PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6554
http://www.pctestlab.com

CERTIFICATE OF COMPLIANCE
FCC Part 27 Certification

Applicant Name:
Samsung Electronics, Co. Ltd.
18600 Broadwick St.
Rancho Dominguez, CA 90220
United States

Date of Testing:
October 20, 2008 - November 4, 2008
Test Site/Location:
PCTEST Lab., Columbia, MD, USA
Test Report Serial No.:
0810061477.A3L

FCC ID:	**A3LSWCU200**
APPLICANT:	**SAMSUNG ELECTRONICS, CO. LTD.**

Application Type:	Certification
FCC Classification:	Licensed Non-Broadcast Transmitter (TNB)
FCC Rule Part(s):	§2; §27 Subpart M
EUT Type:	Wimax USB Modem
Model(s):	SWC-U200
Tx Frequency Range:	2498.5 - 2687.5MHz (WiMAX using 5MHz BW)
	2501 - 2685MHz (WiMAX using 10MHz BW)
Max. RF Output Power:	0.215 W EIRP 10MHz WiMAX(23.32 dBm)
	0.288 W EIRP 5MHz WiMax (24.6 dBm)
Emission Designator(s):	10MHz WiMax: 9M40G7D (QPSK) / 9M41W7D (16QAM)
	5MHz WiMax: 4M72G7D (QPSK) / 4M72W7D (16QAM)
Test Device Serial No.:	*identical prototype* [S/N: FF-211-A]

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Grant Conditions: Power output listed is EIRP for Part 27.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

© 2008 PCTEST Engineering Laboratory, Inc.

TABLE OF CONTENTS

FCC PART 27 MEASUREMENT REPORT 3

1.0 INTRODUCTION 4

1.1 MEASUREMENT PROCEDURE 4

1.2 SCOPE 4

1.3 TESTING FACILITY 4

2.0 PRODUCT INFORMATION 5

2.1 EQUIPMENT DESCRIPTION 5

2.2 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS 5

2.3 LABELING REQUIREMENTS 5

3.0 DESCRIPTION OF TESTS 6

3.1 OCCUPIED BANDWIDTH EMISSION LIMITS 6

3.2 BAND EDGE 6

3.3 EBS/BRS - FREQUENCY BLOCKS 6

3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL 7

3.5 RADIATED SPURIOUS AND HARMONIC EMISSIONS 7

3.6 FREQUENCY STABILITY / TEMPERATURE VARIATION 7

4.0 TEST EQUIPMENT CALIBRATION DATA 8

5.0 SAMPLE CALCULATIONS 9

6.0 TEST RESULTS 10

6.1 SUMMARY 10

6.2 TRANSMITTER CONDUCTED OUTPUT POWER 11

6.3 EQUIVALENT ISOTROPIC RADIATED POWER OUTPUT DATA 12

6.4 10MHZ WIMAX RADIATED MEASUREMENTS 13

6.5 5MHZ WIMAX RADIATED MEASUREMENTS 16

6.6 10MHZ WIMAX FREQUENCY STABILITY MEASUREMENTS 20

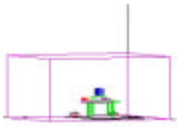
6.7 5MHZ WIMAX FREQUENCY STABILITY MEASUREMENTS 22

7.0 PLOT(S) OF EMISSIONS – 10MHZ WIMAX 24

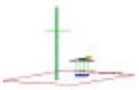
8.0 PLOT(S) OF EMISSIONS – 5MHZ WIMAX 30

9.0 CONCLUSION 33

© 2008 PCTEST Engineering Laboratory, Inc.



MEASUREMENT REPORT
FCC Part 27



§2.1033 General Information

APPLICANT:	Samsung Electronics, Co. Ltd.
APPLICANT ADDRESS:	18600 Broadwick St. Rancho Dominguez, CA 90220
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS:	6660-B Dobbin Road, Columbia, MD 21045 USA
FCC RULE PART(S):	§2; §27(M)
BASE MODEL:	SWC-U200
FCC ID:	A3LSWCU200
FCC CLASSIFICATION:	Licensed Non-Broadcast Transmitter (TNB)
EMISSION DESIGNATOR(S):	10MHz WiMax: 9M40G7D (QPSK) / 9M41W7D (16QAM) 5MHz WiMax: 4M72G7D (QPSK) / 4M72W7D (16QAM)
MODE:	WiMAX
FREQUENCY TOLERANCE:	Emission must remain in band
Test Device Serial No.:	FF-211-A ☐ Production ☒ Pre-Production ☐ Engineering
DATE(S) OF TEST:	October 20, 2008 - November 4, 2008
TEST REPORT S/N:	0810061477.A3L

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab. located in Columbia, MD 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC-2451).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).

- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

© 2008 PCTEST Engineering Laboratory, Inc.

1.0 INTRODUCTION

1.1 Measurement Procedure

The radiated spurious measurements were made outdoors at a 3-meter test range (see Figure 1-1). The equipment under test is placed on a wooden turntable 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

Deviation from Measurement Procedure.....None

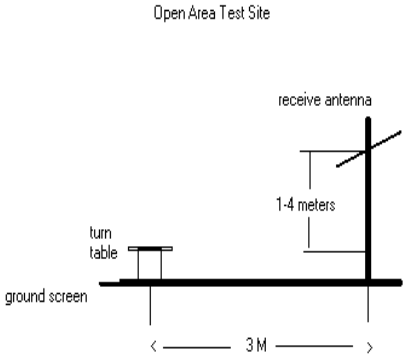


Figure 1-1. Diagram of 3-meter outdoor test range

1.2 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

1.3 Testing Facility

These measurements were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 27, 2006 and Industry Canada.

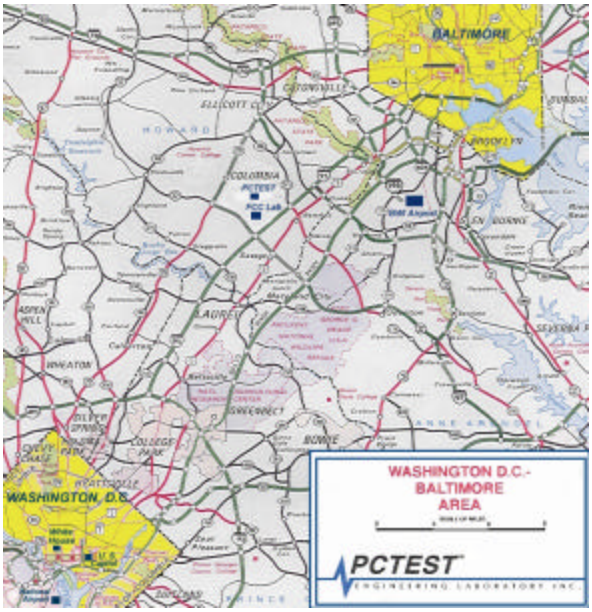


Figure 1-2. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

© 2008 PCTEST Engineering Laboratory, Inc.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Wimax USB Modem FCC ID: A3LSWCU200**. The test data contained in this report pertains only to the emissions due to the EUT's WiMAX function. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
Samsung / Model: SWC-U200	A3LSWCU200	Wimax USB Modem

Table 2-1. EUT Equipment Description

The EUT was set to transmit at full power through test software installed in a laptop computer. Each of the four available types of modulations was tested to determine the configuration producing the worst case emissions. The gated triggering functionality of the spectrum analyzer was used so that all measurements were made during the transmitter's "on" period.

2.2 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

2.3 Labeling Requirements

Per 2.925

The FCC identifier shall be permanently affixed to the equipment and shall be readily visible to the purchaser at the time of purchase.

Per 15.19; Docket 95-19

In addition to this requirement, a device subject to certification shall be labeled as follows:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

© 2008 PCTEST Engineering Laboratory, Inc.

3.0 DESCRIPTION OF TESTS

3.1 Occupied Bandwidth Emission Limits

§2.1049, §27.53(l)(6)

a. On any frequency outside but within 5.5MHz from the band edge of a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. At frequencies greater than 5.5MHz from any in-band channel edge, the transmitter power (P) shall be attenuated by at least 55 + 10 log(P) dB.

b. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

c. When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

d. The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

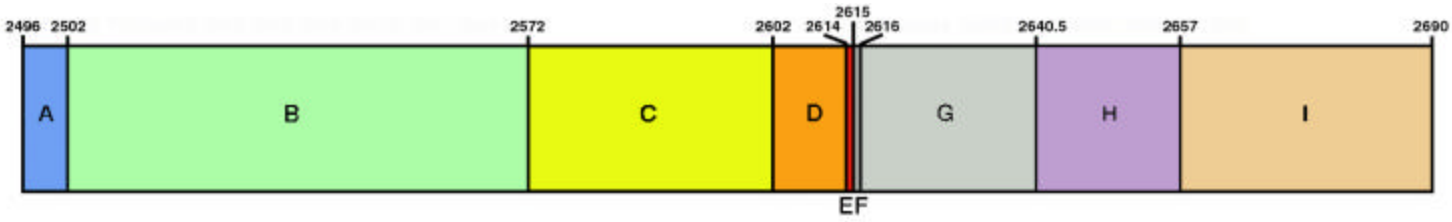
3.2 Band Edge

§2.1051, §27.53(l)(4)(6)

When measuring conducted band edge, the ACP (Adjacent Channel Power) feature of the signal analyzer was used. For each segment of the band edge, the allowed integration bandwidth was configured to calculate the channel power that is highest within that band edge segment.

3.3 EBS/BRS - Frequency Blocks

§27.5(i)



BLOCK A: 2496MHz – 2502MHz (BRS)

BLOCK B: 2502MHz – 2572MHz (EBS)

BLOCK C: 2572MHz – 2602MHz (EBS)

BLOCK D: 2602MHz – 2614MHz (BRS)

BLOCK E: 2614MHz – 2615MHz (BRS)

BLOCK F: 2615MHz – 2616MHz (EBS)

BLOCK G: 2616MHz – 2640.5MHz (BRS)

BLOCK H: 2640.5MHz – 2657MHz (EBS)

BLOCK A: 2657MHz – 2690MHz (BRS)

© 2008 PCTEST Engineering Laboratory, Inc.

3.4 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051, §27.53(l)(4)(6)

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic.

3.5 Radiated Spurious and Harmonic Emissions

§2.1053, §27.53(l)(4)(6)

Spurious and harmonic radiated emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration. This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation.

3.6 Frequency Stability / Temperature Variation

§2.1055, §27.54

The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).

2. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

© 2008 PCTEST Engineering Laboratory, Inc.

4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Calibration Date	Cal Interval	Calibration Due	Serial No.
-	263-10dB	(DC-18GHz) 10 dB Attenuator	N/A		N/A	N/A
-	No.165	(30MHz - 1000MHz) RG58 Coax Cable	N/A		N/A	N/A
-	No.166	(1000-26500MHz) Microwave RF Cable	N/A		N/A	N/A
-	No.167	(100kHz - 100MHz) RG58 Coax Cable	N/A		N/A	N/A
Agilent	11713A	Attenuation/Switch Driver	12/13/07	Annual	12/13/08	3439A02645
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	12/13/07	Annual	12/12/08	3008A00985
Agilent	8495A	(0-70dB) DC-4GHz Attenuator	N/A		N/A	N/A
Agilent	85650A	Quasi-Peak Adapter	03/13/08	Annual	03/13/09	2043A00301
Agilent	8566B	(100Hz–22GHz) Spectrum Analyzer	12/13/07	Annual	12/13/08	3638A08713
Agilent	8566B	Opt. 462 Impulse Bandwidth	12/13/07	Annual	12/12/08	3701A22204
Agilent	8591A	(9kHz-1.8GHz) Spectrum Analyzer	08/19/08	Annual	08/19/09	3144A02458
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/11/07	Biennial	10/10/09	3613A00315
Agilent	E4407B	ESA Spectrum Analyzer	03/13/08	Annual	03/13/09	US39210313
Agilent	E4448A	(3Hz-50GHz) Spectrum Analyzer	01/24/08	Annual	01/24/09	US42510244
Agilent	E5515C	Wireless Communications Test Set	06/08/07	Biennial	06/08/09	GB46110872
Agilent	E5515C	Wireless Communications Test Set	06/08/07	Biennial	06/08/09	GB46310798
Agilent	E5515C	Wireless Communications Test Set	09/10/08	Biennial	09/10/10	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	03/08/07	Biennial	03/08/09	MY45470194
Compliance Design	Roberts	Dipole Set	11/09/07	Biennial	11/08/09	146
Compliance Design	Roberts	Dipole Set	11/09/07	Biennial	11/08/09	147
Emco	3115	Horn Antenna (1-18GHz)	9/24/07	Biennial	9/23/09	9704-5182
Emco	3115	Horn Antenna (1-18GHz)	10/4/07	Biennial	10/3/09	9205-3874
Emco	3121C-DB4	Dipole Antenna	1/23/07	Biennial	1/22/09	00023951
Espec	ESX-2CA	Environmental Chamber	3/12/08	Annual	3/12/09	017620
Gigatronics	80701A	(0.05-18GHz) Power Sensor	8/18/08	Annual	8/18/09	1833460
Gigatronics	8651A	Universal Power Meter	8/18/08	Annual	8/18/09	1835299
Gigatronics	8651A	Universal Power Meter	8/18/08	Annual	8/18/09	8650319
K & L	11SH10	Band Pass Filter	N/A	Annual	N/A	1300/4000
K & L	11SH10	Band Pass Filter	N/A	Annual	N/A	
MiniCircuits	VHF-1300+	High Pass Filter	N/A		N/A	30716
MiniCircuits	VHF-3100+	High Pass Filter	N/A		N/A	30721
Pasternack	PE2208-6	Bidirectional Coupler	N/A		N/A	
Rohde & Schwarz	CMU200	Base Station Simulator	5/29/08	Annual	5/29/09	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	12/6/07	Annual	12/5/08	107826
Rohde & Schwarz	CMU200	Base Station Simulator	7/23/08	Annual	7/23/09	109892
Rohde & Schwarz	NRVD	Dual Channel Power Meter	12/12/06	Biennial	12/11/08	101695
Rohde & Schwarz	NRVS	Single Channel Power Meter	7/3/07	Biennial	7/2/09	835360/0079
Rohde & Schwarz	NRV-Z32	Peak Power Sensor (100uW-2W)	12/21/06	Biennial	12/20/08	100155
Rohde & Schwarz	NRV-Z33	Peak Power Sensor (1mW-20W)	11/28/06	Biennial	11/27/08	100004
Rohde & Schwarz	NRV-Z53	Power Sensor	7/3/07	Biennial	7/2/09	846076/0007
Schwarzbeck	UHA9105	Dipole Antenna (400 - 1GHz) Rx	6/19/07	Biennial	6/18/09	9105-2404
Schwarzbeck	UHA9105	Dipole Antenna (400 - 1GHz) Tx	6/19/07	Biennial	6/18/09	9105-2403
Solar Electronics	8012-50-R-24-BNC	LISN	11/8/07	Biennial	11/8/09	0310233
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	5/9/07	Biennial	5/8/09	A050307
Agilent	MXA	N9020A Signal Analyzer	4/30/2008	Annual	4/30/2009	US46470561

Table 4-1. Test Equipment

© 2008 PCTEST Engineering Laboratory, Inc.

5.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 9M62G7D

WiMAX BW = 9.62 MHz
G = Phase Modulation
7 = Quantized/ Digital Info
D = Amplitude/Angle Modulated

16QAM Modulation

Emission Designator = 9M45W7D

WiMAX BW = 9.45 MHz
D = Amplitude/Angle Modulated
7 = Quantized/Digital Info
W = Combination (Audio/Data)

Spurious Radiated Emission – WiMAX Band

Example: Middle Channel WiMAX Mode 2nd Harmonic (5200 MHz)

The receive analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the receive analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 3.2 dB at 5200 MHz. So 4.9 dB is added to the signal generator reading of –30.00 dBm yielding –25.1 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-25.1) = 50.6 dBc.

© 2008 PCTEST Engineering Laboratory, Inc.

6.0 TEST RESULTS

6.1 Summary

Company Name: Samsung Electronics, Co. Ltd.

FCC ID: A3LSWCU200

FCC Classification: Licensed Non-Broadcast Transmitter (TNB)

Mode(s): WiMAX

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (Tx)					
2.1049, 27.53(l)(6)	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.0
2.1051, 27.53(l)(4)(6)	Band Edge	< 43 + 10log$_{10}$ (P[Watts]) within 5.5MHz from the band edge		PASS	Section 7.0
2.1051, 27.53(l)(4)(6)	Conducted Spurious Emissions	< 55 + 10log$_{10}$ (P[Watts]) for all emissions greater than 5.5MHz from the band edge		PASS	Section 7.0
2.1046	Transmitter Conducted Output Power Measurements	N/A		PASS	Section 6.2
27.50(h)(2)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP	RADIATED	PASS	Section 6.3
2.1053, 27.53(l)(4)	Undesirable Emissions	< 55 + 10log$_{10}$ (P[Watts]) for all out-of-band emissions		PASS	Section 6.4
2.1055, 27.54	Frequency Stability	Fundamental emissions must stay within the allotted band		PASS	Section 6.5
RECEIVER MODE (Rx) / DIGITAL EMISSIONS					
15.107	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.107 limits	LINE CONDUCTED	PASS	Pt. 15B Test Report
15.109	General Field Strength Limits (Restricted Bands and Radiated Emissions Limits)	< FCC 15.109 limits	RADIATED (30MHz-1GHz) (1-25 GHz)	PASS	Pt. 15B Test Report
RF EXPOSURE					
2.1091 / 2.1093	SAR Test	1.6 W/kg (SAR Limit)	SAR	PASS	SAR Report

Table 6-1. Summary of Test Results

© 2008 PCTEST Engineering Laboratory, Inc.

6.2 Transmitter Conducted Output Power

§2.1046

The MXA Signal Analyzer was used as to measure the power of the wimax device. The wimax channel power measurement feature of the MXA, was utilized for conducted power measurements. The WiMAX conducted powers are reported below as well as a test setup diagram.

Frequency[MHz]	Modulation	10MHz	5MHz
2501(for 10MHz) / 2498.5 (for 5MHz)	PUSC_QPSK1/2	22.6	22.8
	PUSC_16QAM1/2	23	22.2
	BAMC2*3_QPSK1/2	23.4	22.8
	BAMC2*3_16QAM1/2	23.8	23.3
	PUSC_QPSK3/4	23.4	22.9
	PUSC_16QAM3/4	23	22.5
	BAMC2*3_QPSK3/4	23.5	23.5
	BAMC2*3_16QAM3/4	23.3	23.3
2600 (for 10 MHz and 5MHz)	PUSC_QPSK1/2	23.3	23
	PUSC_16QAM1/2	23.8	22.6
	BAMC2*3_QPSK1/2	23.4	22.9
	BAMC2*3_16QAM1/2	23.7	23.3
	PUSC_QPSK3/4	23.4	23.2
	PUSC_16QAM3/4	23.1	22.7
	BAMC2*3_QPSK3/4	23.5	23.3
	BAMC2*3_16QAM3/4	23.3	23.3
2685 (for 10MHz)/ 2687.5 (for 5MHz)	PUSC_QPSK1/2	22.4	22.8
	PUSC_16QAM1/2	22.6	23.1
	BAMC2*3_QPSK1/2	23.2	23
	BAMC2*3_16QAM1/2	23.5	23.1
	PUSC_QPSK3/4	23.1	23
	PUSC_16QAM3/4	22.7	22.7
	BAMC2*3_QPSK3/4	23.3	23.4
	BAMC2*3_16QAM3/4	23	23

Table 6-2. WiMAX Conducted Output Power

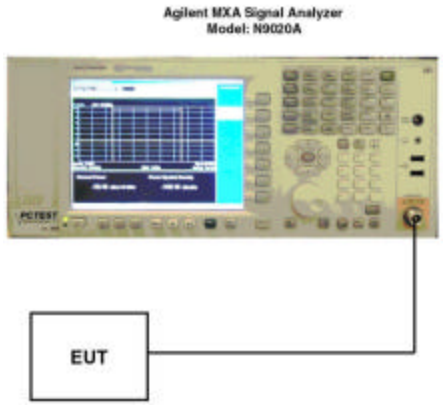


Figure 6-1. WiMAX Conducted Power Test Setup Diagram

© 2008 PCTEST Engineering Laboratory, Inc.

6.3 Equivalent Isotropic Radiated Power Output Data

§27.50(h)(2)

POWER: Maximum (WiMAX Mode)

Frequency [MHz]	Modulation	Measured Level [dBm]	Substitute Level [dBm]	Antenna Gain [dBi]	Pol [H/V]	EIRP [dBm]	EIRP [Watts]	Battery Type
2501.00	16QAM	-23.600	13.42	8.00	V	21.42	0.139	Standard
2600.00	16QAM	-21.700	15.32	8.00	V	23.32	0.215	Standard
2685.00	16QAM	-23.100	13.92	8.00	V	21.92	0.156	Standard
2600.00	QPSK	-23.380	13.64	8.00	V	21.64	0.146	Standard

Table 6-3. Equivalent Isotropic Radiated Power Output Data for 10MHz Wimax

Frequency [MHz]	Modulation	Measured Level [dBm]	Substitute Level [dBm]	Antenna Gain [dBi]	Pol [H/V]	EIRP [dBm]	EIRP [Watts]	Battery Type
2498.50	16QAM	-22.500	16.60	8.00	V	24.60	0.288	Standard
2600.00	16QAM	-23.400	15.70	8.00	V	23.70	0.234	Standard
2687.50	16QAM	-23.700	15.40	8.00	V	23.40	0.219	Standard
2498.50	QPSK	-22.600	16.50	8.00	V	24.50	0.282	Standard

Table 6-4. Equivalent Isotropic Radiated Power Output Data for 5MHz Wimax

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For WiMAX signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation. This unit was tested with its standard battery.

© 2008 PCTEST Engineering Laboratory, Inc.

6.4 10MHz WiMAX Radiated Measurements

§2.1053, §27.53(l)(4)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 2501.00 MHz

CHANNEL: LBS

MEASURED OUTPUT POWER: 23.320 dBm = 0.215 W

MODULATION SIGNAL: WiMAX (Internal)

DISTANCE: 3 meters

LIMIT: $55 + 10 \log_{10} (W)$ = 48.32 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
5002.00	-38.65	10.50	-28.15	V	51.5
7503.00	-35.88	10.60	-25.28	V	48.6
10004.00	-85.58	12.00	-73.57	V	96.9
12505.00	-78.99	12.50	-66.49	V	89.8
15006.00	-73.15	13.03	-60.12	V	83.4

Table 6-4. Radiated Spurious Data (WiMAX Mode)

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For WiMAX signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation. This unit was tested with its standard battery.

© 2008 PCTEST Engineering Laboratory, Inc.

10MHz WiMAX Radiated Measurements (Cont'd)

§2.1053, §27.53(l)(4)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 2600.00 MHz
CHANNEL: MBS
MEASURED OUTPUT POWER: 23.320 dBm = 0.215 W
MODULATION SIGNAL: WiMAX (Internal)
DISTANCE: 3 meters
LIMIT: $55 + 10 \log_{10} (W)$ = 48.32 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
5200.00	-39.61	10.46	-29.15	V	52.5
7800.00	-36.51	10.84	-25.66	V	49.0
10400.00	-85.28	12.16	-73.12	V	96.4
13000.00	-77.07	12.30	-64.77	V	88.1
15600.00	-75.91	15.30	-60.61	V	83.9

Table 6-5. Radiated Spurious Data (WiMAX Mode)

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For WiMAX signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation. This unit was tested with its standard battery.

© 2008 PCTEST Engineering Laboratory, Inc.

10MHz WiMAX Radiated Measurements (Cont'd)

§2.1053, §27.53(l)(4

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 2685.00 MHz
CHANNEL: UBS
MEASURED OUTPUT POWER: 23.320 dBm = 0.215 W
MODULATION SIGNAL: WiMAX (Internal)
DISTANCE: 3 meters
LIMIT: 55 + 10 $\log_{10}$ (W) = 48.32 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
5370.00	-36.92	10.43	-26.49	V	49.8
8055.00	-36.31	11.03	-25.27	V	48.6
10740.00	-84.85	12.49	-72.36	V	95.7
13425.00	-75.88	12.30	-63.58	V	86.9
16110.00	-74.75	15.46	-59.30	V	82.6

Table 6-6. Radiated Spurious Data (WiMAX Mode)

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For WiMAX signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation. This unit was tested with its standard battery.

© 2008 PCTEST Engineering Laboratory, Inc.

6.5 5MHz WiMAX Radiated Measurements

§2.1053, §27.53(l)(4)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 2498.50 MHz

CHANNEL: LBS

MEASURED OUTPUT POWER: 24.600 dBm = 0.288 W

MODULATION SIGNAL: WiMAX (Internal)

DISTANCE: 3 meters

LIMIT: 55 + 10 $\log_{10}$ (W) = 49.60 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
4997.00	-35.67	10.50	-25.17	V	49.8
7495.50	-37.89	10.60	-27.29	V	51.9
9994.00	-85.58	12.00	-73.59	V	98.2
12492.50	-79.01	12.49	-66.52	V	91.1
14991.00	-73.07	12.97	-60.10	V	84.7

Table 6-7. Radiated Spurious Data (WiMAX Mode)

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For WiMAX signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation. This unit was tested with its standard battery.

© 2008 PCTEST Engineering Laboratory, Inc.

5MHz WiMAX Radiated Measurements (Cont'd)

§2.1053, §27.53(l)(4

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 2600.00 MHz
CHANNEL: MBS
MEASURED OUTPUT POWER: 24.600 dBm = 0.288 W
MODULATION SIGNAL: WiMAX (Internal)
DISTANCE: 3 meters
LIMIT: $55 + 10 \log_{10} (W)$ = 49.60 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
5200.00	-38.91	10.46	-28.45	V	53.1
7800.00	-40.21	10.84	-29.36	V	54.0
10400.00	-85.28	12.16	-73.12	V	97.7
13000.00	-77.07	12.30	-64.77	V	89.4
15600.00	-75.91	15.30	-60.61	V	85.2

Table 6-8. Radiated Spurious Data (WiMAX Mode)

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For WiMAX signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation. This unit was tested with its standard battery.

© 2008 PCTEST Engineering Laboratory, Inc.

5MHz WiMAX Radiated Measurements (Cont'd)

§2.1053, §27.53(l)(4

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 2687.50 MHz
CHANNEL: UBS
MEASURED OUTPUT POWER: 24.600 dBm = 0.288 W
MODULATION SIGNAL: WiMAX (Internal)
DISTANCE: 3 meters
LIMIT: $55 + 10 \log_{10} (W)$ = 49.60 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
5375.00	-35.50	10.42	-25.07	V	49.7
8062.50	-40.50	11.04	-29.46	V	54.1
10750.00	-37.71	12.50	-25.21	V	49.8
13437.50	-75.84	12.30	-63.54	V	88.1
16125.00	-74.75	15.48	-59.28	V	83.9

Table 6-9. Radiated Spurious Data (WiMAX Mode)

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For WiMAX signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the worst case is reported with BAMC 16QAM modulation. This unit was tested with its standard battery.

© 2008 PCTEST Engineering Laboratory, Inc.

6.6 10MHz WiMAX Frequency Stability Measurements

§2.1055, §27.54

OPERATING FREQUENCY: 2,600,000,000 Hz

CHANNEL: MBS

REFERENCE VOLTAGE: 10.65 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (ºC)	FREQ. (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	10.65	+ 20 (Ref)	2,600,000,000	0.00	0.000000
100 %		- 30	2,600,020,365	20,365	0.000783
100 %		- 20	2,600,016,031	16,031	0.000617
100 %		- 10	2,600,004,103	4,103	0.000158
100 %		0	2,600,011,794	11,794	0.000454
100 %		+ 10	2,600,016,888	16,888	0.000650
100 %		+ 20	2,600,004,885	4,885	0.000188
100 %		+ 30	2,600,025,466	25,466	0.000979
100 %		+ 40	2,600,007,312	7,312	0.000281
100 %		+ 50	2,600,027,347	27,347	0.001052
115 %	12.25	+ 20	2,600,024,792	24,792.08	0.000954
BATT. ENDPOINT	9.44	+ 20	2,600,011,383	11,382.86	0.000438

Table 6-7. Frequency Stability Data (10MHz WiMAX Mode)

Note:

The frequency deviation was measured to ensure that the channels emissions remained within the authorized band with varying temperature and voltage.

© 2008 PCTEST Engineering Laboratory, Inc.

10MHz WiMAX Frequency Stability Measurements (Cont'd)
§2.1055, §27.54

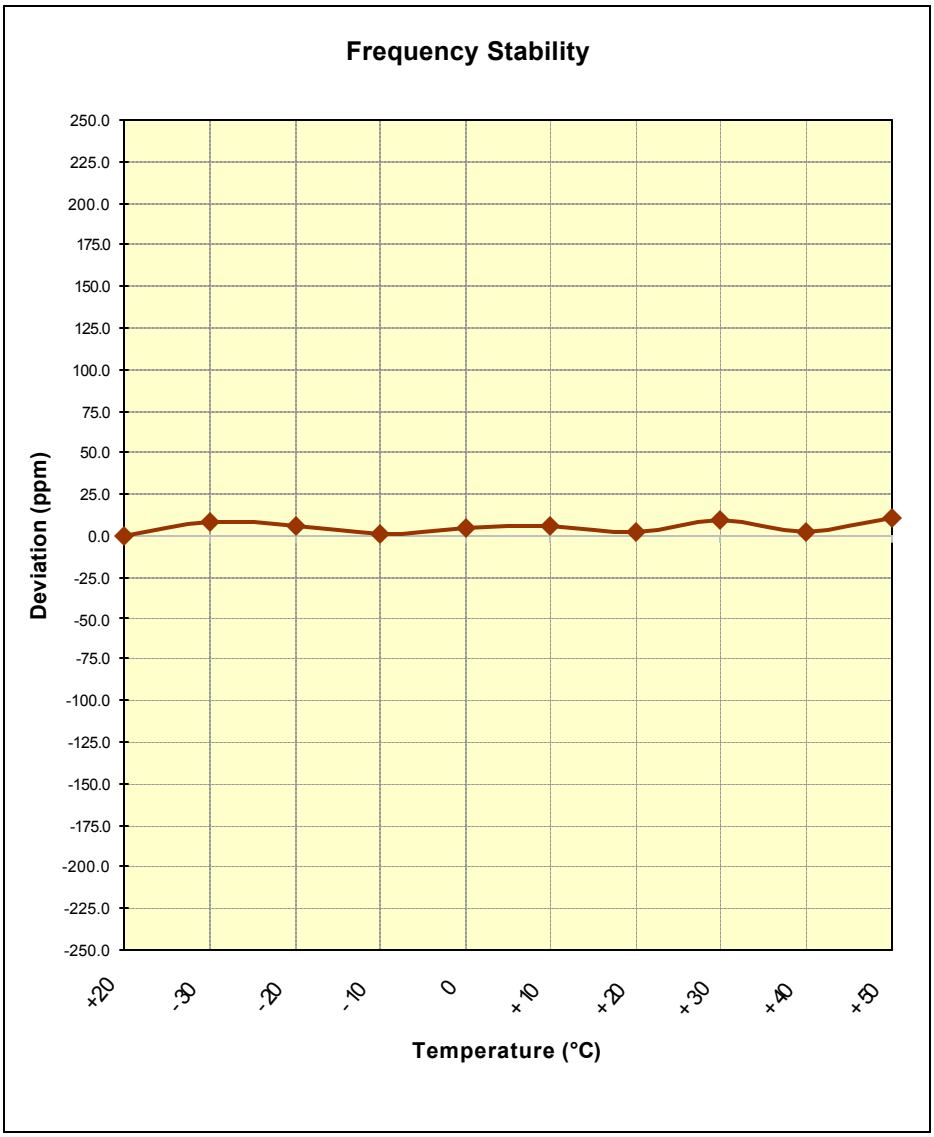


Figure 6-2. Frequency Stability Graph (10MHz WiMAX Mode)

Note:

The frequency deviation was measured to ensure that the channels emissions remained within the authorized band with varying temperature and voltage.

© 2008 PCTEST Engineering Laboratory, Inc.

6.7 5MHz WiMAX Frequency Stability Measurements

§2.1055, §27.54

OPERATING FREQUENCY: 2,600,000,000 Hz

CHANNEL: MBS

REFERENCE VOLTAGE: 10.65 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (ºC)	FREQ. (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	10.65	+ 20 (Ref)	2,600,000,000	0	0.000000
100 %		- 30	2,600,023,895	23895	0.000919
100 %		- 20	2,599,995,646	-4354	-0.000167
100 %		- 10	2,599,971,053	-28947	-0.001113
100 %		0	2,600,028,249	28249	0.001086
100 %		+ 10	2,599,997,865	-2135	-0.000082
100 %		+ 20	2,600,016,271	16271	0.000626
100 %		+ 30	2,600,021,548	21548	0.000829
100 %		+ 40	2,600,018,210	18210	0.000700
100 %		+ 50	2,600,027,310	27310	0.001050
115 %	12.25	+ 20	2,600,011,803	11803	0.000454
BATT. ENDPOINT	9.45	+ 20	2,600,023,406	23406	0.000900

Table 6-8. Frequency Stability Data (5MHz WiMAX Mode)

Note:

The frequency deviation was measured to ensure that the channels emissions remained within the authorized band with varying temperature and voltage.

© 2008 PCTEST Engineering Laboratory, Inc.

5MHz WiMAX Frequency Stability Measurements (Cont'd)
§2.1055, §27.54

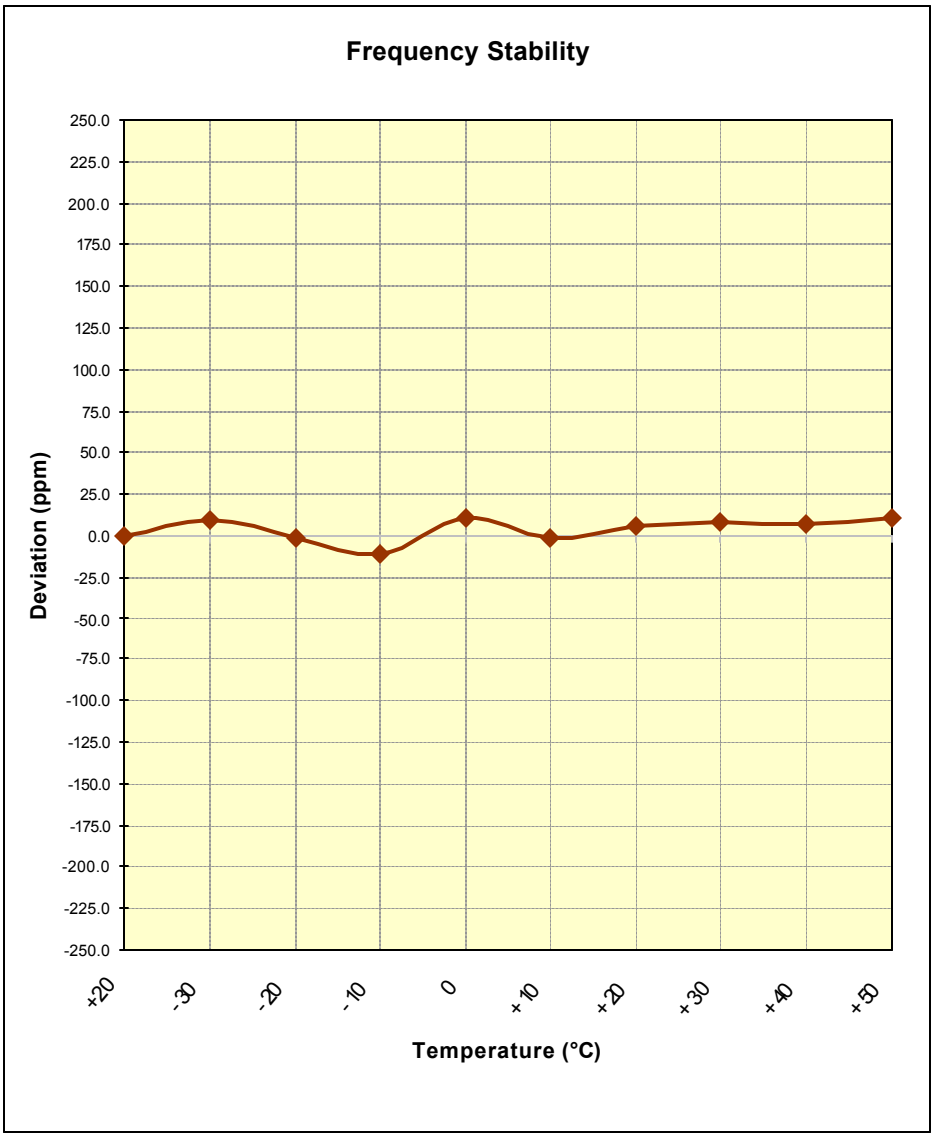


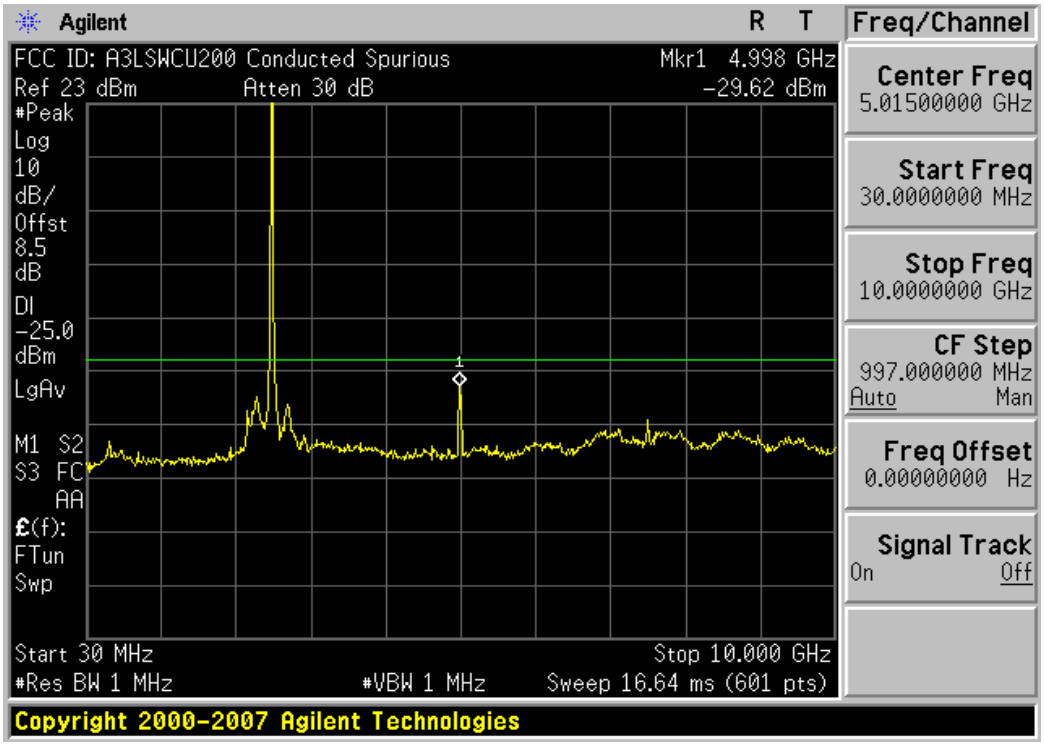
Figure 6-3. Frequency Stability Graph (5MHz WiMAX Mode)

Note:

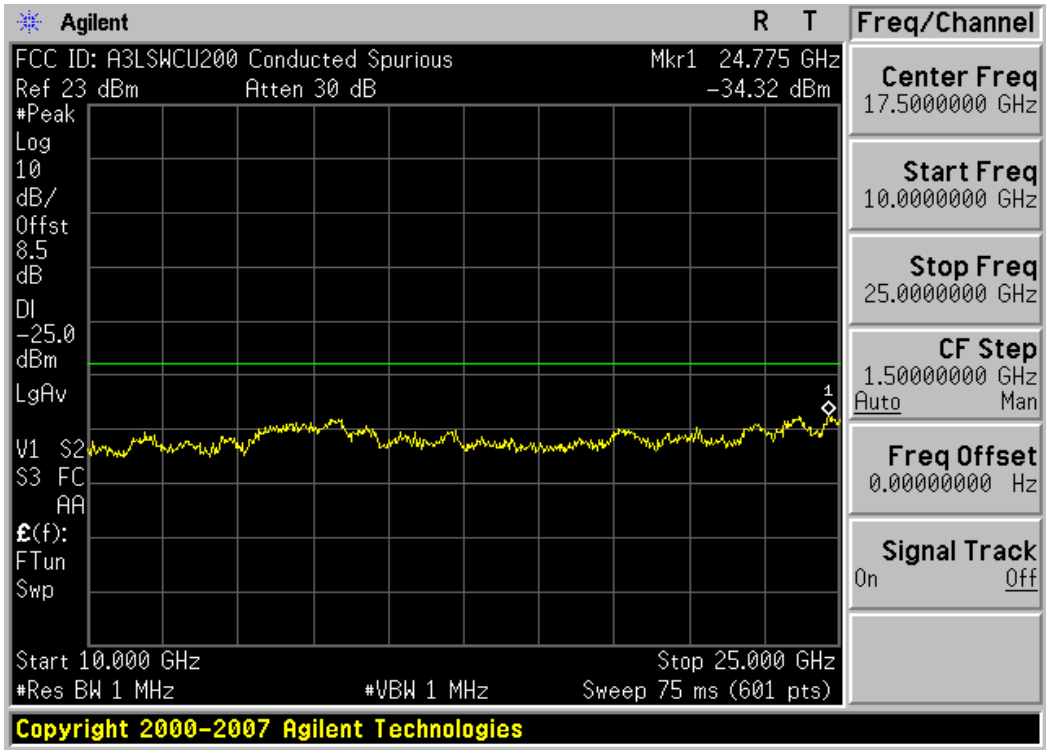
The frequency deviation was measured to ensure that the channels emissions remained within the authorized band with varying temperature and voltage.

© 2008 PCTEST Engineering Laboratory, Inc.

7.0 PLOT(S) OF EMISSIONS – 10MHZ WIMAX

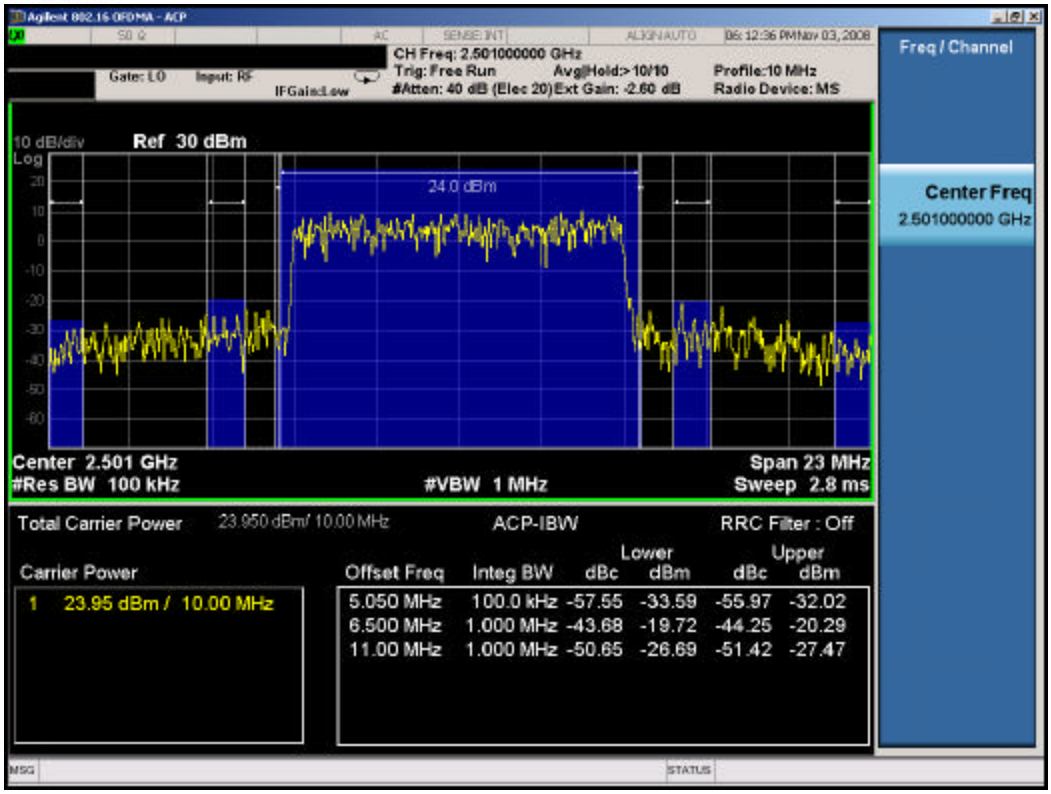


Plot 7-1. Conducted Spurious Plot (WiMAX Mode – Low Channel)

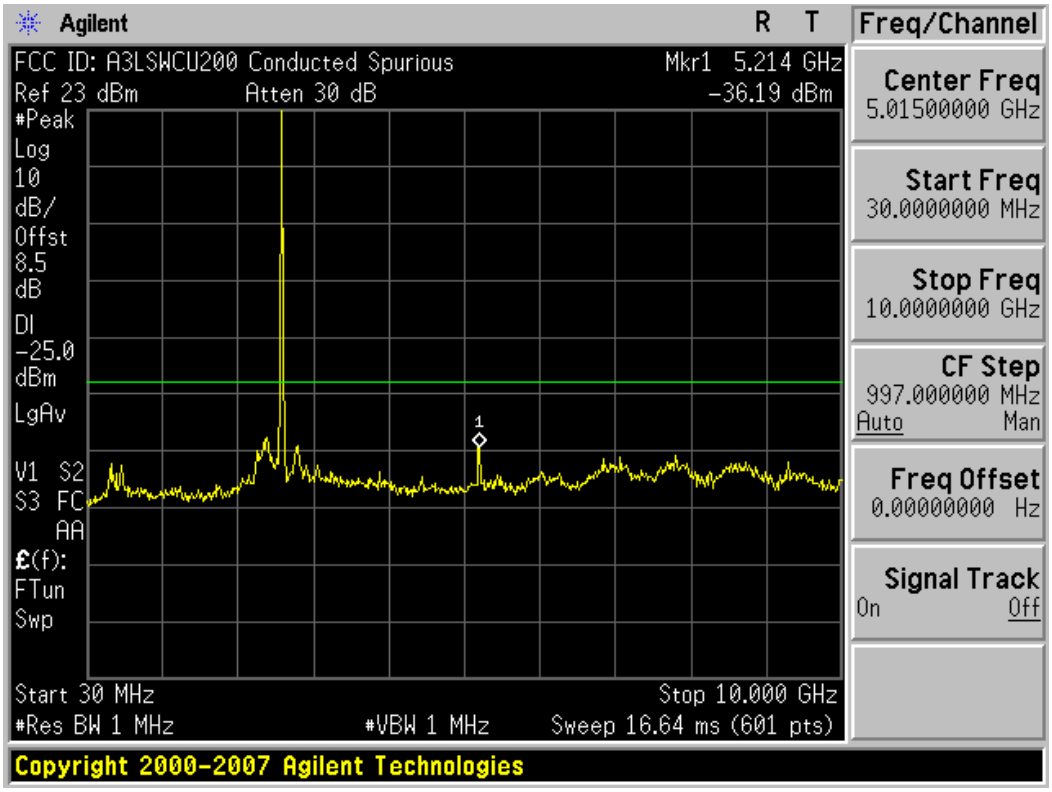


Plot 7-2. Conducted Spurious Plot (WiMAX Mode – Low Channel)

© 2008 PCTEST Engineering Laboratory, Inc.

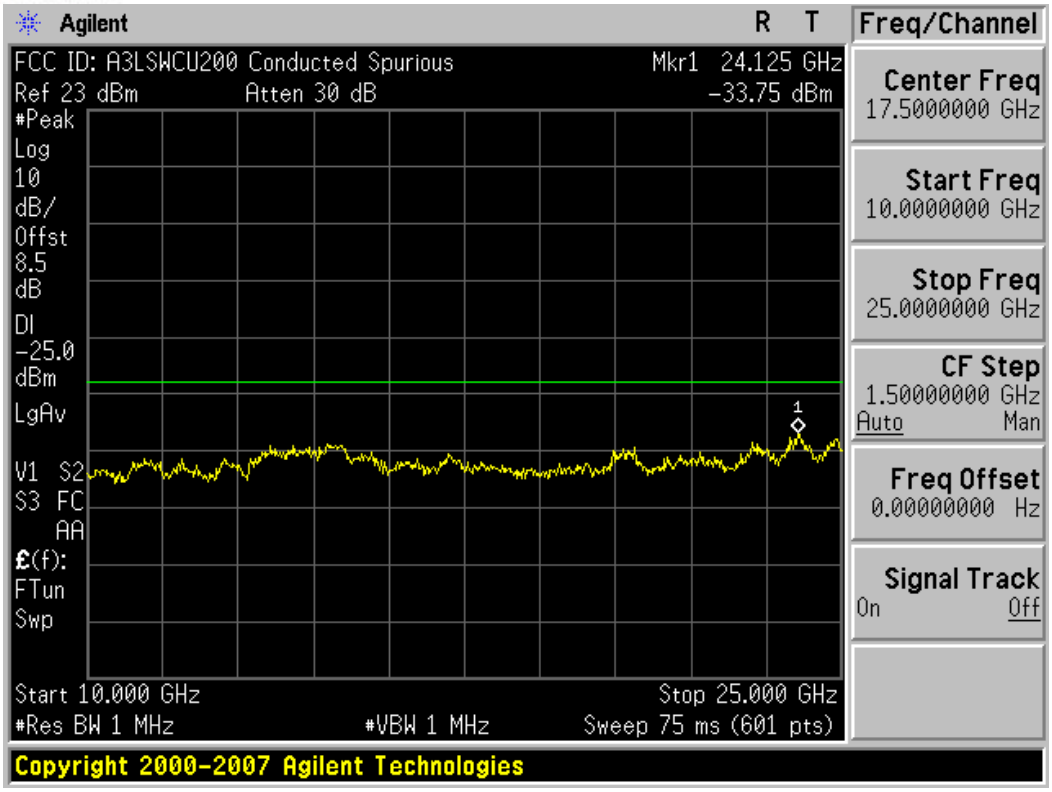


Plot 7-3. Band Edge Plot (WiMAX Mode – Low Channel)

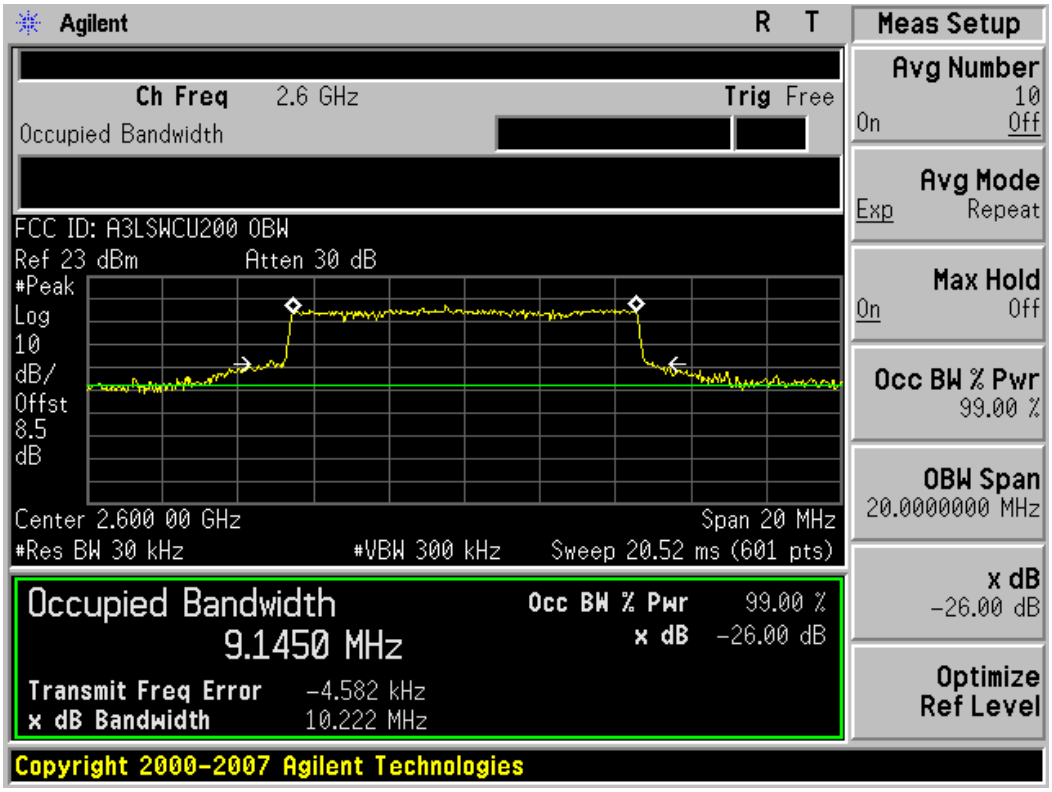


Plot 7-4. Conducted Spurious Plot (WiMAX Mode – Mid Channel)

© 2008 PCTEST Engineering Laboratory, Inc.

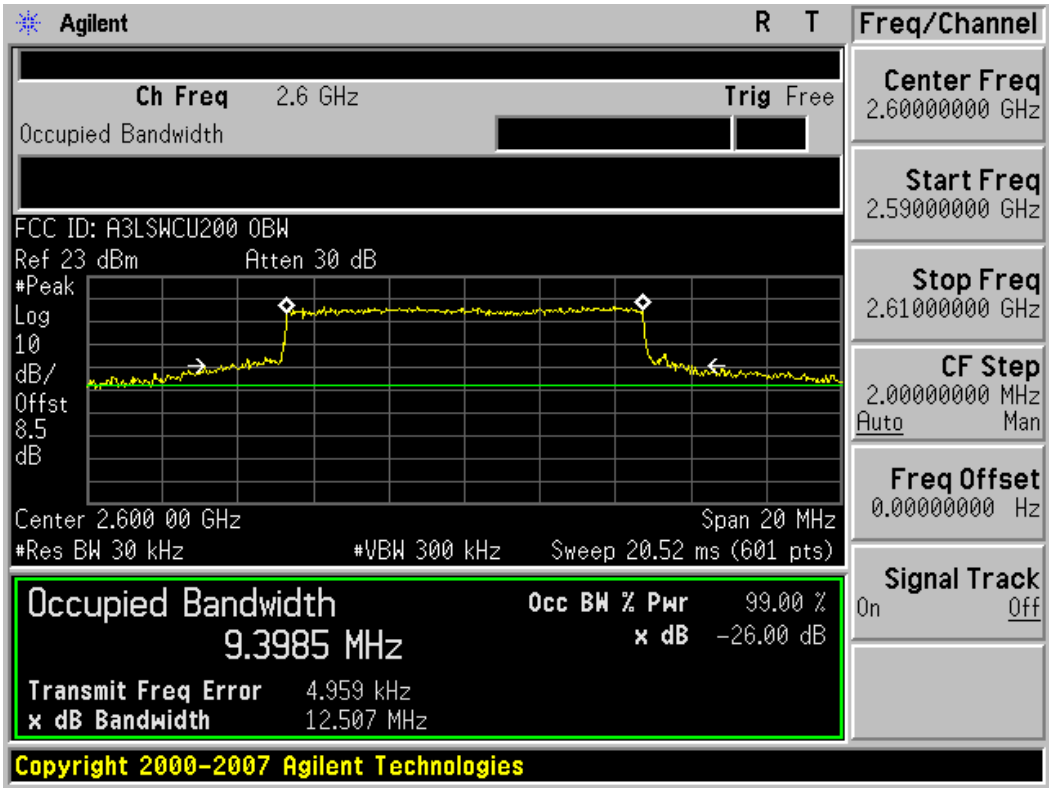


Plot 7-5. Conducted Spurious Plot (WiMAX Mode – Mid Channel)

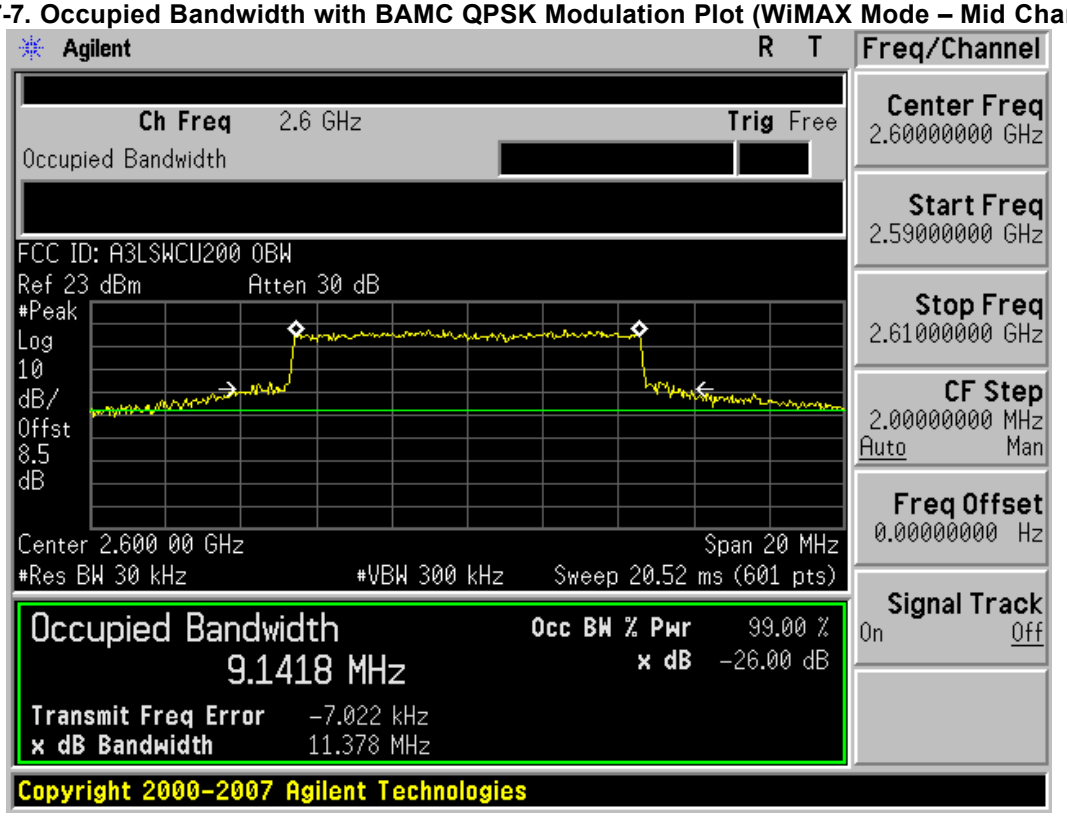


Plot 7-6. Occupied Bandwidth with PUSC QPSK Modulation Plot (WiMAX Mode – Mid Channel)

© 2008 PCTEST Engineering Laboratory, Inc.

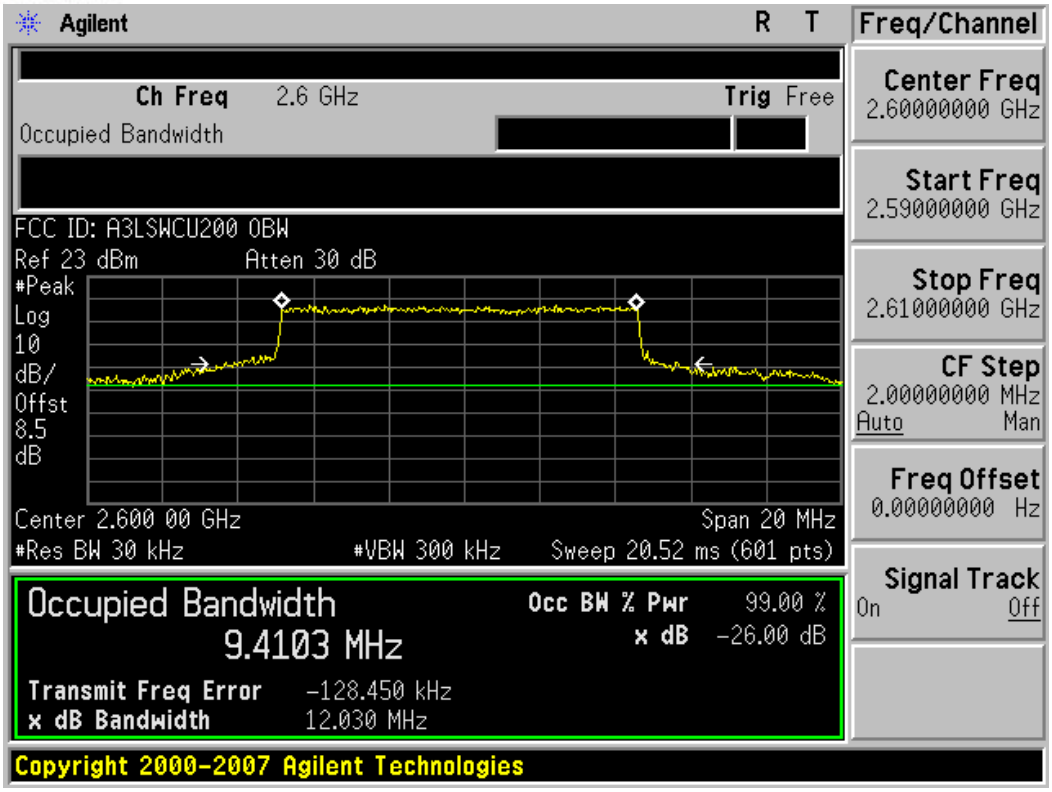


Plot 7-7. Occupied Bandwidth with BAMC QPSK Modulation Plot (WiMAX Mode – Mid Channel)

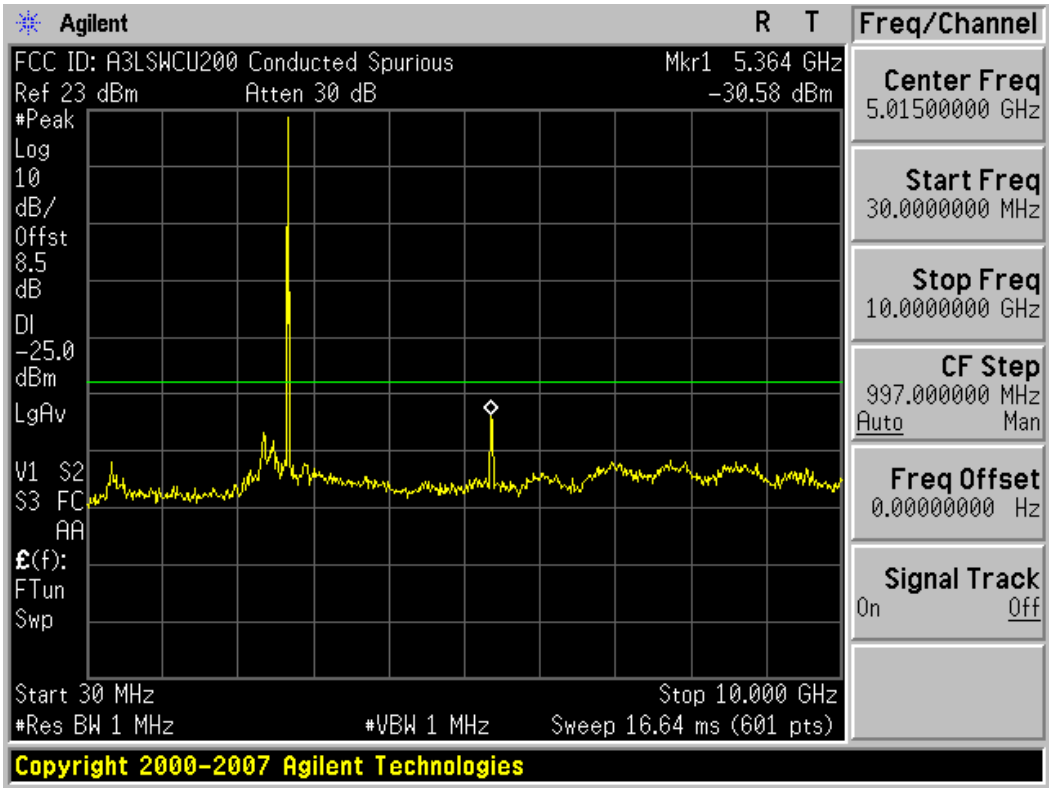


Plot 7-8. Occupied Bandwidth with PUSC 16QAM Modulation Plot (WiMAX Mode – Mid Channel)

© 2008 PCTEST Engineering Laboratory, Inc.

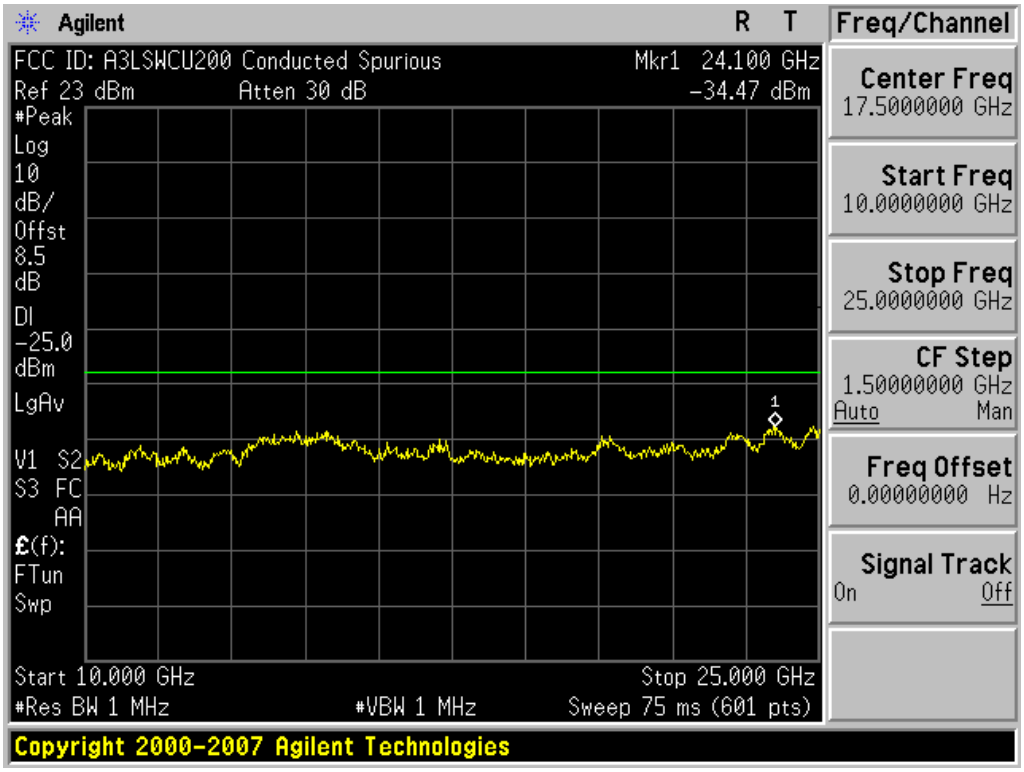


Plot 7-9. Occupied Bandwidth with BAMC 16QAM Modulation Plot (WiMAX Mode – Mid Channel)

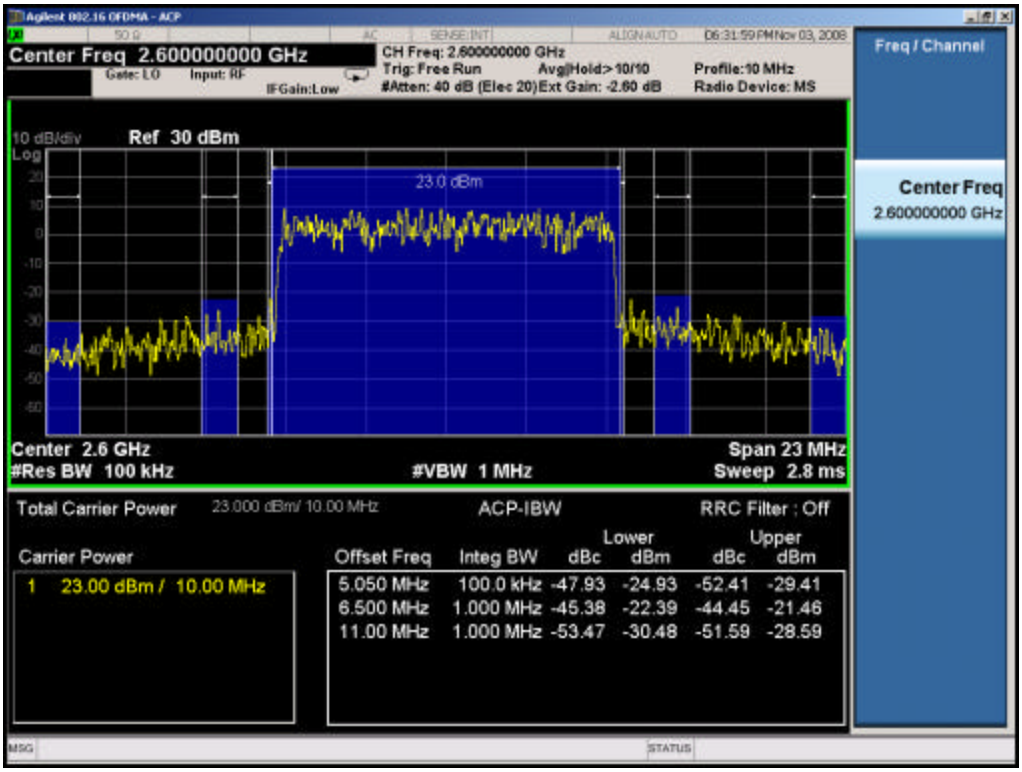


Plot 7-10. Conducted Spurious Plot (WiMAX Mode – High Channel)

© 2008 PCTEST Engineering Laboratory, Inc.



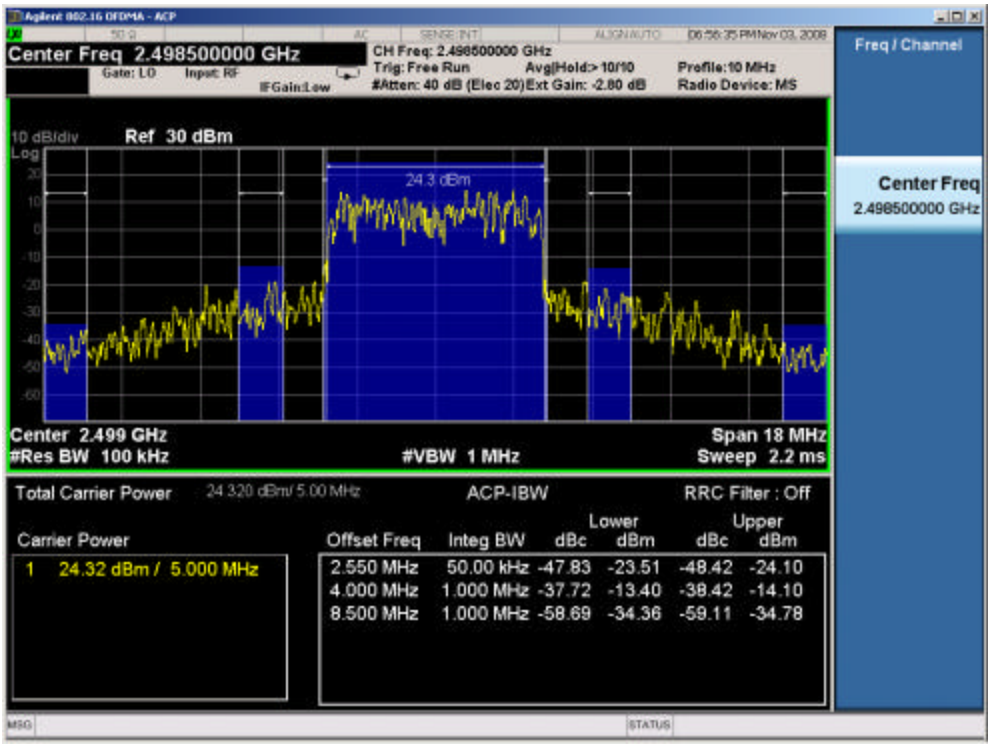
Plot 7-11. Conducted Spurious Plot (WiMAX Mode – High Channel)



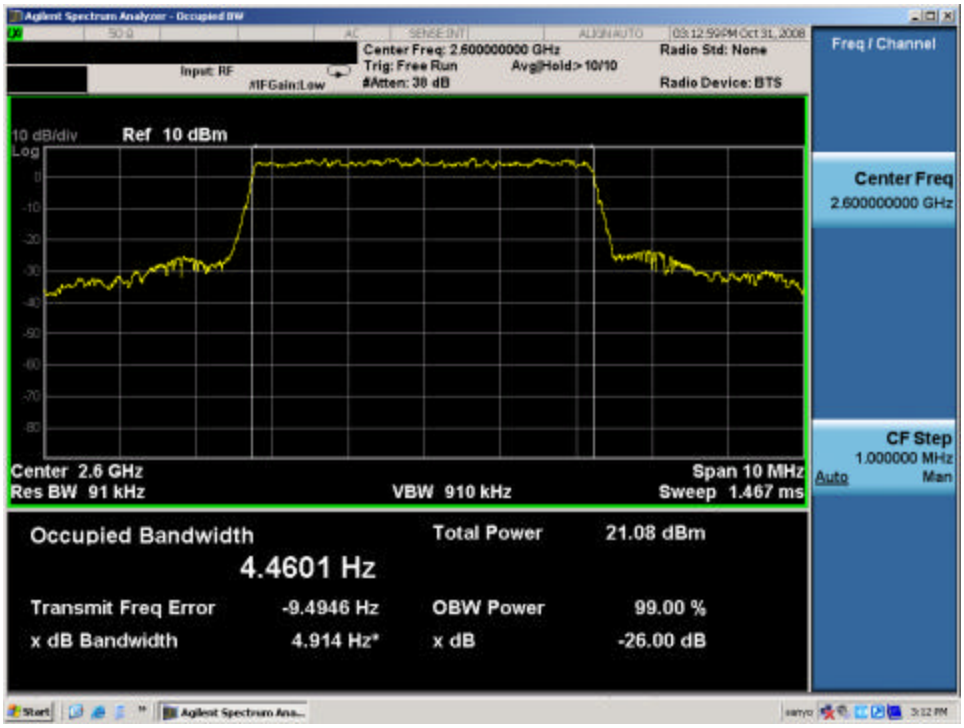
Plot 7-12. Band Edge Plot (WiMAX Mode – High Channel)

© 2008 PCTEST Engineering Laboratory, Inc.

8.0 PLOT(S) OF EMISSIONS – 5MHZ WIMAX

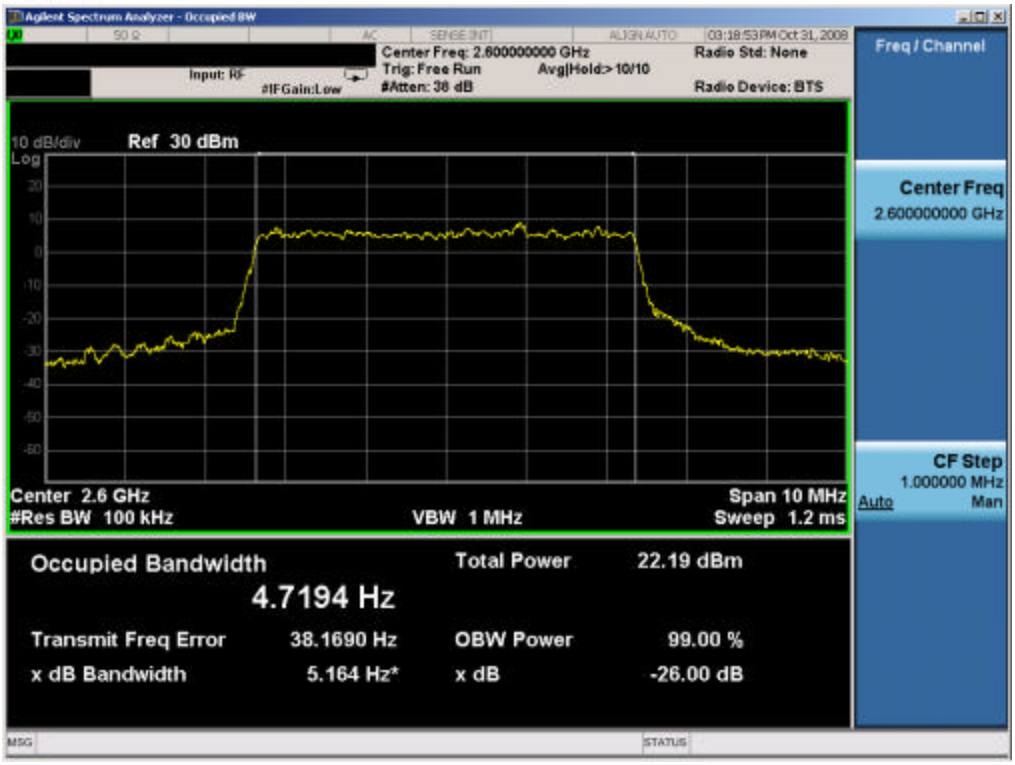


Plot 8-1. Band Edge Plot (WiMAX Mode – Low Channel)

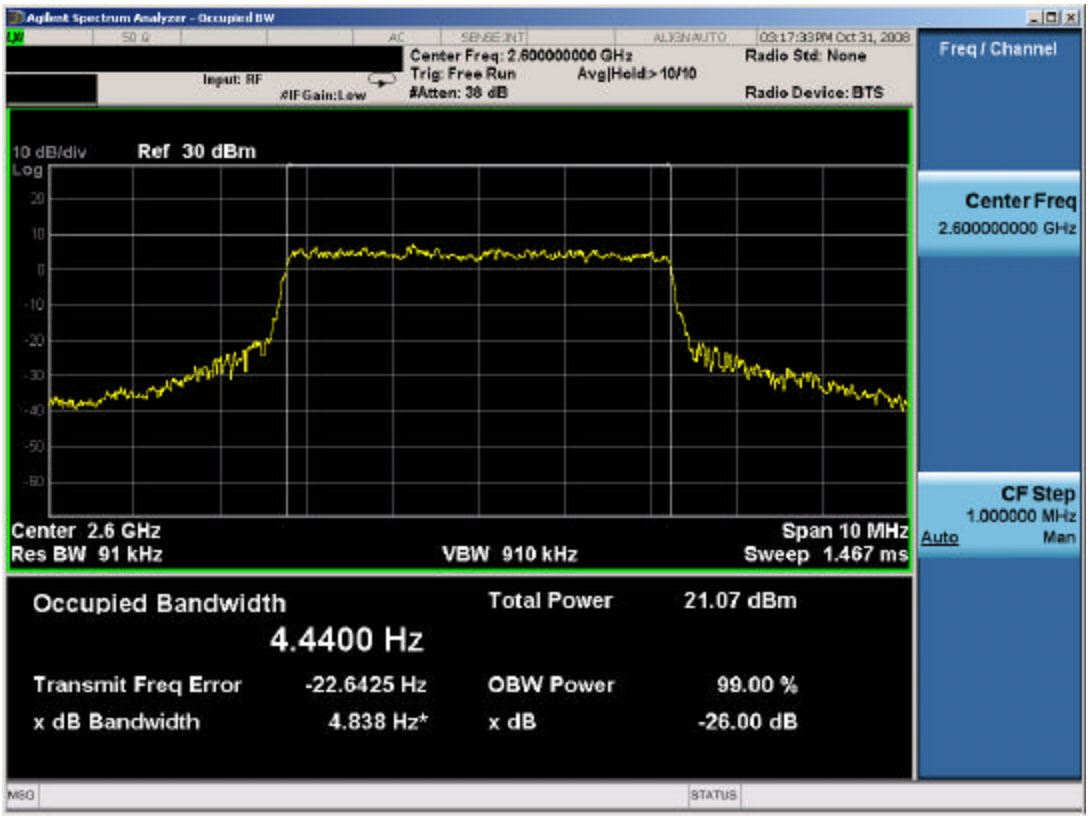


Plot 8-2. Occupied Bandwidth with PUSC QPSK Modulation Plot (WiMAX Mode – Mid Channel)

© 2008 PCTEST Engineering Laboratory, Inc.

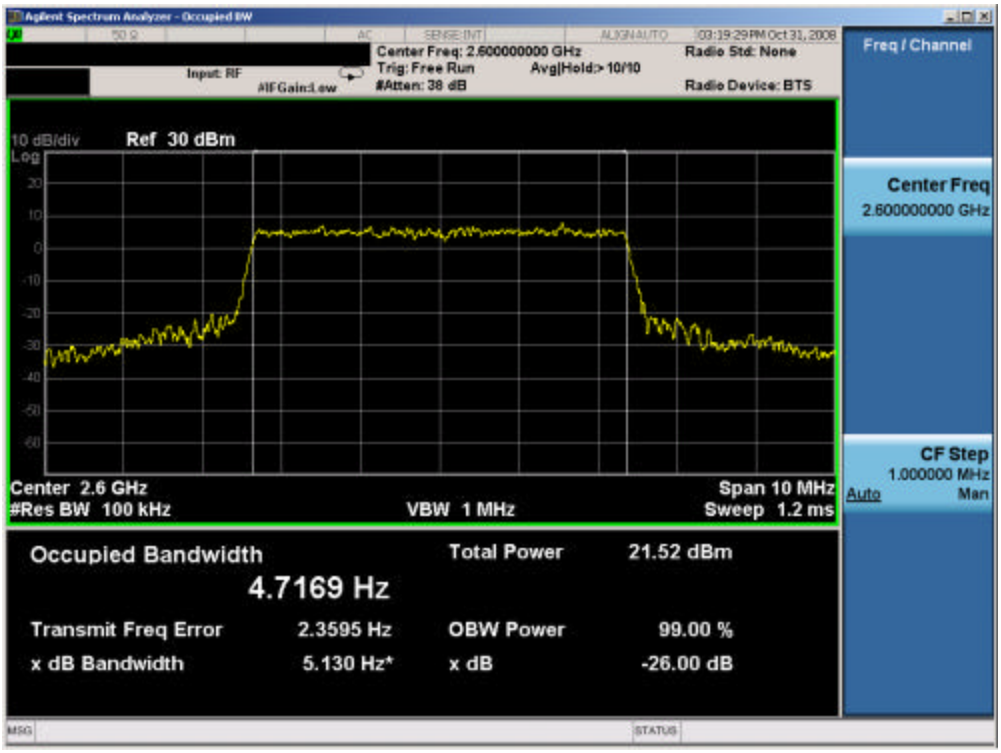


Plot 8-3. Occupied Bandwidth with BAMC QPSK Modulation Plot (WiMAX Mode – Mid Channel)

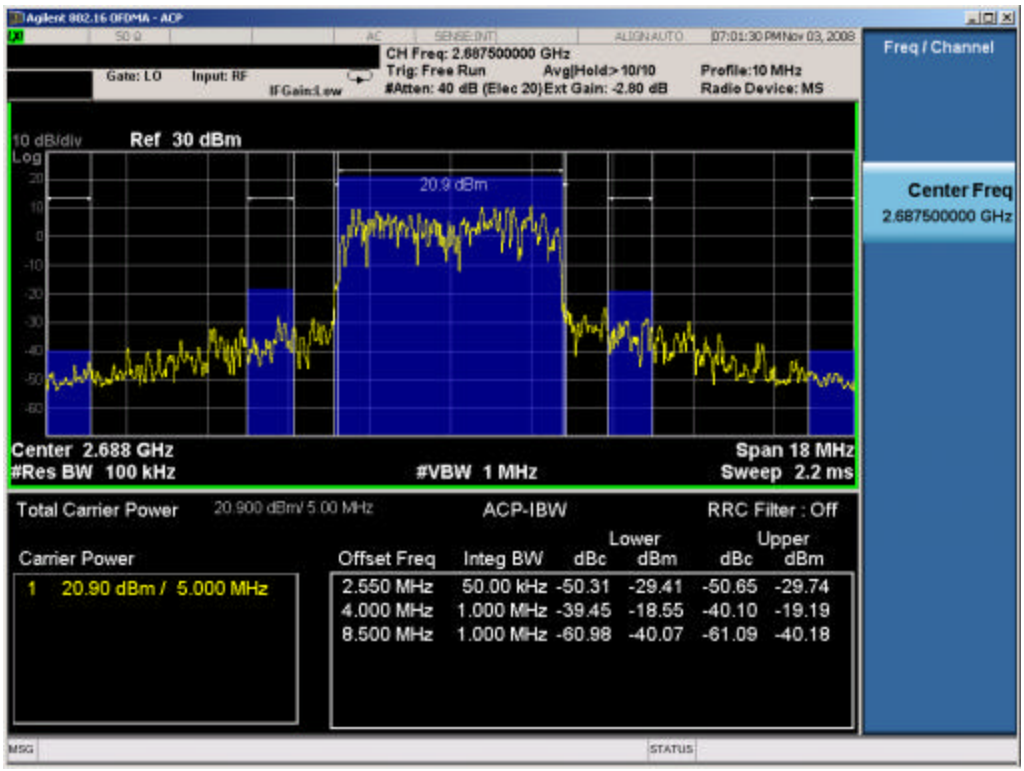


Plot 8-4. Occupied Bandwidth with PUSC 16QAM Modulation Plot (WiMAX Mode – Mid Channel)

© 2008 PCTEST Engineering Laboratory, Inc.



Plot 8-5. Occupied Bandwidth with BAMC 16QAM Modulation Plot (WiMAX Mode – Mid Channel)



Plot 8-6. Band Edge Plot (WiMAX Mode – High Channel)

© 2008 PCTEST Engineering Laboratory, Inc.

9.0 CONCLUSION

The data collected show that the **Samsung Wimax USB Modem FCC ID: A3LSWCU200** complies with all the requirements of Parts 2 and 27 of the FCC rules.

© 2008 PCTEST Engineering Laboratory, Inc.