



HCT CO., LTD.

CERTIFICATION DIVISION

105-1, JANGAM-RI, MAJANG-MYEON, ICHEON-SI, KYUNGGI-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: October 21, 2011

Test Site/Location:

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

Test Report No.: HCTR1110FR03

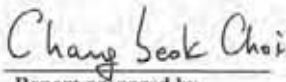
FCC ID : A3LSMM-2CR0480800

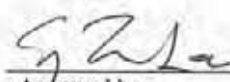
APPLICANT : **SAMSUNG Electronics Co., Ltd.**

EUT Type : Remote Radio Head
Manufacturer : SAMSUNG Electronics Co., Ltd
Model name : SMM-2CR0480800
Frequency of Operation : 862 MHz ~ 869 MHz
TX Output Power : 100 W (50 W + 50 W)
FCC Rule Part(s) : FCC Part 90
Emission Designator : 1M25F9W, 1M24W9W
Test Procedure(s) : ANSI/TIA-603C-2004
Application Type : Original Equipment
Data of issue : October 21, 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 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

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Revision

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1110FR03	October 21, 2011	First Approval Report

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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: Jung- Ho Bae / Senior Research Engineer E-mail : <u>banco@samsung.com</u> Tel: +82-31-279-3544 Fax: +82-31-279-7576

1.2. PRODUCT INFORMATION

EUT TYPE	Remote Radio Head
EMISSION DESIGNATOR	1M25F9W (BPSK, QPSK), 1M24W7W (16QAM)
OPERATING FREQUENCY	862 MHz ~ 869 MHz
TX OUTPUT POWER	100 W (50 W + 50 W)
CHANNEL BANDWIDTH	1.25 MHz
MODULATION TYPE	BPSK, QPSK, 16QAM
MAXIMUM NUMBER OF CARRIERS/SECTORS	5 Carrier / 3 Sector
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, 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

※ SMM-2CR0480800 provides only CDMA 1X / EVDO.

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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 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, and 16QAM) 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

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4. TEST EQUIPMENT

Manufacturer	Model / Equipment	Serial No.	Calibration Due
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	US46220219	06/10/2012
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012
WEINSCHTEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHTEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHTEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHTEL	AF9003-69-31 / Attenuator	639	11/12/2011

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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

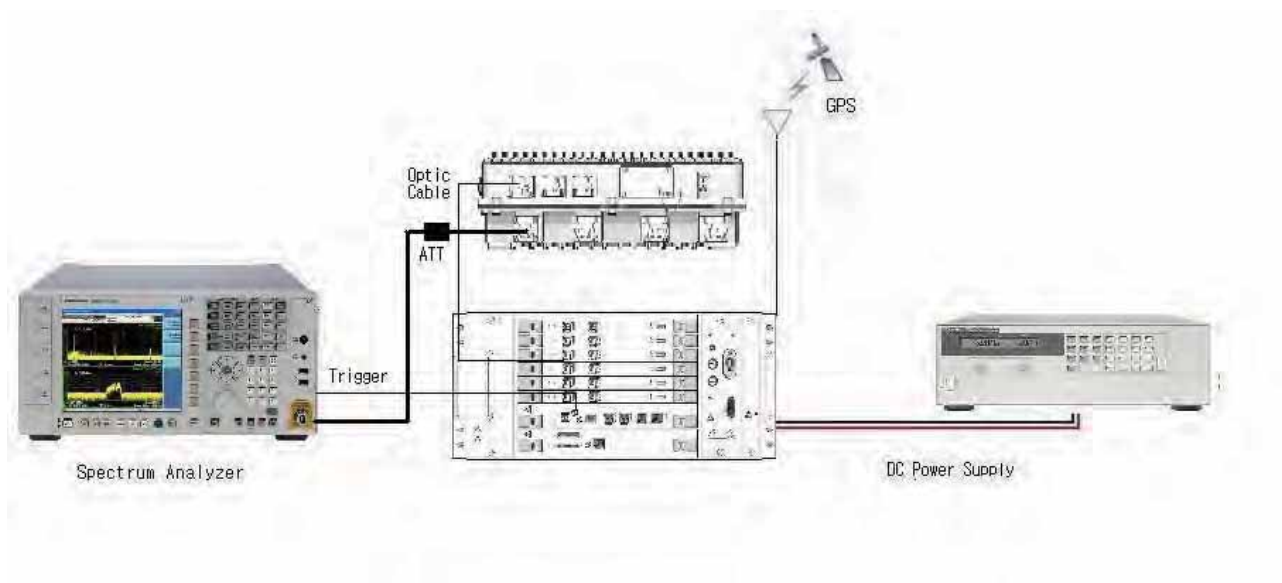
Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	06/10/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	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 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.

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5.4. Test Result

: PASS

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[1 Tx Mode – 1 Carrier / 1 Port]

5.4.1. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	862.9	42.15	16.4059
	Middle	865.4	41.98	15.7761
	High	867.9	41.92	15.5597
QPSK	Low	862.9	42.19	16.5577
	Middle	865.4	42.07	16.1065
	High	867.9	41.92	15.5597
16QAM	Low	862.9	42.12	16.2930
	Middle	865.4	41.93	15.5955
	High	867.9	41.86	15.3417

5.4.2. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	862.9	42.00	15.8489
	Middle	865.4	42.33	17.1002
	High	867.9	42.25	16.7880
QPSK	Low	862.9	42.03	15.9588
	Middle	865.4	42.37	17.2584
	High	867.9	42.24	16.7494
16QAM	Low	862.9	41.80	15.1356
	Middle	865.4	41.93	15.5955
	High	867.9	42.03	15.9588

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[2 Tx Mode – 1 Carrier / 2 Ports]

5.4.3. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	862.9	40.18	10.4232
	Middle	865.4	40.14	10.3276
	High	867.9	40.03	10.0693
QPSK	Low	862.9	39.93	9.8401
	Middle	865.4	40.20	10.4713
	High	867.9	40.14	10.3276
16QAM	Low	862.9	39.81	9.5719
	Middle	865.4	40.11	10.2565
	High	867.9	39.92	9.8175

5.4.4. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	862.9	40.28	10.6660
	Middle	865.4	40.07	10.1625
	High	867.9	39.97	9.9312
QPSK	Low	862.9	40.07	10.1625
	Middle	865.4	40.28	10.6660
	High	867.9	40.20	10.4713
16QAM	Low	862.9	39.97	9.9312
	Middle	865.4	40.22	10.5196
	High	867.9	40.01	10.0231

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5.4.5. Measure and sum data

Modulation	Channel	Frequency	Sum of Output Power(W)
BPSK	Low	862.9	21.0892
	Middle	865.4	20.4901
	High	867.9	20.0005
QPSK	Low	862.9	20.0026
	Middle	865.4	21.1373
	High	867.9	20.7989
16QAM	Low	862.9	19.5031
	Middle	865.4	20.7761
	High	867.9	19.8406

[2 Tx Mode – 2 Carriers / 2 Ports]

5.4.6. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	863.525	43.26	21.1836
	Middle	864.775	43.14	20.6063
	High	867.275	43.11	20.4645
QPSK	Low	863.525	43.03	20.0909
	Middle	864.775	43.08	20.3236
	High	867.275	43.13	20.5589
16QAM	Low	863.525	43.12	20.5116
	Middle	864.775	43.29	21.3305
	High	867.275	43.10	20.4174

5.4.7. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	863.525	43.18	20.7970
	Middle	864.775	43.07	20.2768
	High	867.275	43.02	20.0447
QPSK	Low	863.525	43.14	20.6063
	Middle	864.775	43.19	20.8449
	High	867.275	43.26	21.1836
16QAM	Low	863.525	43.26	21.1836
	Middle	864.775	43.29	21.3305
	High	867.275	43.29	21.3305

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5.4.8. Measure and sum data

Modulation	Channel	Frequency	Sum of Output Power(W)
BPSK	Low	863.525	41.9806
	Middle	864.775	40.8831
	High	867.275	40.5092
QPSK	Low	863.525	40.6972
	Middle	864.775	41.1685
	High	867.275	41.7425
16QAM	Low	863.525	41.6952
	Middle	864.775	42.6610
	High	867.275	41.7479

[2 Tx Mode – 3 Carriers / 2 Port]

5.4.9. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	864.15	44.96	31.3329
	Middle	865.4	44.94	31.1889
	High	866.65	44.90	30.9030
QPSK	Low	864.15	44.88	30.7610
	Middle	865.4	44.86	30.6200
	High	866.65	44.84	30.4790
16QAM	Low	864.15		
	Middle	865.4		
	High	866.65		

5.4.10. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	864.15	44.92	31.0456
	Middle	865.4	44.86	30.6196
	High	866.65	44.82	30.3389
QPSK	Low	864.15	45.02	31.7687
	Middle	865.4	45.05	31.9890
	High	866.65	45.02	31.7687
16QAM	Low	864.15		
	Middle	865.4		
	High	866.65		

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5.4.11. Measure and sum data

Modulation	Channel	Frequency	Sum of Output Power(W)
BPSK	Low	864.15	62.3785
	Middle	865.4	61.8085
	High	866.65	61.2419
QPSK	Low	864.15	62.5297
	Middle	865.4	62.6090
	High	866.65	62.2477
16QAM	Low	864.15	
	Middle	865.4	
	High	866.65	

[2 Tx Mode – 4 Carriers / 2 Port]

5.4.12. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	864.775	46.06	40.3645
	High	866.025	46.00	39.8107
QPSK	Low	864.775	46.01	39.9025
	High	866.025	46.08	40.5509
16QAM	Low	864.775		
	High	866.025		

5.4.13. Test Data at Output Port 1

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Low	864.775	46.11	40.8319
	High	866.025	45.91	38.9942
QPSK	Low	864.775	46.13	41.0204
	High	866.025	46.19	41.5911
16QAM	Low	864.775		
	High	866.025		

5.4.14. Measure and sum data

Modulation	Channel	Frequency	Sum of Output Power(W)
BPSK	Low	864.775	81.1964
	High	866.025	78.8049
QPSK	Low	864.775	80.9229
	High	866.025	82.1420
16QAM	Low	864.775	
	High	866.025	

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[2 Tx Mode – 5 Carriers / 2 Port]

5.4.15. Test Data at Output Port 0

Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Middle	865.4	46.89	48.8652
QPSK	Middle	865.4	46.83	48.1948
16QAM	Middle	865.4		

5.4.16. Test Data at Output Port 1

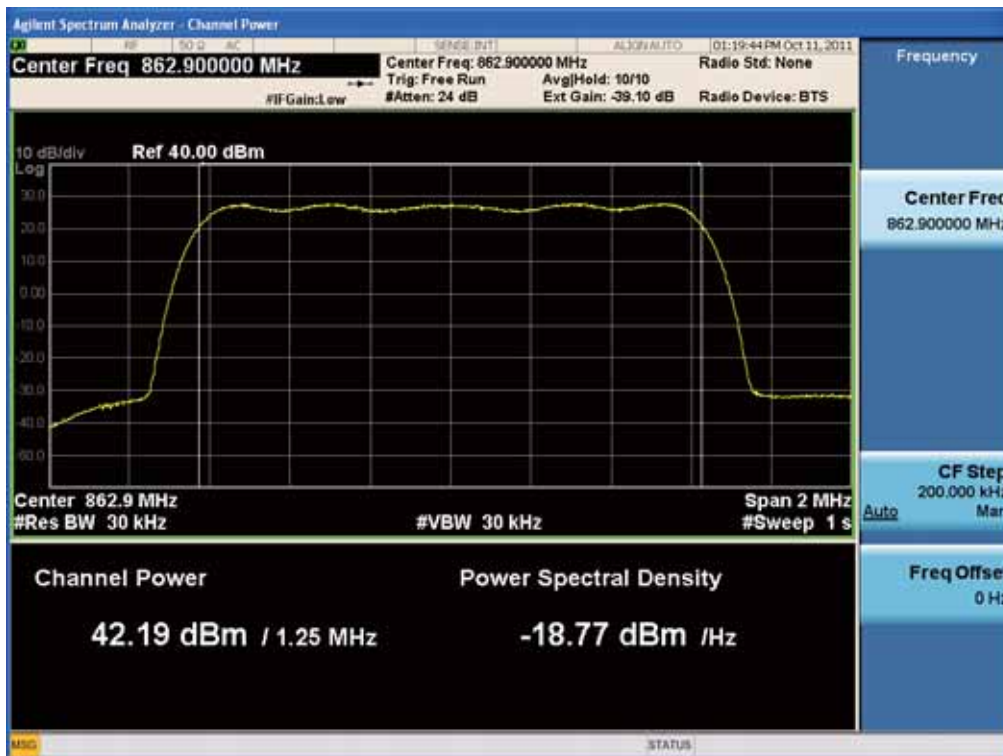
Modulation	Channel	Frequency	Measured Output Power	
			dBm	W
BPSK	Middle	865.4	46.85	48.4172
QPSK	Middle	865.4	47.02	50.3501
16QAM	Middle	865.4		

5.4.17. Measure and sum data

Modulation	Channel	Frequency	Sum of Output Power(W)
BPSK	Middle	865.4	97.2824
QPSK	Middle	865.4	98.5449
16QAM	Middle	865.4	

5.4.1. Plot Data for 1 Tx mode – 1 Carrier , Output Port 0

(QPSK Low Channel)

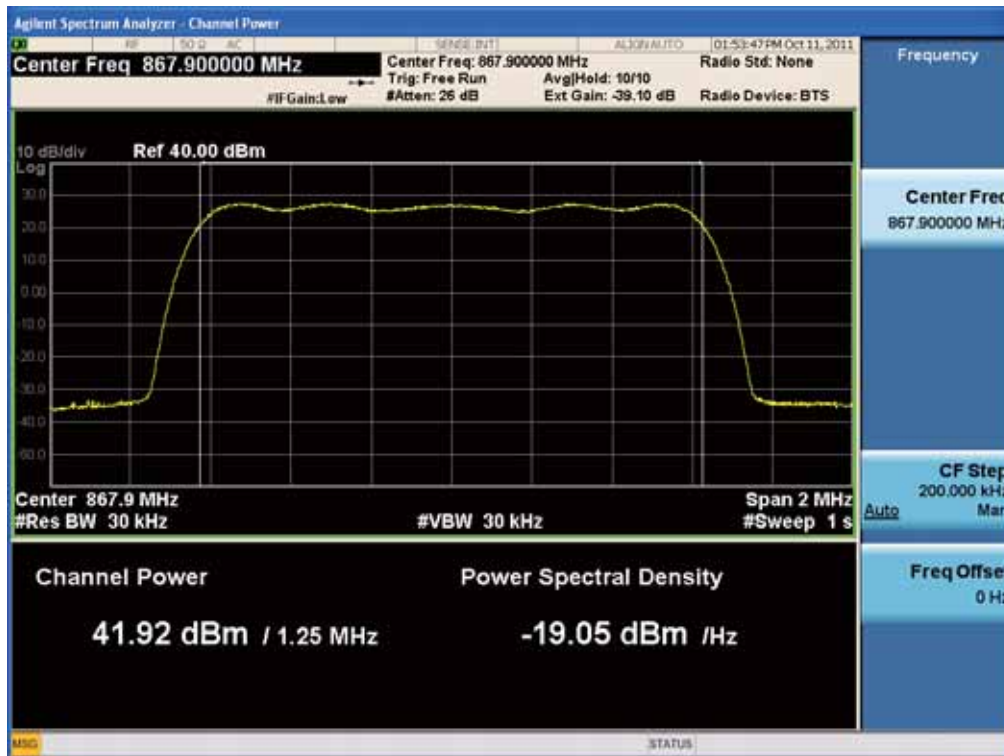


(QPSK Middle Channel)



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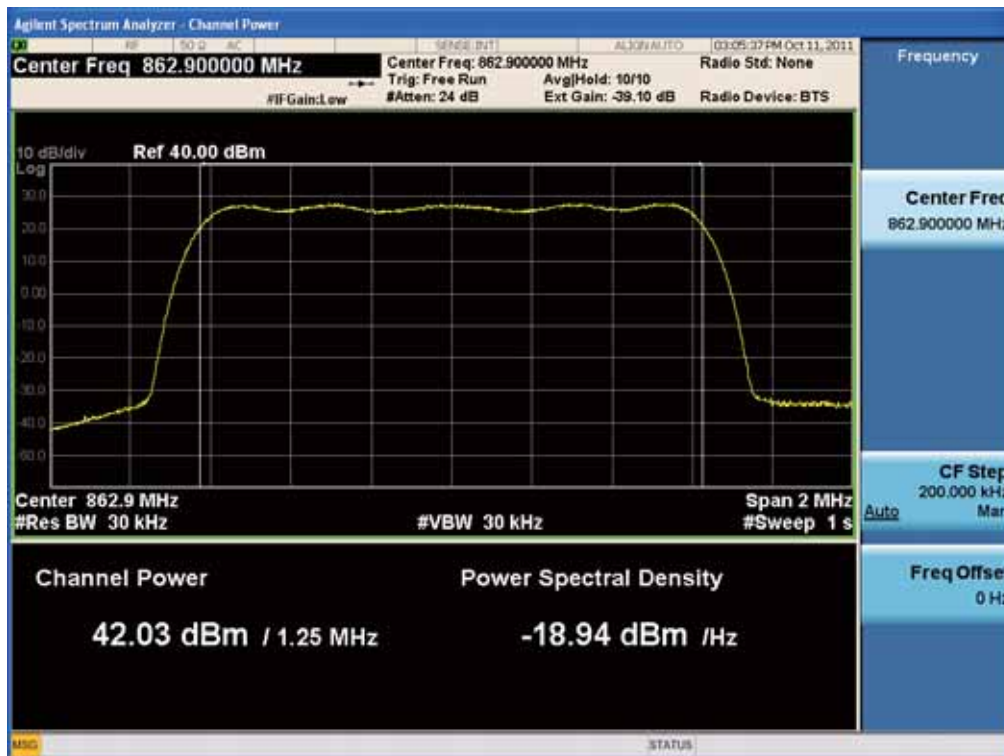
(QPSK High Channel)



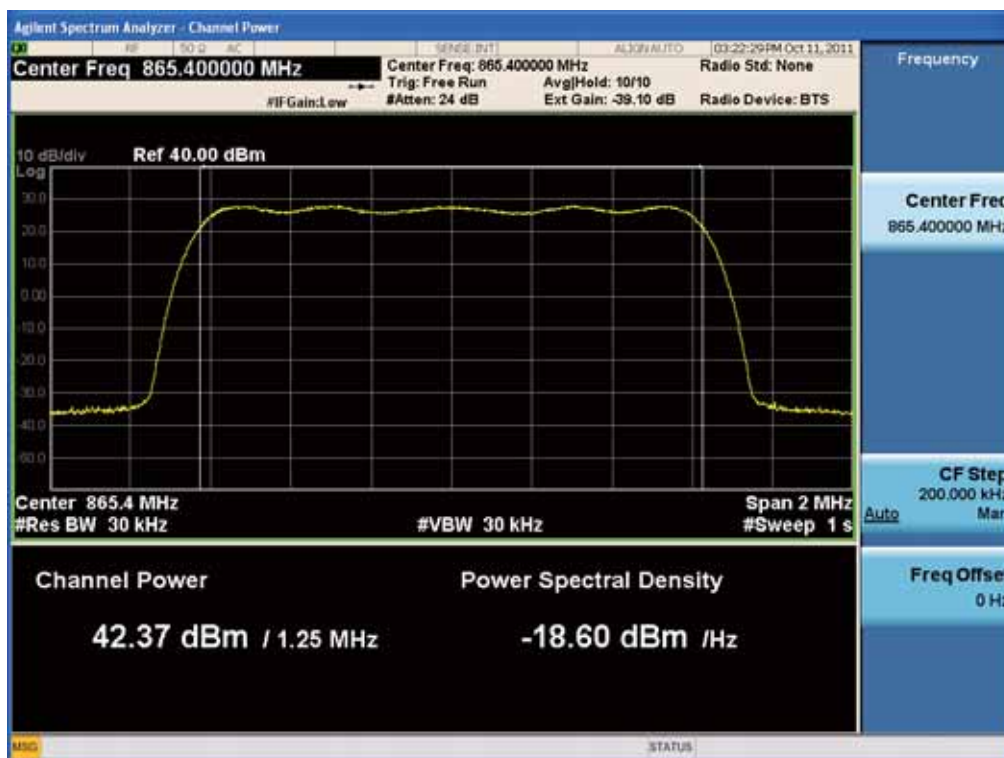
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5.4.2. Plot Data for 1 Tx mode – 1 Carrier , Output Port 1

(QPSK Low Channel)

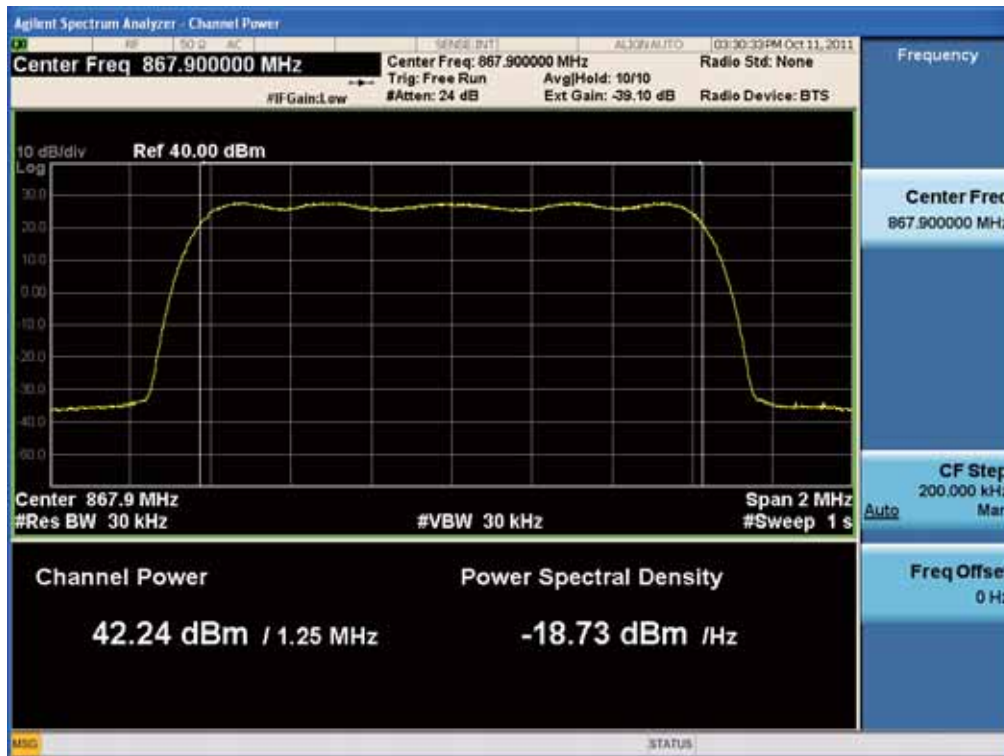


(QPSK Middle Channel)



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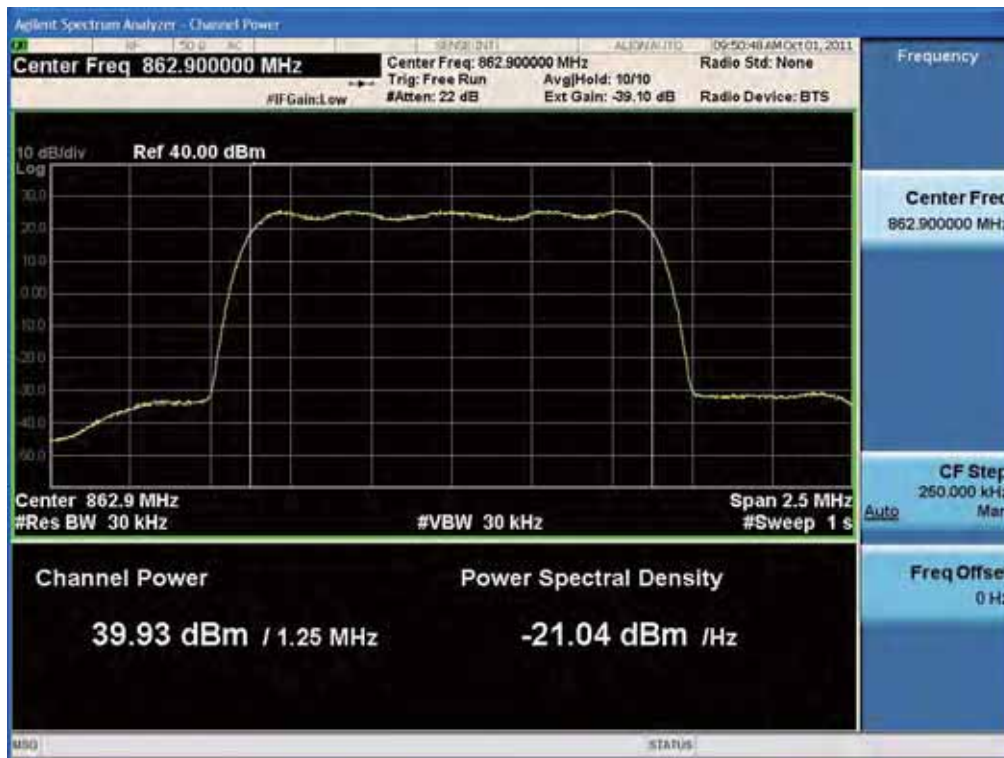
(QPSK High Channel)



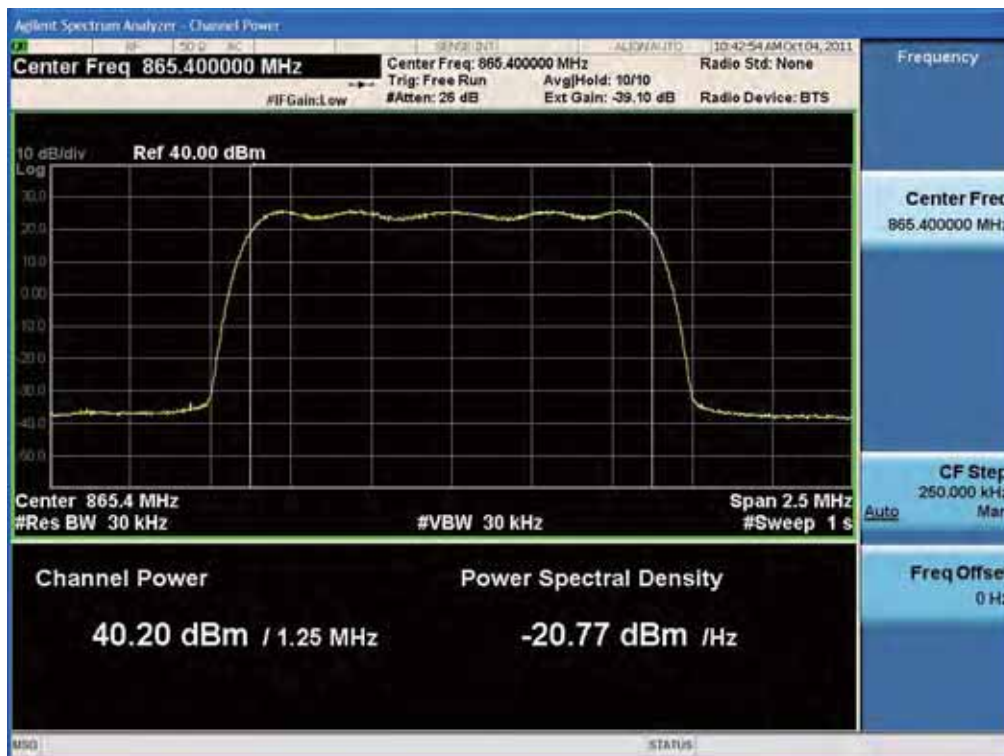
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 25 of 133

5.4.3. Plot Data for 2 Tx mode – 1 Carrier, Output Port 0

(QPSK Low Channel)

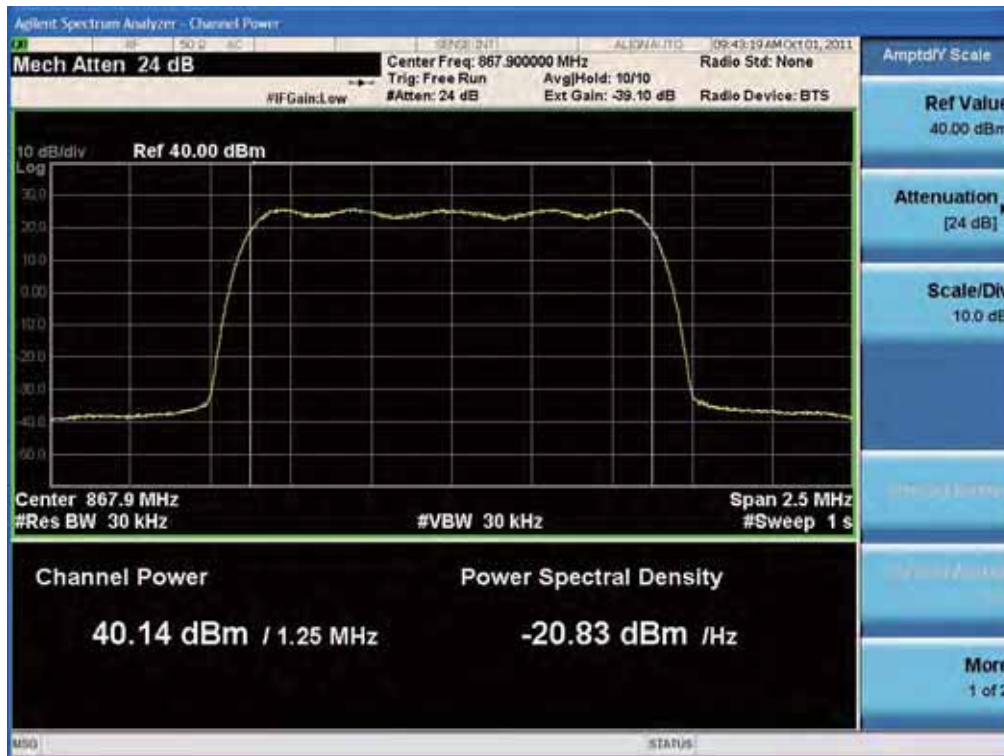


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 26 of 133

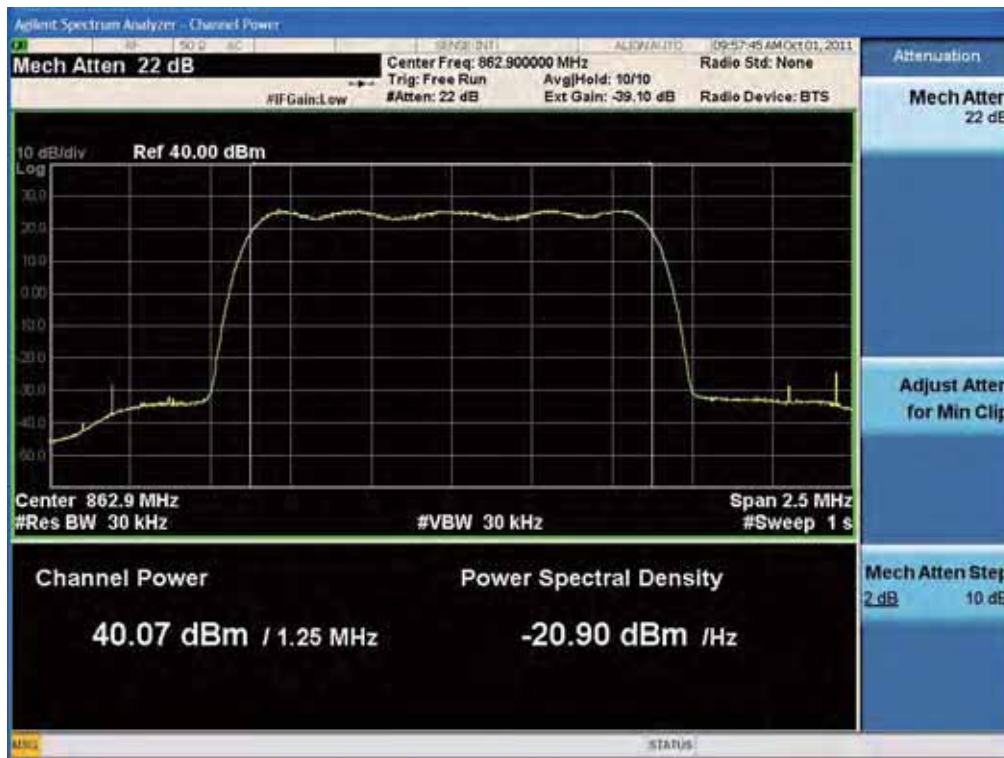
(QPSK High Channel)



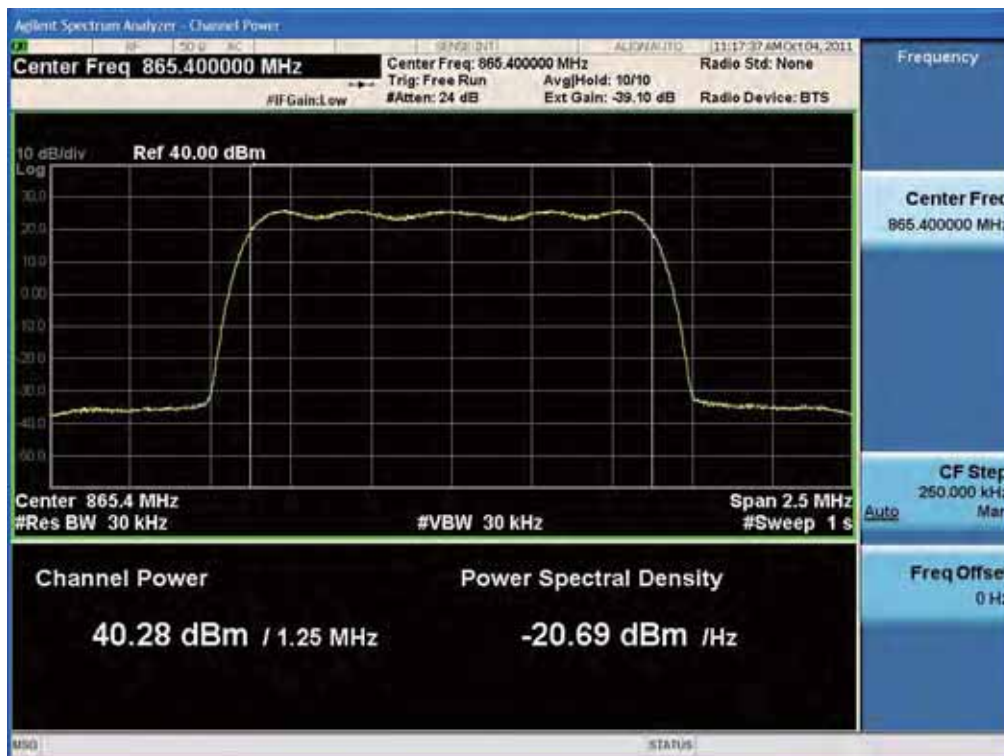
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 27 of 133

5.4.4. Plot Data for 2 Tx mode – 1 Carrier, Output Port 1

(QPSK Low Channel)

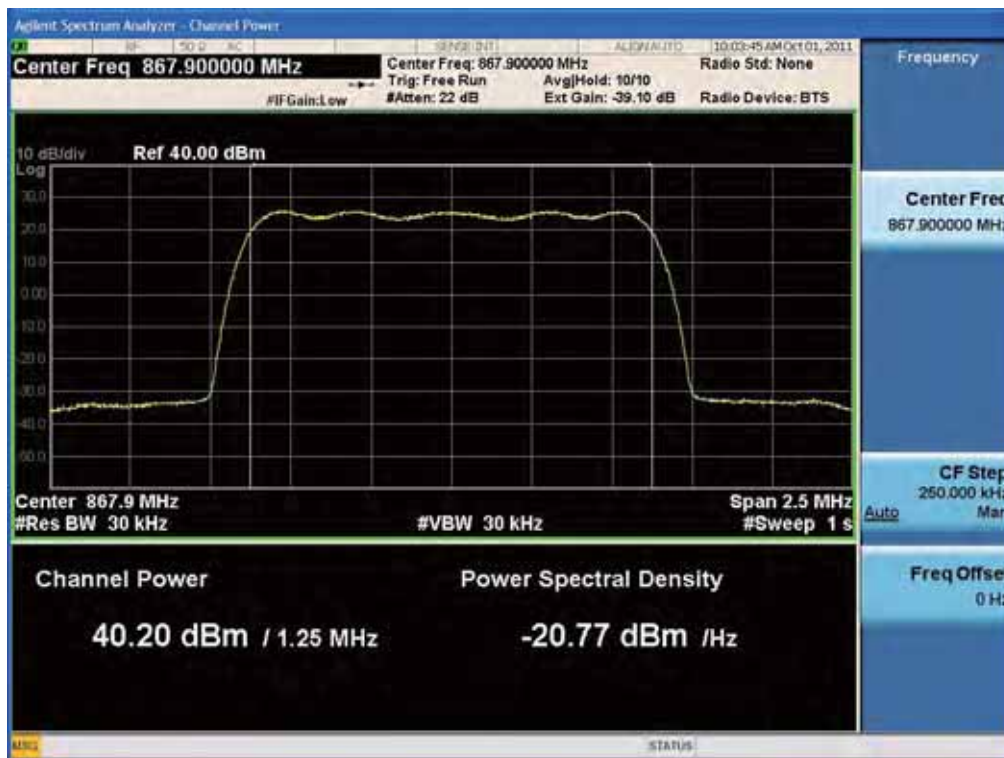


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 28 of 133

(QPSK High Channel)



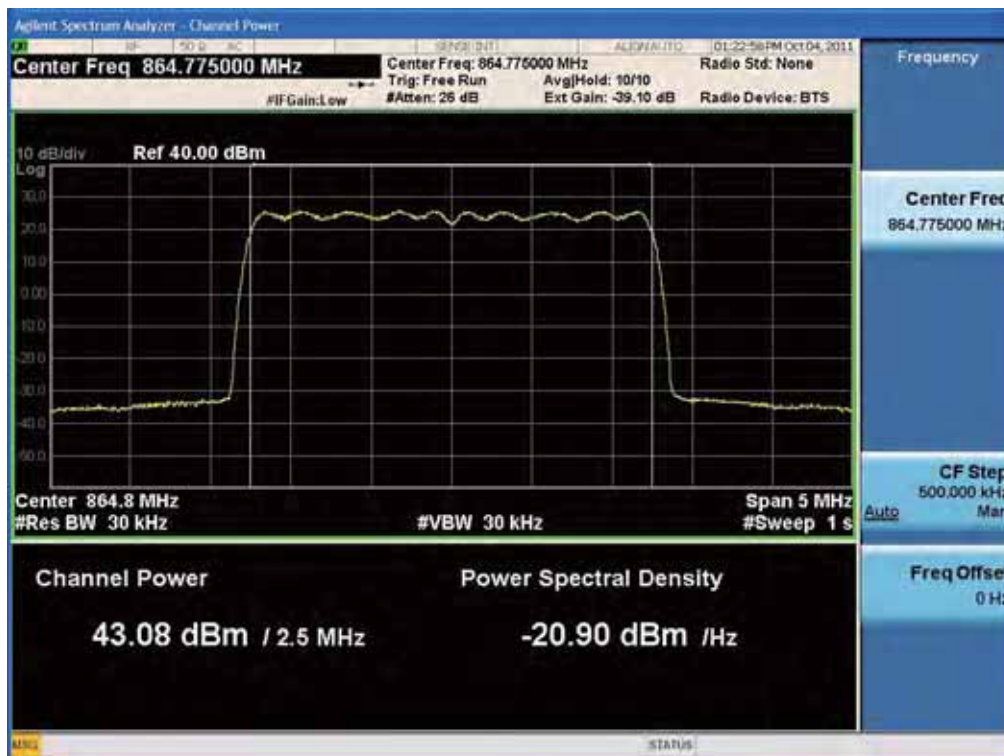
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 29 of 133

5.4.5. Plot Data for 2 Tx mode – 2 Carriers, Output Port 0

(QPSK Low Channel)

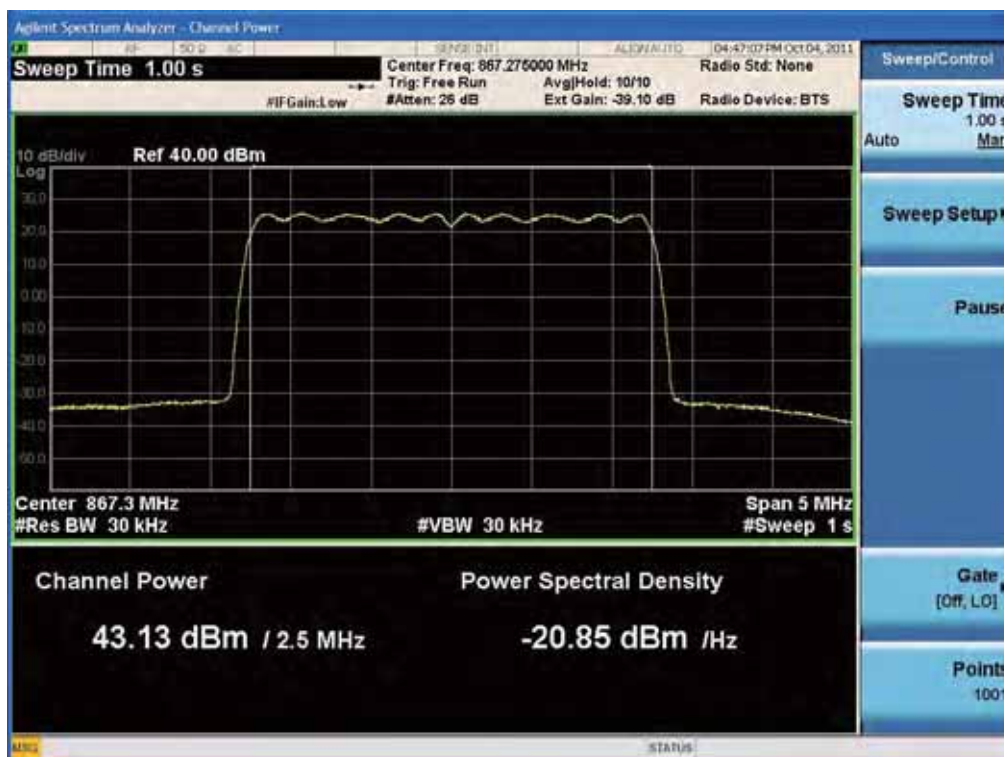


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 30 of 133

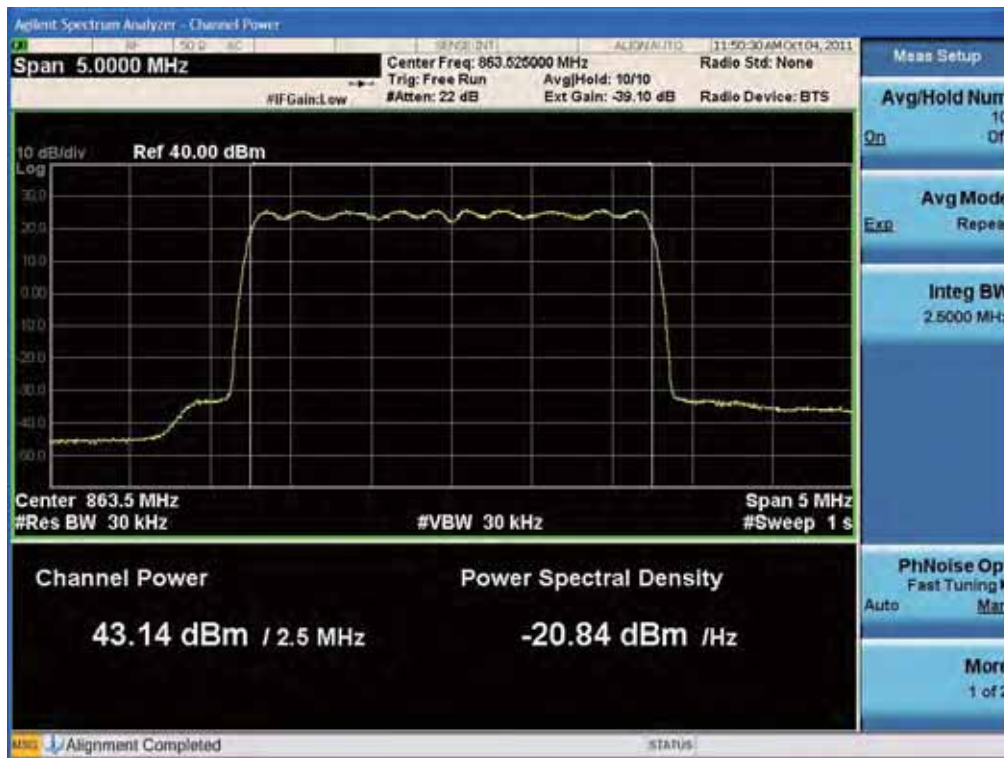
(QPSK High Channel)



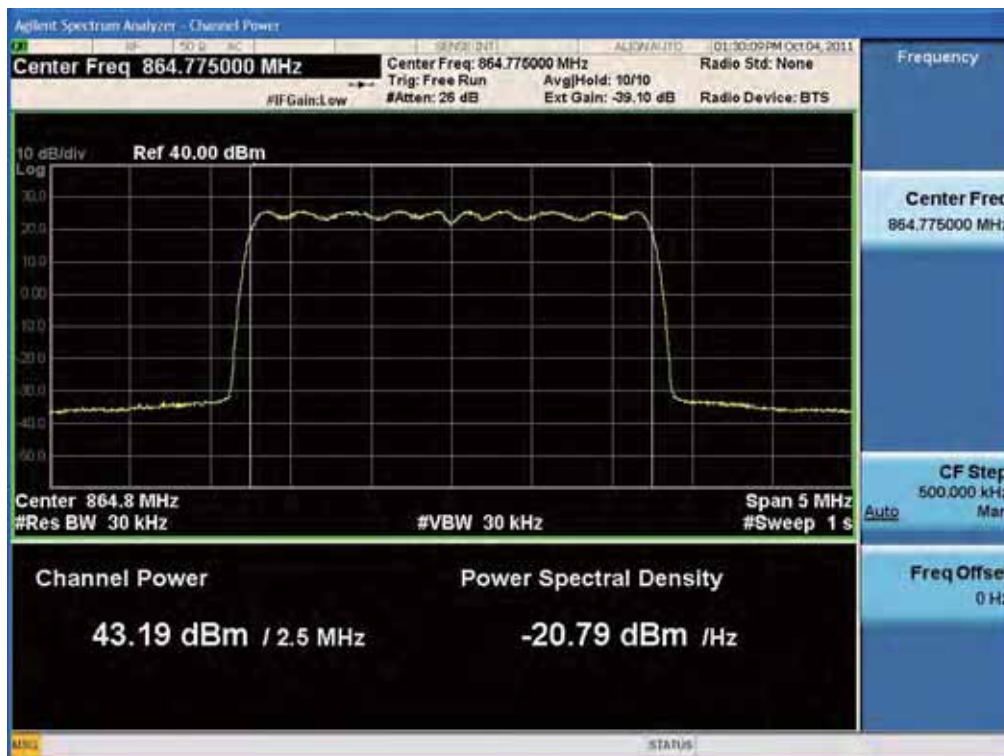
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 31 of 133

5.4.6. Plot Data for 2 Tx mode – 2 Carriers, Output Port 1

(QPSK Low Channel)

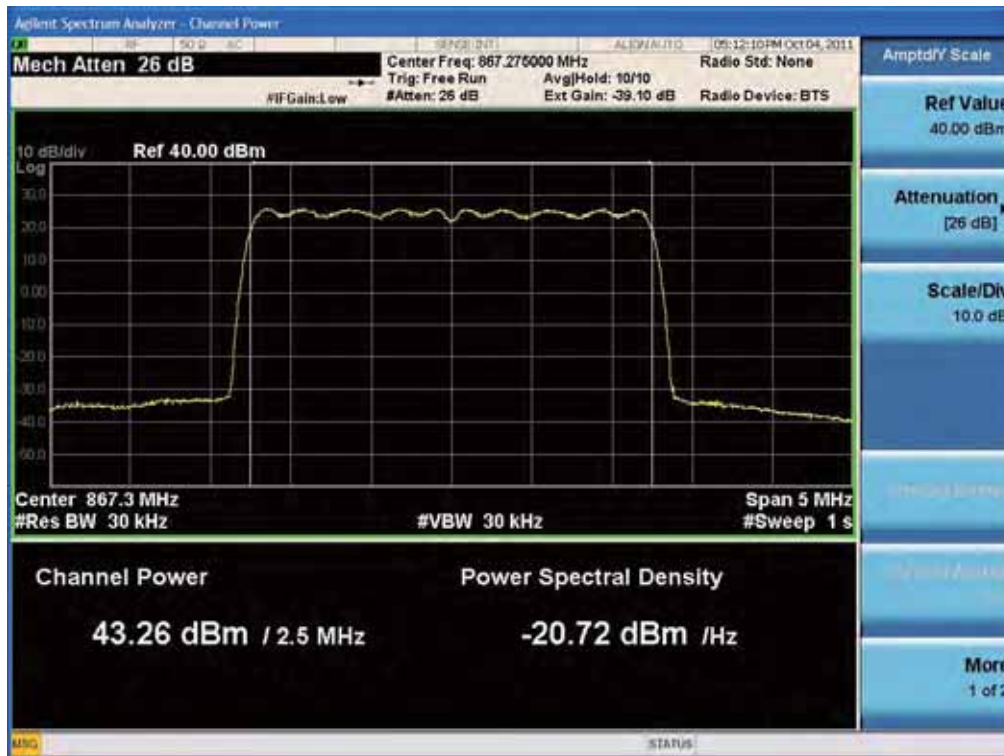


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 32 of 133

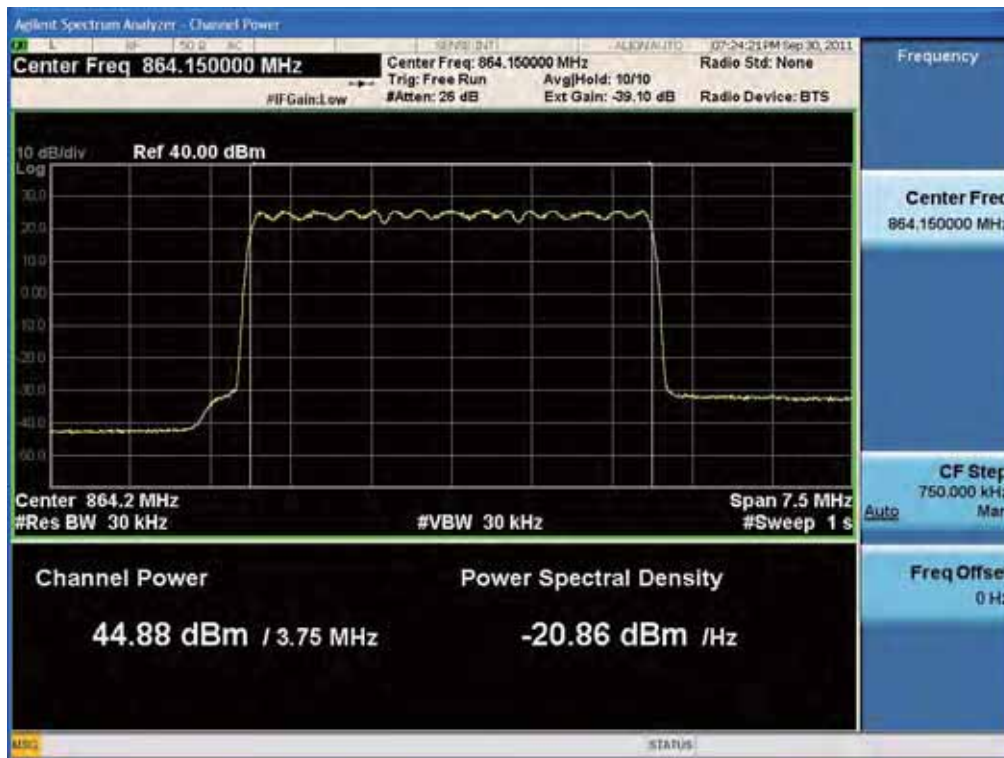
(QPSK High Channel)



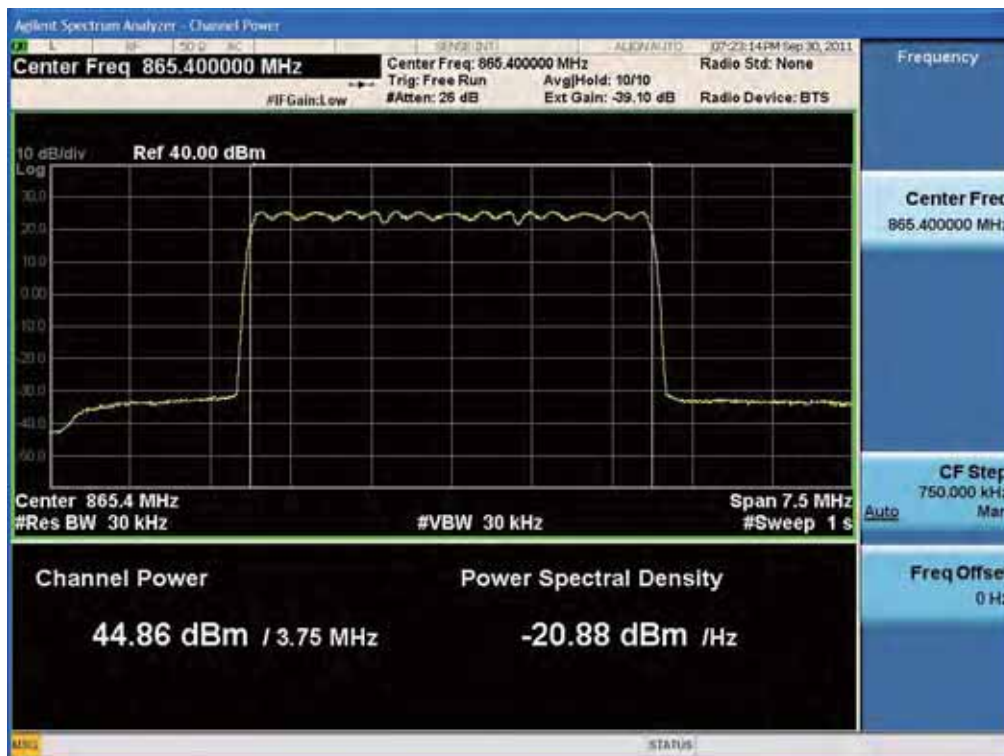
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 33 of 133

5.4.7. Plot Data for 2 Tx mode – 3 Carriers, Output Port 0

(QPSK Low Channel)

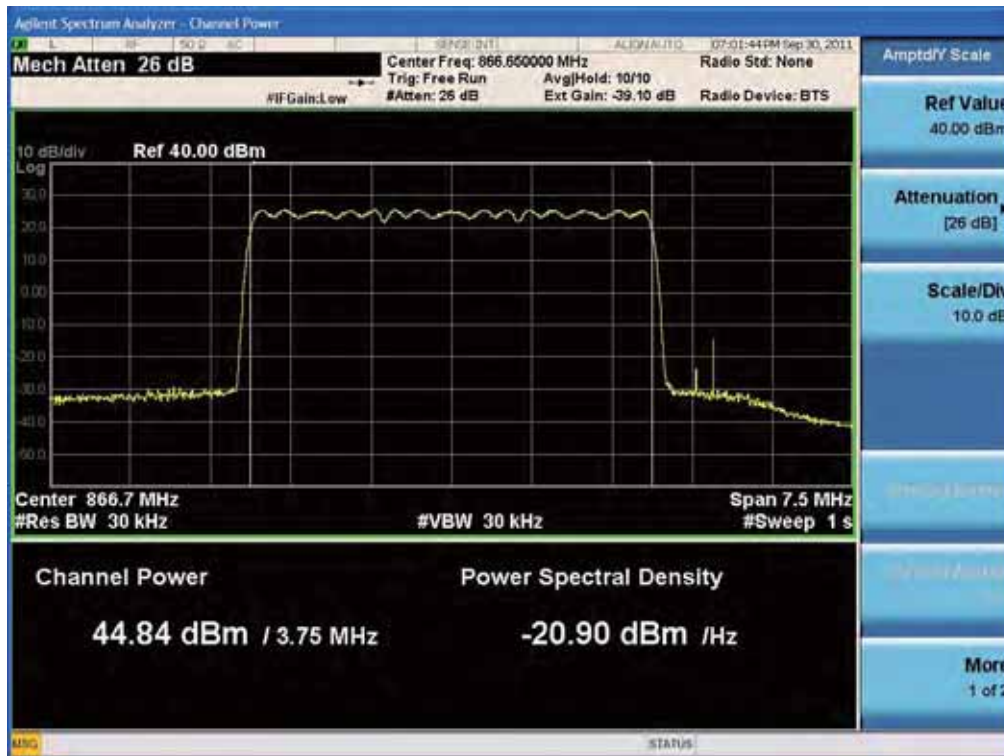


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 34 of 133

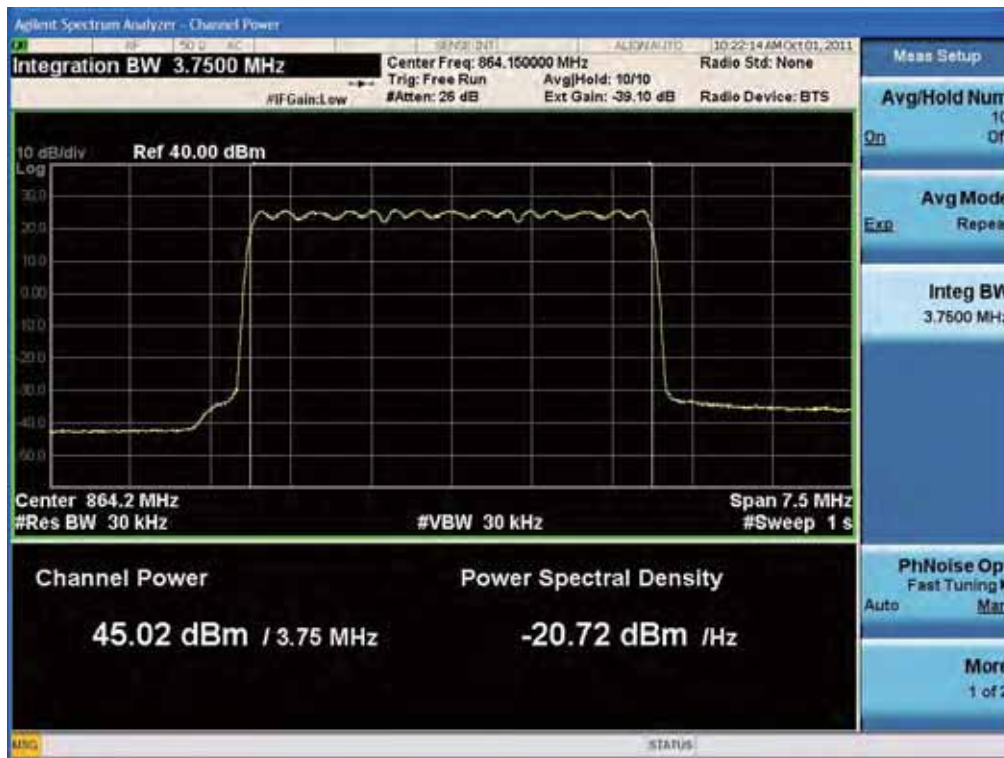
(QPSK High Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 35 of 133

5.4.8. Plot Data for 2 Tx mode – 3 Carriers, Output Port 1

(QPSK Low Channel)

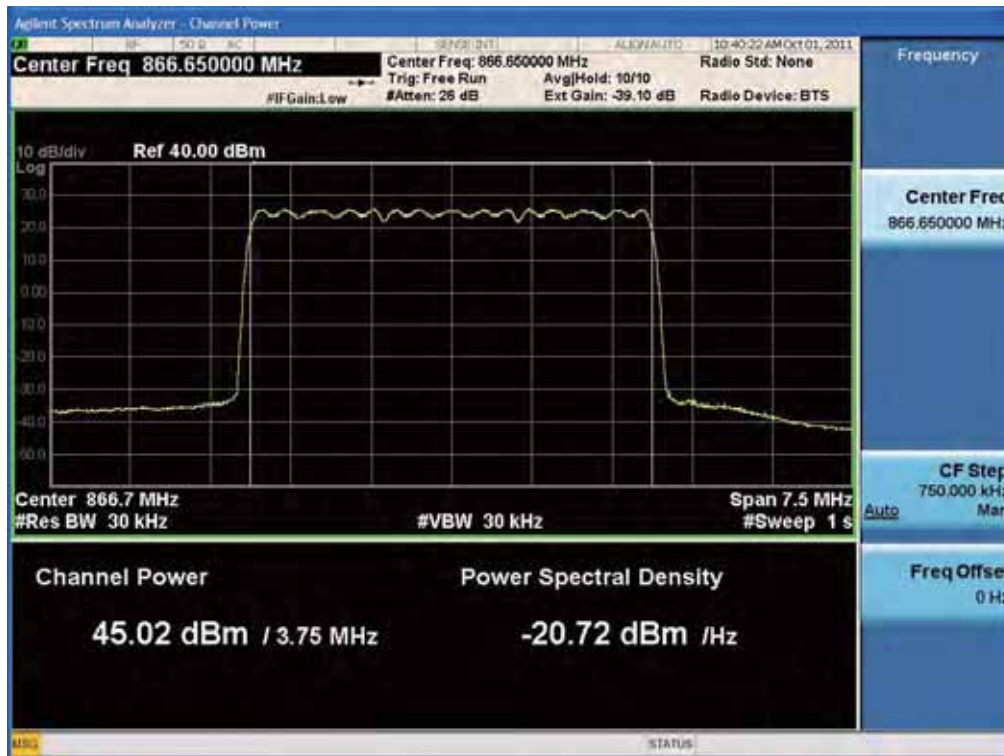


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 36 of 133

(QPSK High Channel)



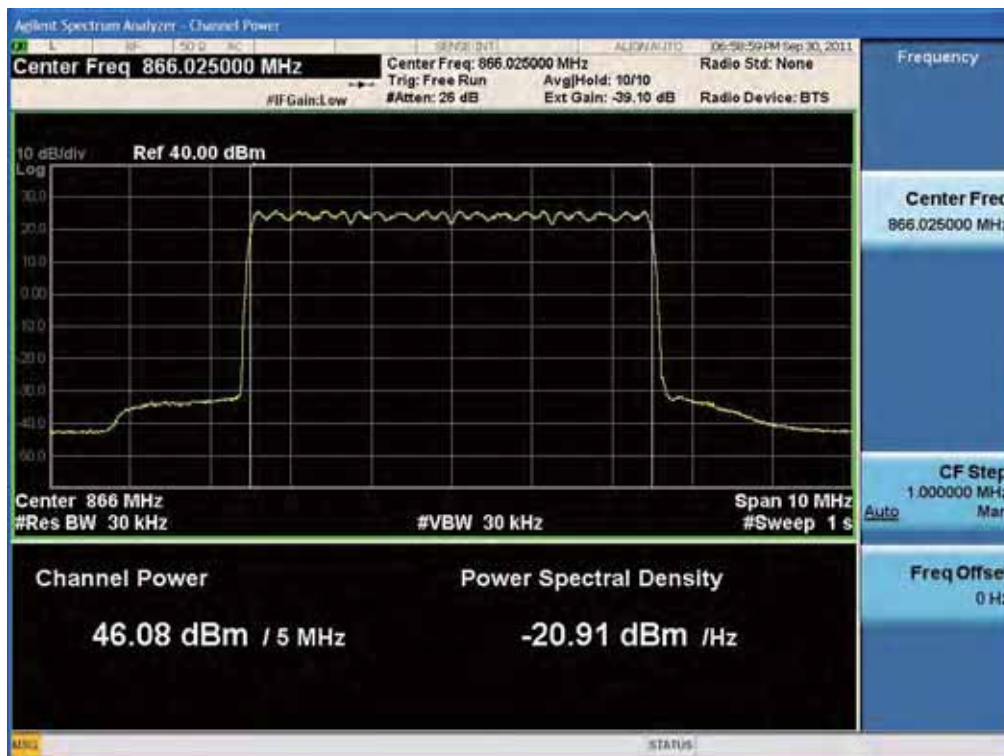
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 37 of 133

5.4.9. Plot Data for 2 Tx mode – 4 Carriers, Output Port 0

(QPSK Low Channel)



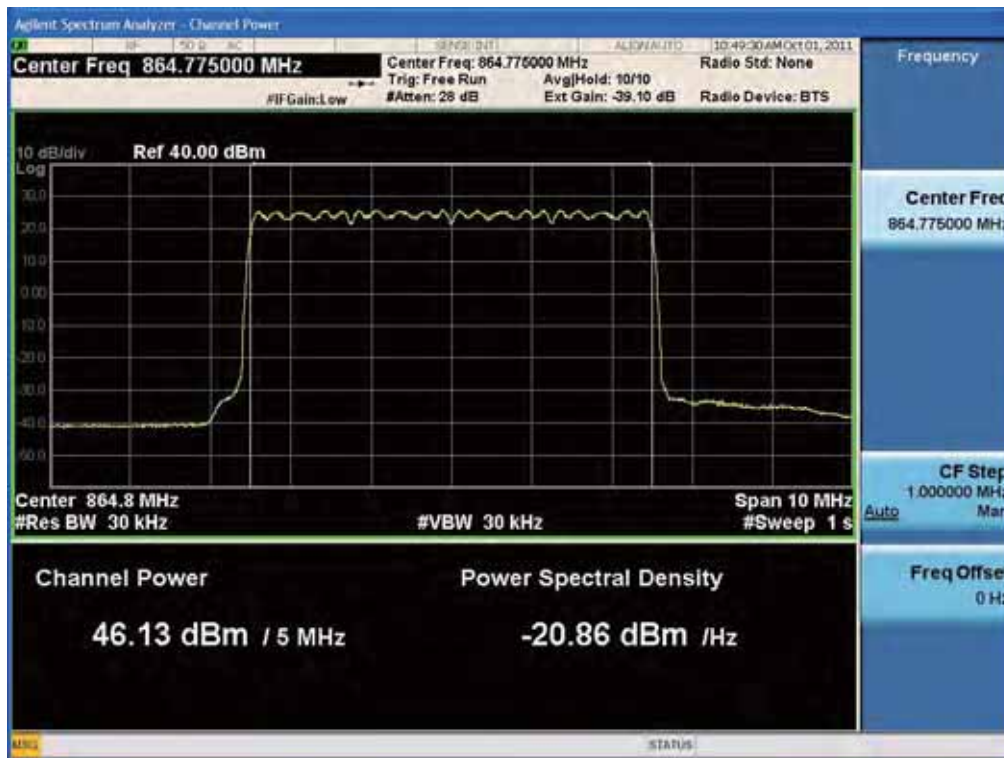
(QPSK High Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 38 of 133

5.4.10. Plot Data for 2 Tx mode – 4 Carriers, Output Port 1

(QPSK Low Channel)



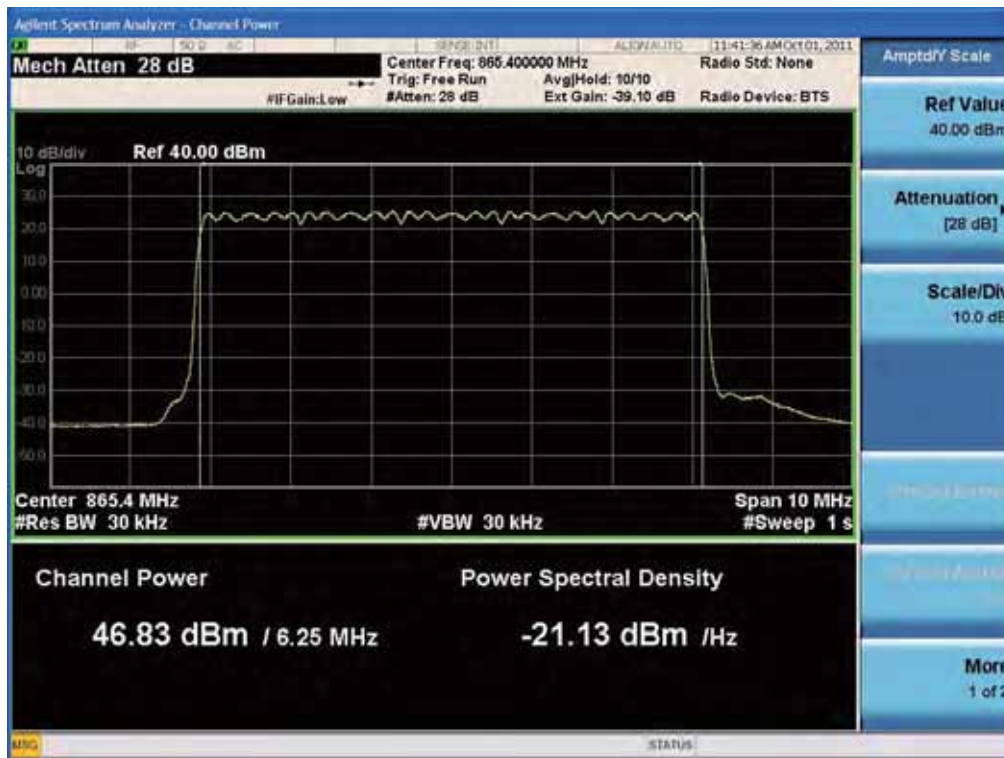
(QPSK High Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 39 of 133

5.4.11. Plot Data for 2 Tx mode – 5 Carriers, Output Port 0

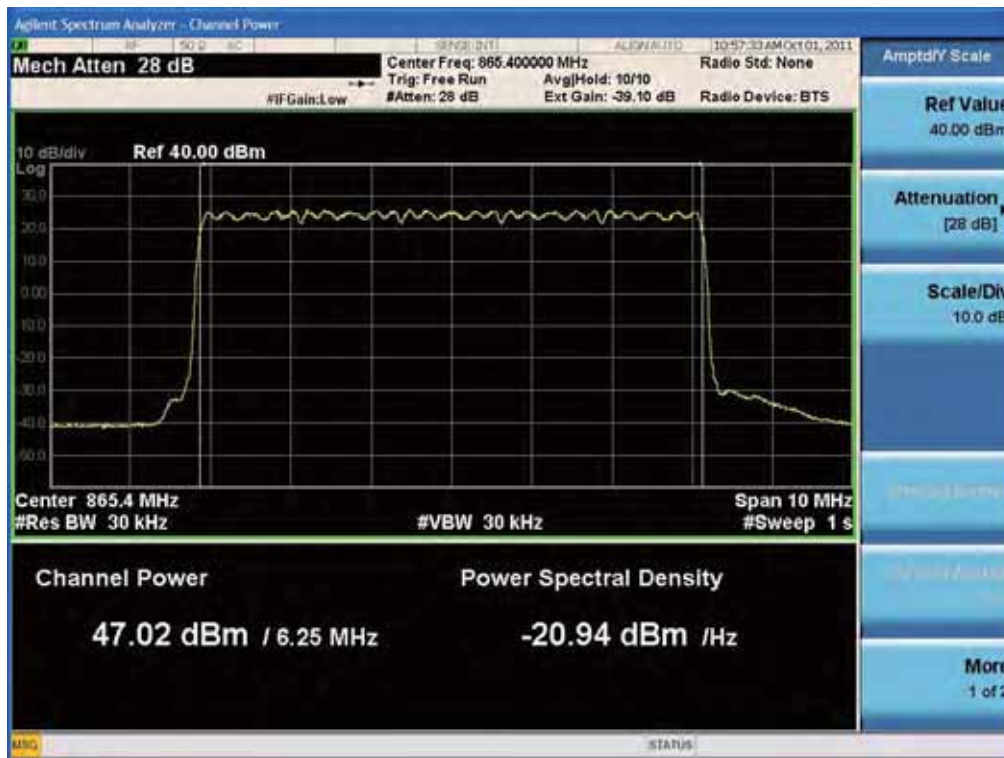
(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 40 of 133

5.4.12. Plot Data for 2 Tx mode – 5 Carriers, Output Port 1

(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 41 of 133

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

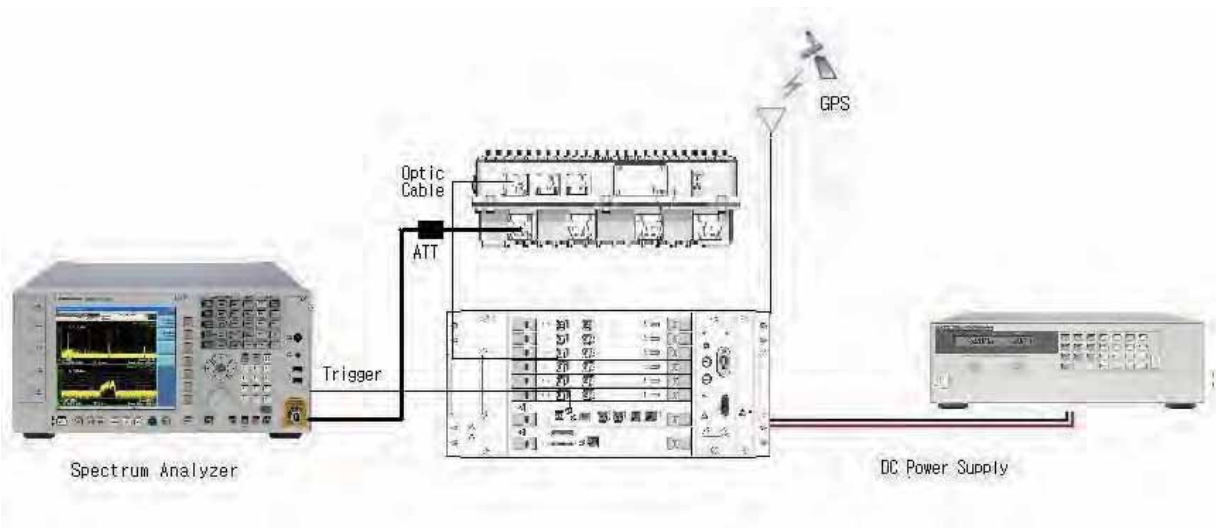
Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	06/10/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	639	11/12/2011
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 42 of 133

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.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 43 of 133

[1 Tx Mode – 1 Carrier / 1 Port]

6.4.1. Test Data at Output Port 0

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	862.9	1.2470
	Middle	865.4	1.2492
	High	867.9	1.2477
QPSK	Low	862.9	1.2468
	Middle	865.4	1.2470
	High	867.9	1.2486
16QAM	Low	862.9	1.2464
	Middle	865.4	1.2479
	High	867.9	1.2488

6.4.2. Test Data at Output Port 1

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	862.9	1.2461
	Middle	865.4	1.2495
	High	867.9	1.2491
QPSK	Low	862.9	1.2468
	Middle	865.4	1.2486
	High	867.9	1.2485
16QAM	Low	862.9	1.2472
	Middle	865.4	1.2485
	High	867.9	1.2479

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 44 of 133

[2 Tx Mode – 1 Carrier / 2 Ports]

6.4.3. Test Data at Output Port 0

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	862.9	1.2465
	Middle	865.4	1.2480
	High	867.9	1.2482
QPSK	Low	862.9	1.2476
	Middle	865.4	1.2487
	High	867.9	1.2485
16QAM	Low	862.9	1.2482
	Middle	865.4	1.2474
	High	867.9	1.2493

6.4.4. Test Data at Output Port 1

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	862.9	1.2464
	Middle	865.4	1.2502
	High	867.9	1.2488
QPSK	Low	862.9	1.2478
	Middle	865.4	1.2484
	High	867.9	1.2474
16QAM	Low	862.9	1.2479
	Middle	865.4	1.2478
	High	867.9	1.2482

[2 Tx Mode – 2 Carriers / 2 Ports]

6.4.5. Test Data at Output Port 0

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	863.525	2.4646
	Middle	864.775	2.4670
	High	867.275	2.4673
QPSK	Low	863.525	2.4642
	Middle	864.775	2.4669
	High	867.275	2.4659
16QAM	Low	863.525	2.4645
	Middle	864.775	2.4654
	High	867.275	2.4669

6.4.6. Test Data at Output Port 1

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	863.525	2.4644
	Middle	864.775	2.4665
	High	867.275	2.4672
QPSK	Low	863.525	2.4639
	Middle	864.775	2.4655
	High	867.275	2.4680
16QAM	Low	863.525	2.4638
	Middle	864.775	2.4660
	High	867.275	2.4660

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 46 of 133

[2 Tx Mode – 3 Carriers / 2 Port]

6.4.7. Test Data at Output Port 0

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	864.15	3.6936
	Middle	865.4	3.6934
	High	866.65	3.6931
QPSK	Low	864.15	3.6912
	Middle	865.4	3.6953
	High	866.65	3.6973
16QAM	Low	864.15	
	Middle	865.4	
	High	866.65	

6.4.8. Test Data at Output Port 1

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	864.15	3.6933
	Middle	865.4	3.6945
	High	866.65	3.6960
QPSK	Low	864.15	3.6881
	Middle	865.4	3.6939
	High	866.65	3.6933
16QAM	Low	864.15	
	Middle	865.4	
	High	866.65	

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 47 of 133

[2 Tx Mode – 4 Carriers / 2 Port]

6.4.9. Test Data at Output Port 0

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	864.775	4.9234
	High	866.025	4.9270
QPSK	Low	864.775	4.9214
	High	866.025	4.9238
16QAM	Low	864.775	
	High	866.025	

6.4.10. Test Data at Output Port 1

Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	Low	864.775	4.9265
	High	866.025	4.9279
QPSK	Low	864.775	4.9257
	High	866.025	4.9267
16QAM	Low	864.775	
	High	866.025	

[2 Tx Mode – 5 Carriers / 2 Port]

6.4.11. Test Data at Output Port 0

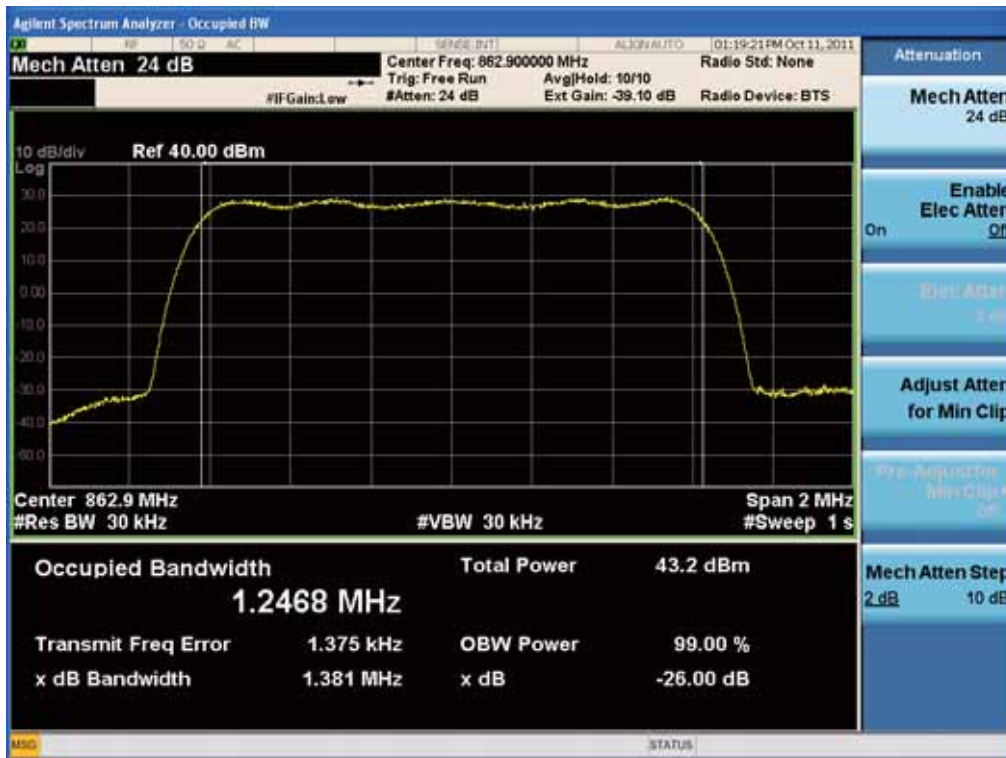
Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	High	865.4	6.1635
QPSK	High	865.4	6.1564
16QAM	High	865.4	

6.4.12. Test Data at Output Port 1

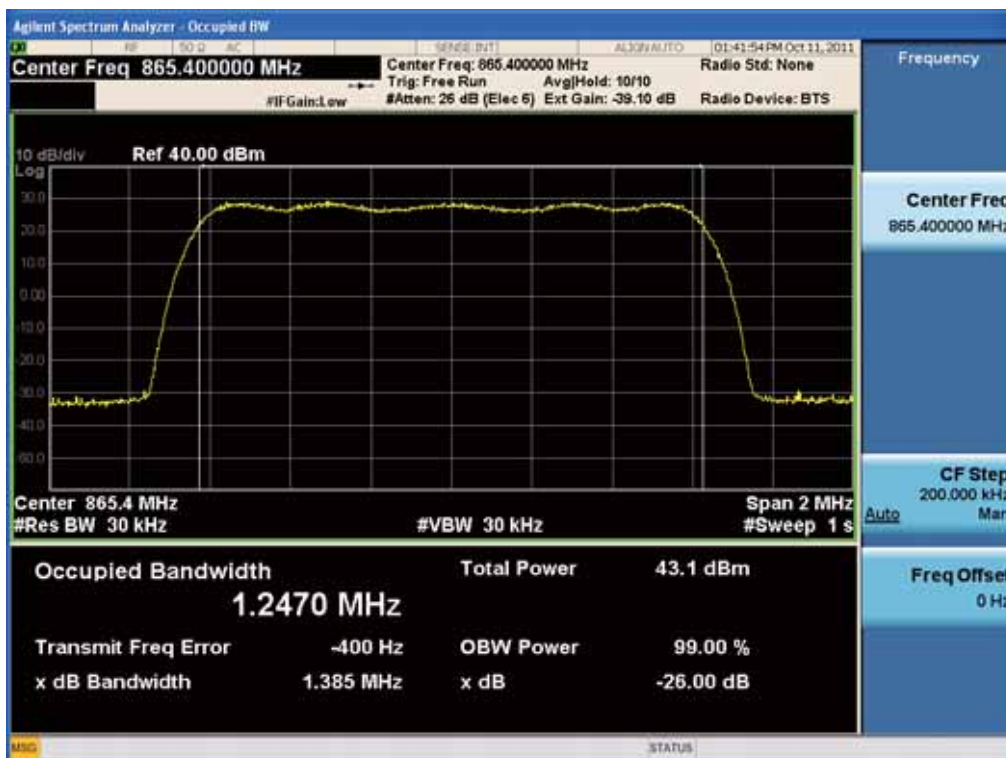
Modulation	Channel	Frequency (MHz)	Measured Bandwidth (MHz)
BPSK	High	865.4	6.1613
QPSK	High	865.4	6.1620
16QAM	High	865.4	

6.4.1. Plot Data for 1 Tx mode – 1 Carrier , Output Port 0

(QPSK Low Channel)

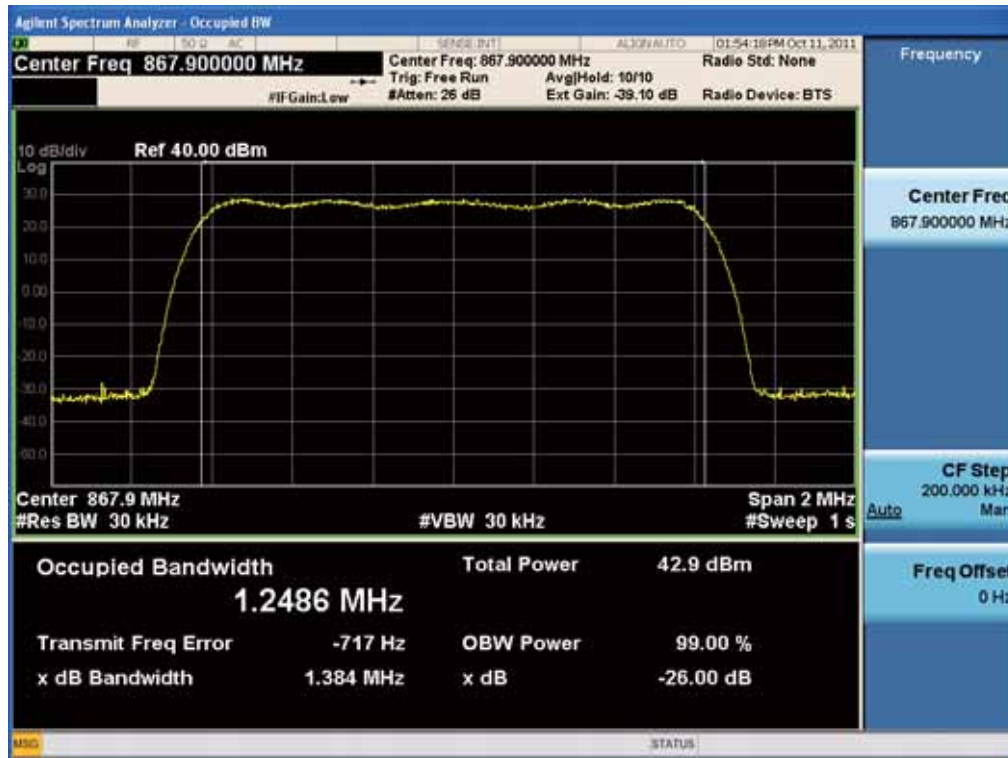


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 50 of 133

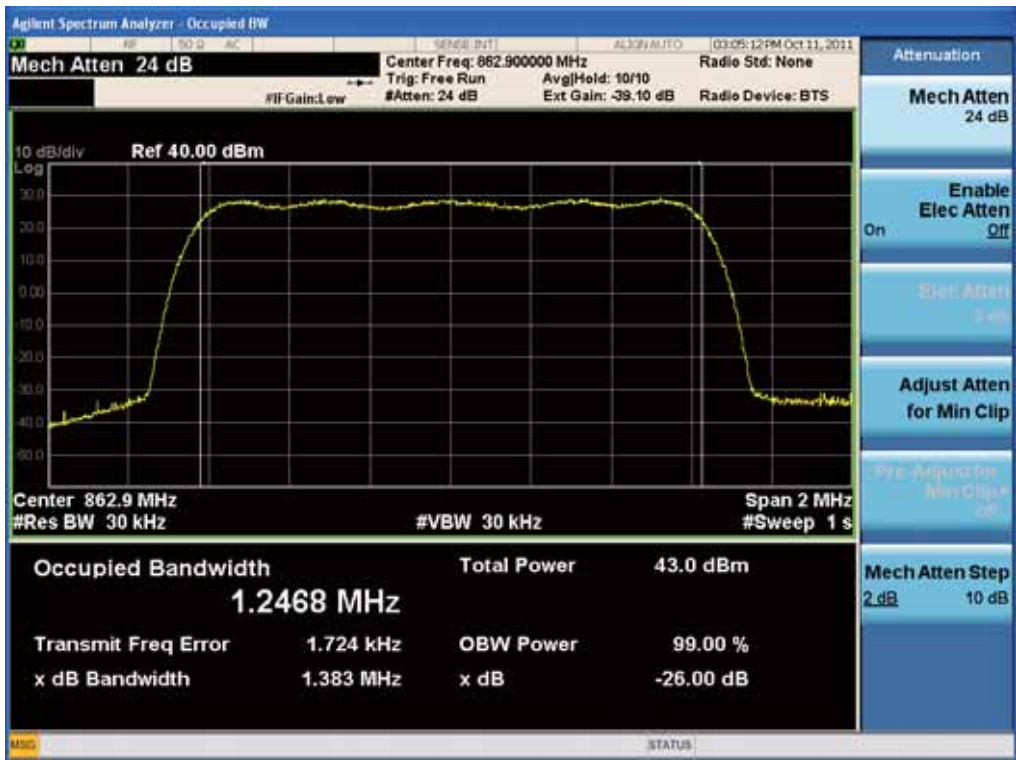
(QPSK High Channel)



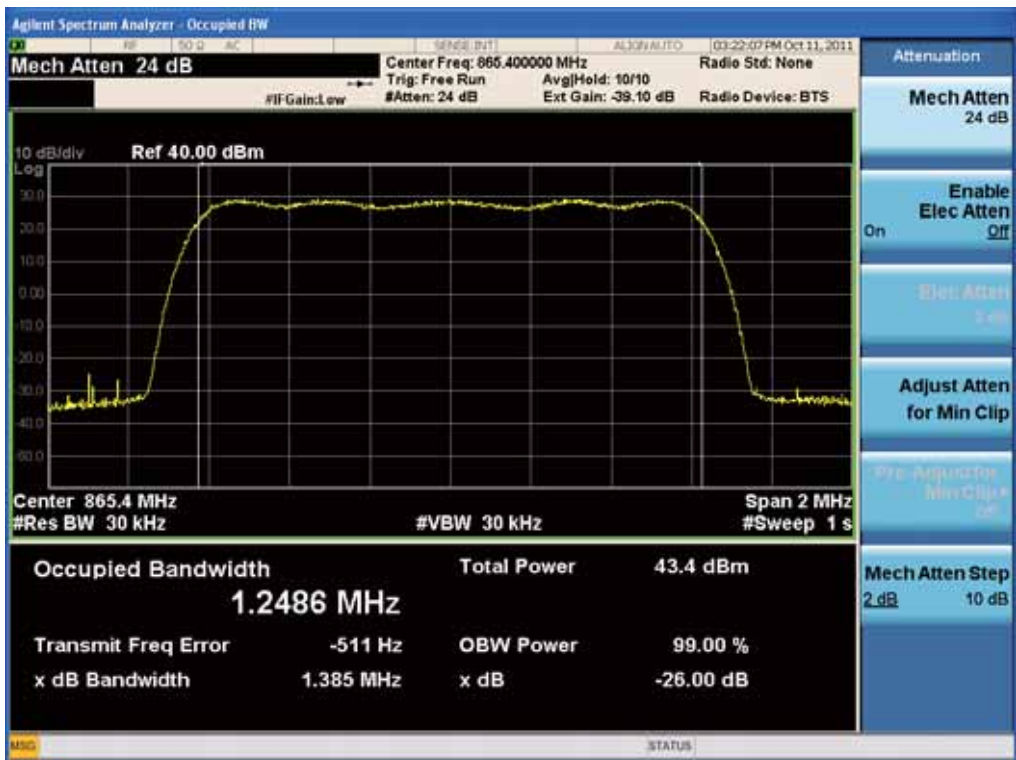
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 51 of 133

6.4.2. Plot Data for 1 Tx mode – 1 Carrier , Output Port 1

(QPSK Low Channel)

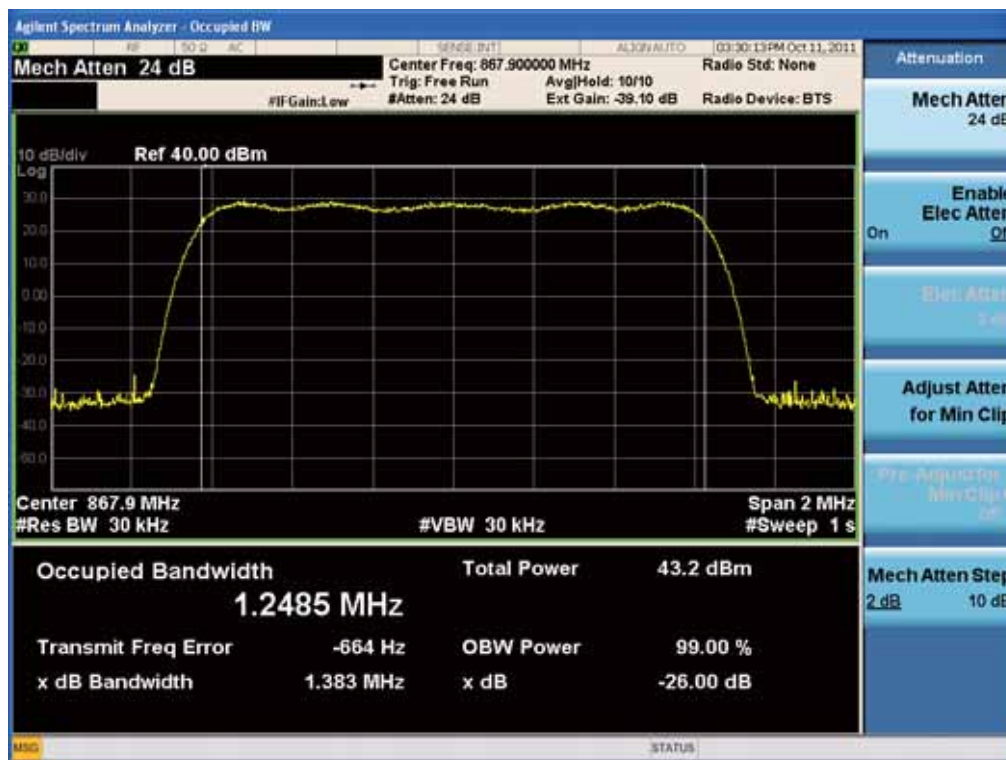


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 52 of 133

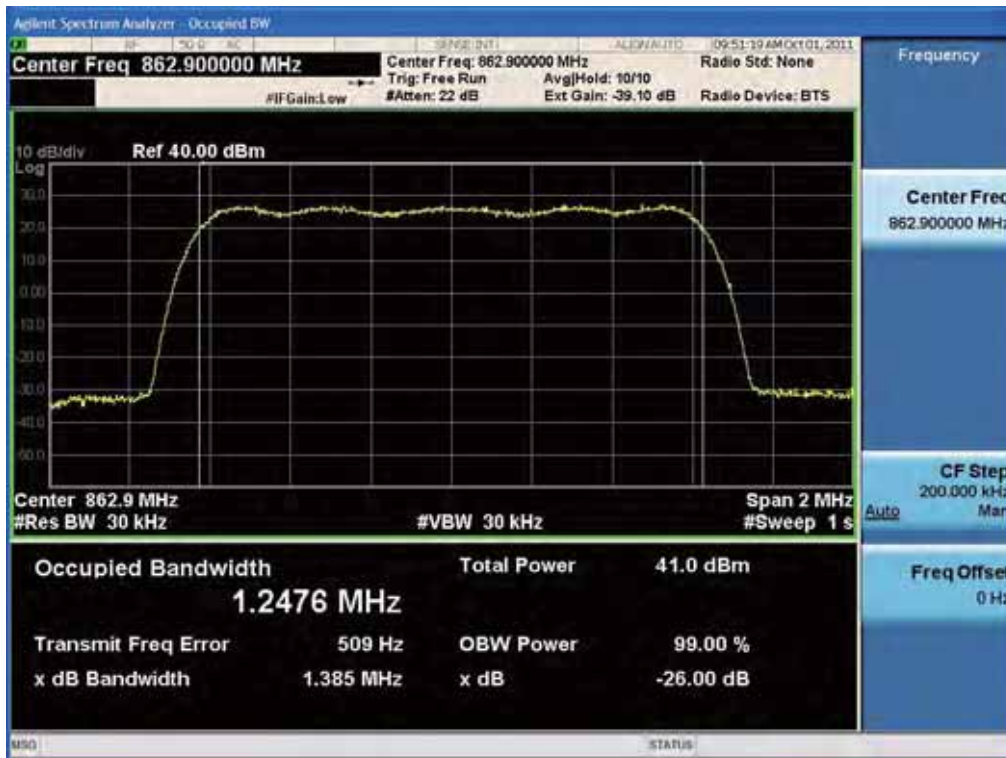
(QPSK High Channel)



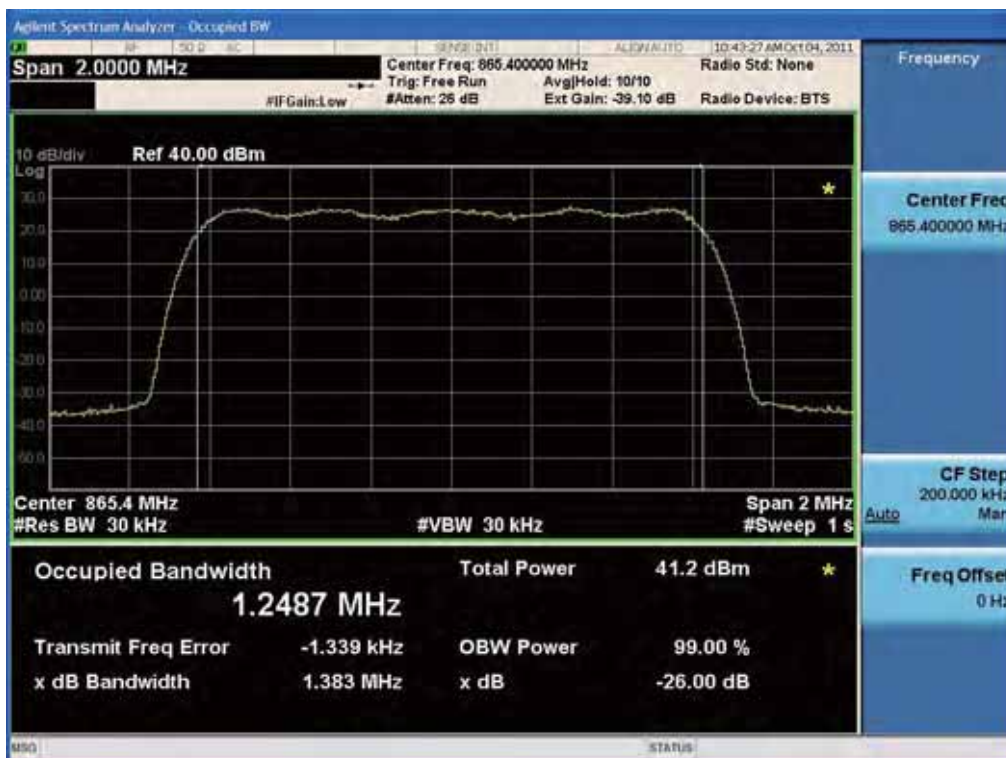
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 53 of 133

6.4.3. Plot Data for 2 Tx mode – 1 Carrier, Output Port 0

(QPSK Low Channel)

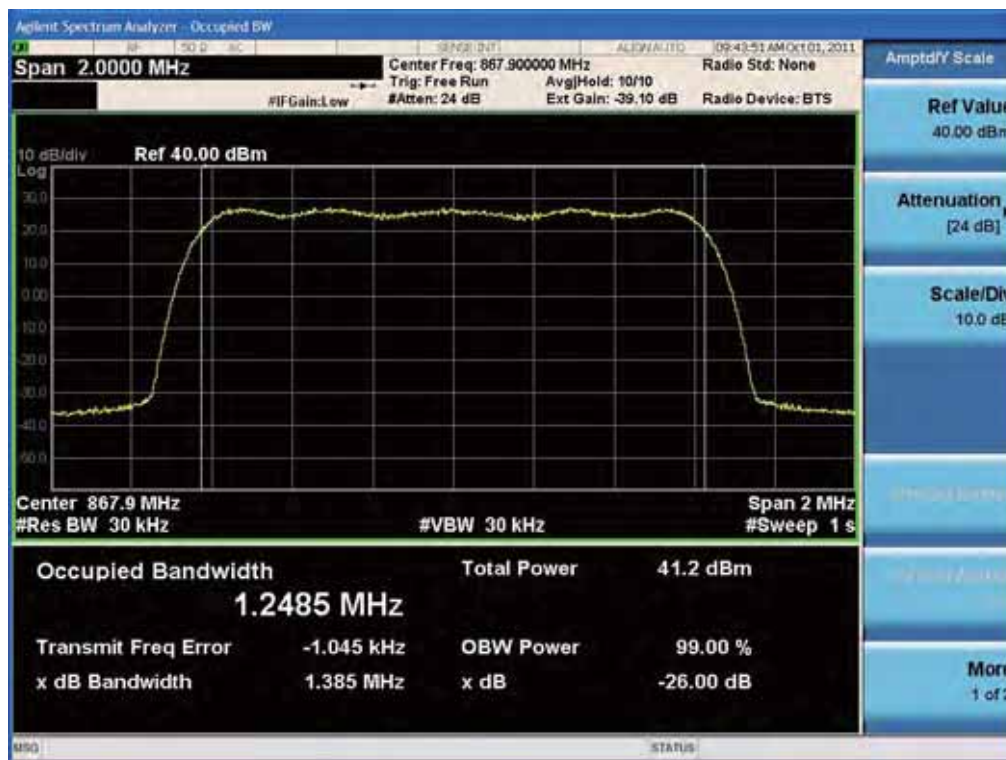


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 54 of 133

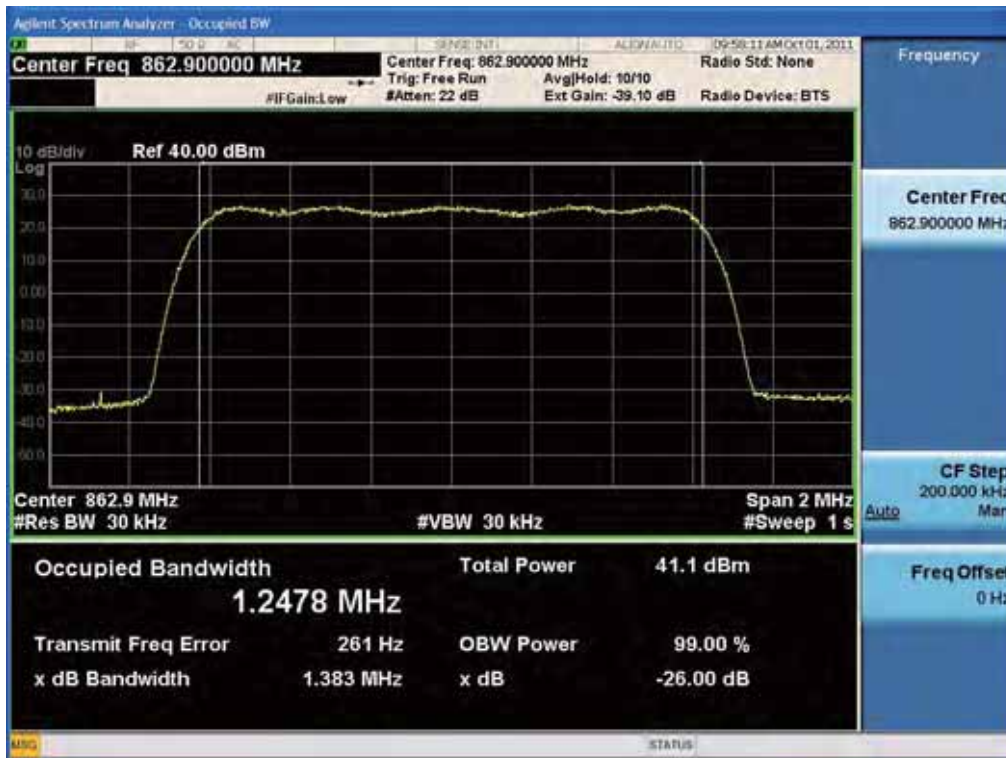
(QPSK High Channel)



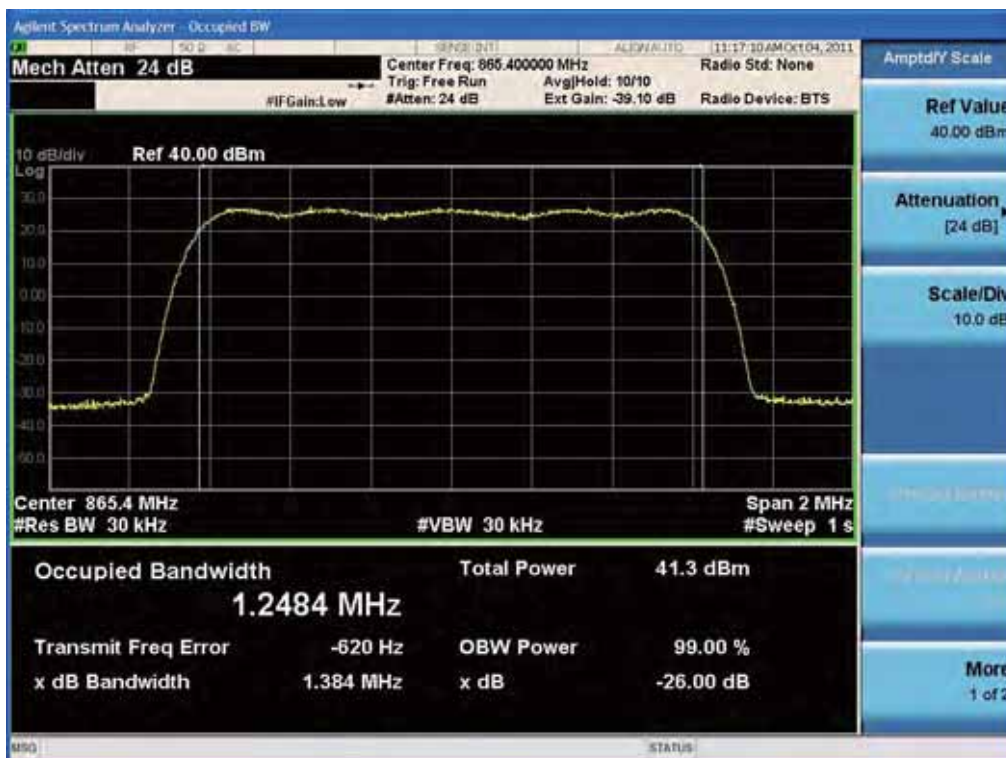
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 55 of 133

6.4.4. Plot Data for 2 Tx mode – 1 Carrier, Output Port 1

(QPSK Low Channel)

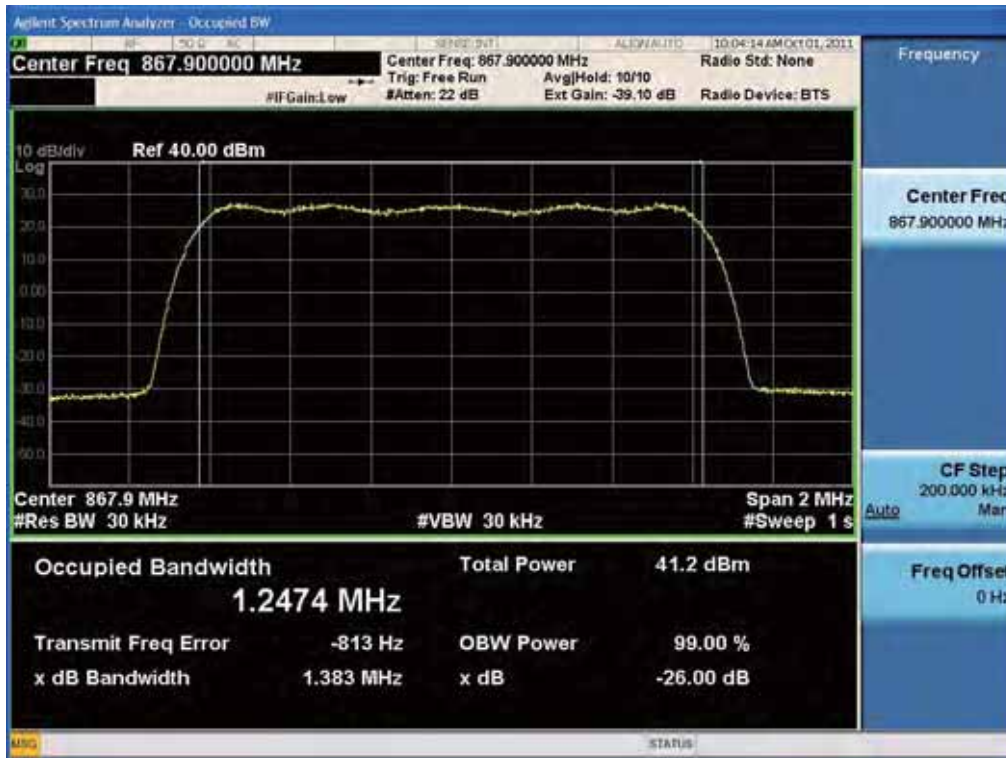


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 56 of 133

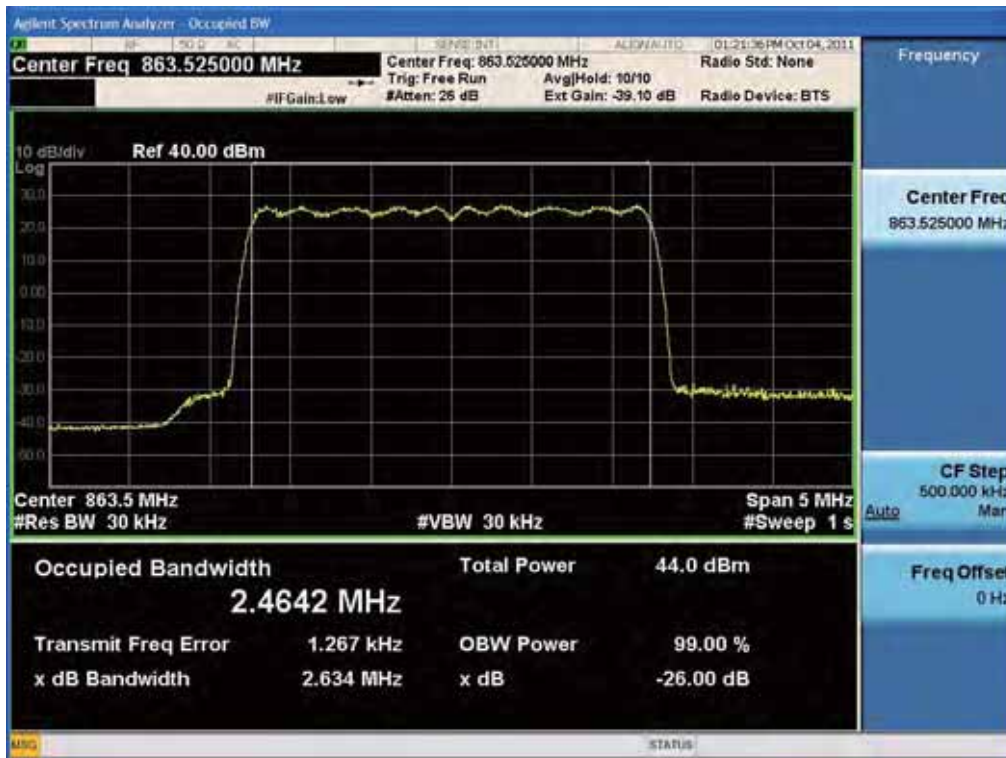
(QPSK High Channel)



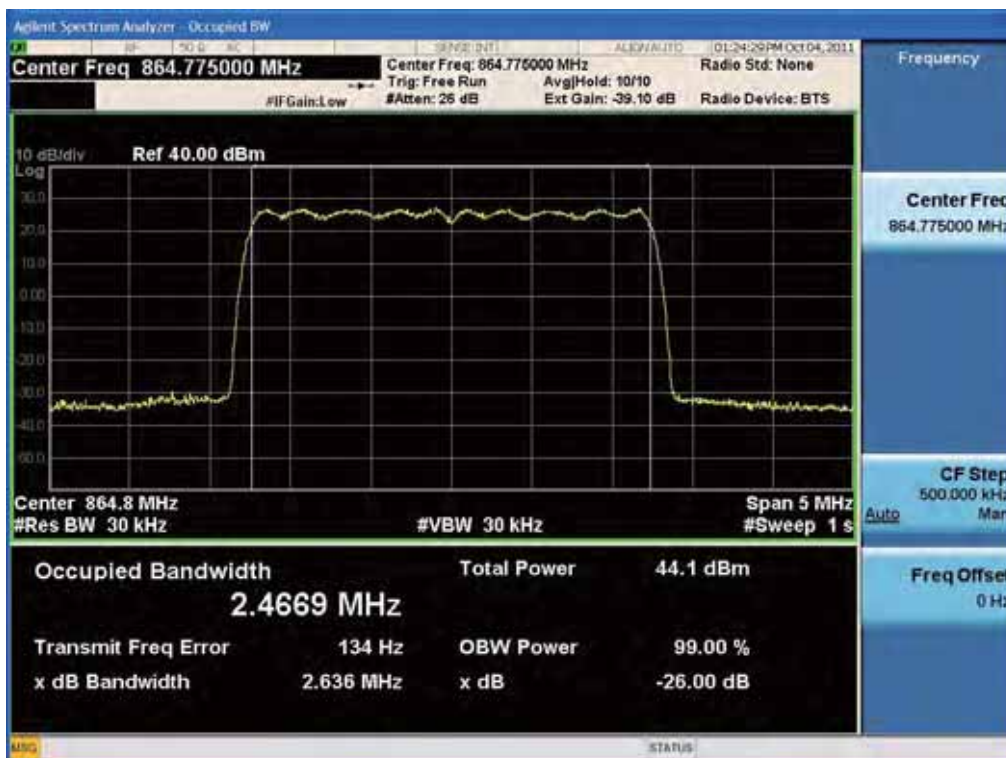
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 57 of 133

6.4.5. Plot Data for 2 Tx mode – 2 Carriers, Output Port 0

(QPSK Low Channel)

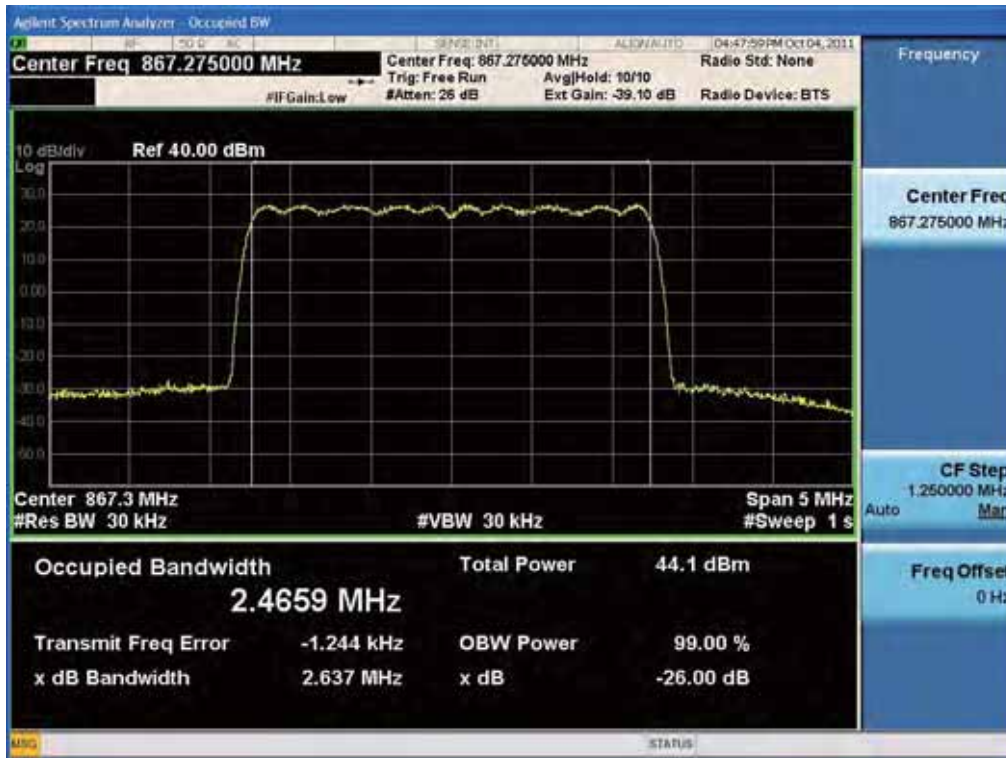


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 58 of 133

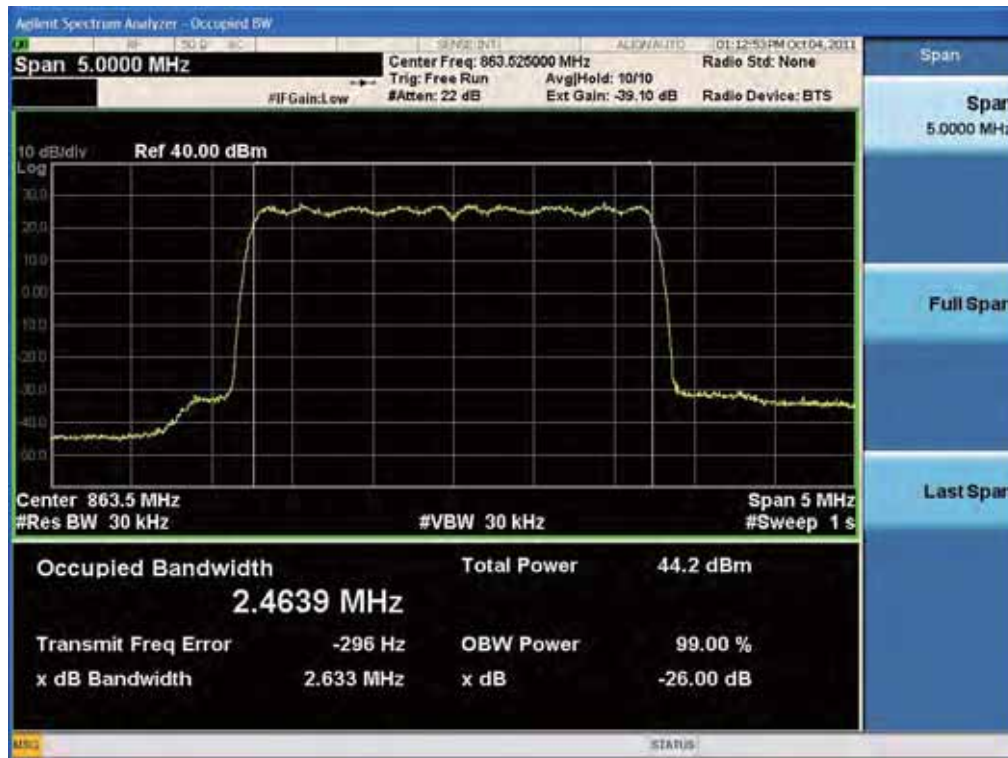
(QPSK High Channel)



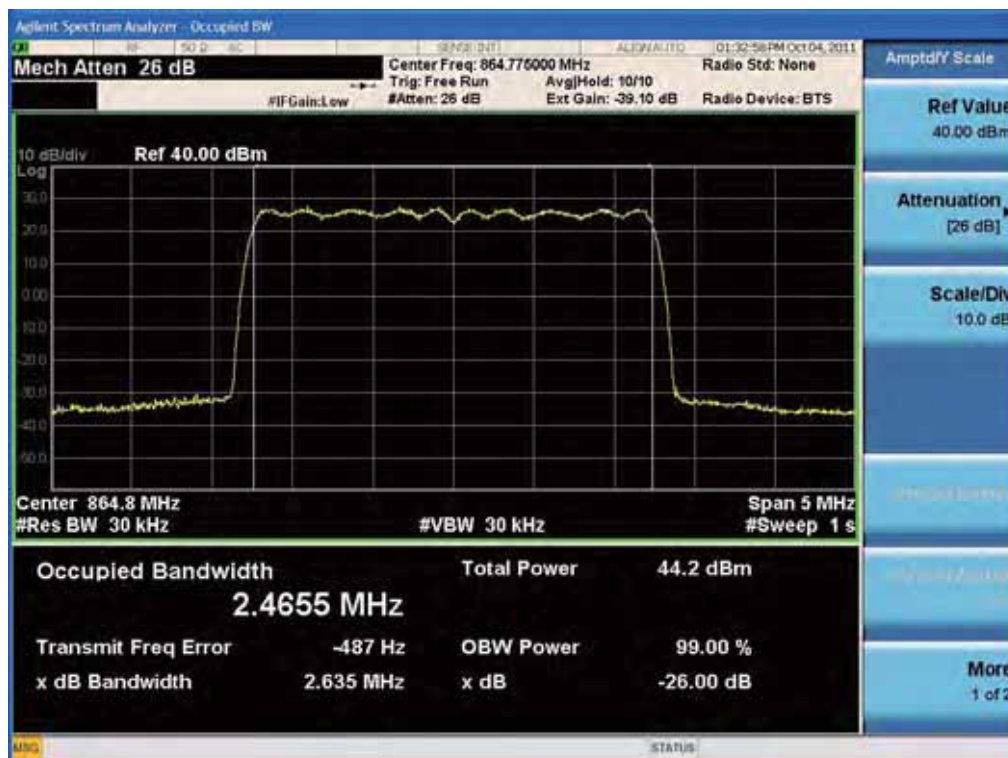
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 59 of 133

6.4.6. Plot Data for 2 Tx mode – 2 Carriers, Output Port 1

(QPSK Low Channel)

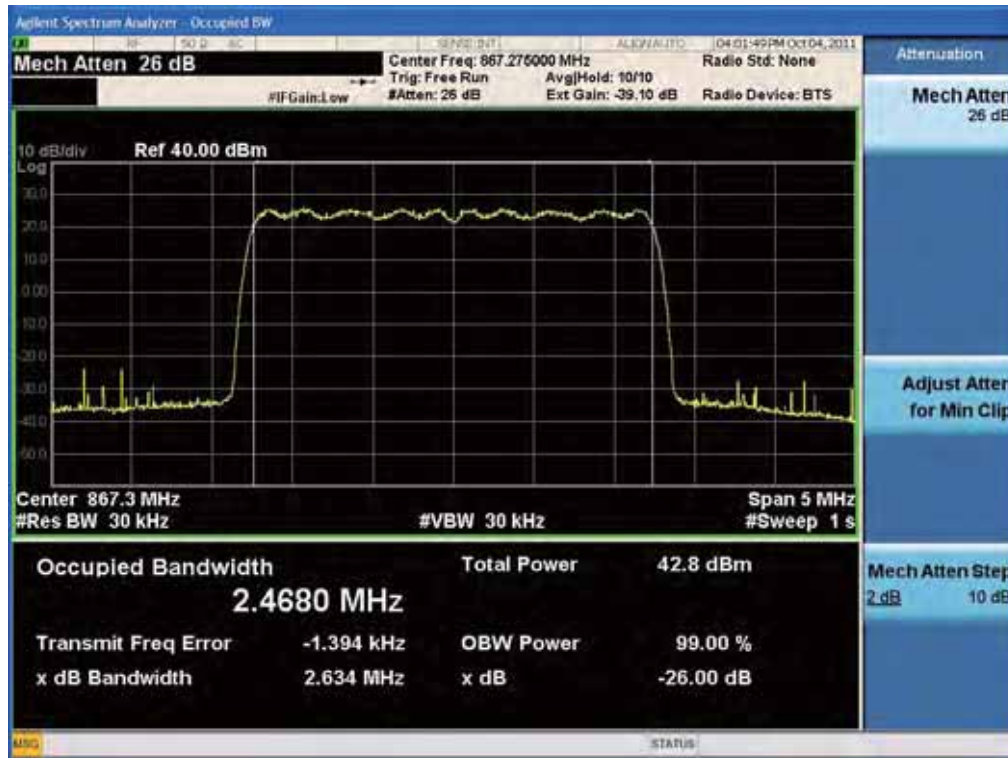


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 60 of 133

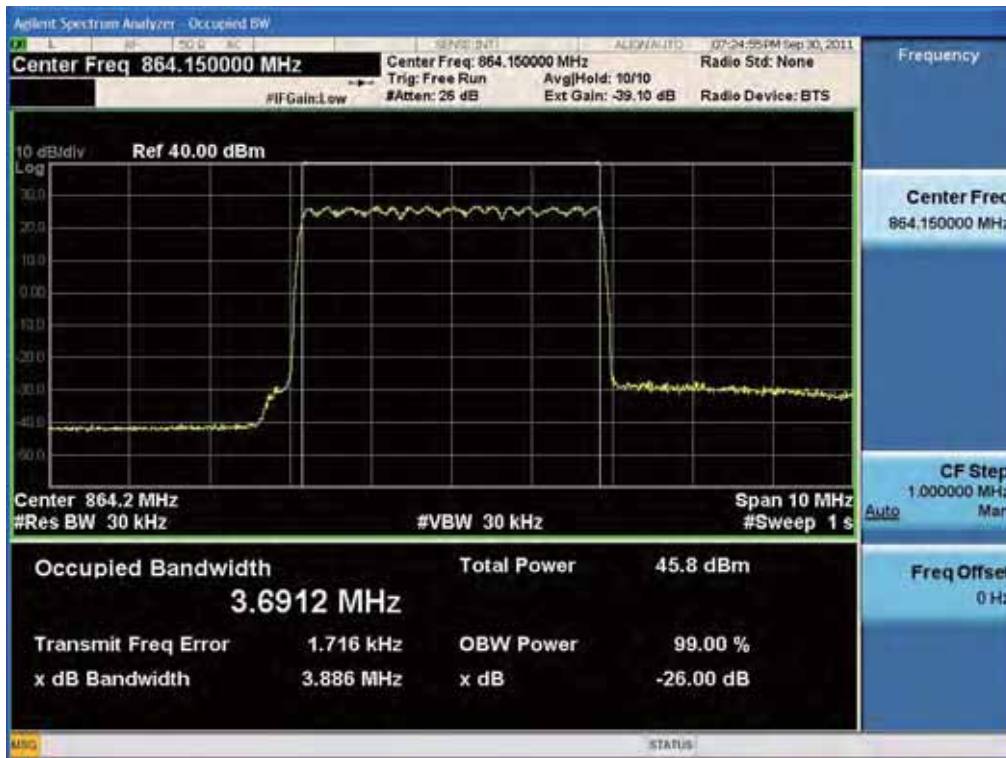
(QPSK High Channel)



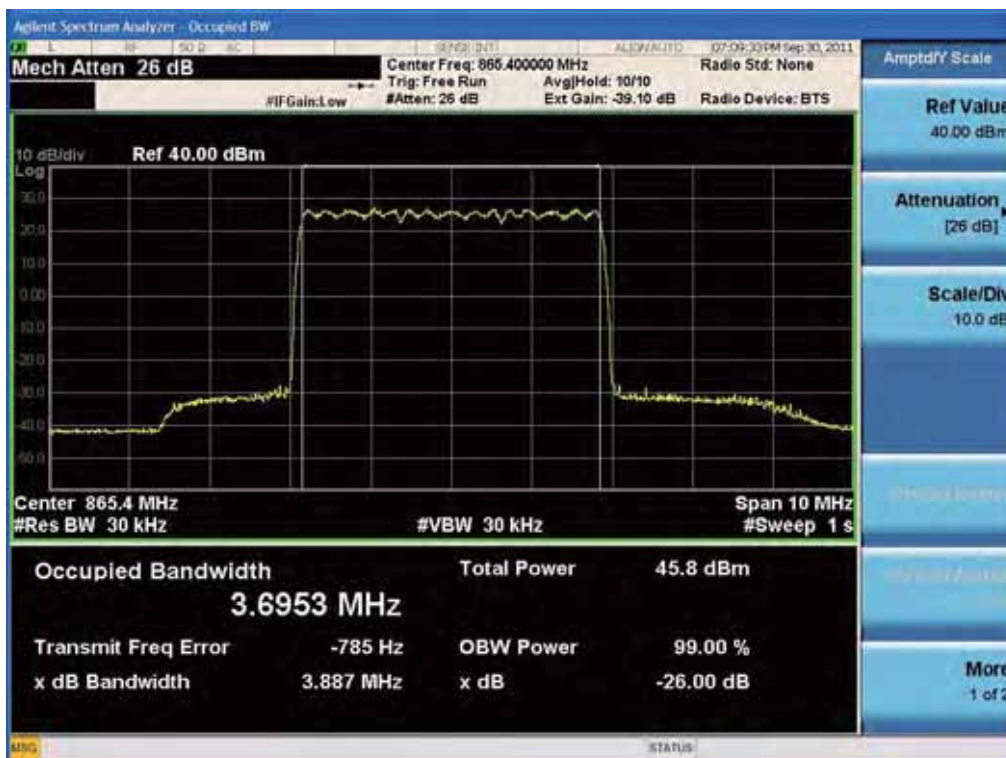
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 61 of 133

6.4.7. Plot Data for 2 Tx mode – 3 Carriers, Output Port 0

(QPSK Low Channel)

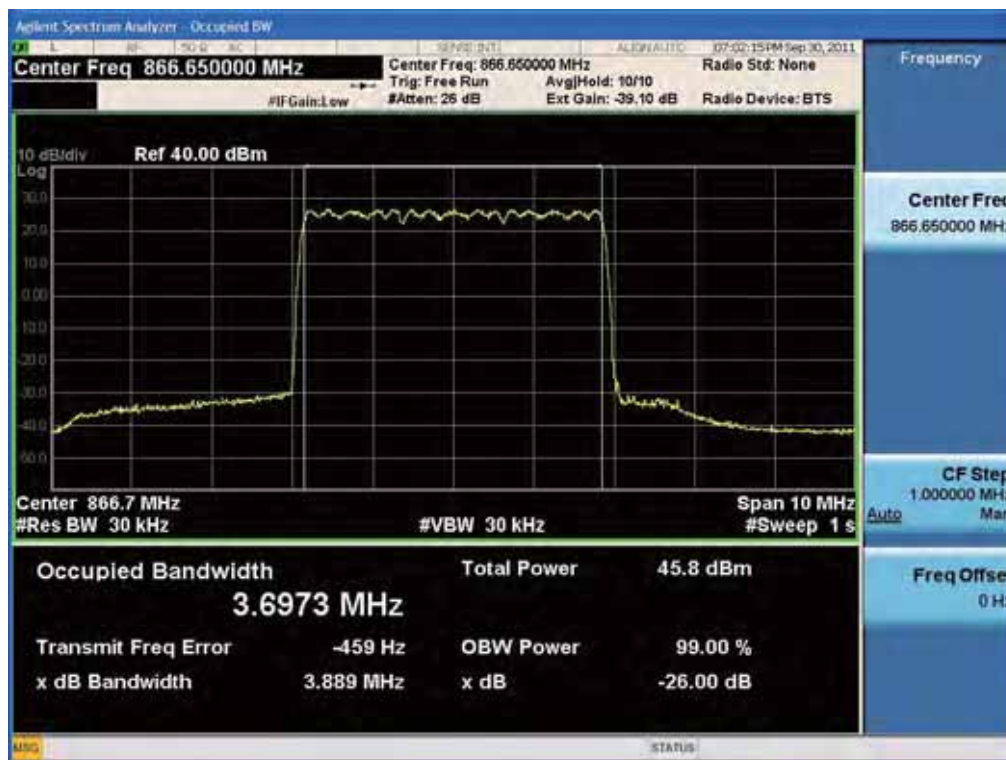


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 62 of 133

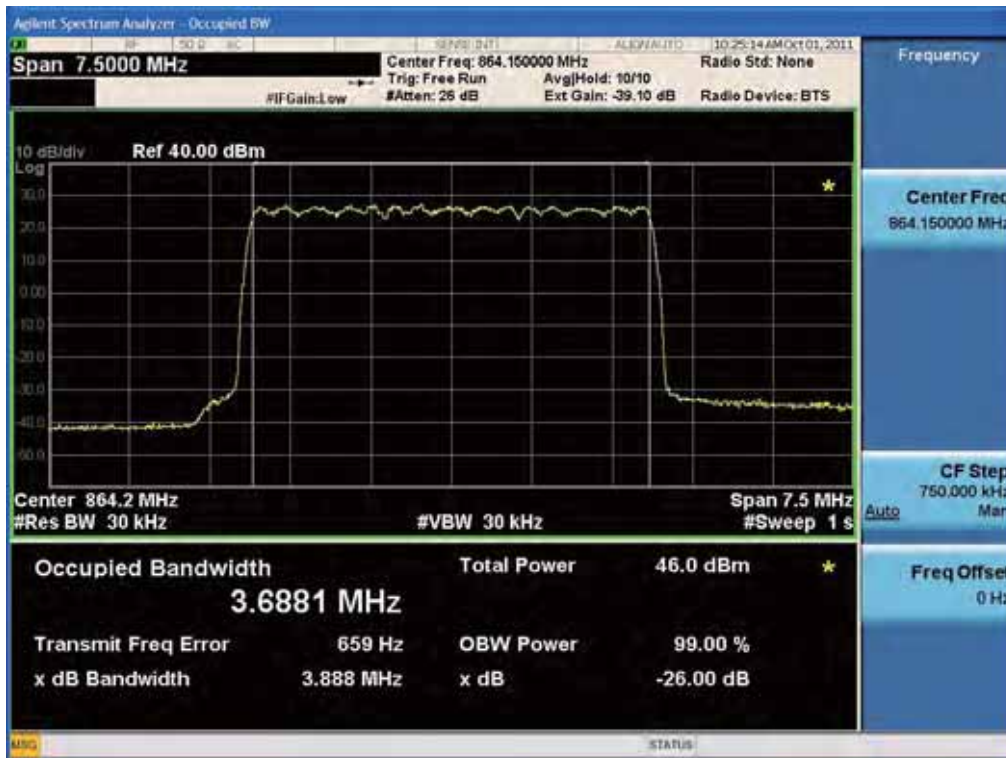
(QPSK High Channel)



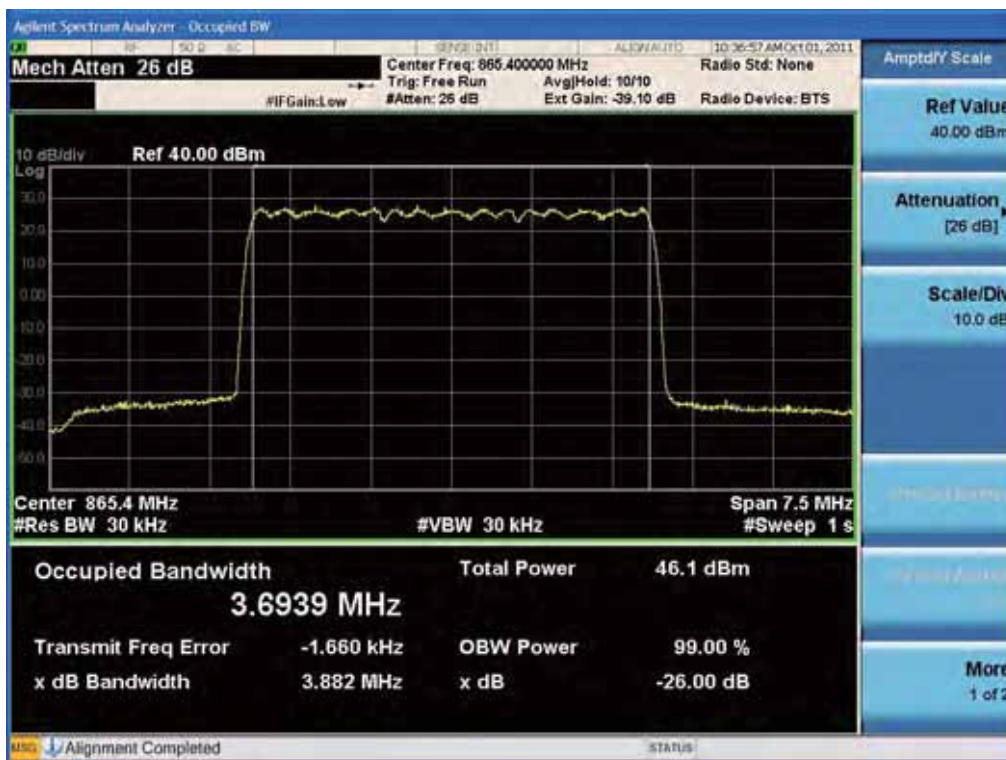
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 63 of 133

6.4.8. Plot Data for 2 Tx mode – 3 Carriers, Output Port 1

(QPSK Low Channel)

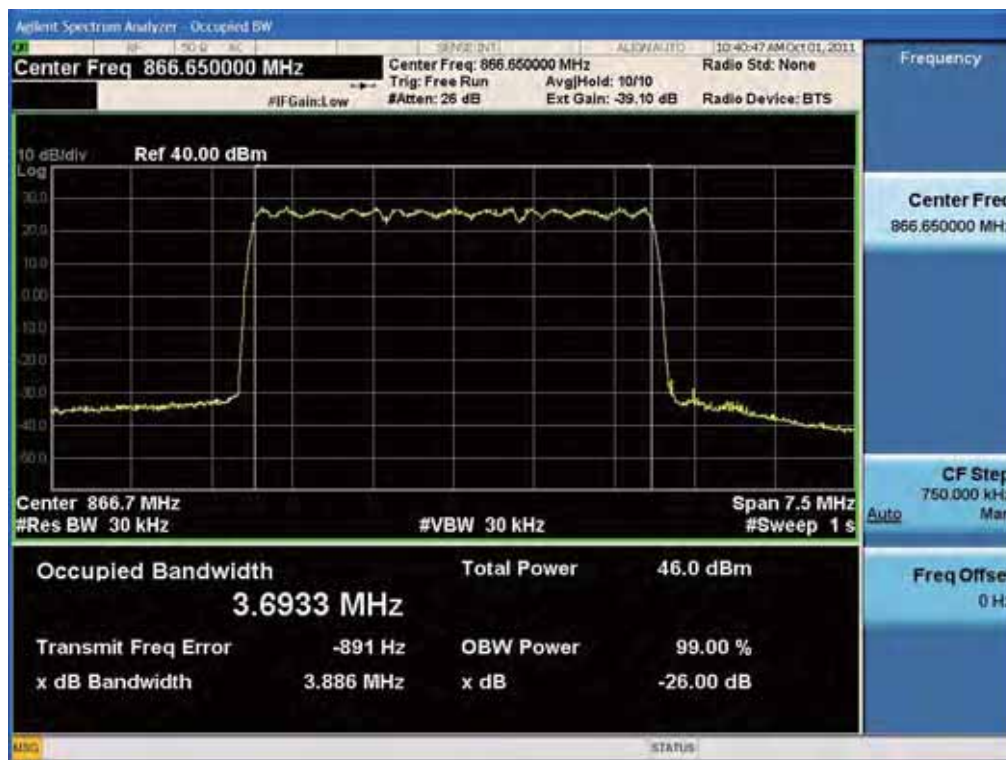


(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 64 of 133

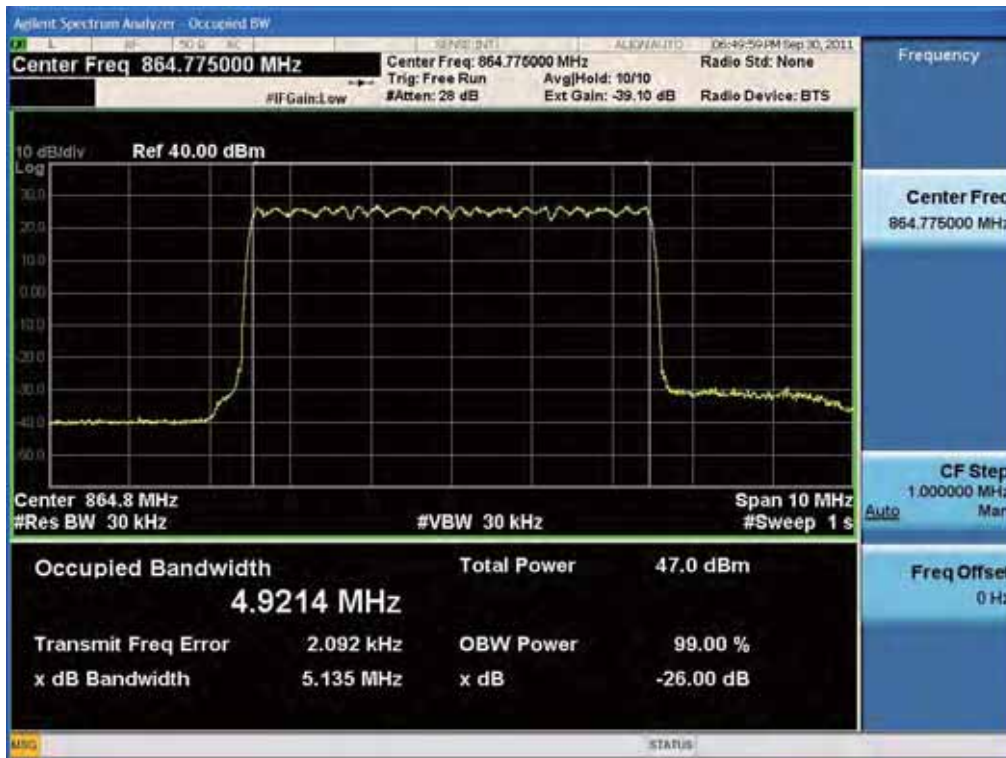
(QPSK High Channel)



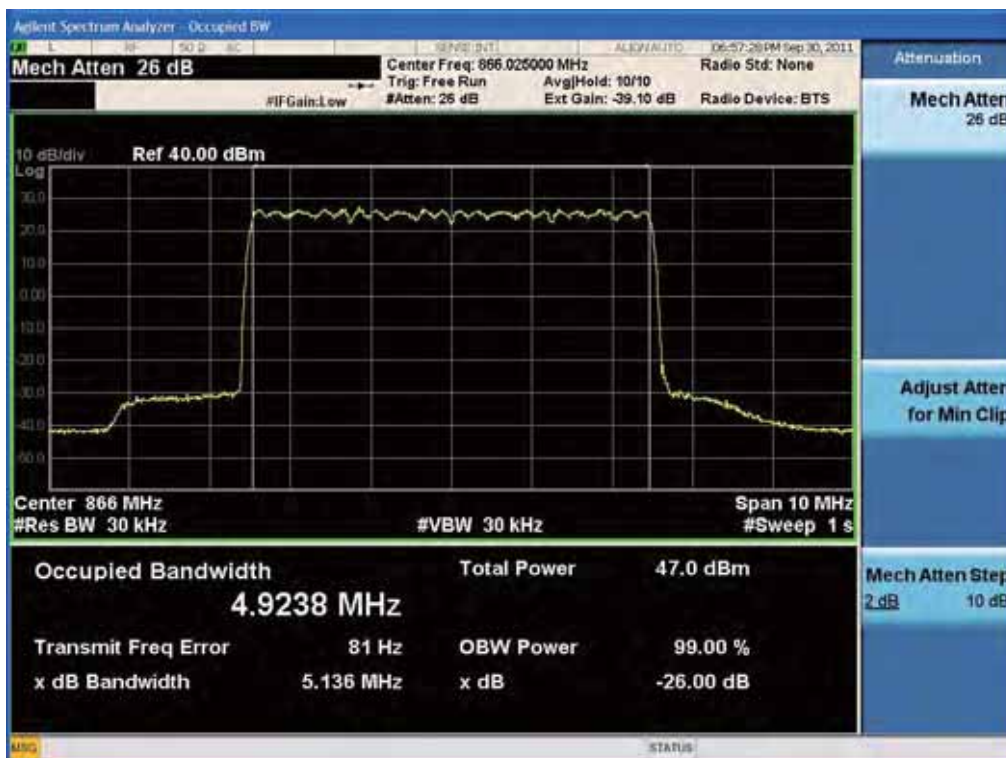
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 65 of 133

6.4.9. Plot Data for 2 Tx mode – 4 Carriers, Output Port 0

(QPSK Low Channel)



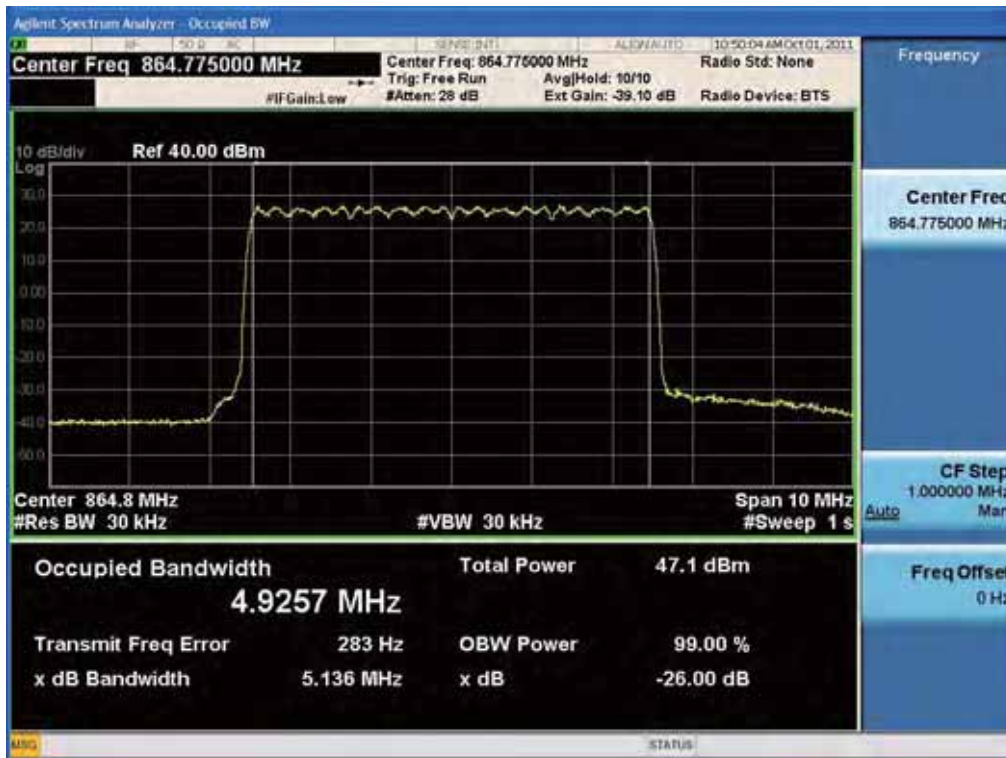
(QPSK High Channel)



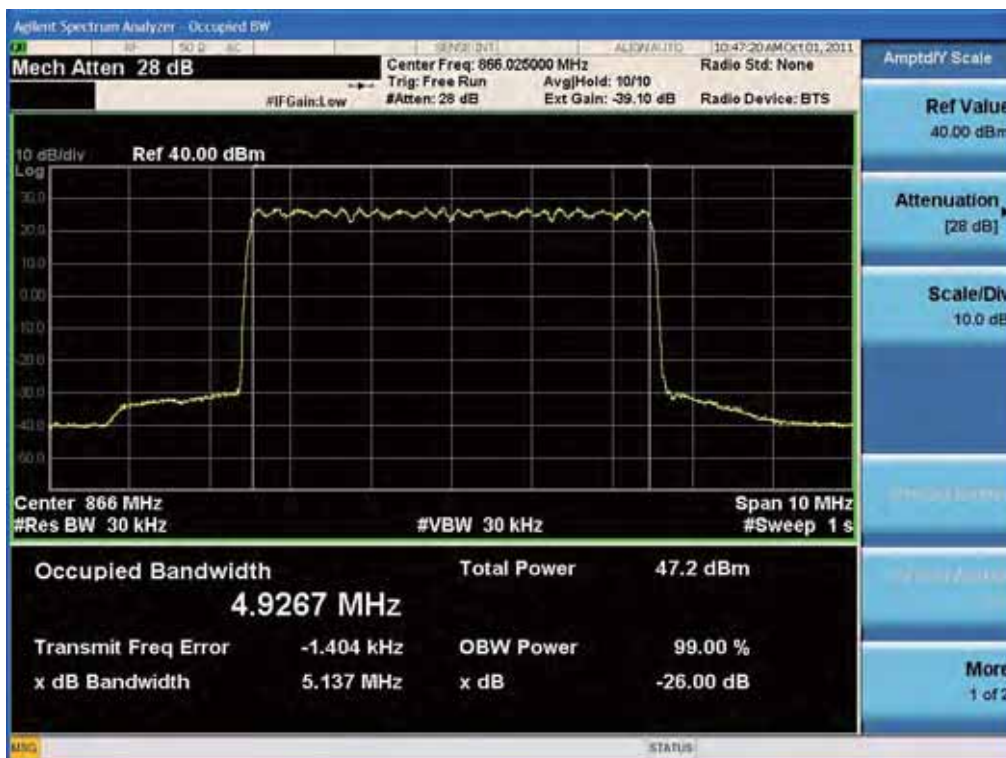
FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 66 of 133

6.4.10. Plot Data for 2 Tx mode – 4 Carriers, Output Port 1

(QPSK Low Channel)



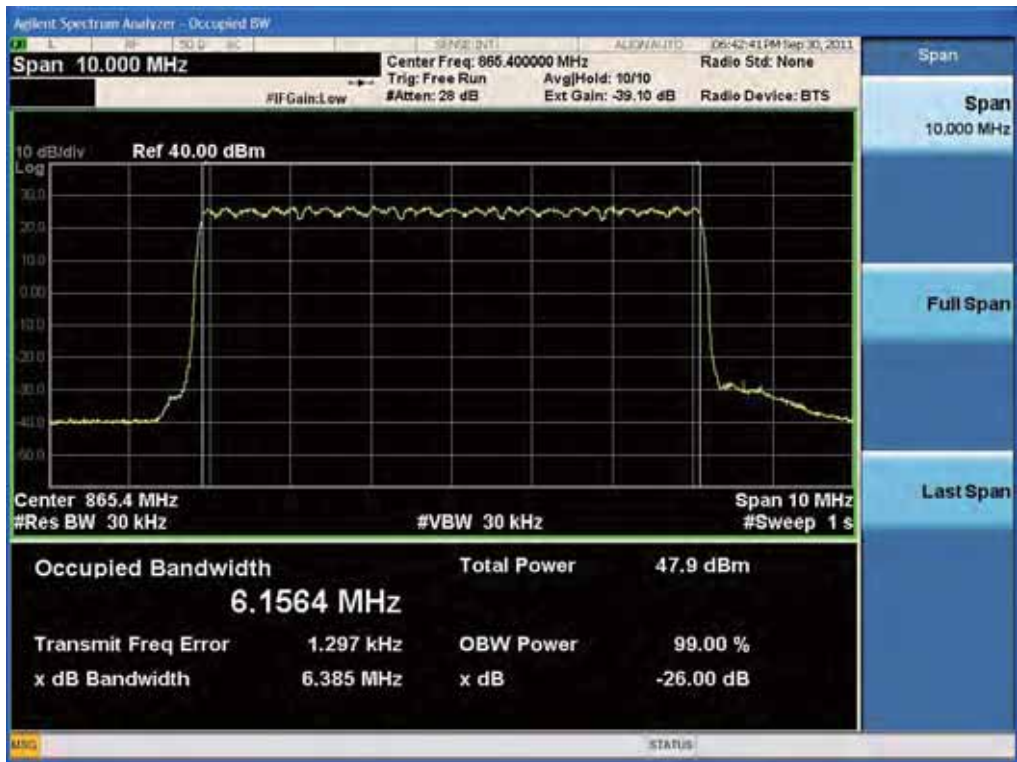
(QPSK High Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 67 of 133

6.4.11. Plot Data for 2 Tx mode – 5 Carriers, Output Port 0

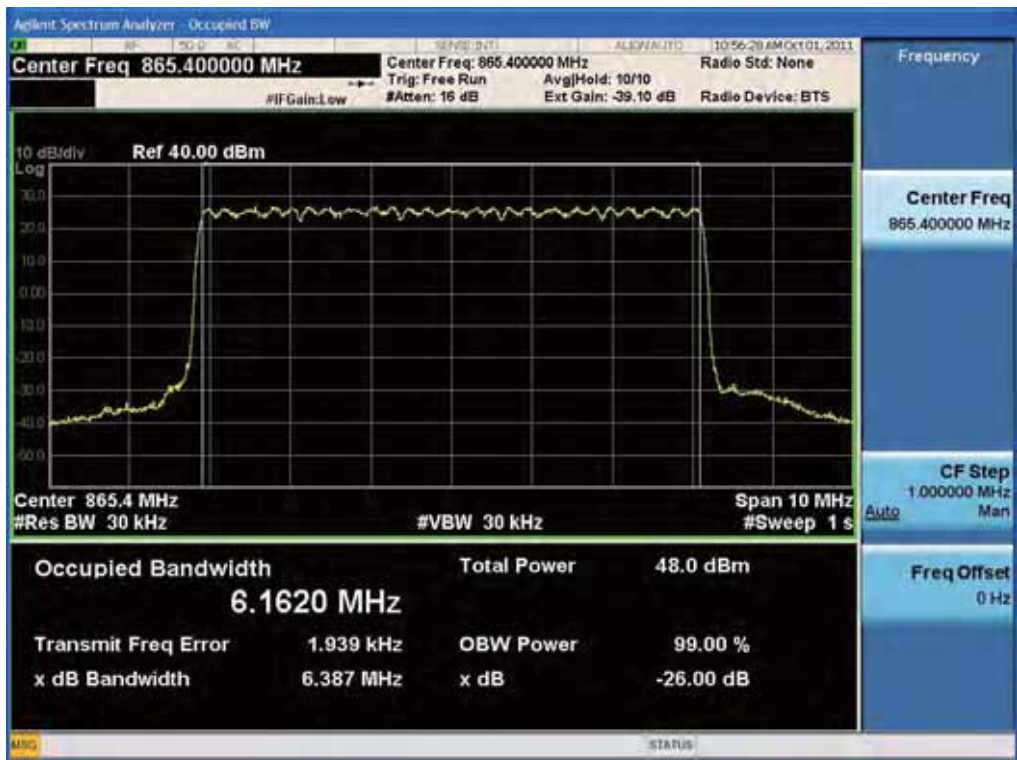
(QPSK Middle Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 68 of 133

6.4.12. Plot Data for 2 Tx mode – 5 Carriers, Output Port 1

(QPSK High Channel)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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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 § 90.691, (a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows: (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz. (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

7.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	06/10/2012
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

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.

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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7.4. Test Result
: Pass

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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7.4.1. Plot Data for 1 Tx mode – 1 Carrier , Output Port 0
(QPSK Low Channel)

(30 MHz ~ 1 GHz)

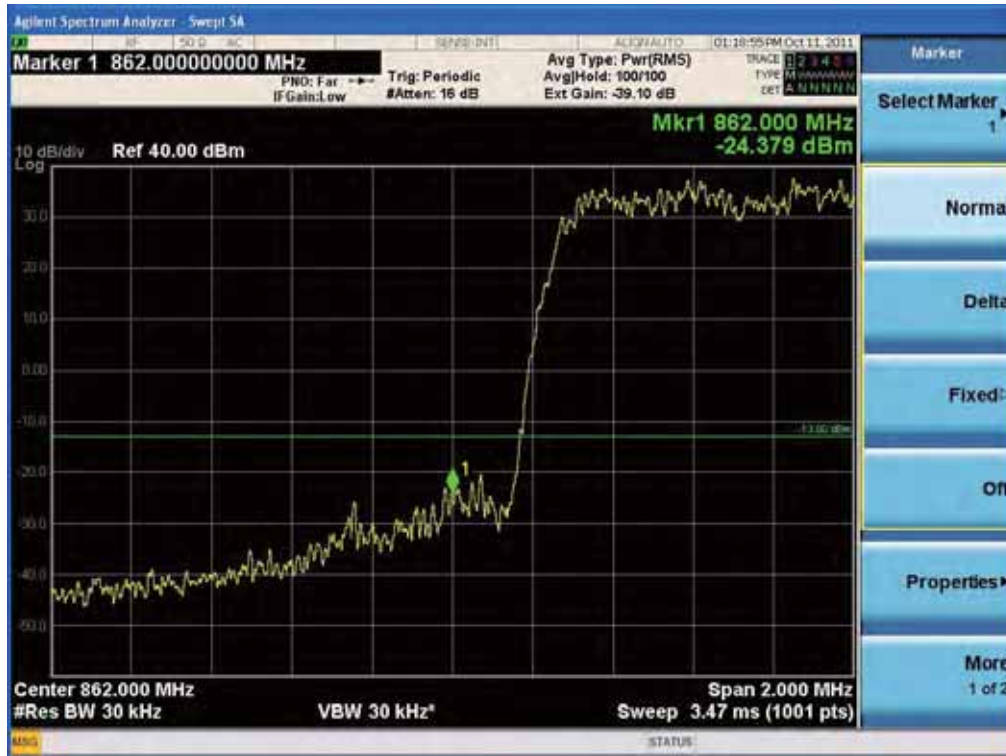


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 72 of 133

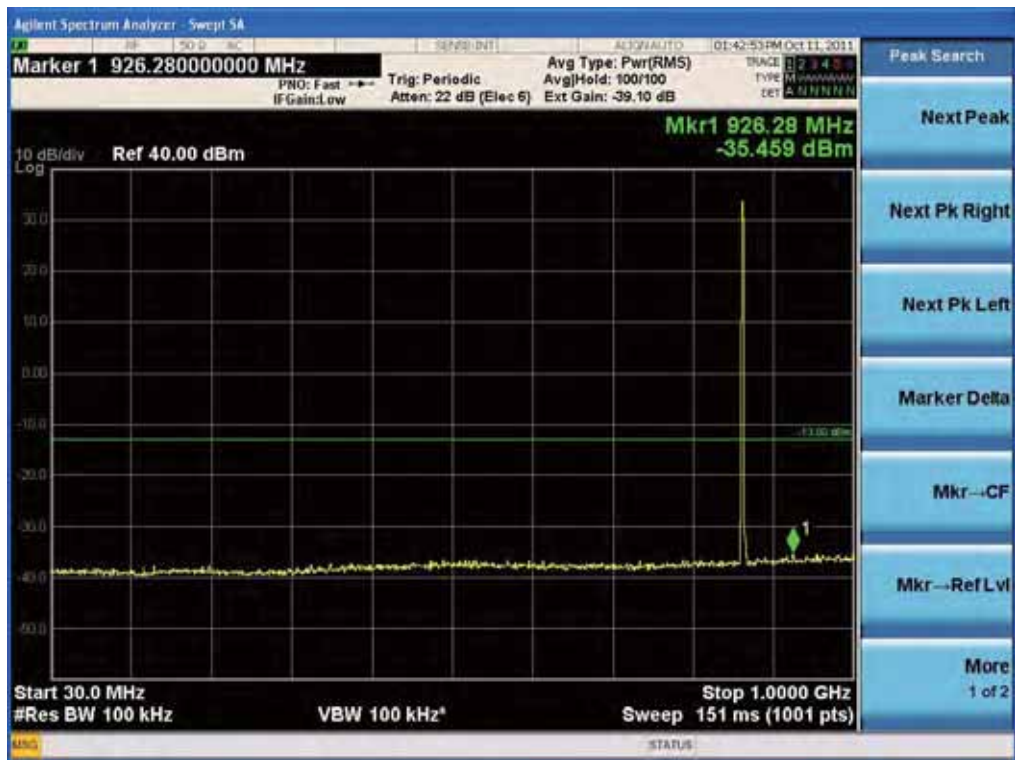
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 73 of 133

(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



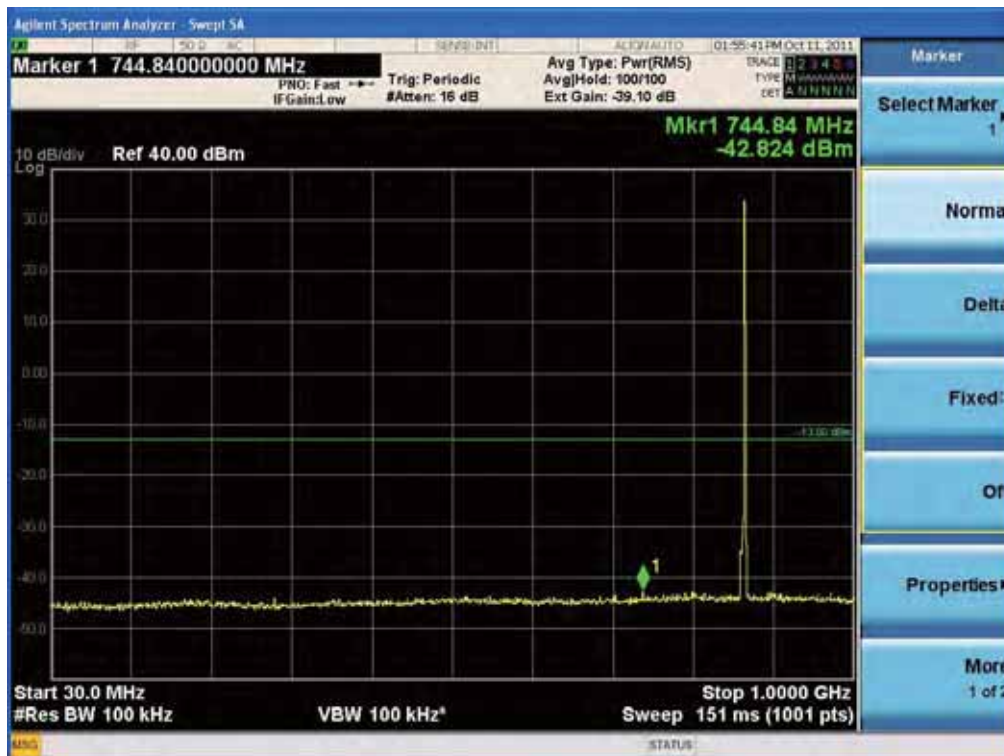
(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 74 of 133

(QPSK High Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 75 of 133

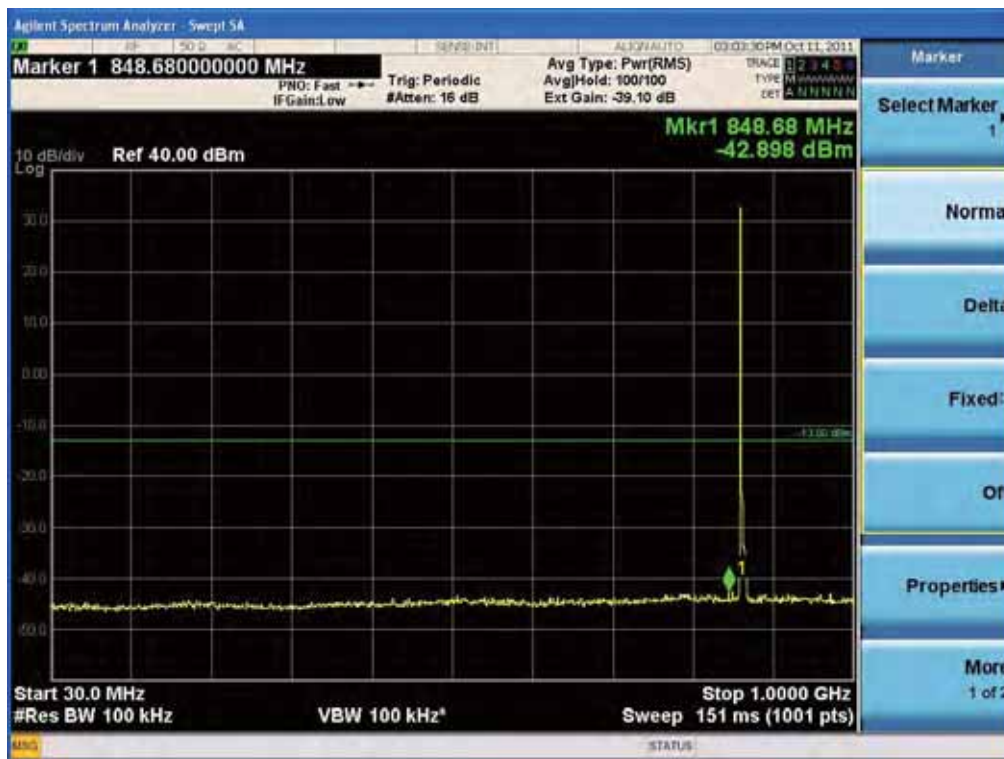
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 76 of 133

7.4.2. Plot Data for 1 Tx mode – 1 Carrier , Output Port 1
(QPSK Low Channel)

(30 MHz ~ 1 GHz)

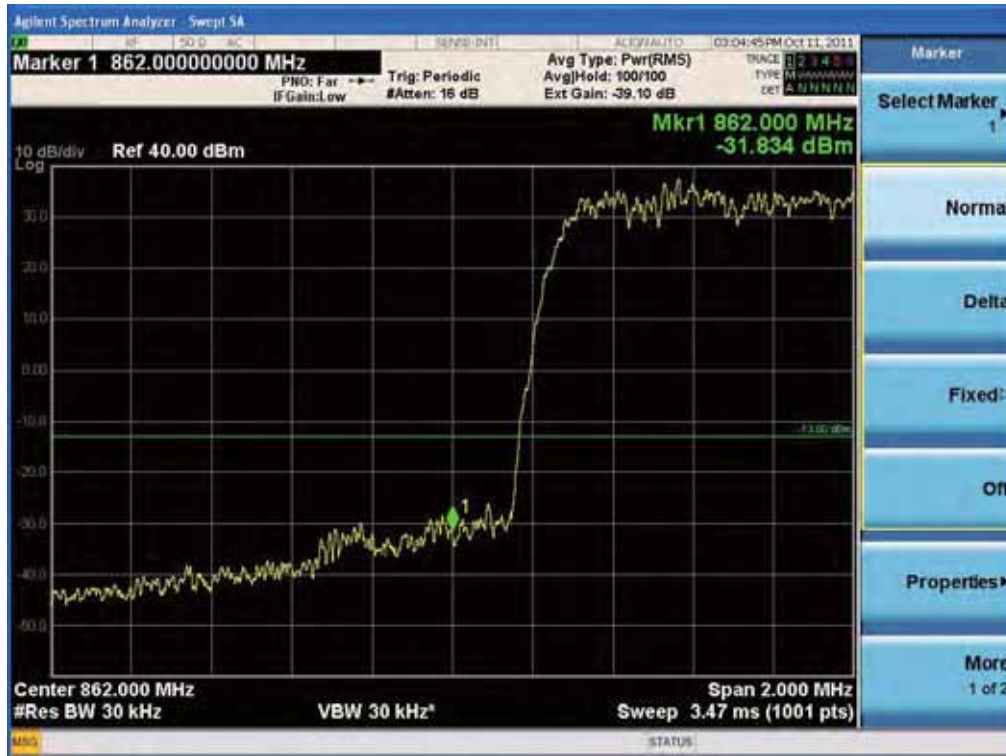


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 77 of 133

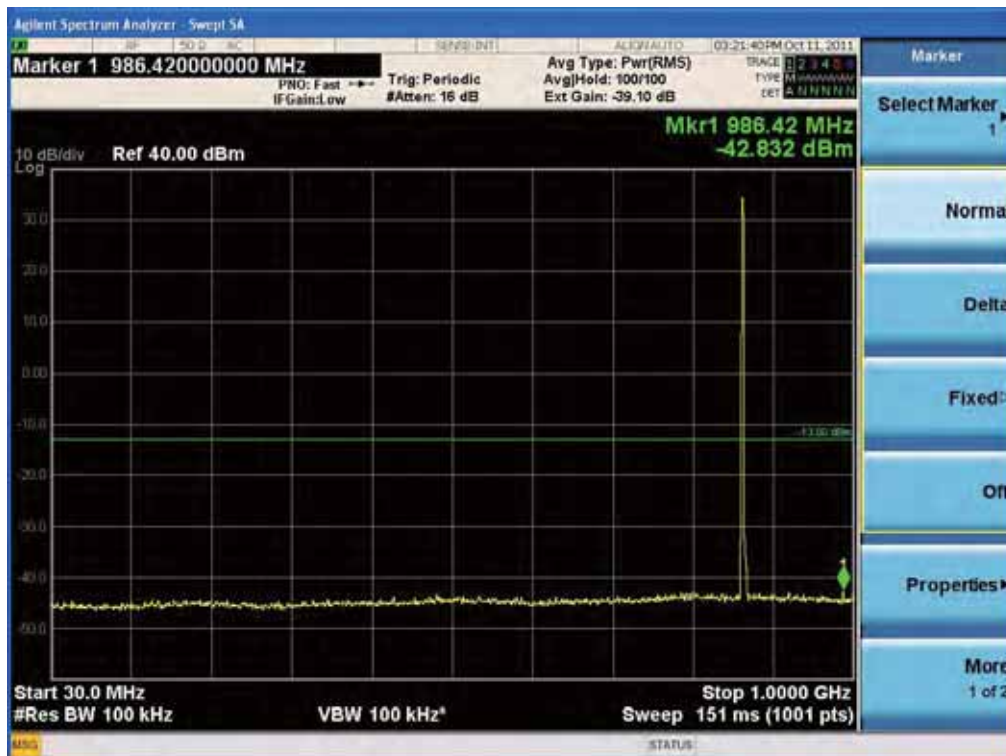
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 78 of 133

(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



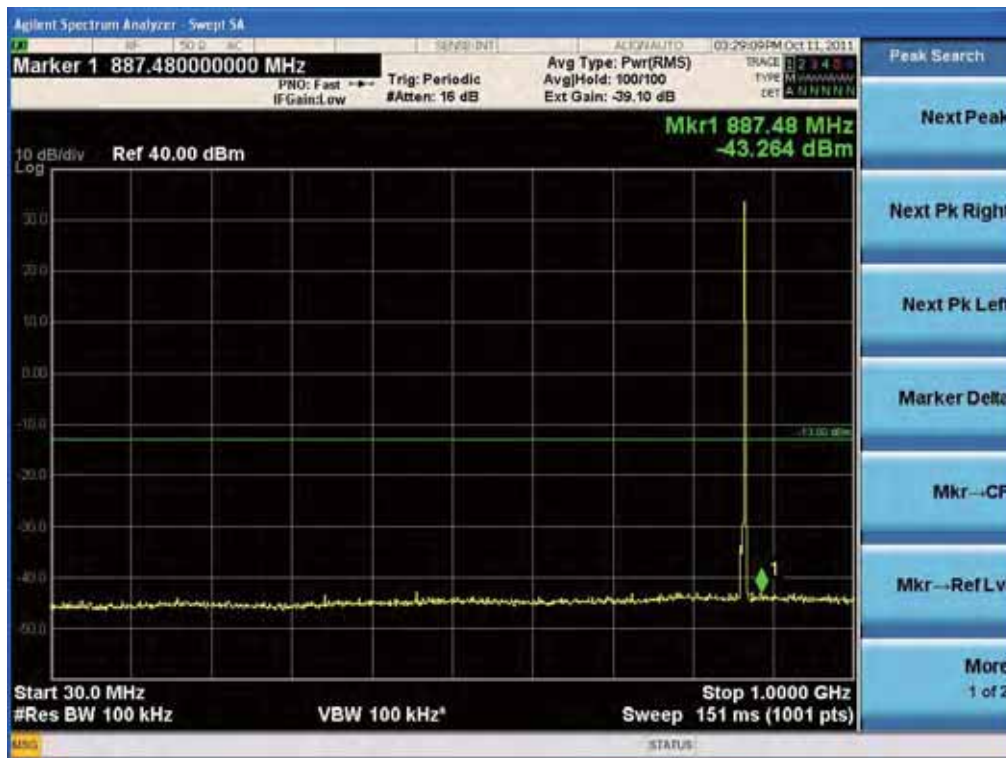
(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 79 of 133

(QPSK High Channel)

(30 MHz ~ 1 GHz)

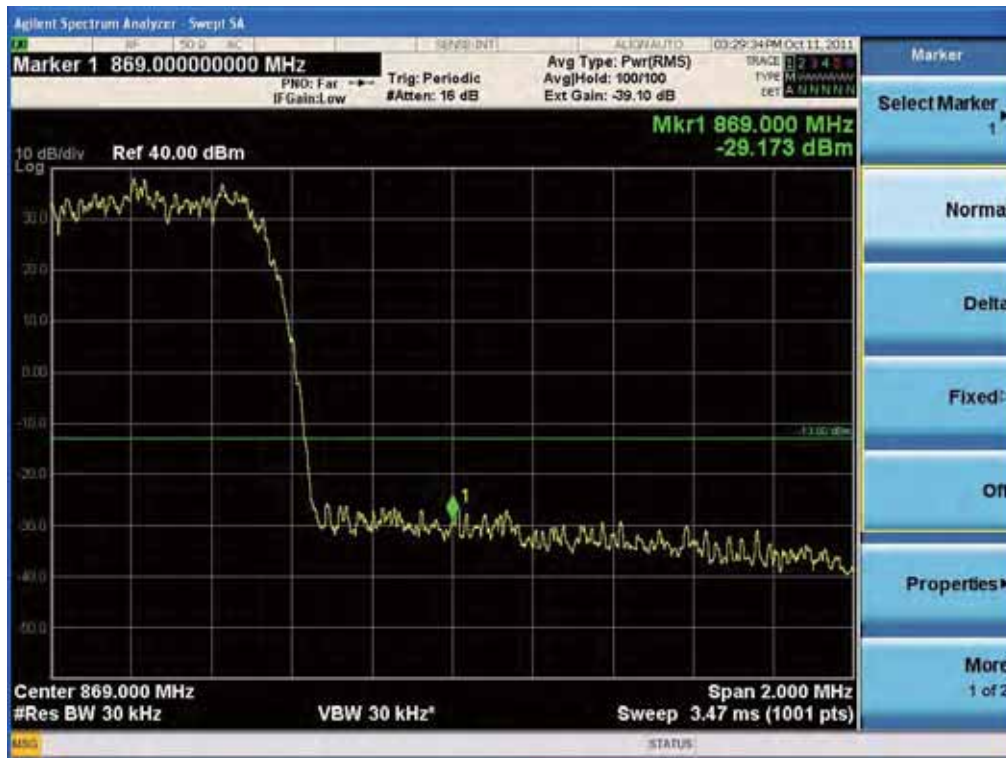


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 80 of 133

(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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7.4.3. Plot Data for 2 Tx mode – 1 Carrier, Output Port 0
(QPSK Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 82 of 133

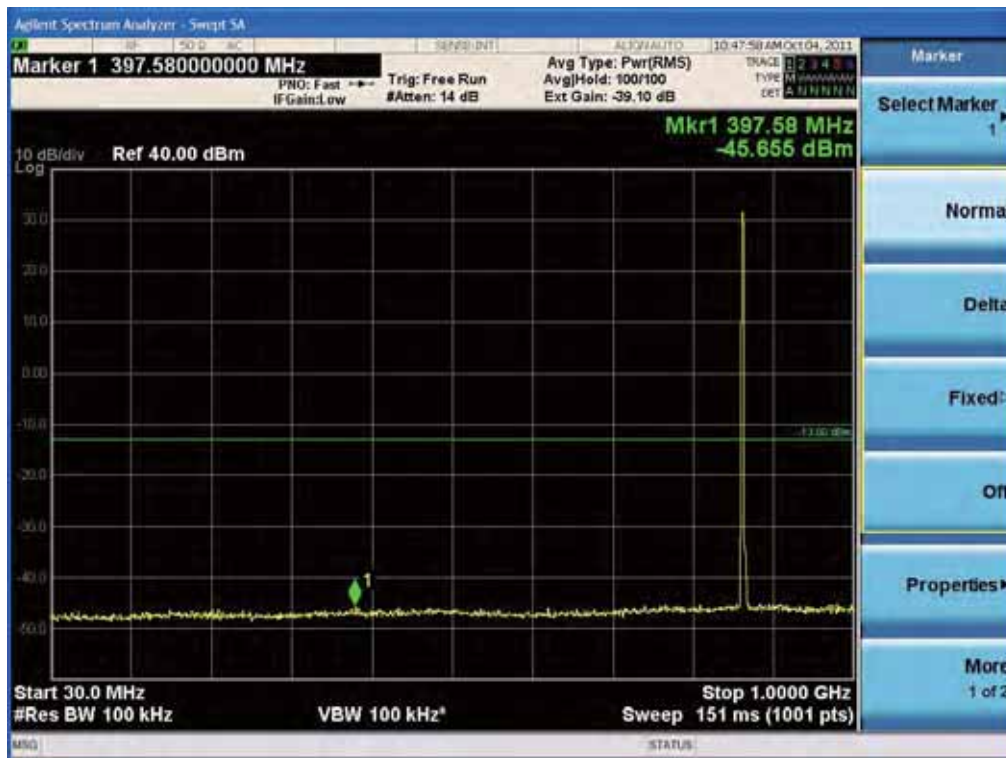
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 83 of 133

(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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(QPSK High Channel)

(30 MHz ~ 1 GHz)

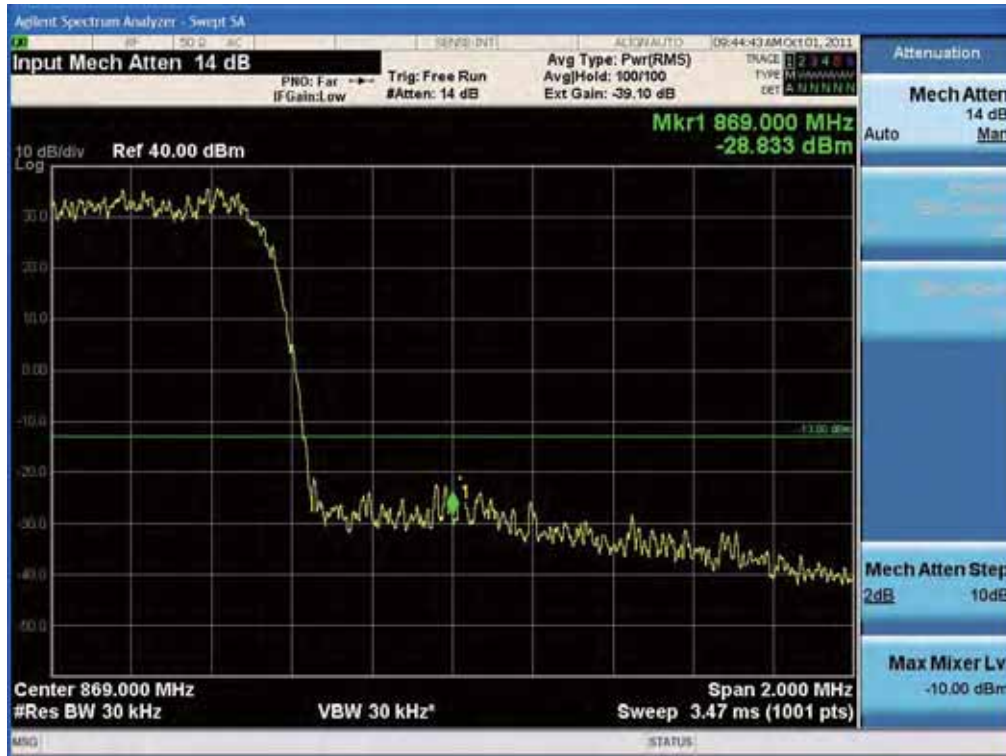


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 85 of 133

(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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7.4.4. Plot Data for 2 Tx mode – 1 Carrier, Output Port 1
(QPSK Low Channel)

(30 MHz ~ 1 GHz)

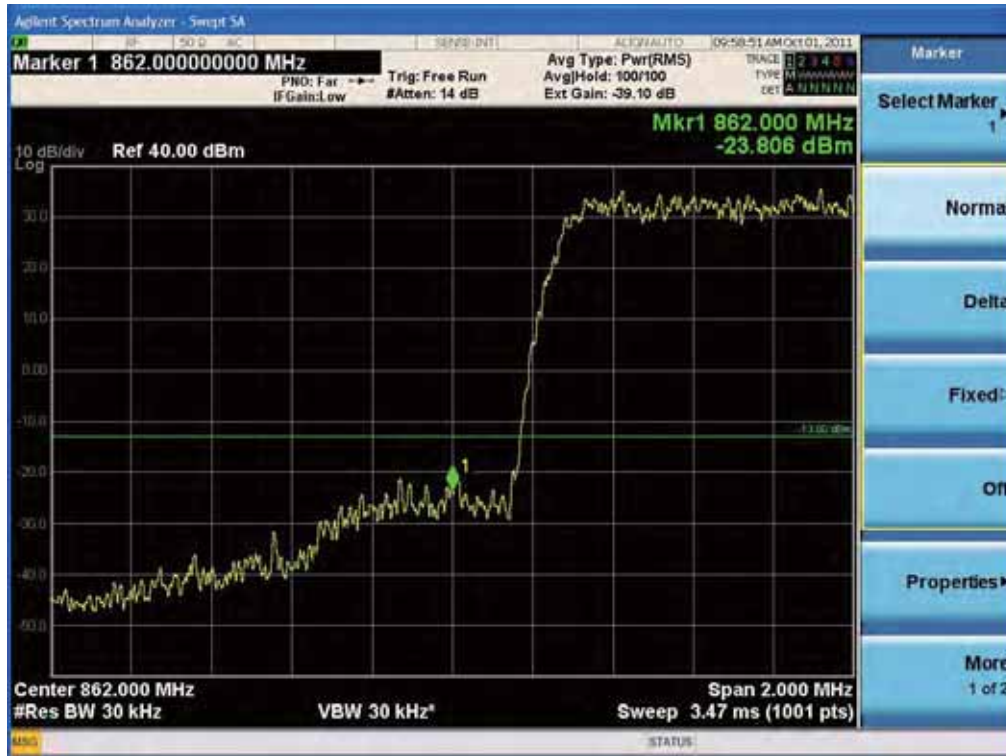


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 87 of 133

(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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(QPSK High Channel)

(30 MHz ~ 1 GHz)

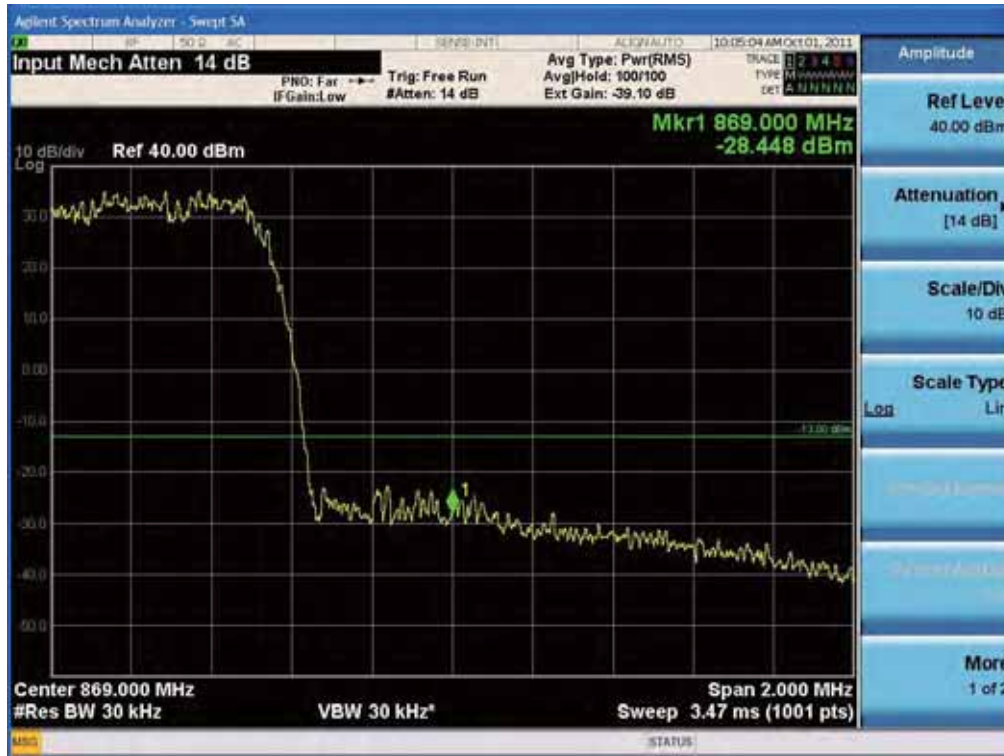


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 90 of 133

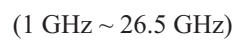
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 91 of 133

(QPSK Low Channel)

(30 MHz $\sim$ 1 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3I SMM-2CR0480800	Page 92 of 133

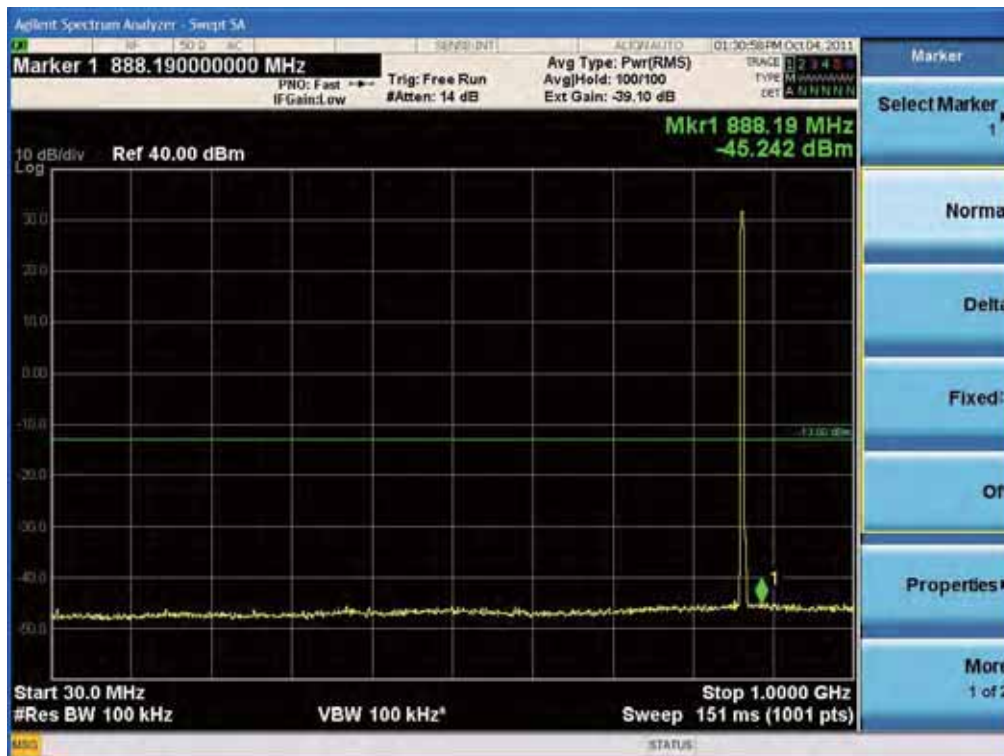
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 93 of 133

(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



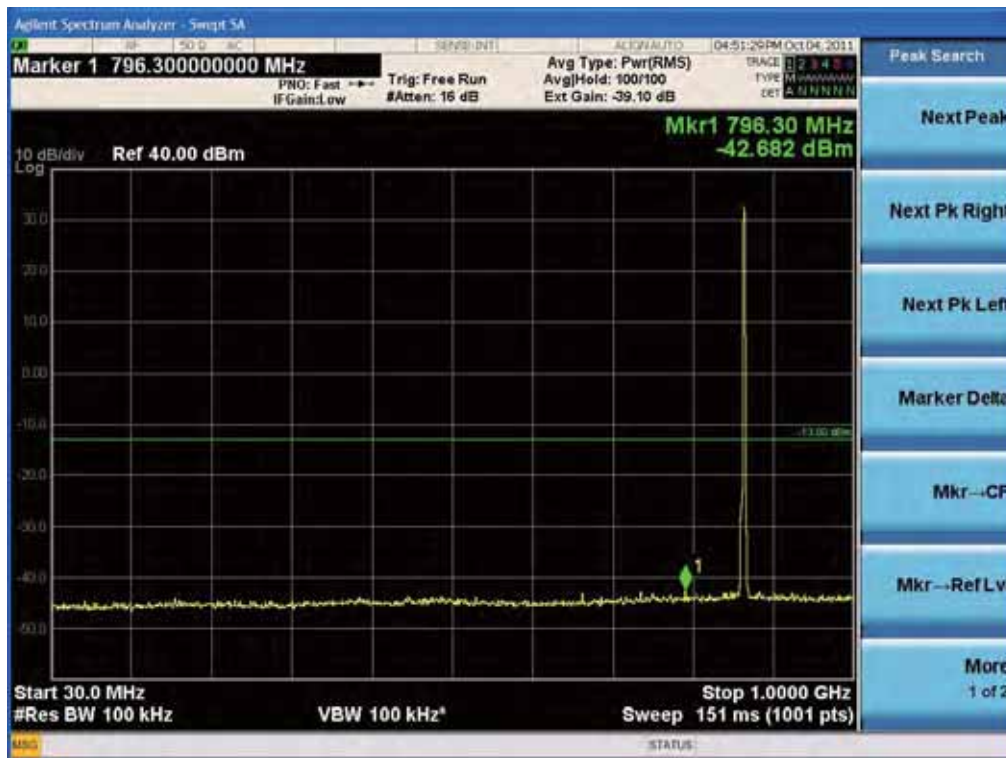
(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 94 of 133

(QPSK High Channel)

(30 MHz ~ 1 GHz)

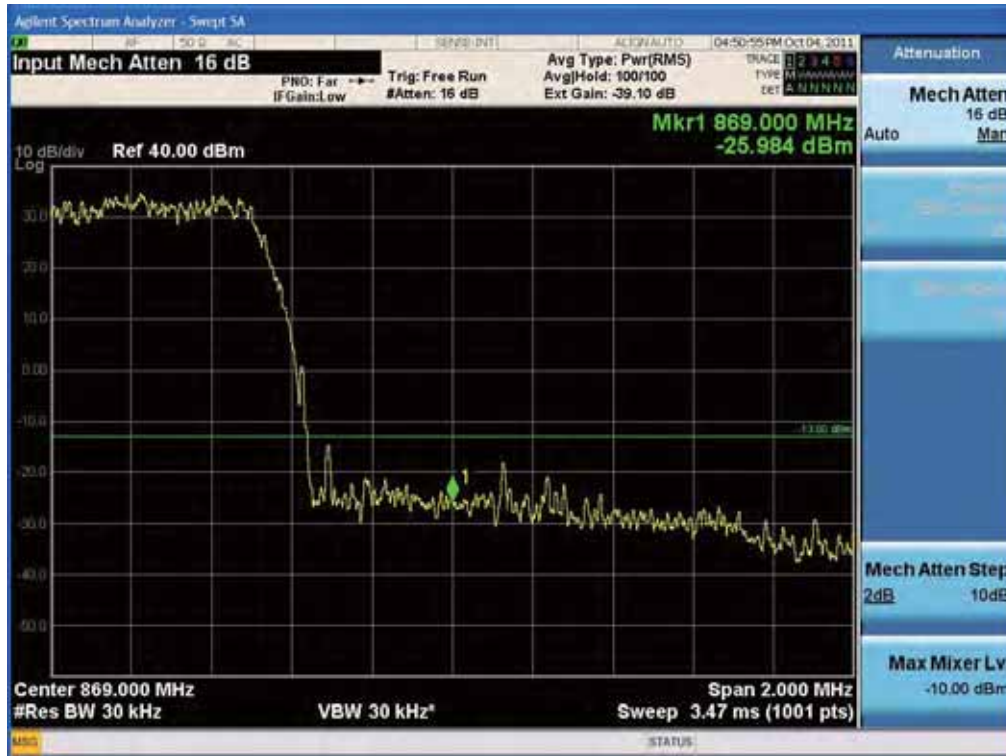


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 95 of 133

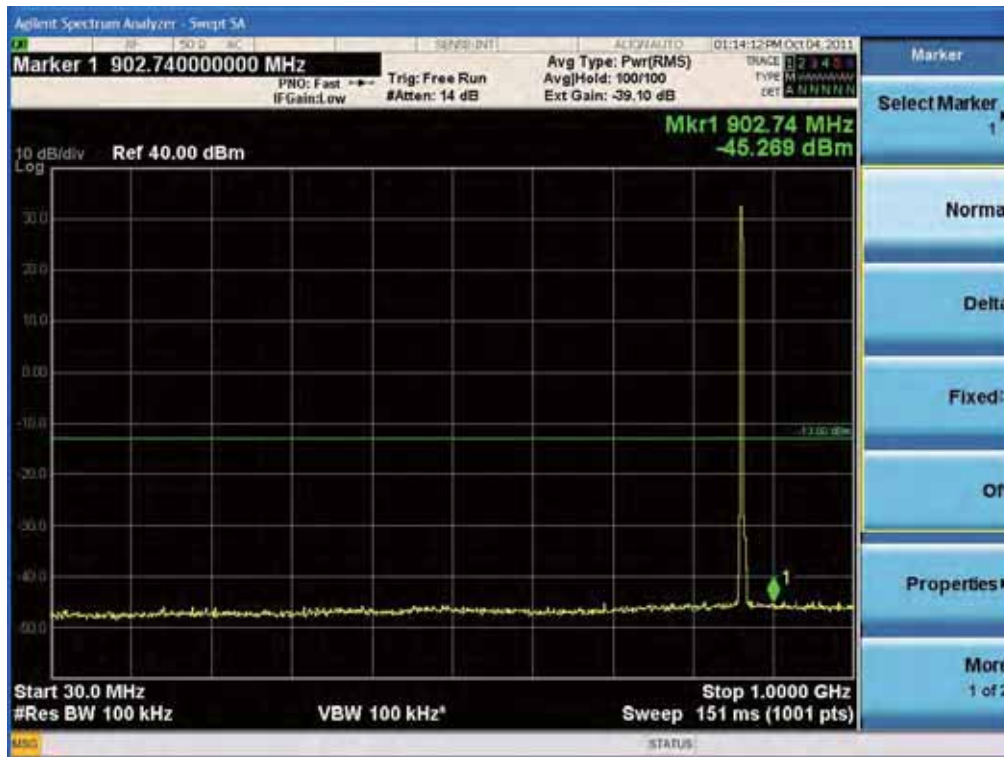
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 96 of 133

(QPSK Low Channel)

(30 MHz $\sim$ 1 GHz)

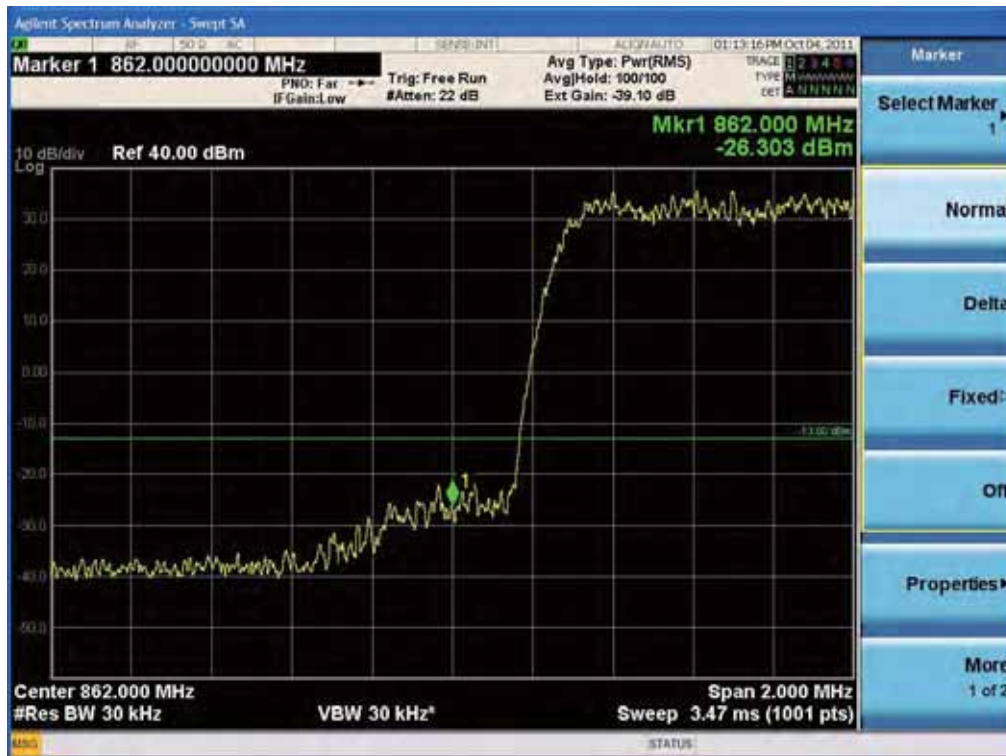


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3I SMM-2CR0480800	Page 97 of 133

(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 99 of 133

(QPSK High Channel)

(30 MHz ~ 1 GHz)

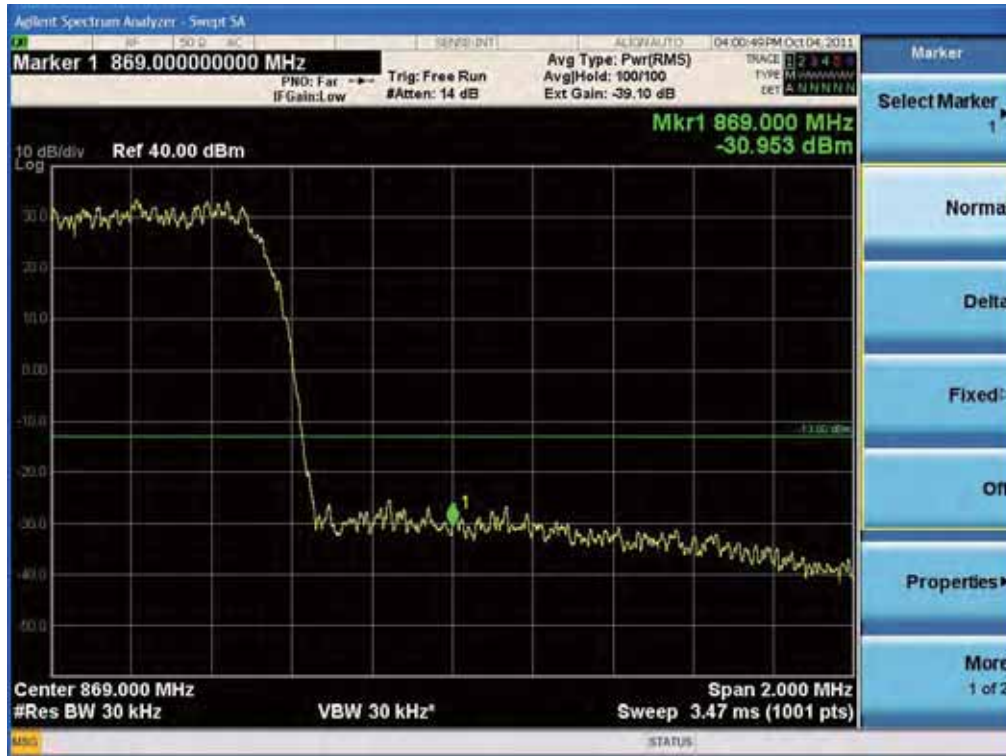


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 100 of 133

(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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7.4.7. Plot Data for 2 Tx mode – 3 Carriers, Output Port 0
(QPSK Low Channel)

(30 MHz ~ 1 GHz)

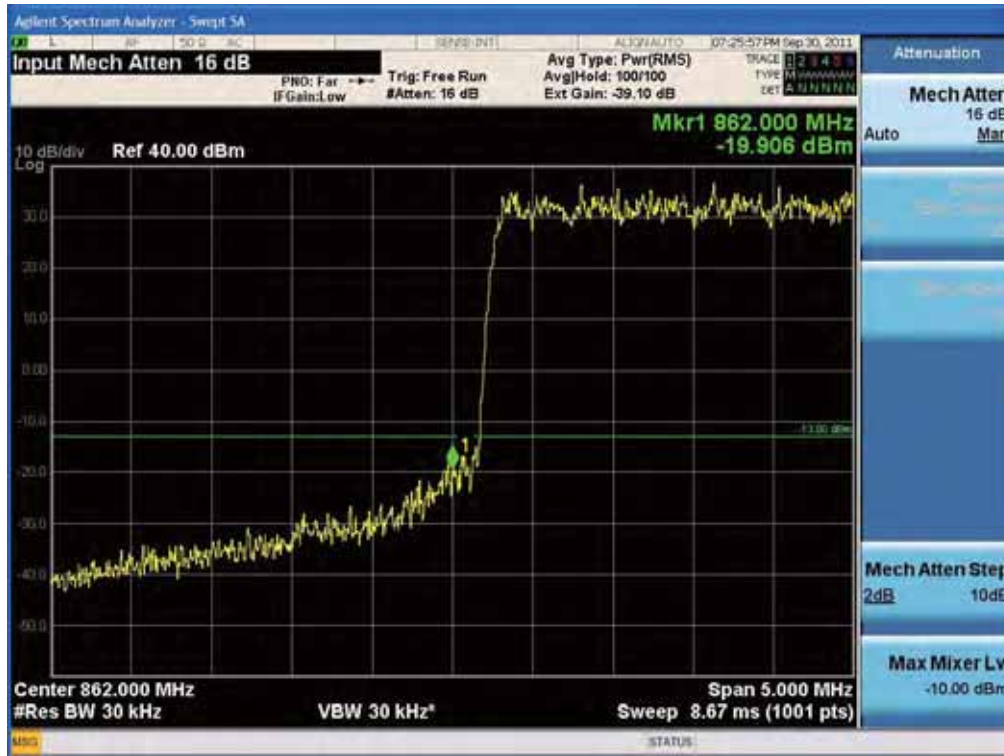


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 102 of 133

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FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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(QPSK High Channel)

(30 MHz ~ 1 GHz)

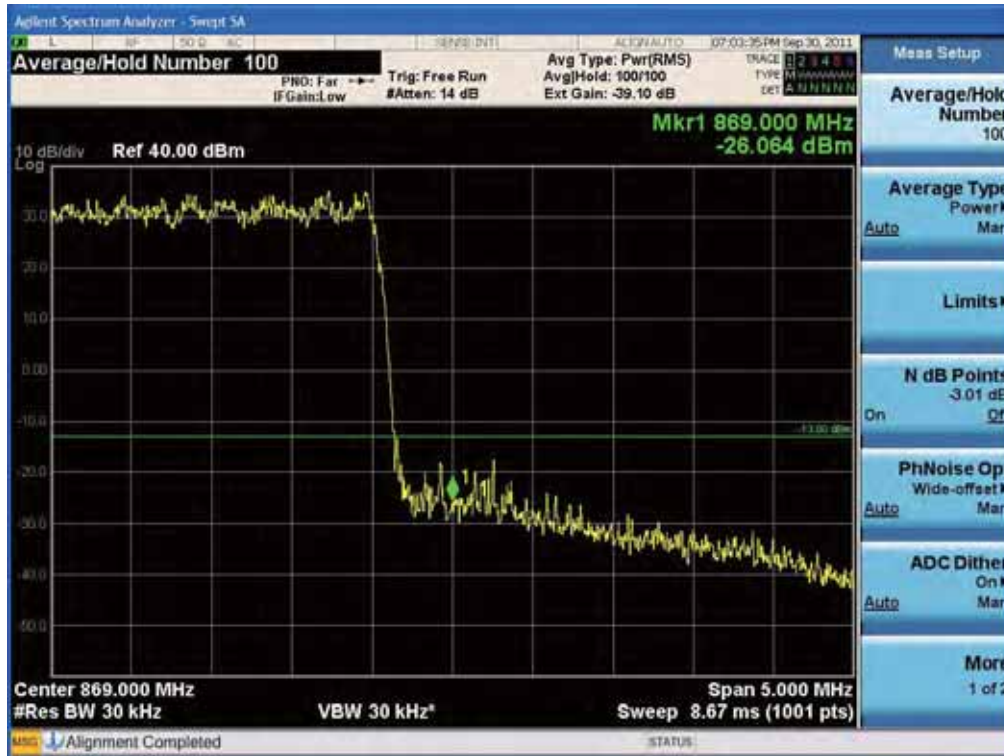


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 105 of 133

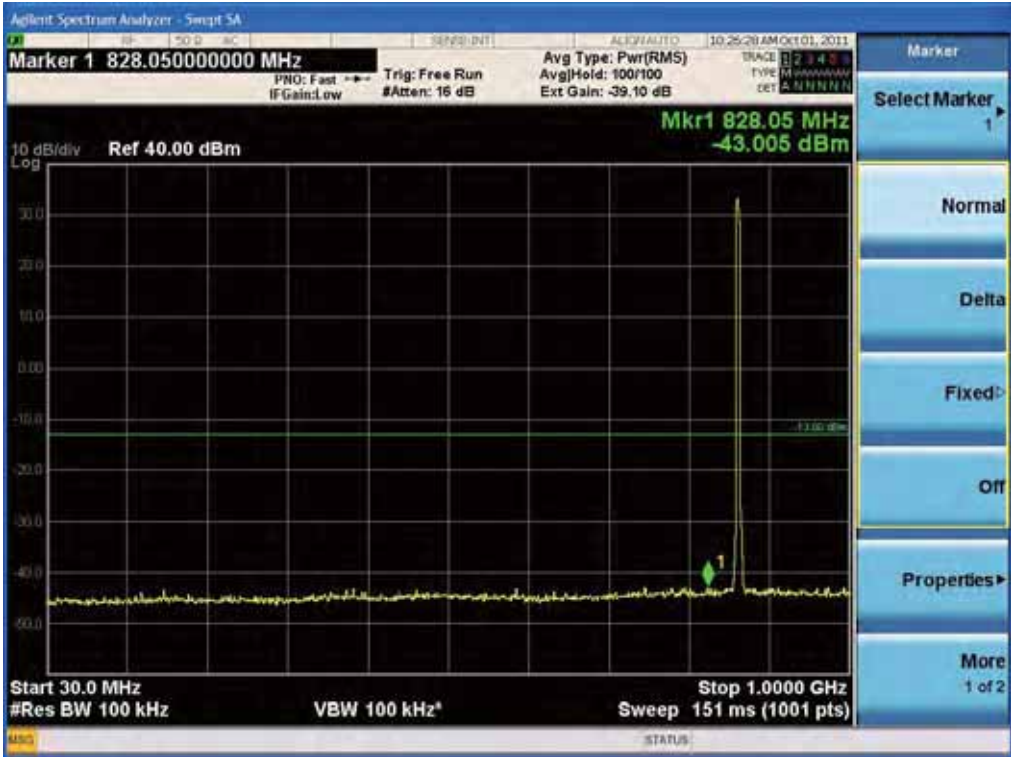
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 106 of 133

7.4.8. Plot Data for 2 Tx mode – 3 Carriers, Output Port 1
(QPSK Low Channel)

(30 MHz ~ 1 GHz)

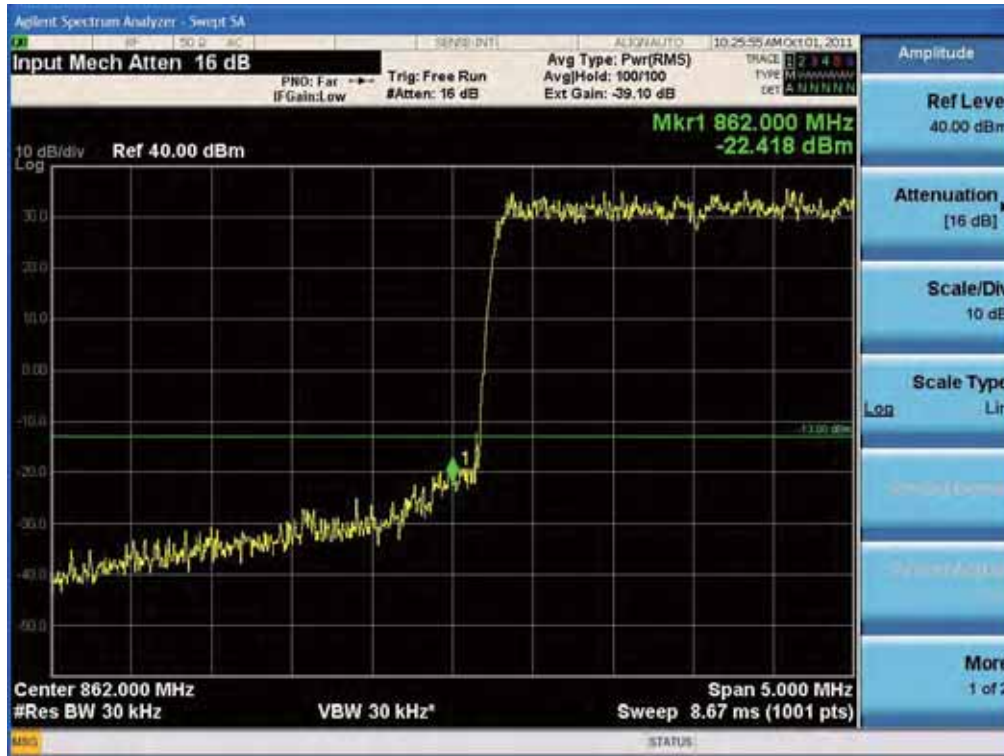


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 107 of 133

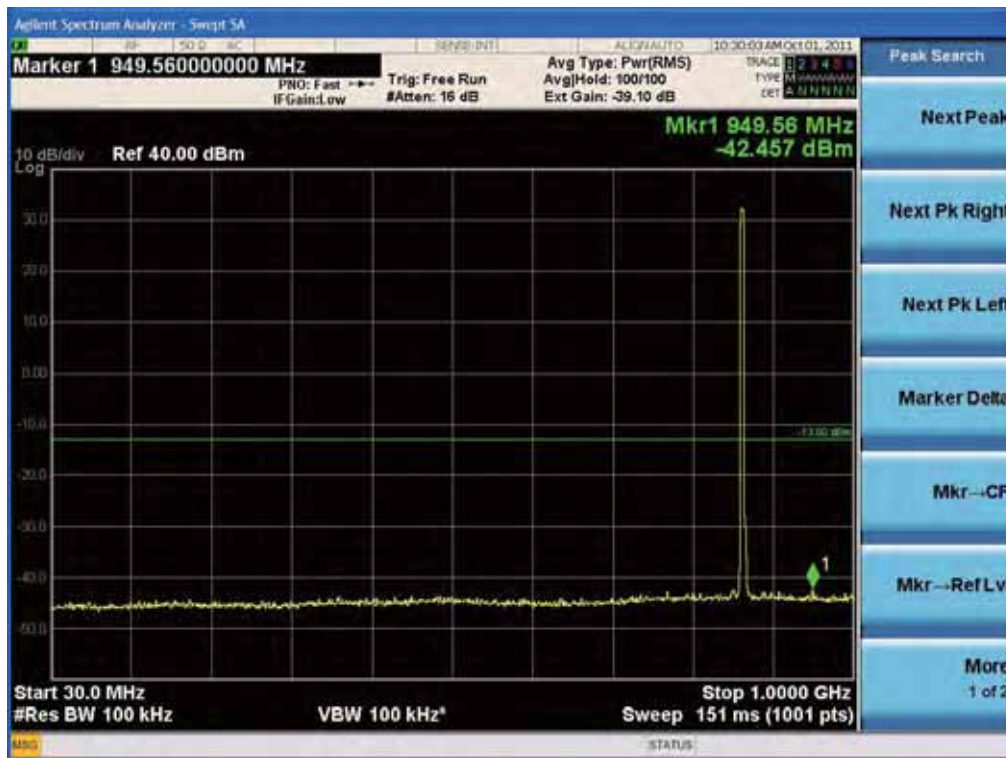
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 108 of 133

(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



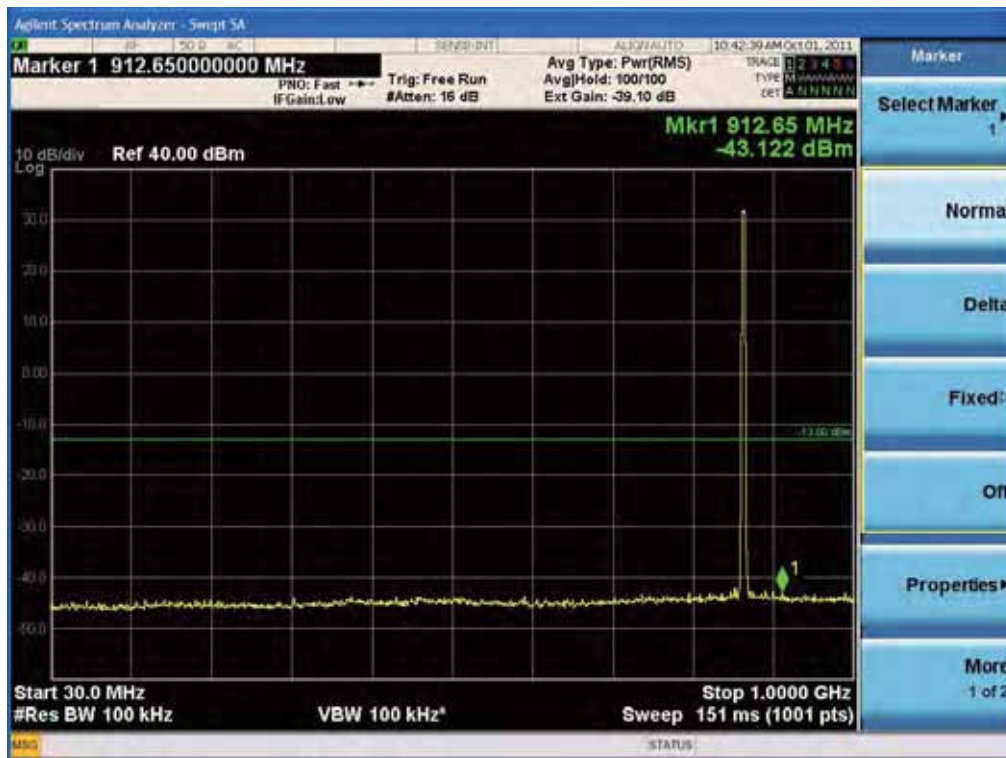
(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 109 of 133

(QPSK High Channel)

(30 MHz ~ 1 GHz)

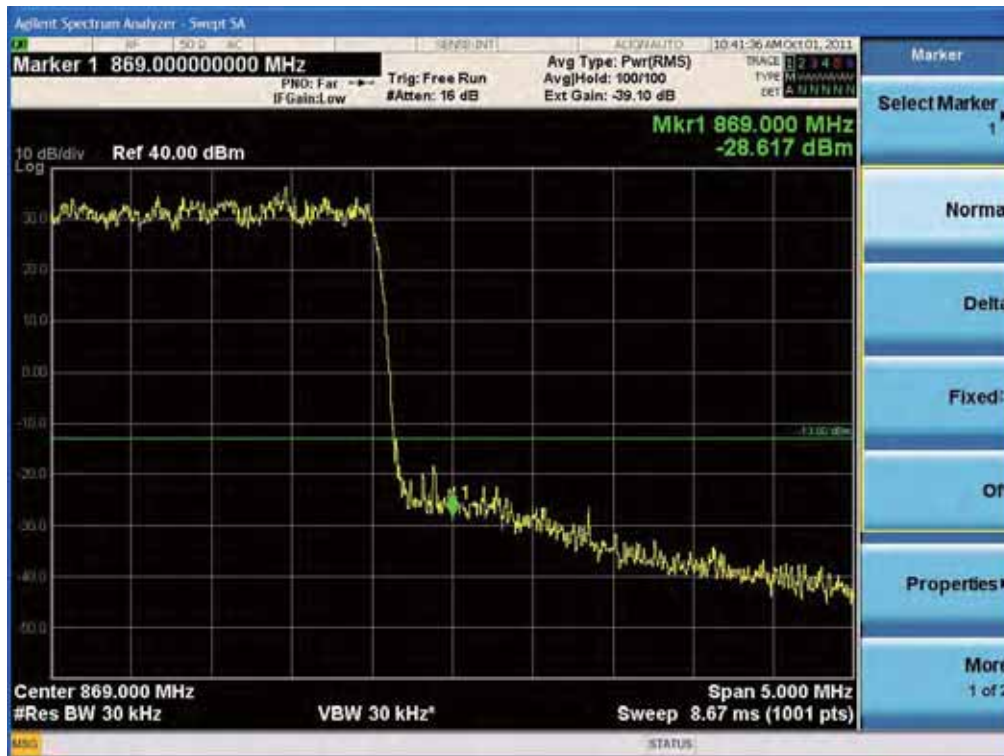


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 110 of 133

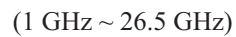
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 111 of 133

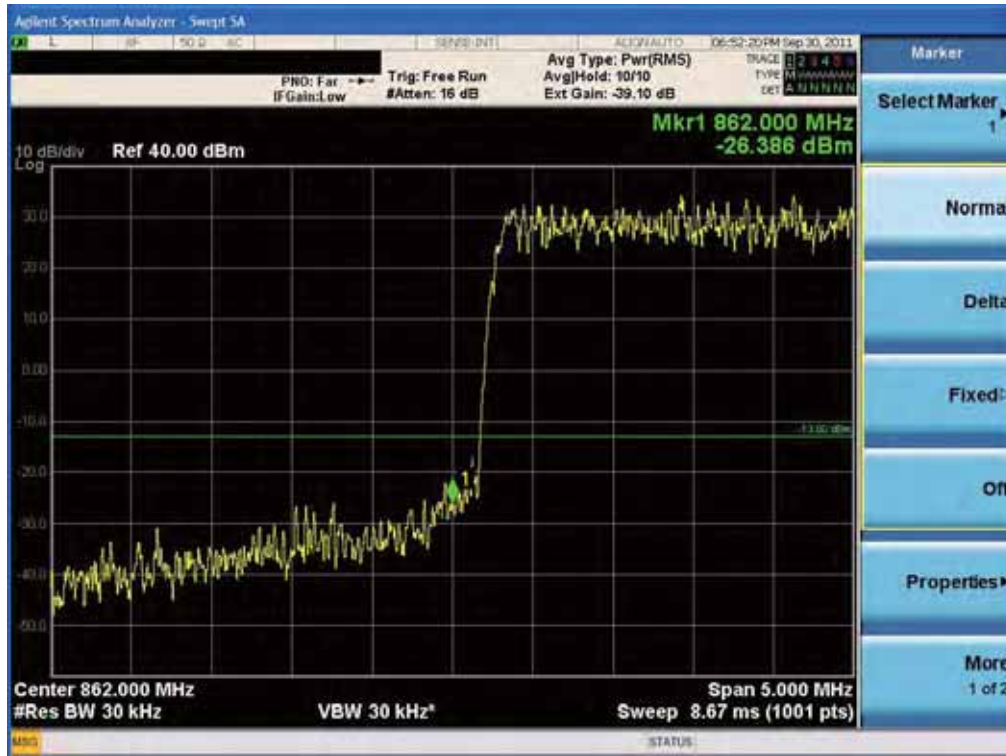
(QPSK Low Channel)

(30 MHz $\sim$ 1 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3I SMM-2CR0480800	Page 112 of 133

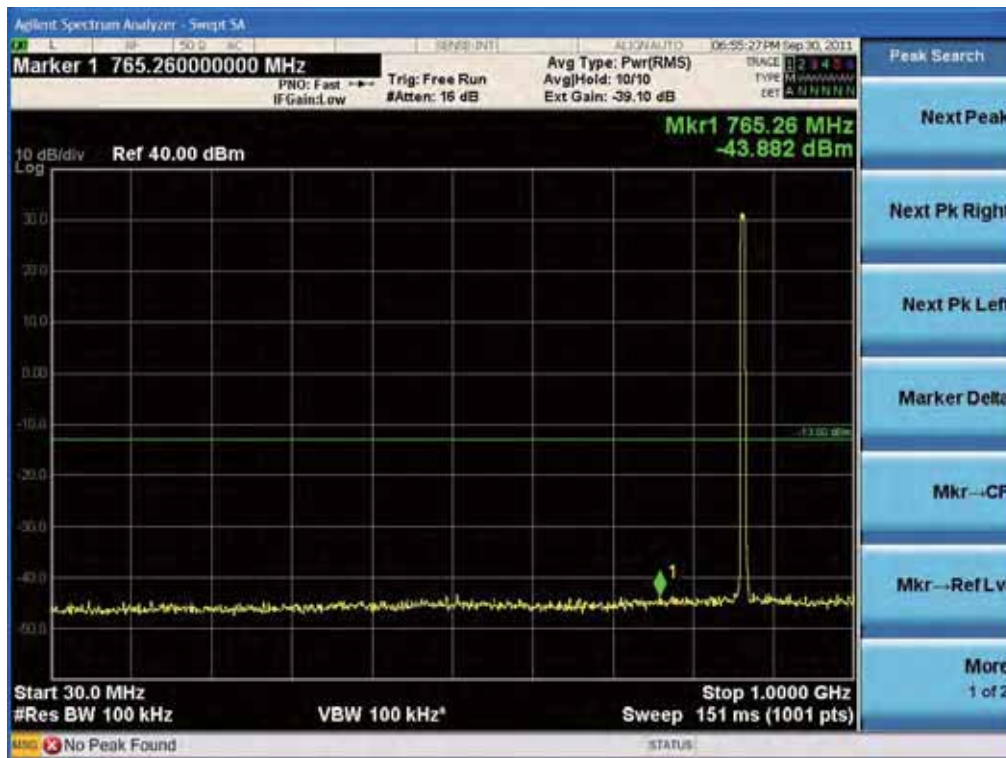
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 113 of 133

(QPSK High Channel)

(30 MHz ~ 1 GHz)

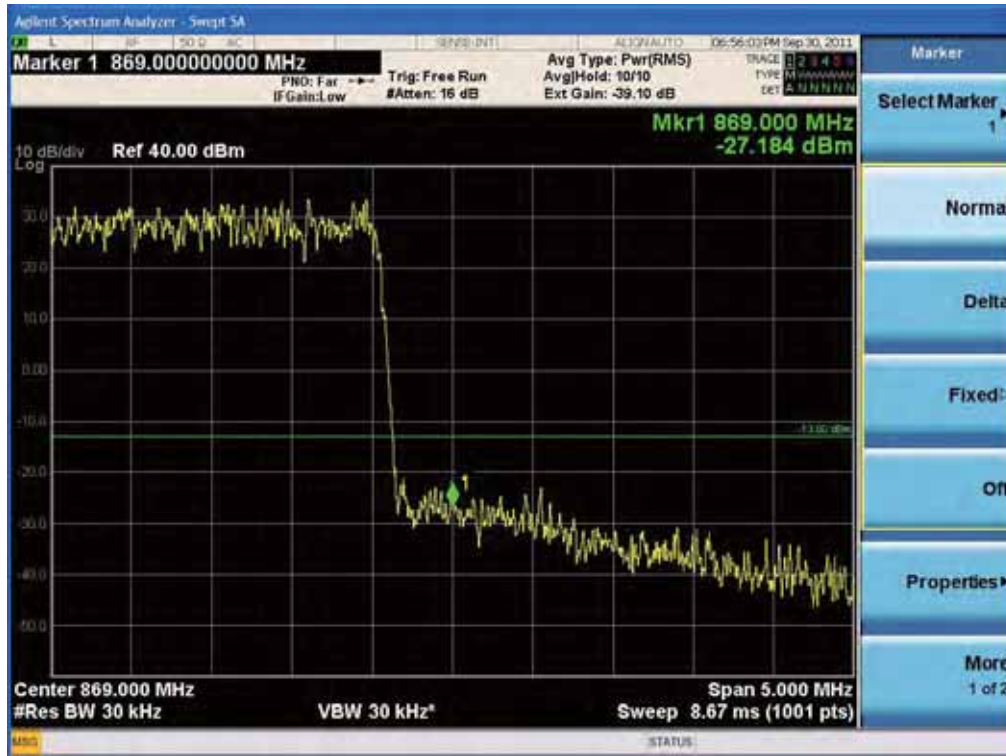


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 114 of 133

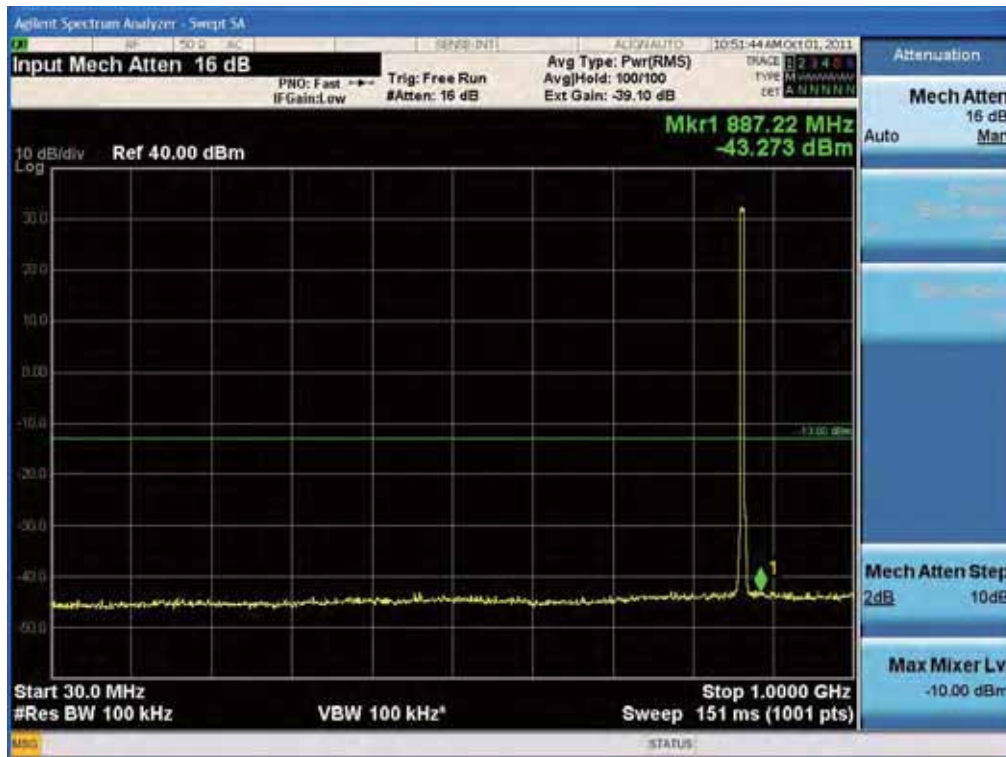
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 115 of 133

7.4.10. Plot Data for 2 Tx mode – 4 Carriers, Output Port 1
(QPSK Low Channel)

(30 MHz ~ 1 GHz)

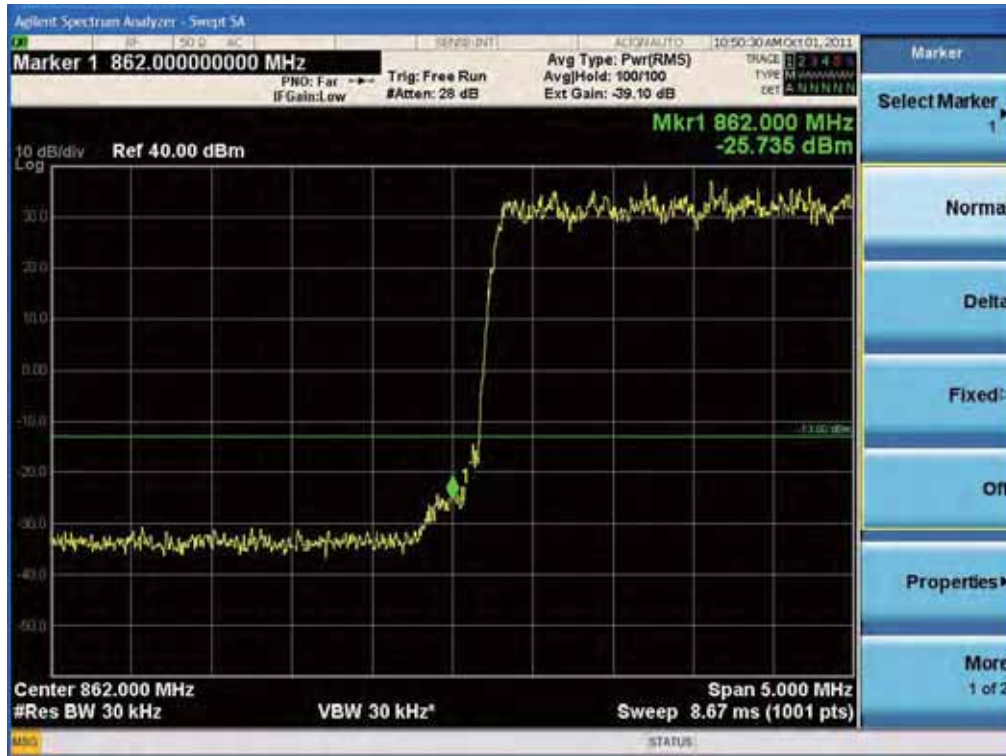


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 116 of 133

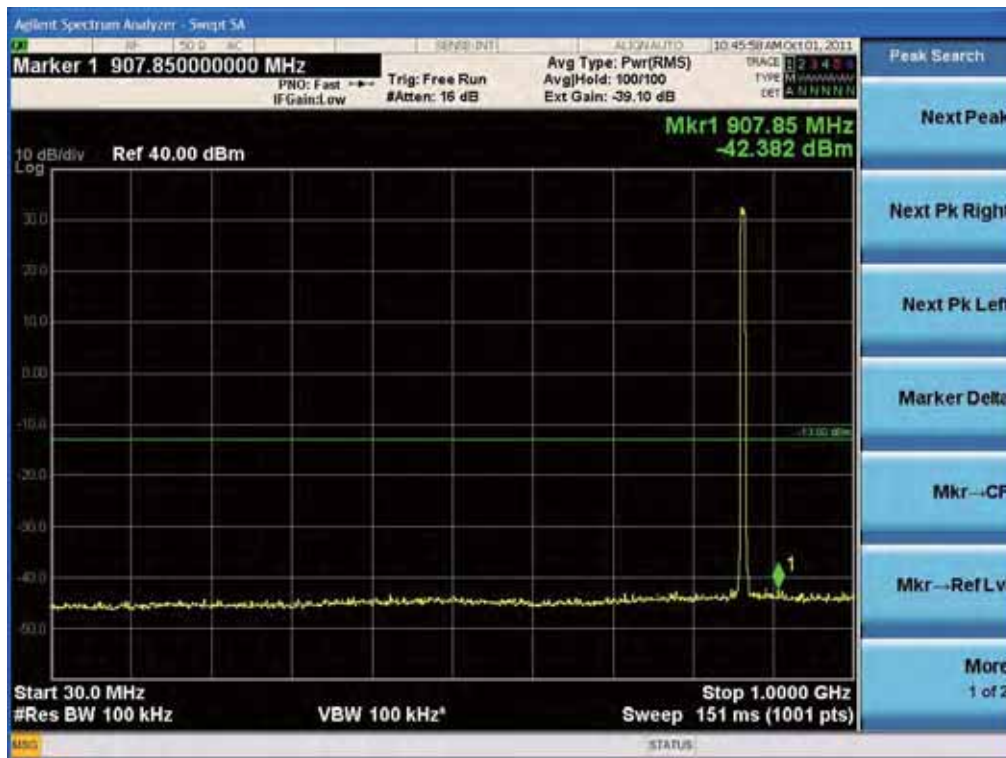
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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(QPSK High Channel)

(30 MHz ~ 1 GHz)

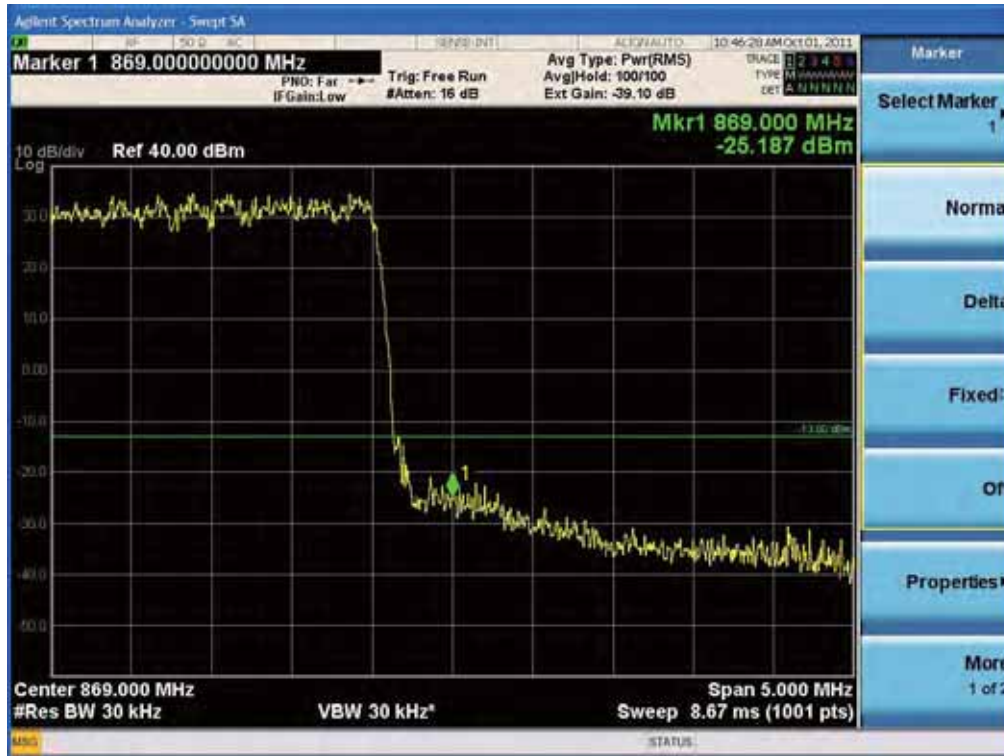


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 118 of 133

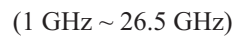
(Band Edge)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 119 of 133

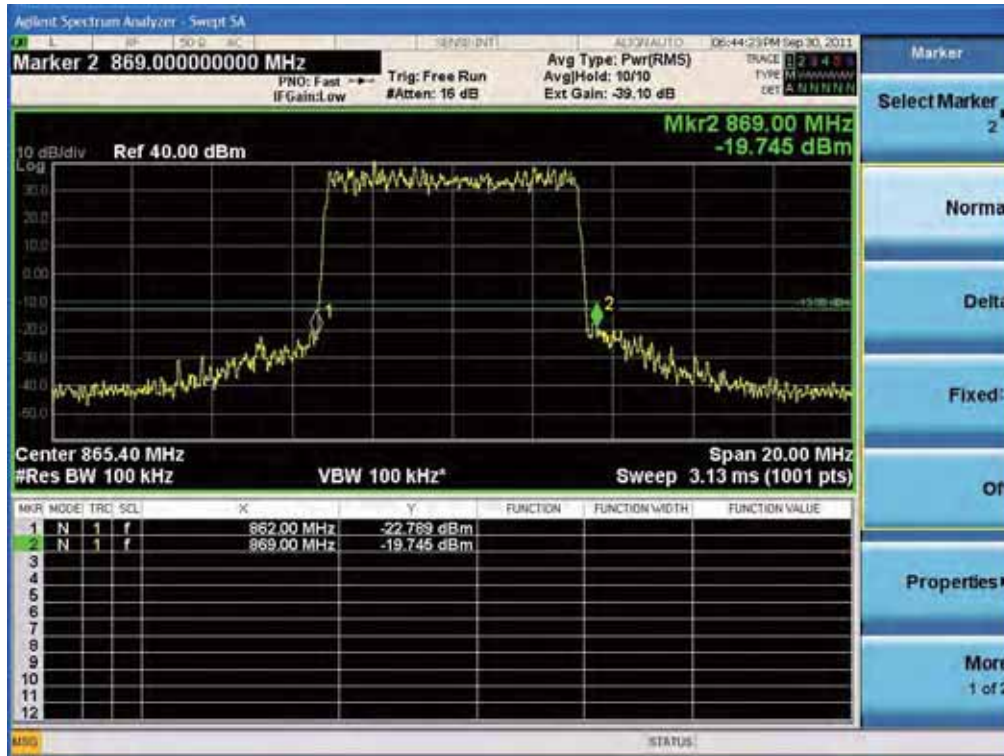
(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3I SMM-2CR0480800	Page 120 of 133

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FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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7.4.12. Plot Data for 2 Tx mode – 5 Carriers, Output Port 1
(QPSK Middle Channel)

(30 MHz ~ 1 GHz)

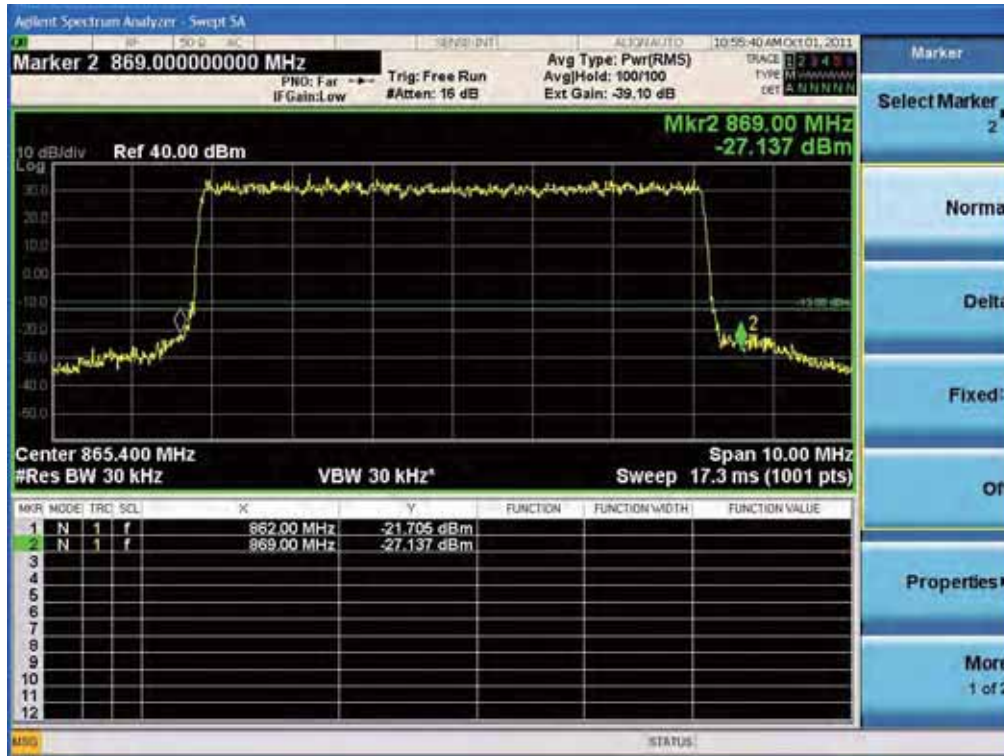


(1 GHz ~ 26.5 GHz)



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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8. RADIATED SPURIOUS EMISSION

8.1 Applicable Standard

According to FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
Test Report No. HCTR1110FR03	Date of Issue: October 21, 2011	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2CR0480800	Page 124 of 133

8.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
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	US46220219	06/10/2012
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

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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8.3 Test Procedure

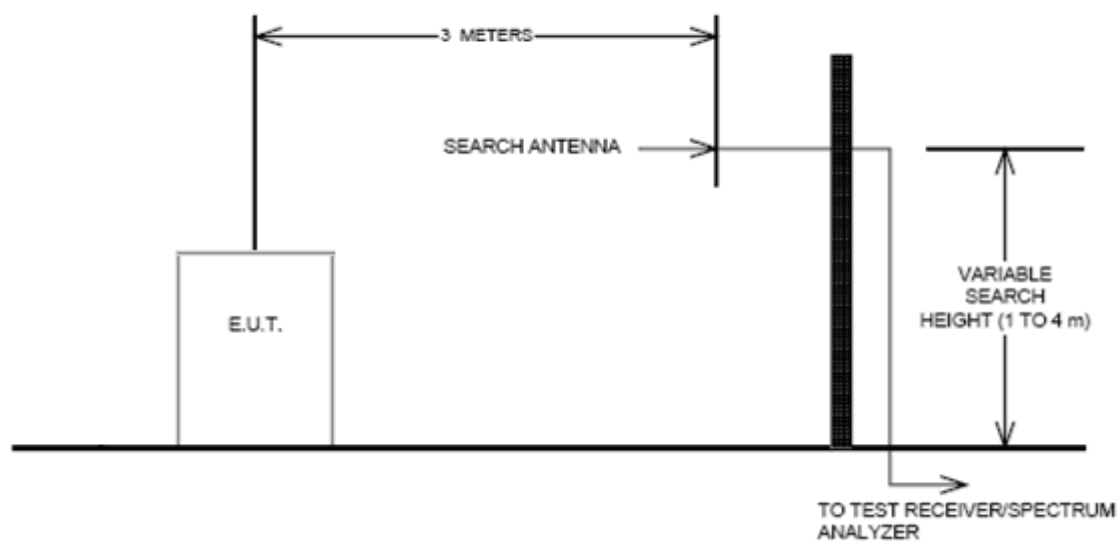
Radiated emission measurements were performed at an semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360⁰ and the receiving antenna scanned from 1-4m in order to capture the maximum emission.

A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated.

The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

8.3.1 Radiated Spurious Emissions Test Setup



FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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8.4 Test Result

: PASS (There were no emissions detected above the noise floor which was at least 20 dB below the limit.)

Test Frequency	Freq.(MHz)	<u>Substitute</u> <u>Level</u> [dBm]	Ant. Gain (dBd)	C.L	Pol.	ERP (dBm)	Margin (dB)
865.40	1730.80	-47.98	7.56	2.99	V	-43.41	-30.41
	2147.50	-65.77	8.00	3.20	V	-60.97	-47.97
	2596.20	-61.33	8.30	3.51	V	-56.54	-43.54

※ Tested at 2 Tx mode – 5 carriers (Port 0)

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9. FREQUENCY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055 (a), §90.213 following:

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25–50	20	20	50
72–76	5		50
150–174	^{5,11} 5	⁶ 5	^{4,6} 50
216–220	1.0		1.0
220–222 ¹²	0.1	1.5	1.5
421–512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806–809	¹⁴ 1.0	1.5	1.5
809–824	¹⁴ 1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	¹⁴ 0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928 ¹³	2.5	2.5	2.5
929–930	1.5		
935–940	0.1	1.5	1.5
1427–1435	⁹ 300	300	300
Above 2450 ¹⁰			

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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9.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	06/10/2012
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

9.3 Test Procedure

Frequency Stability over Temperature variation:

The equipment under test was connected to an external DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 30 minutes, the frequency output was recorded from the VSA8960 S/W via MXA Signal Analyzer.

Frequency stability over Voltage variation: An external variable DC power supply Source. The voltage was set to 85% and 115% of the nominal value. The output frequency was recorded for each voltage.

9.4. Test Result

: Pass

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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9.4.1. Frequency Stability over Temperature and Voltage variation

Modulation: BPSK

Reference: - 48 Vdc at 20°C **Freq.** = 862.9 MHz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	862 899 776	-224	0	0.0000
	-30	862 899 772	-228	-4	-0.0046
	-20	862 899 739	-261	-37	-0.0429
	-10	862 899 746	-254	-30	-0.0348
	0	862 899 761	-239	-15	-0.0174
	+10	862 899 759	-241	-17	-0.0197
	+30	862 899 727	-273	-49	-0.0568
	+40	862 899 778	-222	2	0.0023
	+50	862 899 759	-241	-17	-0.0197
115%	+20	862 899 705	-295	-71	-0.0823
85%	+20	862 899 744	-256	-32	-0.0371

Modulation: QPSK

Reference: - 48 Vdc at 20°C **Freq.** = 865.4 MHz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	865 400 509	509	0	0.0000
	-30	865 400 624	624	115	0.1329
	-20	865 400 578	578	69	0.0797
	-10	865 400 530	530	21	0.0243
	0	865 400 572	572	63	0.0728
	+10	865 400 536	536	27	0.0312
	+30	865 400 541	541	32	0.0370
	+40	865 400 572	572	63	0.0728
	+50	865 400 555	555	46	0.0532
115%	+20	865 400 529	529	20	0.0231
85%	+20	865 400 541	541	32	0.0370

FCC PT.90 TEST REPORT	FCC CERTIFICATION REPORT			HCT PT.90 TEST REPORT
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Modulation: 16QAM**Reference: - 48 Vdc at 20°C Freq. = 867.9 MHz**

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	867 899 324	-676	0	0.0000
	-30	867 899 369	-631	45	0.0518
	-20	867 899 334	-666	10	0.0115
	-10	867 899 307	-693	-17	-0.0196
	0	867 899 295	-705	-29	-0.0334
	+10	867 899 328	-672	4	0.0046
	+30	867 899 361	-639	37	0.0426
	+40	867 899 345	-655	21	0.0242
	+50	867 899 379	-621	55	0.0634
115%	+20	867 899 316	-684	-8	-0.0092
85%	+20	867 899 390	-610	66	0.0760

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10. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
1.34 - 30.....	824/f	2.19/f	*(180/ f ²)	30
30 - 300.....	27.5	0.073	0.2	30
300 - 1500.....			f/1500	30
1500 - 100.000.....			1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

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3. RESULTS

Max Peak output Power at antenna input terminal	47.020	dBm
Max Peak output Power at antenna input terminal	50.350	W
Prediction distance	500.000	cm
Prediction frequency	865.4000	MHz
Antenna Gain(typical)	14.000	dBi
Antenna Gain(numeric)	25.119	–
Power density at prediction frequency(S)	0.403	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.577	mW/cm ²

The power density level at 500 cm is 0.403 mW/cm², which is below the uncontrolled exposure limit of 0.577 mW/cm² at 865.4 MHz.

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