 GHz ~ 26.5 GHz)



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(Band Edge)



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(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(QPSK High Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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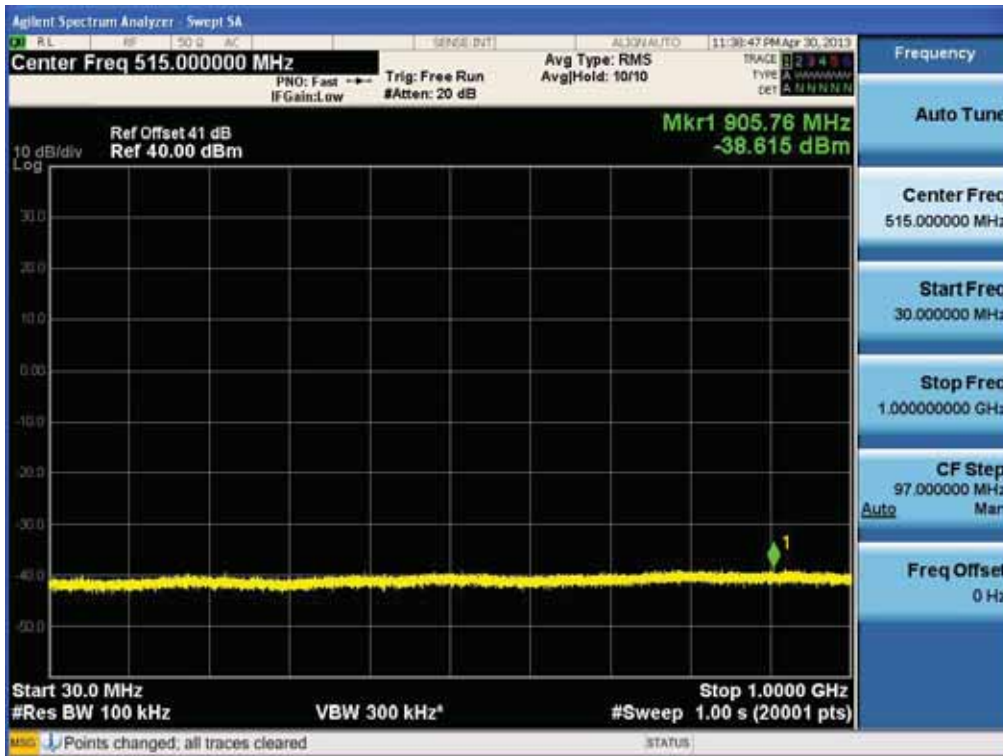
(Band Edge)



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(16QAM Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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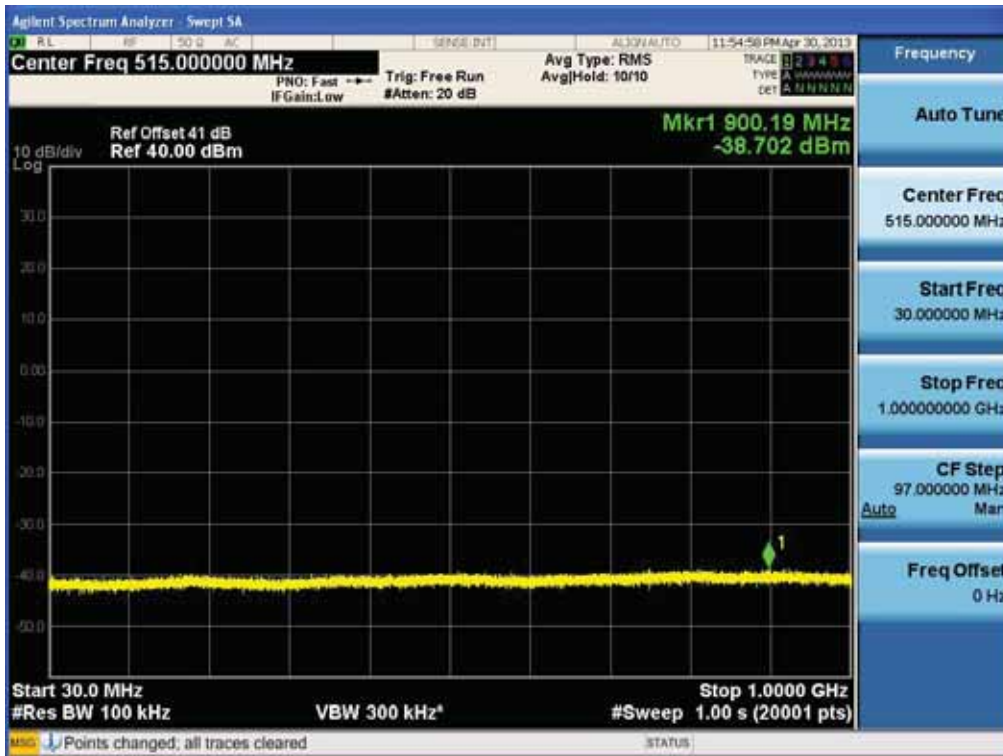
(Band Edge)



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(16QAM Middle Channel)

(30 MHz ~ 1 GHz)



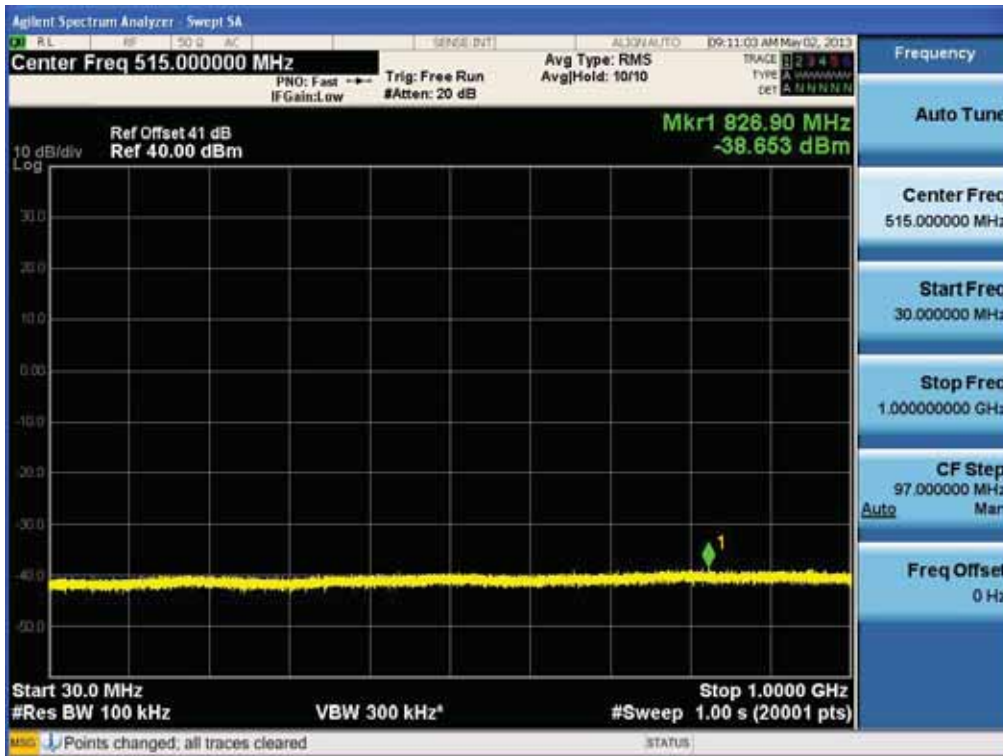
(1 GHz ~ 26.5 GHz)



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(16QAM High Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(64QAM Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(64QAM Middle Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(64QAM High Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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. Plot Data for LTE 5 MHz : 1 Carrier , Output Port 1  
 (QPSK Low Channel)

(30 MHz ~ 1 GHz)

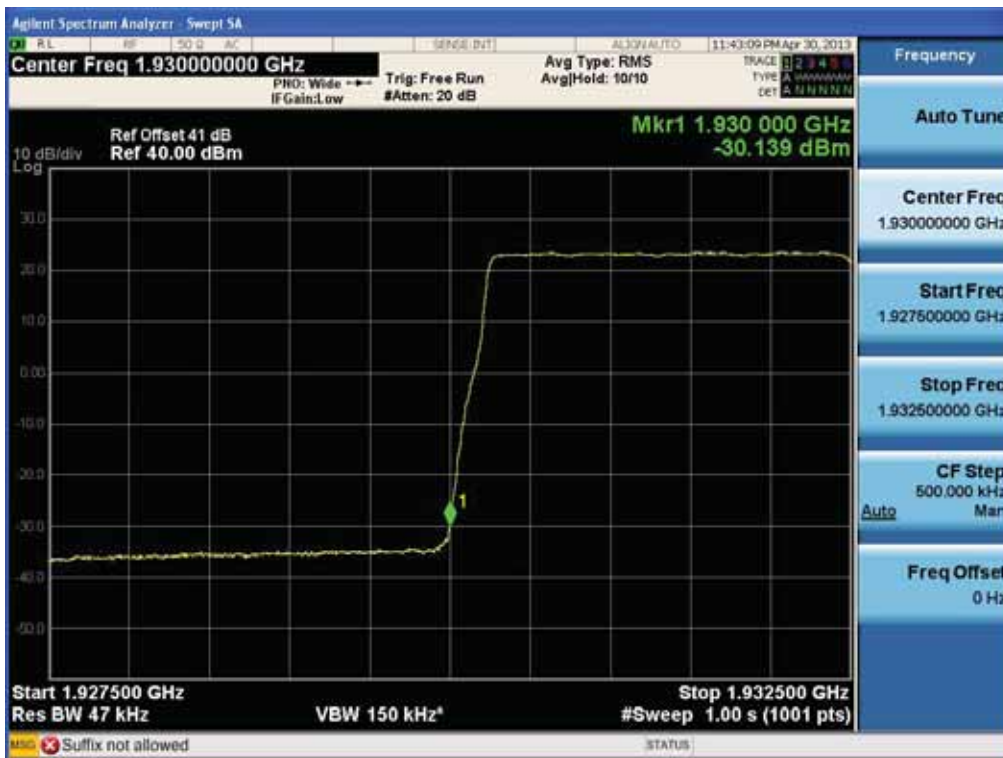


(1 GHz ~ 26.5 GHz)



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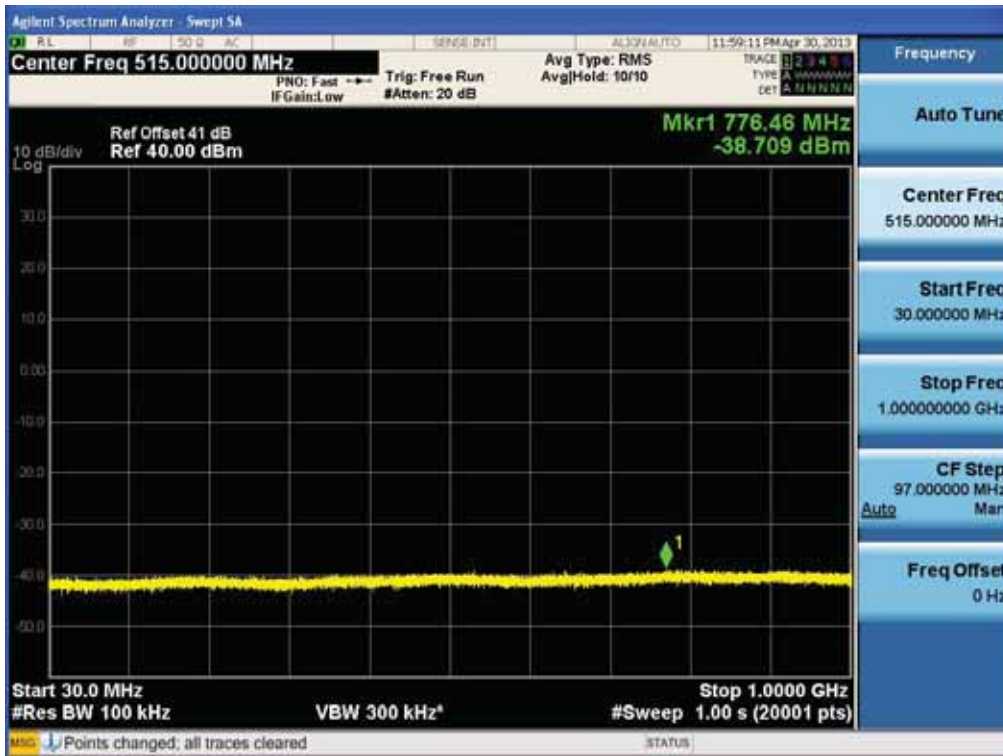
(Band Edge)



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(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(QPSK High Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(16QAM Low Channel)

(30 MHz ~ 1 GHz)

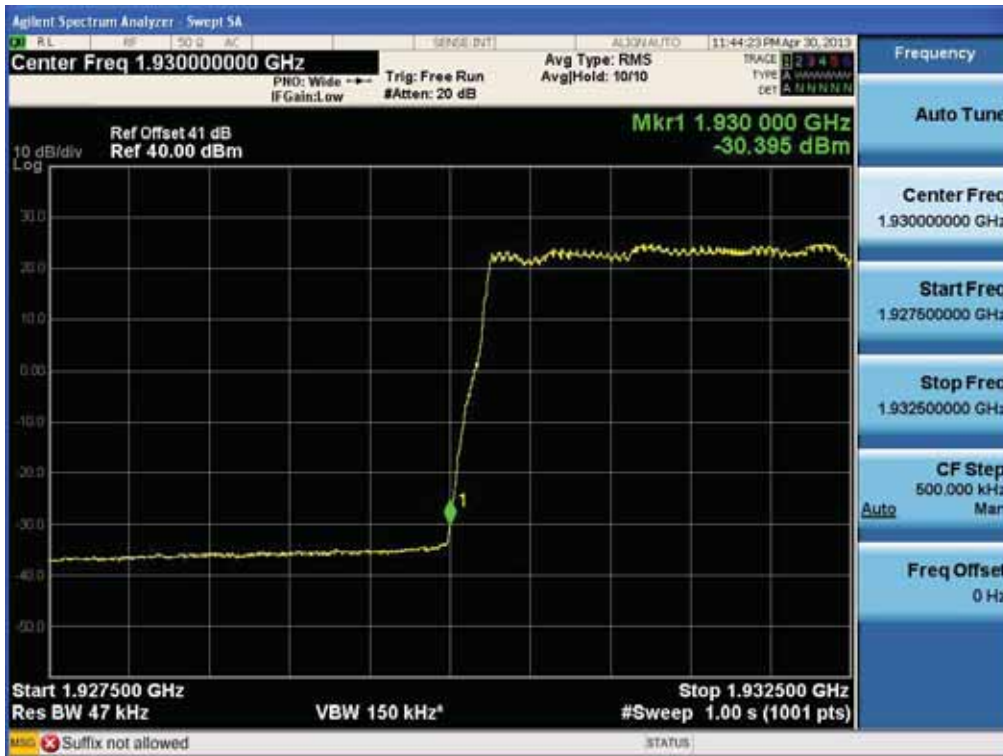


(1 GHz ~ 26.5 GHz)



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