



HCT CO., LTD.

CERTIFICATION DIVISION

105-1, JANGAM-RI, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, KOREA

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CERTIFICATE OF COMPLIANCE

FCC PART 90 Certification

Applicant Name:

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

Date of Issue: August 21, 2012**Test Site/Location:**

HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon,
Icheon-si, Gyeonggi-Do, Korea

Test Report No.: HCTR1207FR21-1

FCC ID : **A3LSMM-2CR0480800**

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

EUT Type : Remote Radio Head
Manufacturer : SAMSUNG Electronics Co., Ltd
Model name : SMM-2CR0480800
Frequency of Operation : 862 MHz ~ 869 MHz
TX Output Power : 80 W (40 W + 40 W)
FCC Rule Part(s) : FCC Part 90
Emission Designator : 1M24F9W, 1M24W7W, 4M49F9W, 4M49W7W
Test Procedure(s) : ANSI/TIA-603C-2004
Application Type : Permissive Change II
Data of issue : August 21, 2012

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 90 of the FCC Rules under normal use and maintenance.

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

Approved by
: Sang Jun Lee
Manager of RF Team

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 1 of 95

Revision

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1207FR21	July 30, 2012	First Approval Report
HCTR1207FR21-1	August 21, 2012	Add LTE 2 FAs data

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 2 of 95

C O N T E N T S

1. GENERAL INFORMATION.....	5
1.1. CLIENT INFORMATION	5
1.2. PRODUCT INFORMATION	5
1.3. INTRODUCTION OF EUT.....	6
2. TEST SUMMARY	7
2.1. STANDARDS	7
2.2. MODE OF OPERATION DURING THE TEST	7
3. STANDARDS ENVIRONMENTAL TEST CONDITIONS	8
4. TEST EQUIPMENT	8
5. CONDUCTED OUTPUT POWER.....	9
5.1. Applicable Standard	9
5.2. Test Equipment List and Details	9
5.3. Test Procedure.....	9
5.4. Test Result	10
6. OCCUPIED BANDWIDTH	25
6.1. Applicable Standard	25
6.2. Test Equipment List and Details	25
6.3. Test Procedure.....	26
6.4. Test Result	26
7. SPURIOUS EMISSION AT ANTENNA TERMINAL	40
7.1. Applicable Standard.....	40
7.2. Test Equipment List and Details	40
7.3. Test Procedure.....	40
7.4. Test Result	41
8. RADIATED SPURIOUS EMISSION	86
8.1 Applicable Standard.....	86
8.2 Test Equipment List and Details	87
8.3 Test Procedure.....	88
8.3.1 Radiated Spurious Emissions Test Setup	88
8.4 Test Result	89
9. FREQUENCY STABILITY	90
9.1 Applicable Standard	90
9.2 Test Equipment List and Details.....	91

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 3 of 95

9.3 Test Procedure.....	91
9.4. Test Result	91
10. RF EXPOSURE STATEMENT.....	94

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 4 of 95

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	CDMA : 1M24F9W, 1M24W7W LTE : 4M49F9W, 4M49W7W
OPERATING FREQUENCY	862 MHz ~ 869 MHz
TX OUTPUT POWER	80 W (40 W + 40 W)
CHANNEL BANDWIDTH	CDMA : 1.25 MHz, LTE : 5MHz
MODULATION TYPE	BPSK, QPSK, 16QAM, 64QAM
MAXIMUM NUMBER OF CARRIERS/SECTORS	CDMA : 4Carrier 3Sector or mix LTE : 1Carrier 3Sector @ 5MHz channel BW
SYSTEM INPUT VOLTAGE	DC - 48 V

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 5 of 95

1.3. INTRODUCTION OF EUT

Smart MBS is the Basestation of Samsung Multi-Modal System. It is managed by packet core (either BSC, ACR, 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 (20110408)), 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/ACR/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 5Carrier/3Sector(2Br)
- LTE (FDD) : Max 5Carrier/3Sector
- LTE (TDD) : Max 3Carrier/3Sector

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-C2A: 800MHz Cellular band, 2Tx/2Rx RF path
- RRH-P4 : 1.9GHz PCS band, 4Tx/4Rx RF path

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 6 of 95

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 90.

SECTION	TEST ITEMS	RESULTS
2.1046, 90.635	Conducted Output Power	Compliant
2.1049	Occupied Bandwidth	Compliant
2.1051, 2.1057, 90.691	Spurious Emissions at Antenna Terminals	Compliant
2.1055, 90.213	Frequency Stability over Temperature variation	Compliant
2.1055, 90.213	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.

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 7 of 95

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	147	05/15/2014
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	937	10/17/2013
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-6B-180265-35-10P / POWER AMP	667624	04/16/2013
Agilent	N9020A /Signal Analyzer	US46220219	05/02/2013
Agilent	6674A / DC Power Supply	3501A00901	05/02/2013
WEINSCHL	67-30-33 / Attenuator	BU5347	11/07/2012
WEINSCHL	67-30-33 / Attenuator	BR0530	11/07/2012
WEINSCHL	AF9003-69-31 / Attenuator	11787	11/07/2012
WEINSCHL	AF9003-69-31 / Attenuator	5701	11/07/2012
Nang-Yeoul	NY-THR18750 / Temperature Chamber	NY-2009012201A	11/08/2012

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 8 of 95

5. CONDUCTED OUTPUT POWER

5.1. Applicable Standard

According to FCC §2.1046 & 90.635

- (a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

5.2. Test Equipment List and Details

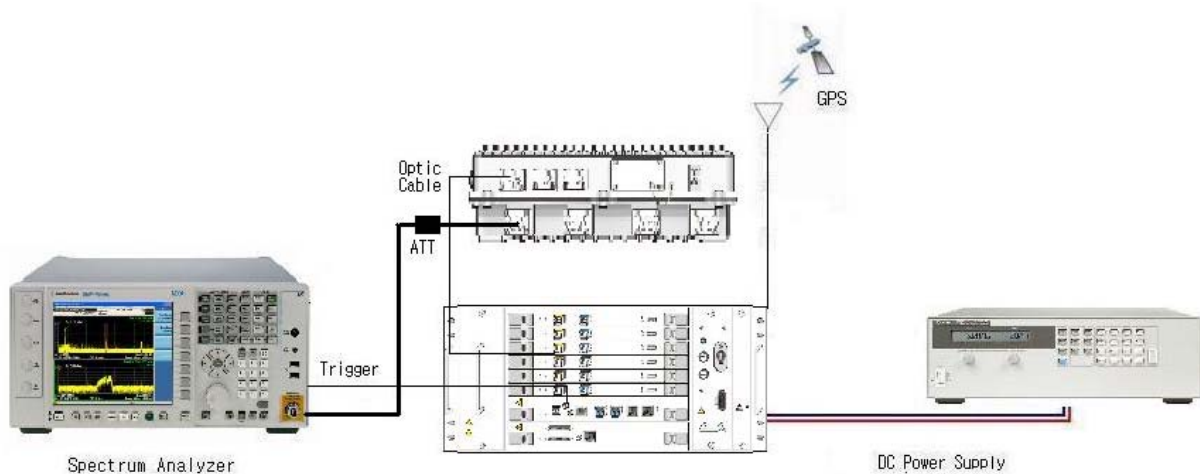
Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	05/02/2013
Agilent	6674A / DC Power Supply	3501A00901	05/02/2013
WEINSCHEL	67-30-33 / Attenuator	BU5347	11/07/2012
WEINSCHEL	67-30-33 / Attenuator	BR0530	11/07/2012
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/07/2012
WEINSCHEL	AF9003-69-31 / Attenuator	5701	11/07/2012

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 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.

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 9 of 95



5.4. Test Result

: PASS (Test data for CDMA<E is calculated data)

- ※ The EUT transmits CDMA & LTE simultaneously when LTE use 866.5 MHz and CDMA use 862.9 MHz.
The EUT transmits LTE only when LTE use 864.5 MHz or 865.5 MHz.

FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 10 of 95

5.4.1. Test Data at Output Port 0

	Frequency (MHz)	Modulation	Measured Output Power	
			dBm	W
CDMA	862.9	BPSK	42.57	18.0717
		QPSK	42.58	18.1134
		16QAM	42.46	17.6198
LTE	866.5	QPSK	42.78	18.9671
		16QAM	42.79	19.0108
		64QAM	42.85	19.2753
	865.5	QPSK	43.12	20.5116
		16QAM	43.11	20.4645
		64QAM	43.07	20.2768
	864.5	QPSK	43.06	20.2302
		16QAM	42.96	19.7697
		64QAM	42.97	19.8153

5.4.2. Test Data at Output Port 1

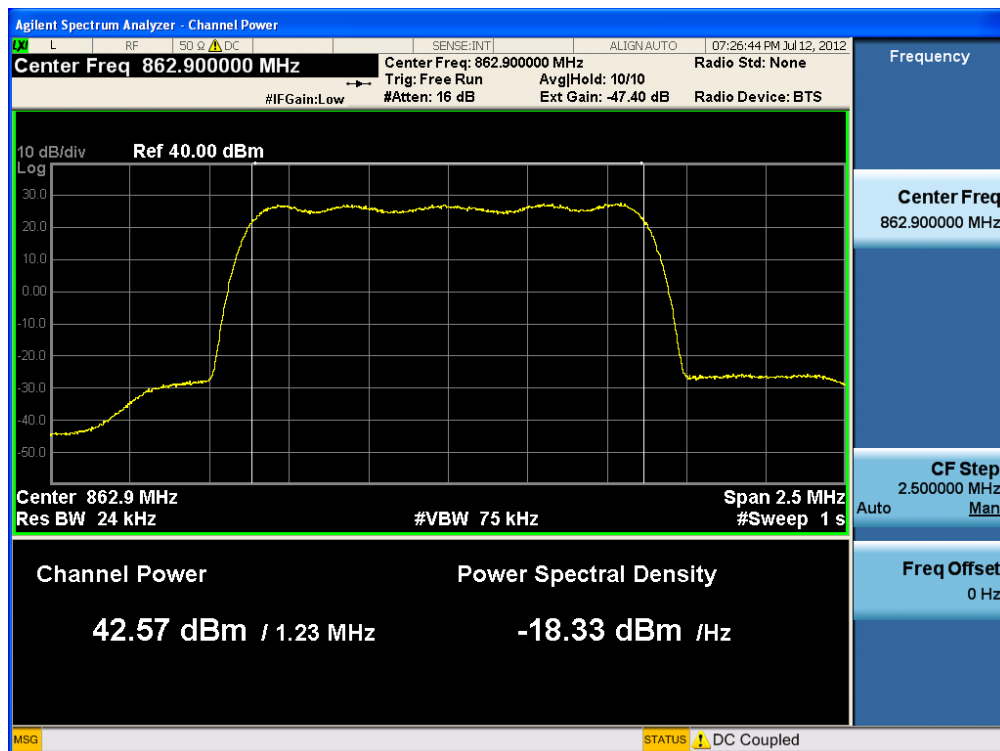
	Frequency (MHz)	Modulation	Measured Output Power	
			dBm	W
CDMA	862.9	BPSK	42.56	18.0302
		QPSK	42.62	18.2810
		16QAM	42.59	18.1552
LTE	866.5	QPSK	42.87	19.3642
		16QAM	42.81	19.0985
		64QAM	42.82	19.1426
	865.5	QPSK	43.15	20.6538
		16QAM	43.11	20.4645
		64QAM	43.09	20.3704
	864.5	QPSK	43.06	20.2302
		16QAM	43.06	20.2302
		64QAM	43.04	20.1372

5.4.3. Measure-and-sum data for Output port 0 & 1

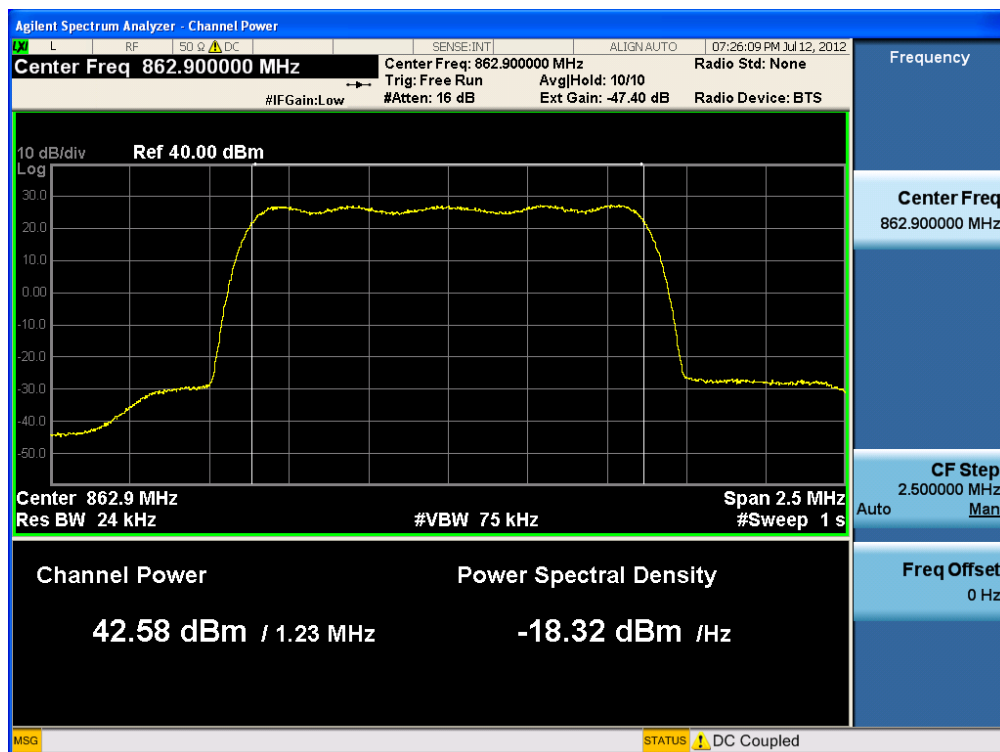
	Frequency (MHz)	Modulation	Sum of Output Power
			W
CDMA	862.9	BPSK	36.1019
		QPSK	36.3944
		16QAM	35.7750
LTE	866.5	QPSK	38.3313
		16QAM	38.1093
		64QAM	38.4179
	865.5	QPSK	41.1654
		16QAM	40.9290
		64QAM	40.6472
	864.5	QPSK	40.4604
		16QAM	39.9999
		64QAM	39.9525

5.4.4. Plot Data for Output Port 0

(CDMA BPSK)

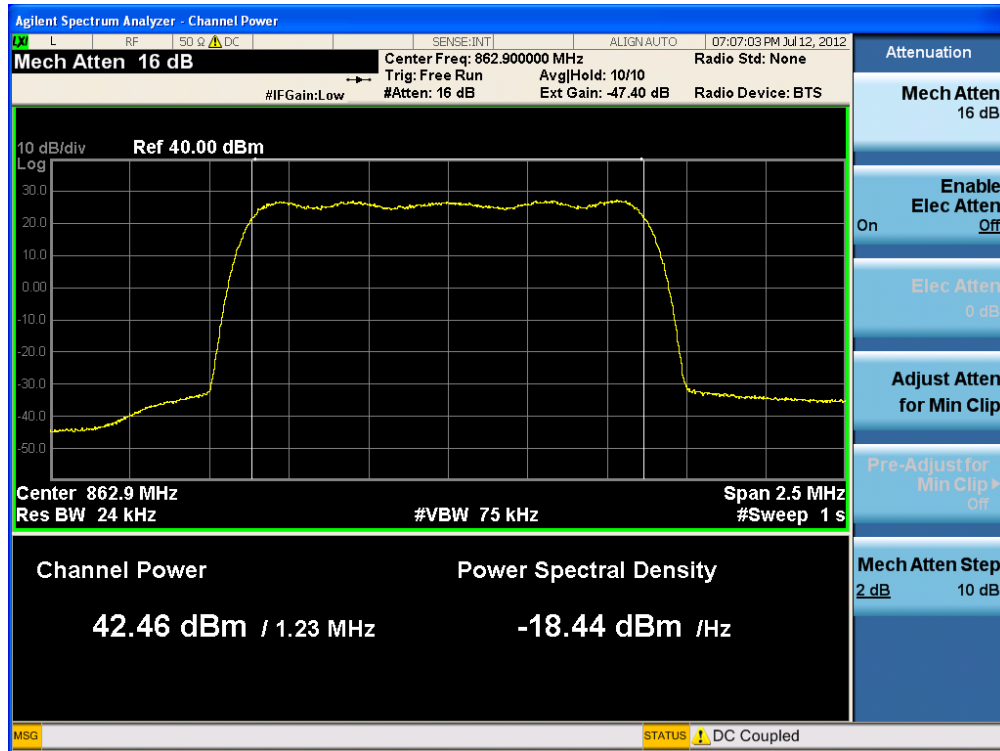


(CDMA QPSK)



FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 13 of 95

(CDMA 16QAM)



(LTE QPSK) High



FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 14 of 95

(LTE 16QAM) High



(LTE 64QAM) High



FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 15 of 95

(LTE QPSK) Middle



(LTE 16QAM) Middle



FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 16 of 95

(LTE 64QAM) Middle

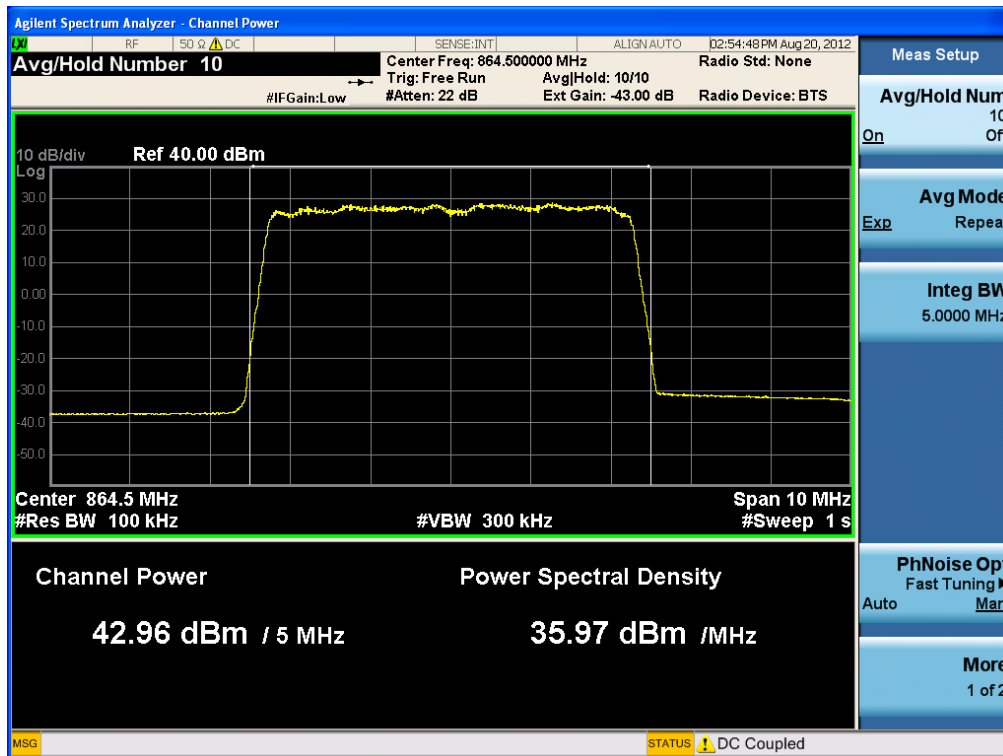


(LTE QPSK) Low

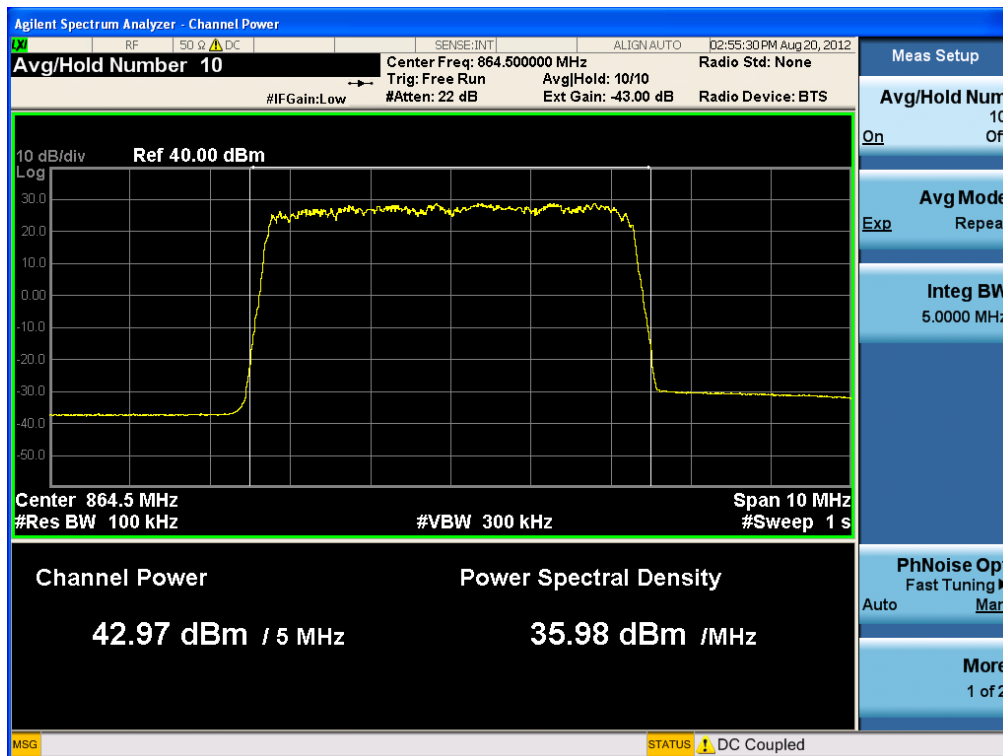


FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 17 of 95

(LTE 16QAM) Low



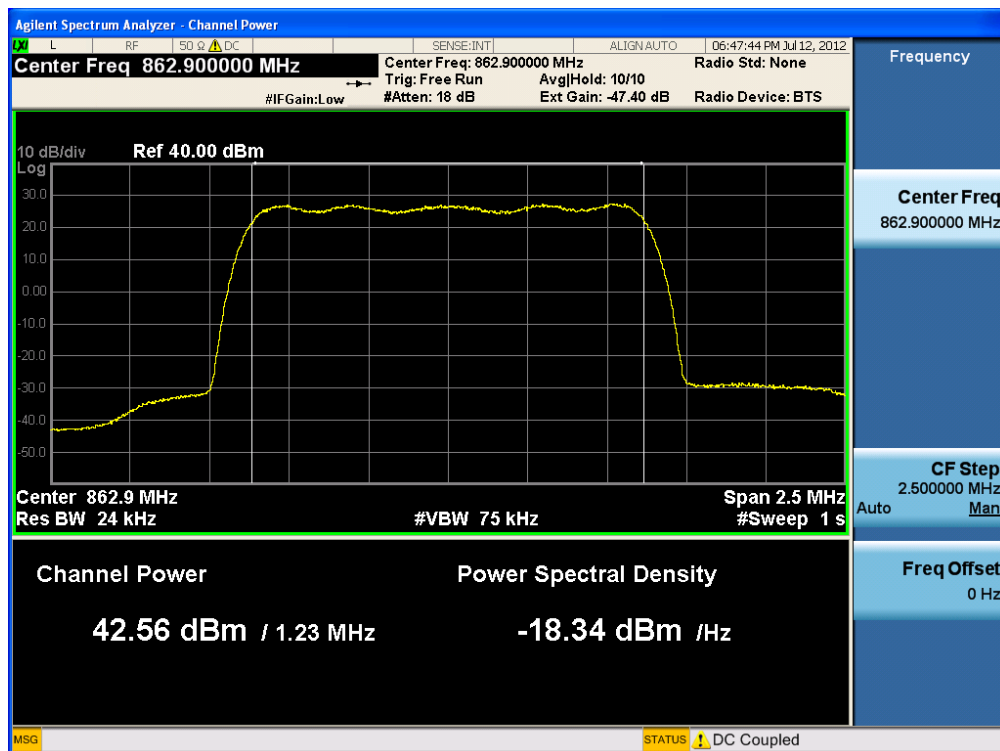
(LTE 64QAM) Low



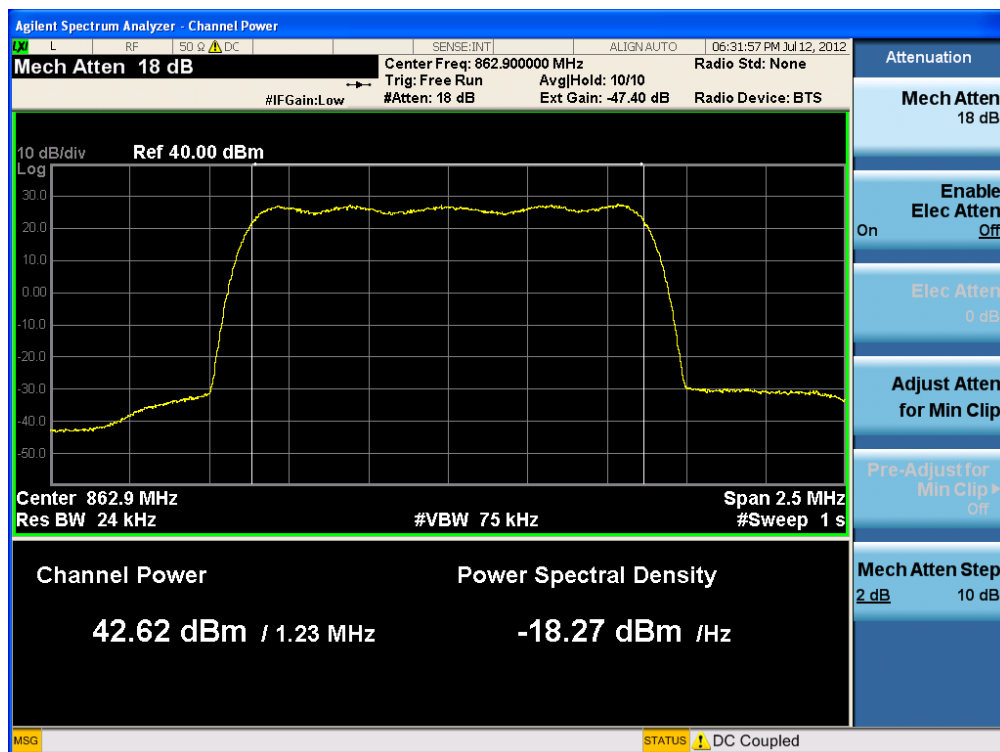
FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 18 of 95

5.4.5. Plot Data for Output Port 1

(CDMA BPSK)

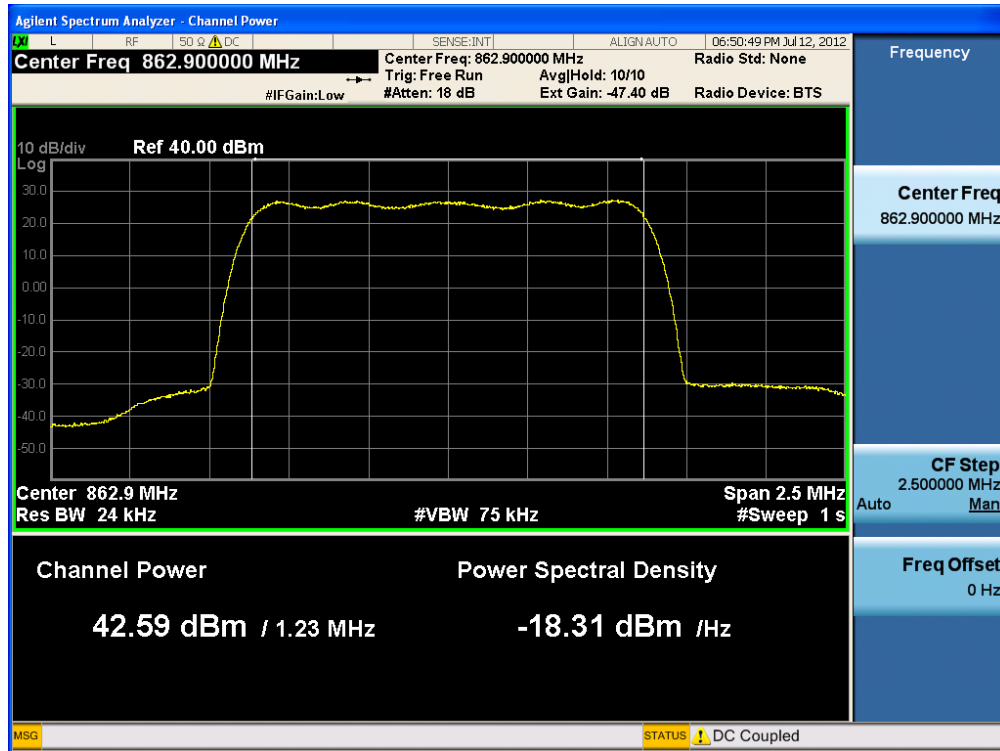


(CDMA QPSK)

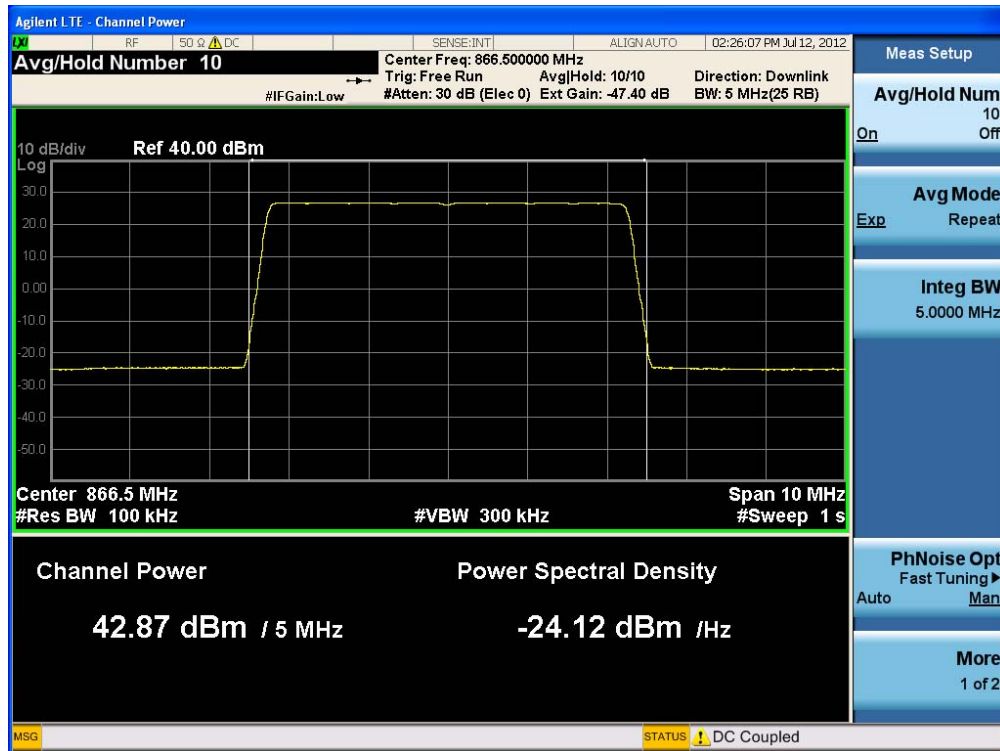


FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 19 of 95

(CDMA 16QAM)



(LTE QPSK) High



FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 20 of 95

(LTE 16QAM) High

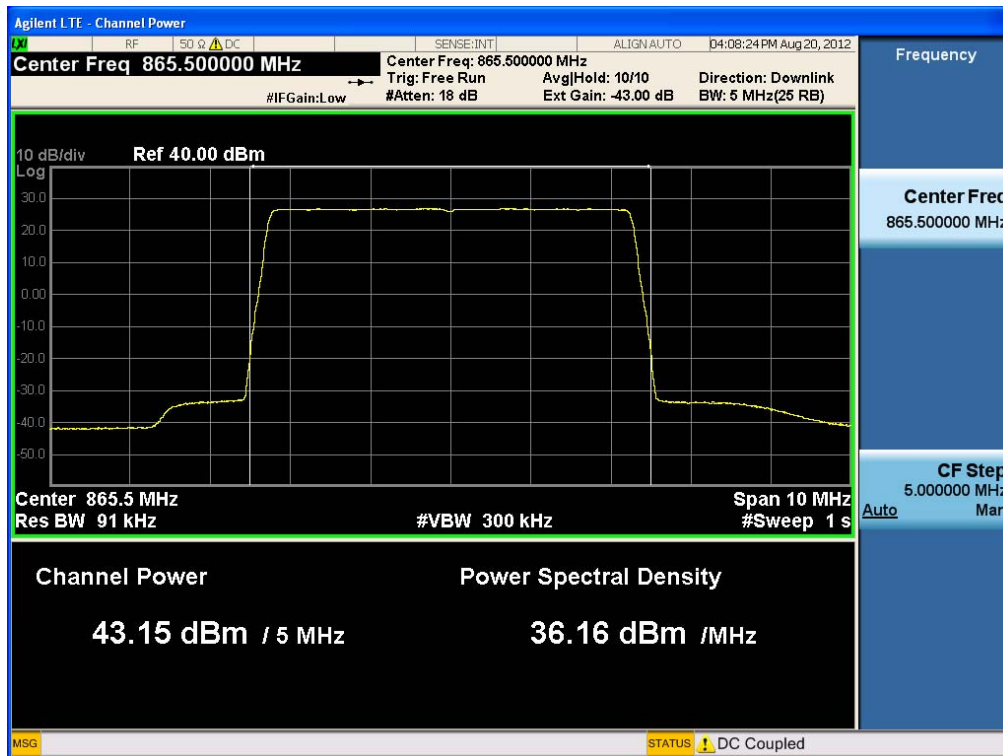


(LTE 64QAM) High

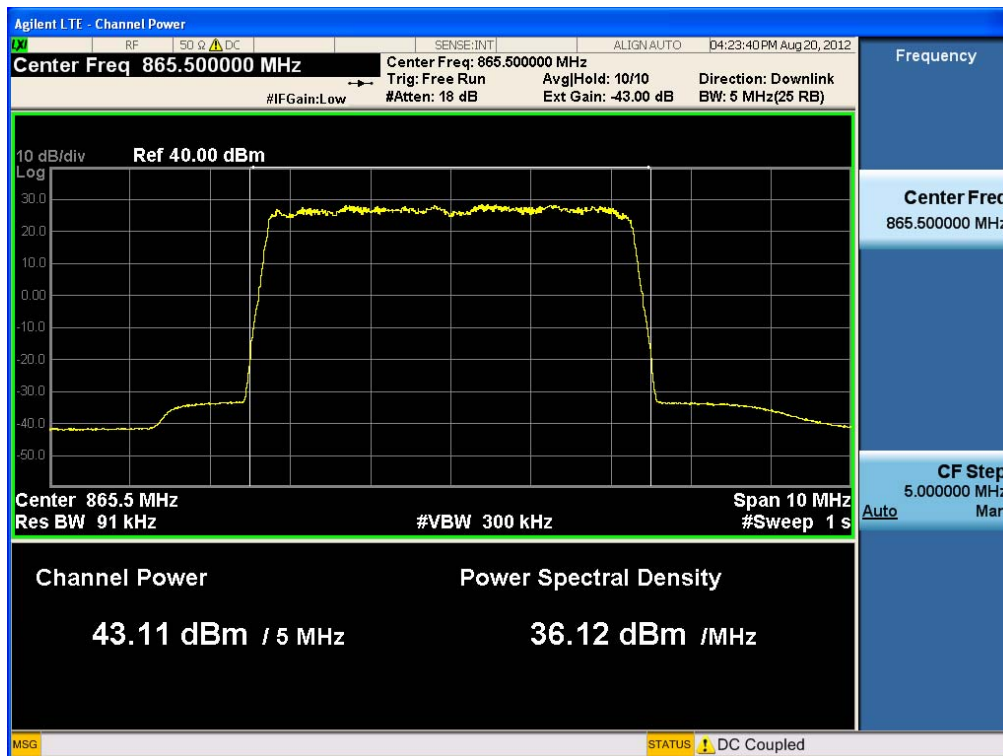


FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 21 of 95

(LTE QPSK) Middle

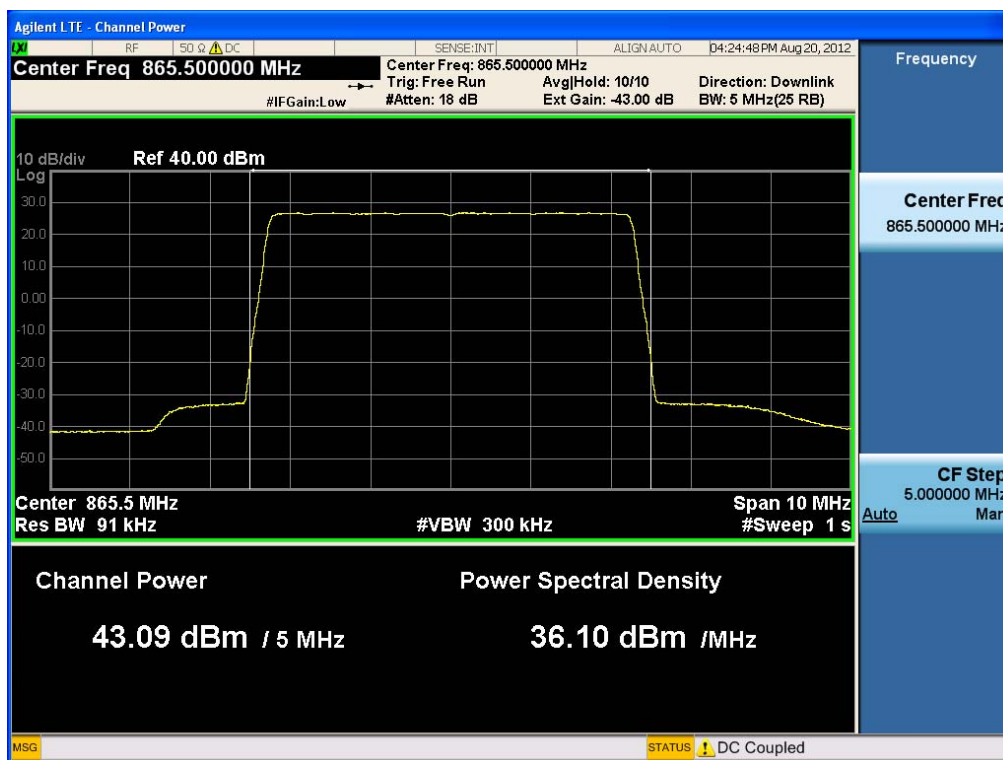


(LTE 16QAM) Middle



FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 22 of 95

(LTE 64QAM) Middle



(LTE QPSK) Low

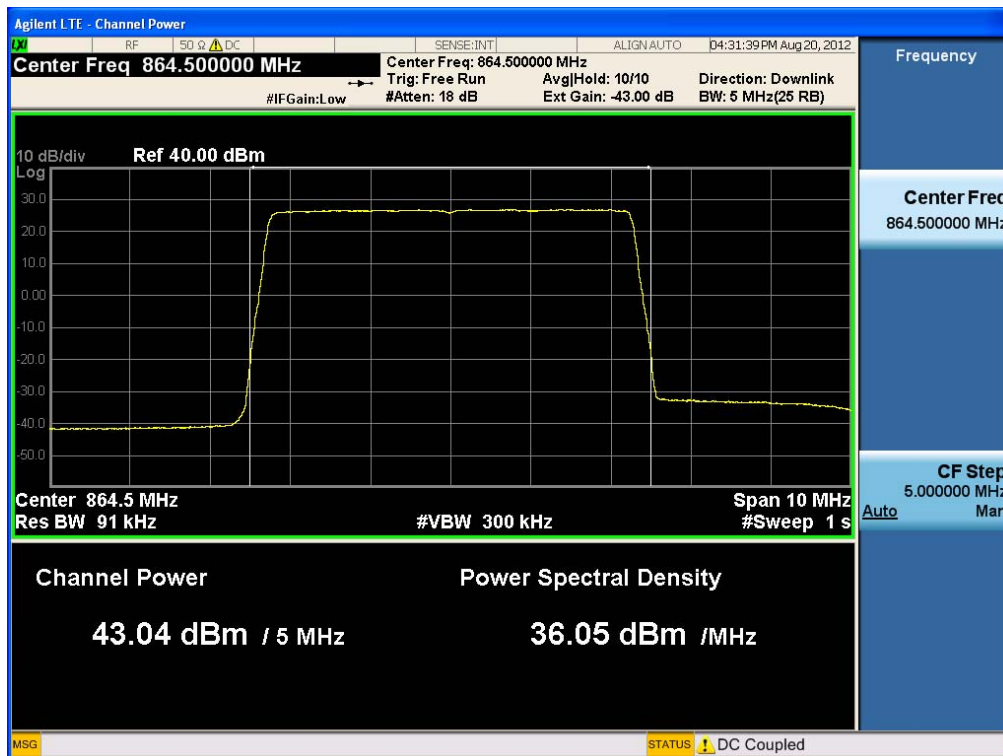


FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 23 of 95

(LTE 16QAM) Low



(LTE 64QAM) Low



FCC PT. 27 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1207FR21-1	Date of Issue: August 21, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 24 of 95