

**EMC EVALUATION OF THE
VPN
ACCESS WIRELESS POINT DEVICE
IN ACCORDANCE WITH THE
FCC PART 15 SUBPART C
AND
FCC PART 15 SUBPART B**

Prepared For:

**VPN SYSTEMS, INC.
280 CHEESE FACTORY ROAD
HONEYE FALLS, NEW YORK 144272
ATTENTION: EDWARD SUOR**

Prepared By:

**ROBERT FOSTER
CHOMERICS TEST SERVICES
77 DRAGON COURT
WOBURN, MASSACHUSETTS 01888**

Date:

JULY 31, 2002

Test Report Number:

TR3317.02

Test Technician or Engineer: _____

CTS Approved Signatory: _____

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written approval of Chomerics Test Services.

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Appendix A: Test Log

LIST OF DEFINITIONS/ABBREVIATIONS

AC	Alternating Current
BB	Broadband
BW	Bandwidth
cm	Centimeter
C.P.U.	Calibrate Prior to Use
dB	Decibel
DC	Direct Current
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ER	Electric Radiation
EUT	Equipment Under Test
GHz	Gigahertz
Hz	Hertz
I-face	Interface
kHz	Kilohertz
m	Meter
MHz	Megahertz
mm	Millimeter
mS	Millisecond
mV	Millivolt
MR	Magnetic Radiation
NB	Narrowband
N.C.R.	No Calibration Required
PLC	Power Line Conduction
PPS	Pulses Per Second
uF	Microfarad
uH	Microhenry
uS	Microsecond
uV	Microvolt
U.W.C.	Use With Calibrated Equipment

1.0 GENERAL

1.1 Introduction

1.1.1 Purpose

The purpose of this report is to document the performance of the VPN Access Wireless Point Device during a variety of radio-performance tests and record the test requirements and procedures used. At the request of VPN, the tests were performed by Chomerics Test Service (CTS) of Woburn, Massachusetts. The assessment will determine the compliance or non-compliance to the requirements set by FCC Part 15 Subpart B and C.

Testing was performed during the period of April 4 through June 19, 2002 under purchase order number 23091.

1.1.2 Requirements

The requirements for the sequence of tests performed on the VPN Access Wireless Point Device are as follows:

FCC Part 15 Subpart B Class B

The transceiver and system shall meet the FCC Part 15 Subpart B Class B radiated and conducted emissions limits as stated in 15.107 and 15.109.

Radiated Emissions Limits		
Frequency (MHz)	Field Strength (uV/meter)	Measurement Distance (meters)
30-88	100	3
88-216	150	3
216-960	200	3
960-2500	500	3

Note: Conducted emissions are not applicable do to the fact that the VPN ISM Radio is powered by 48VDC.

FCC Part 15 Subpart C 15.247 Bandwidth

For Direct Sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

FCC Part 15 Subpart C 15.247 Output Power

For Direct Sequence systems, the maximum output power is 1 Watt.

FCC Part 15 Subpart C 15.247 Spurious

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

FCC Part 15 Subpart C 15.247 Power Spectral Density

For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any interval of continuous transmission.

FCC Part 15 Subpart C 15.247 Processing Gain

The processing gain of a direct sequence system shall be at least 10 dB. The processing gain represents the improvement to the received signal-to-noise ratio, after filtering to the information bandwidth, from the spreading/despreading function. The processing gain may be determined by the following methods:

1. As measured at the demodulated output of the receiver.
2. As measured using the CW jamming margin method.

FCC Part 15 Subpart C 15.249 Field strength of the Fundamental and Harmonics

Field Strength of Fundamental and Harmonics		
Frequency (MHz)	Fundamental (mV/meter)	Harmonics (uV/meter)
2400-2483.5	50	500

FCC Part 15 Subpart C Band-Edge

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power, based on either an RF conducted or a radiated measurement.

1.2 Administrative Data

1.2.1 Test Facility

Chomerics test facility is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for NVLAP Codes 12F01; FCC test methods – 47 CFR Part 15 – Digital Devices, 12F01a; Conducted Emissions, and 12F01b; Radiated Emissions under NVLAP Accreditation Number 100296-0. Tests within this report not conforming to these NVLAP Codes are not covered under Chomerics NVLAP accreditation. Chomerics NVLAP accreditation covers test method 12/CIS22 for IEC/CISPR 22:1993, 12/CIS22a for IEC/CISPR 22 Amendment 1:1995 and Amendment 2:1996. Chomerics NVLAP accreditation code 12/CIS22b covers Chinese National Standard CNS 13438:1997.

Chomerics Radiated and Conducted Emissions testing to AS/NZS3548 is accredited to the Australian Telecommunications Authority (AUSTEL) under file number A92/TH/0048.

Chomerics' Open Area Test Sites A and B are accredited for Radiated and Conducted Emissions through Industry Canada under file numbers IC2959A and IC2959B respectively.

Chomerics' Open Area Test Site A is accredited to the Voluntary Control Council for Interference (VCCI) in Japan for Radiated and Conducted Emissions testing under file R-749 and C-770 respectively.

Chomerics test facility operates under the current revision of Chomerics Quality Assurance (QA) Manual Document Number QA002.

The QA Manual has been constructed to reflect a quality program in accordance with the requirements of the National Institute of Standards and Technology (NIST), ISO 9002, ISO Guide 25, NIST Handbook 150, EN 45001, MIL-I-45208A, MIL-STD-461D, 462D and Chomerics Quality Assurance Program (QAP).

The QA Manual outlines and describes the procedures for establishing and maintaining the quality of analysis, research, inspection, and testing within Chomerics Test Service (CTS).

This test report does not represent an endorsement by the U.S. Government.

The results and/or conclusions within this test report refer and/or apply only to the unit(s) tested as defined by this report.

Measurements performed for this test are traceable to the National Institute of Standards and Technology (NIST) based on the fact that all test equipment used for the measurements were previously calibrated using standards traceable to NIST.

No deviations, additions to, or exclusions from the test specification(s) were made.

The system amplitude accuracy for the measurements made during the radiated emission tests was $\pm 3\text{dB}$. Chomerics Test Services measurement uncertainty calculations are available for review upon request.

1.2.2 Equipment Calibration

The calibration of Chomerics test facility equipment is controlled under the current edition of Chomerics Laboratory Test Equipment Calibration Manual Document Number QA001.

The test equipment used throughout this test sequence conforms to laboratory calibration standards, MIL-STD-45662, traceable to the National Institute of Standards and Technology. The date of the next due scheduled calibration is listed in each test section for the applicable equipment.

All test equipment is calibrated in one year intervals

1.2.3 Personnel

The test personnel performing or supervising the tests are accredited by the National Association of Radio and Telecommunications Engineers, Inc. (NARTE) as Certified Electromagnetic Compatibility Engineers (N.C.E.) and Technicians (N.C.T.).

1.3 Test Set-up

1.3.1 Test Site Matrix

The test locations used for the emissions and immunity tests are as follows: (Refer to Section 1.3.2 for test site descriptions).

Test Performed

Radiated Emission Subpart B
Bandwidth 15.247
Power Output 15.247
Field Strength Fundamental
Spurious Emission 15.247
Band Edge
Power Spectral Density
Strength Harmonics

Test Site

Open Area Test Site A
Open Area Test Site A
Open Area Test Site A
Open Area Test Site A
Open Area Test Site A
Open Area Test Site A
Open Area Test Site A
Open Area Test Site A

1.3.2 Test Site Descriptions

The following is a list of the test sites and descriptions of each. Refer to Section 1.3.1 for specific test sites used for testing.

Open Area Test Site A: Chomerics Open Area Test Site "A" if used for this test program is located in the lower parking lot attached to the Seeger Building at Chomerics, 84 Dragon Court, Woburn, Massachusetts (see Figure 1). Parking is permitted on one side of test site "A" at a discrete distance from the imaginary ellipse.

The Open Area Test Site A enclosure is a wooden structure measuring 56 x 30 x 25 feet in size with galvanized steel sheet metal used as the ground plane. The structure is sized to allow 3 meter measurements and is heated and/or air conditioned.

The structure used to support equipment under test is an EMCO 4 foot diameter motorized turntable. For tabletop equipment, a wooden table measuring 1.5 x 1 meter in size is positioned at the center of the turntable, at the proper height above the ground plane.

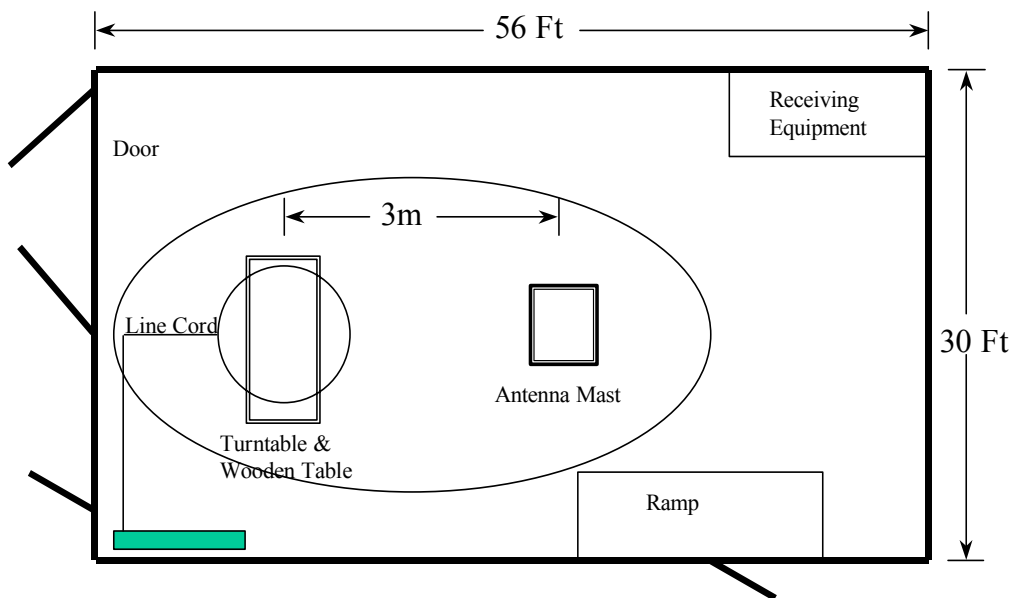
The area at the end of the Open Area Test Site "A" is the location for the test personnel and equipment to ensure they are outside the imaginary ellipse.

The available AC power within Open Area Test Site "A" is 120V 60Hz Single Phase 60Amps; 208V 60Hz Three Phase 60Amps; 208V 60Hz Single Phase 60Amps; 230V 50Hz Single Phase 50Amps.

This Site is listed with the Federal Communications Commissions (FCC).

OPEN AREA TEST SITE A

Figure 1



Key:  = Power board

1.3.3 Equipment Under Test

The VPN Access Wireless Point Device is a wireless LAN 802.11b multi point access device that consist of the following:

1. One Cisco Aironet AIR-AP3552E2C-A-K9 Access Point Device with dual RP-TNC-Female ports.
2. One Cisco Aironet AIR-PWR-INJ Ethernet power injector
3. One LMR-400 Coax Cable, RP-TNC-Male to N-Male
4. One 50 Ohm, 15 watt load
5. One 2.2 dBi Omni-Directional Antenna
6. One 120° 14dBi Sector Panel Antenna
7. One 8 dBi Omni-Directional Antenna

2.0 SUMMARY

The terms "Passed" or "Failed" in this section are intended to guide the reader as to whether or not the EUT met the minimum Performance Criteria that can be interpreted from the FCC Parts 2, 15 and 90. The "Results" paragraph in each test section to follow, and the test data sheets, will outline specifically how the EUT performed during each test.

Radiated Emission Subpart B	Passed
Bandwidth 15.247	Passed
Power Output 15.247	Passed
Field Strength Fundamental	Passed
Spurious Emission 15.247	Passed
Band Edge	Passed
Power Spectral Density	Passed
Field Strength Harmonics	Passed

2.1 Summary of Recommendations

The VPN Access Wireless Point Device will not require modifications in order to insure compliance with CFR 47 FCC Part 15 Subparts B and C.

3.0 TESTS PERFORMED**3.1 FCC Part 15 Subpart B Radiated Emissions****3.1.1 Equipment Used**

Equipment Used	Asset #	Serial #	Cal Date
Tektronix 496 Spectrum Analyzer	56	B010206	4/03
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02
Rhode and Schwartz ESV Test Receiver	521	979531/031	1/03
Hewlett Packard 8447D Pre Amp	633	2805A03022	1/03
EMCO 3120 Tuned Dipole Antenna B1	477	56	1/03
EMCO 3121 Tuned Dipole Antenna B2	478	176	1/03
EMCO 3121 Tuned Dipole Antenna B3	479	728	1/03
EMCO 3109 Biconical Antenna	119	2414	1/03
EMCO 3146 Log Periodic Antenna	377	3380	1/03
Eaton 94626-1 Horn Antenna	334	145	1/03
EMCO 3115 Microwave Horn Antenna	376	2796	1/03
EMCO 3105 Microwave Horn Antenna	78	2118	1/03

3.1.2 Test Conditions

The test procedure of ANSI C63.4 was used for this test. Radiated emissions testing were performed with the Access Wireless Point Device set up on a wooden table above the turntable at a distance of 3 meters from a tuned dipole antenna within Open Area Test Site A.

The Access Wireless Point Device configured to operate in the receive mode of operation to maximize the emissions. The Access Wireless Point Device was set up and powered by 120V 60Hz for radiated emission tests. The worst case signals detected were recorded.

3.1.3 Test Method

The test method of ANSI C63.4 was followed. For the radiated emission measurements, a manual scan was performed from 30MHz to 25GHz. During this scan, the antenna, turntable and the EUT's cable positions were manipulated to maximize the emission levels in a given frequency band displayed on the spectrum analyzer.

3.1.4 Results

The VPN Access Wireless Point Device meets the FCC Part 15, Subpart B, Class B requirements.

3.1.5 Test Data

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: VPN

EQUIPMENT: ACCESS WIRELESS POINT DEVICE

TESTED BY: RICH BARBARO

OPERATING MODE: RECEIVE MODE

BANDWIDTH: 120 KHz (QP)

OTHER (SPECIFY)

FREQUENCY RANGE: 30MHz – 1 GHz

DATE: APRIL 4, 2002

TEST NUMBER: ONE

COUPLING DEVICE: ANTENNA

TEST SPEC: FCC PART 15.209

PROCEDURE: ANSI C63.4

ANTENNA DISTANCE: 3 METERS

FREQUENCY MHz	PEAK MEASURED LEVEL -dBm	QUASI- PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB	FIELD LEVEL dBuV/m ✧	LIMIT dBuV/m (QP)
134.4	-	21	2.0	0	H	12.3	33.3	40.0
200.0	-	22	1.5	180	H	15.9	37.9	43.5
250.0	-	15	1.0	270	H	18.1	33.1	46.0
300.0	-	13	1.0	45	H	20.3	33.3	46.0
308.0	-	9	1.0	90	H	20.5	29.5	46.0
346.4	-	15	1.0	90	H	21.4	36.4	46.0
367.4	-	12	1.0	270	H	22.0	34.0	46.0
396.0	-	14	1.0	270	H	22.9	36.9	46.0
400.0	-	12	1.0	270	H	23.0	35.0	46.0
410.66	-	12	1.0	270	H	23.1	35.1	46.0
440.0	-	17	1.0	45	H	23.6	40.6	46.0
444.67	-	14	1.0	45	H	23.7	37.7	46.0

✧ All signals greater than 3dB from the limit are calculate to the nearest whole number.

Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)

Ambient Temperature: 71°F

Humidity: 30%

Atmospheric Pressure: 30.3"

VPN Access Wireless Point Device
Document #: TR3317.02
Date: July 31, 2002

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER, RICH BARBARO
OPERATING MODE: RECEIVE MODE
BANDWIDTH: 100 KHz (PEAK)/120 KHz (QP) AND
 1MHz PEAK
FREQUENCY RANGE: 30MHz – 25 GHz

DATE: JUNE 5, 2002
TEST NUMBER: 1
TEST SPEC: FCC PART 15 SUBPART B CLASS B
PROCEDURE: ANSI C63.4
ANTENNA DISTANCE: 3 METERS

FREQUENCY MHz	PEAK MEASURED LEVEL -dBm	QUASI- PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB	FIELD LEVEL dBuV/m ✧	LIMIT dBuV/m (QP)
134.4	-	21	2.0	0	H	12.3	33.3	40.0
200.0	-	22	1.5	180	H	15.9	37.9	43.5
250.0	-	15	1.0	270	H	18.1	33.1	46.0
300.0	-	13	1.0	45	H	20.3	33.3	46.0
308.0	-	9	1.0	90	H	20.5	29.5	46.0
346.4	-	15	1.0	90	H	21.4	36.4	46.0
367.4	-	12	1.0	270	H	22.0	34.0	46.0
396.0	-	14	1.0	270	H	22.9	36.9	46.0
400.0	-	12	1.0	270	H	23.0	35.0	46.0
410.66	-	12	1.0	270	H	23.1	35.1	46.0
440.0	-	17	1.0	45	H	23.6	40.6	46.0
444.67	-	14	1.0	45	H	23.7	37.7	46.0

✧ All signals greater than 3dB from the limit are calculate to the nearest whole number.

✧ Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)

Ambient Temperature: 68°F

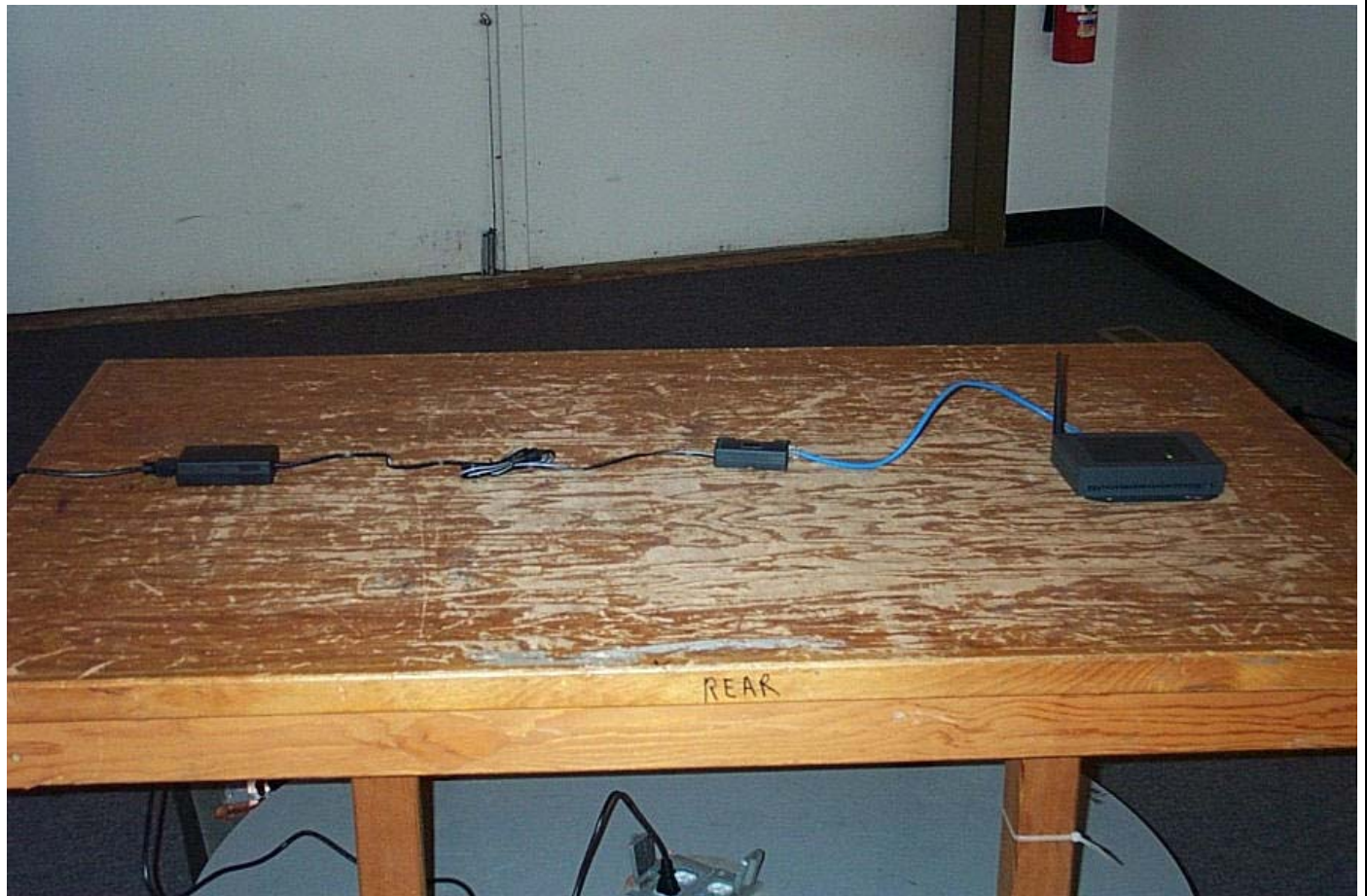
Humidity: 25 %

Atmospheric Pressure: 29.8 ”

NOTES: * = Noise floor of equipment.

FORM CTS-DS-001R

VPN Access Wireless Point Device
 Document #: TR3317.02
 Date: July 31, 2002

3.1.6 Photographic Documentation**CUSTOMER: VPN****DATE: 06/05/02****EQUIPMENT: ACCESS WIRELESS POINT DEVICE****TEST NUMBER: 1****TESTED BY: ROBERT FOSTER**Photograph Description: Radiated set-up**FORM CTS-PHOTO**

VPN Access Wireless Point Device
Document #: TR3317.02
Date: July 31, 2002

TEST SERVICES**CUSTOMER: VPN****DATE: 06/05/02****EQUIPMENT: ACCESS WIRELESS POINT DEVICE****TEST NUMBER: 1****TESTED BY: ROBERT FOSTER**

Photograph Description: Radiated set-up

FORM CTS-PHOTO

VPN Access Wireless Point Device
Document #: TR3317.02
Date: July 31, 2002

3.2 FCC Part 15 Subpart C 15.247 Bandwidth**3.2.1 Equipment Used**

Test Equipment	Asset #	Serial #	Cal Date
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02
EMCO 3115 Microwave Horn Antenna	376	2796	1/03

3.2.2 Test Conditions

Bandwidth measurement testing was performed with the Access Wireless Point Device set up on a wooden table above the turntable with the output connected to the spectrum analyzer with the output connected to the spectrum analyzer. The Access Wireless Point Device was configured to operate in the continuous full power mode of operation. The test was performed at the low, mid, and high frequency.

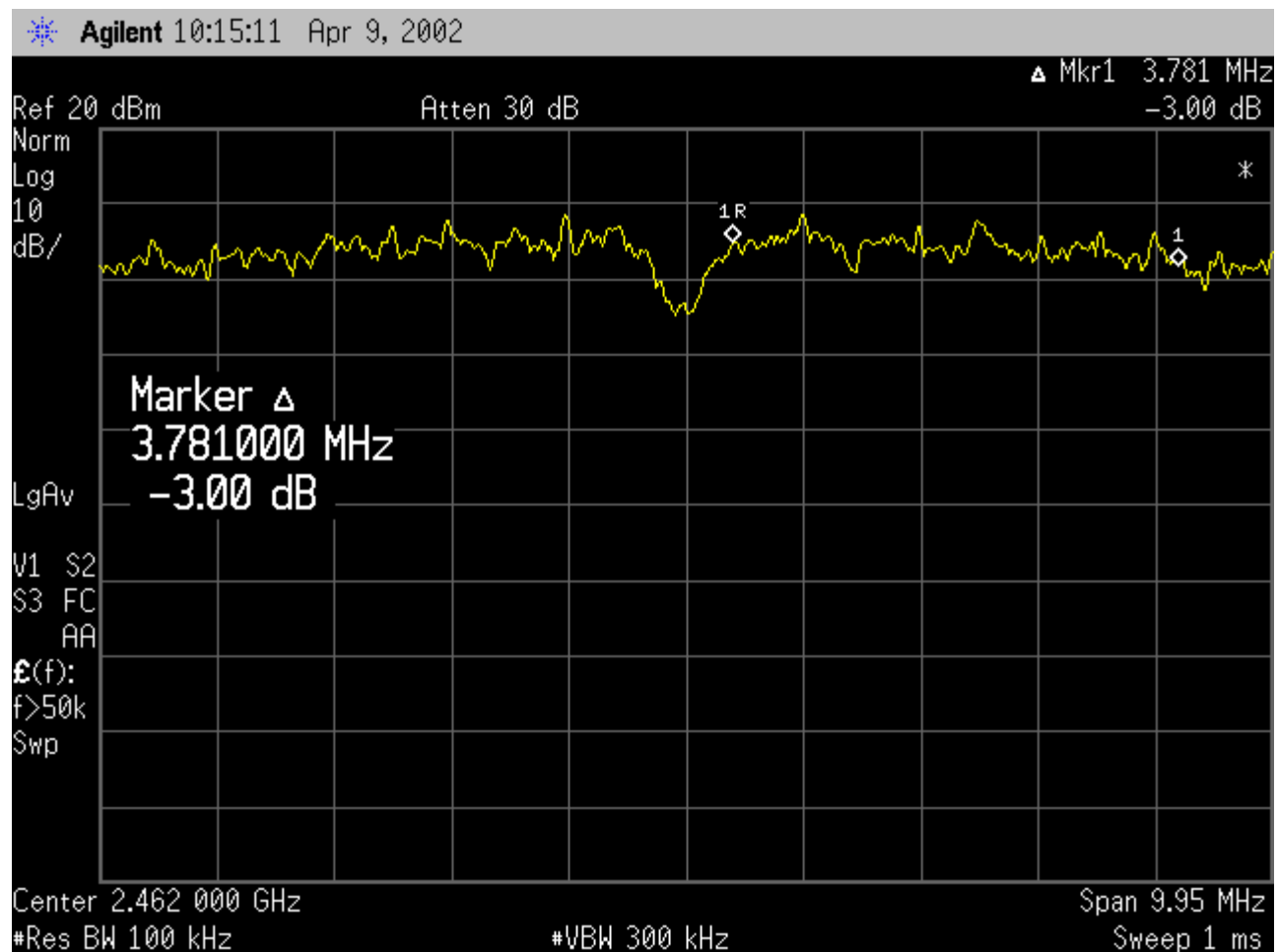
3.2.3 Test Method

The test method of “Guidance on Measurements for Direct Sequence Spread Spectrum Systems” Appendix C of Docket No. 96-8 FCC 97-114 was followed.

The bandwidth of the Transceiver Tower was measured with the output of the transceiver directly connected to the in put of the Spectrum Analyzer.

3.2.4 Results

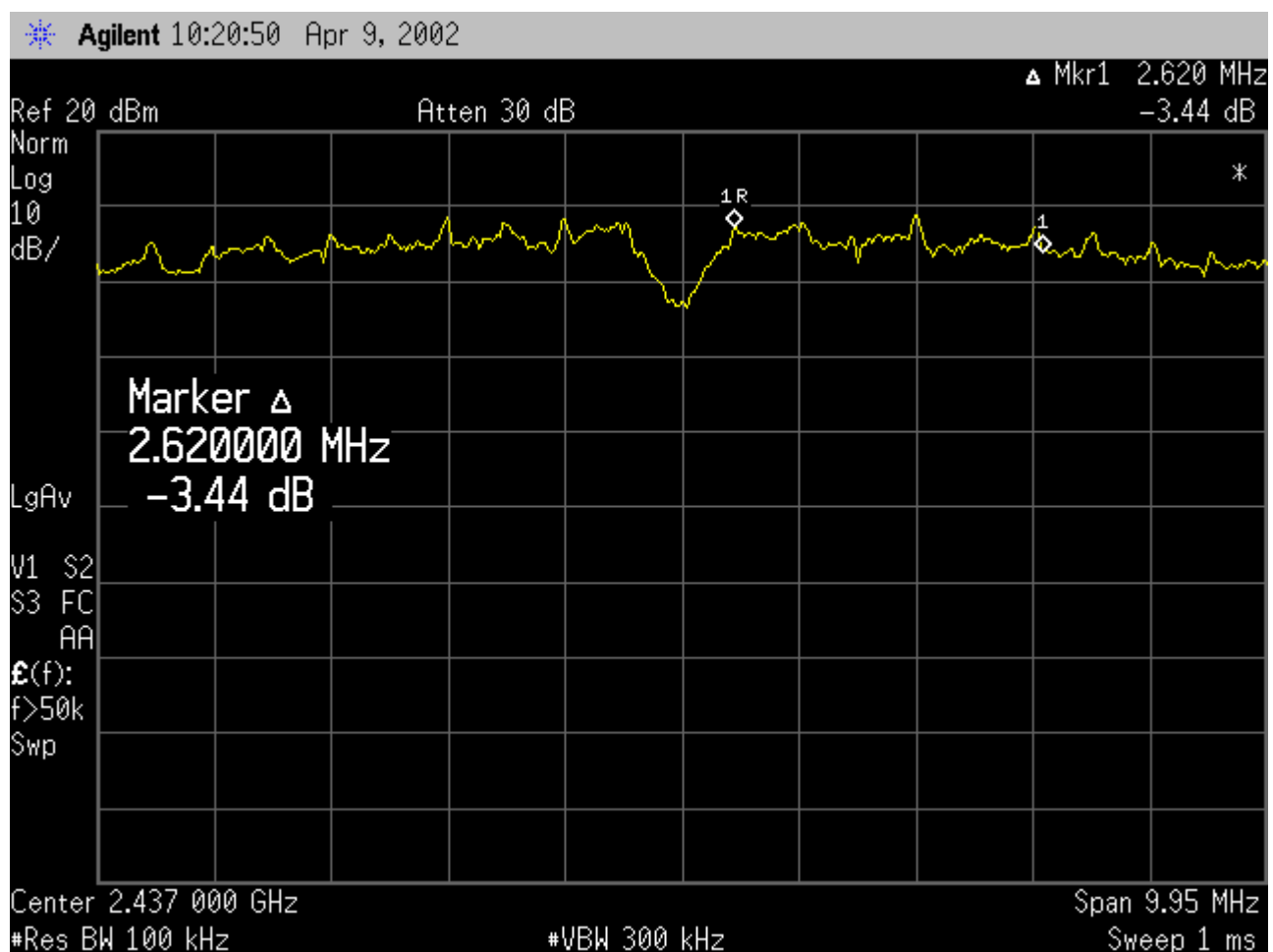
The VPN Access Wireless Point Device meets the bandwidth requirements of FCC Part 15 Subpart C 15.247 bandwidth requirements.

3.2.5 Test Data**BANDWIDTH MEASUREMENTS****CUSTOMER: VPN****EQUIPMENT: ACCESS WIRELESS POINT DEVICE****TESTED BY: ROBERT FOSTER****OPERATING MODE: CONTINUOUS TRANSMISSION****DATE: JUNE 7, 2002****TEST NUMBER: 2****PROCEDURE: 97-114****High Frequency**

BANDWIDTH MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: CONTINUOUS TRANSMISSION

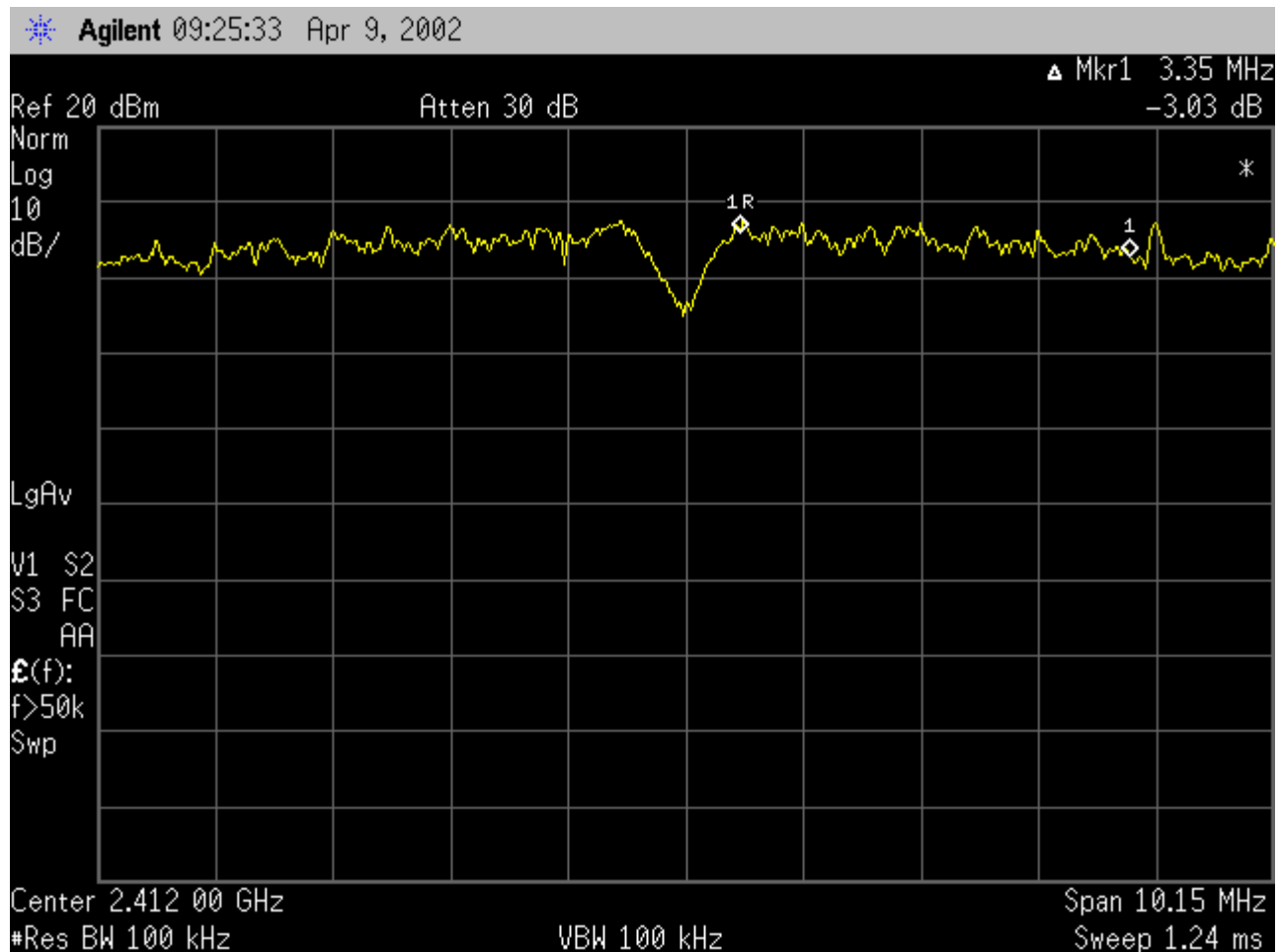
DATE: JUNE 7, 2002
TEST NUMBER: 2
PROCEDURE: 97-114
Mid. Frequency



BANDWIDTH MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: CONTINUOUS TRANSMISSION

DATE: JUNE 7, 2002
TEST NUMBER: 2
PROCEDURE: 97-114
Low Frequency



3.3 FCC Part 15 Subpart C Output Power

3.3.1 Equipment Used

Test Equipment	Asset #	Serial #	Cal Date
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02

3.3.2 Test Conditions

Output Power tests were performed on the VPN Access Wireless Point Device, on the Access Wireless Point Device. The Output Power measurement tests were performed with the Access Wireless Point Device placed in the open area test site with the output connected to the spectrum analyzer. The Access Wireless Point Device was configured to operate in the continuous full power mode of operation. The test was performed at the low, mid, and high frequencies.

3.3.3 Test Method

The test method of “Guidance on Measurements for Direct Sequence Spread Spectrum Systems” Appendix C of Docket No. 96-8 FCC 97-114 was followed.

The Output Power of the Access Wireless Point Device was measured with the output of the transceiver directly connected to the in put of the Spectrum Analyzer.

3.3.4 Results

The VPN Access Wireless Point Device meets the Output Power requirements of FCC Part 15 Subpart C 15.247.

3.3.5 Test Data

OUTPUT POWER MEASUREMENTS

CUSTOMER: VPN

EQUIPMENT: ACCESS WIRELESS POINT DEVICE

TESTED BY: ROBERT FOSTER

OPERATING MODE: CONTINUOUS TRANSMIT

DATE: JUNE 7, 2002

TEST NUMBER: 3

TEST SPEC: FCC PART 15 SUBPART C

TEST PROCEDURE: FCC 97-114

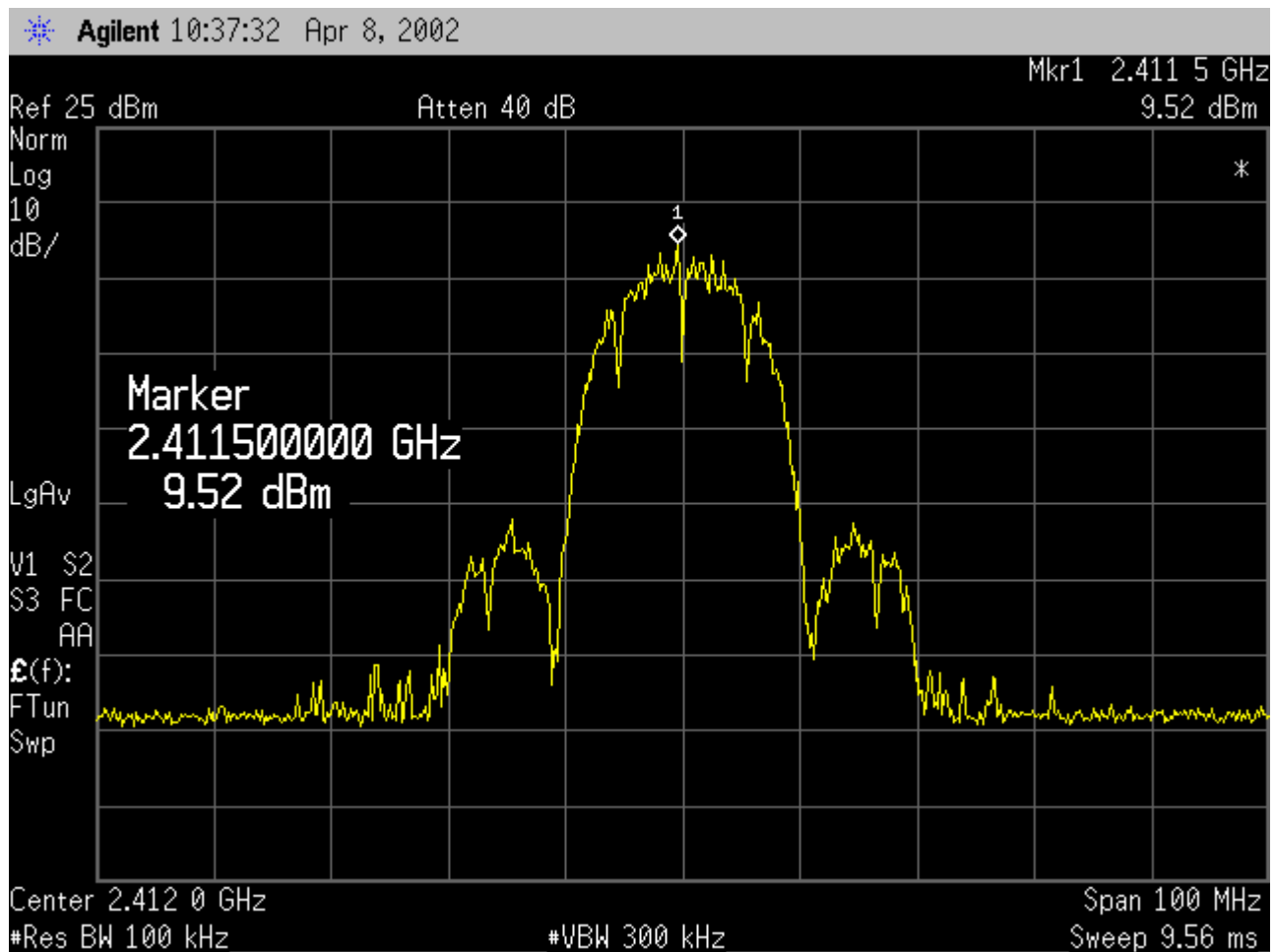
FREQUENCY MHZ	PEAK MEASURED LEVEL dBm	CABLE LOSS dB	FIELD LEVEL dBm	LIMIT dBm	LIMIT W
2412	9.6	0.3	9.9	30	1
2.437	9.7	0.3	10	30	1
2.462	9.7	0.3	10	30	1

**NOTES: * Measurement made with Power Meter
FORM CTS-DS-001R**

OUTPUT POWER

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: CONTINUOUS TRANSMISSION

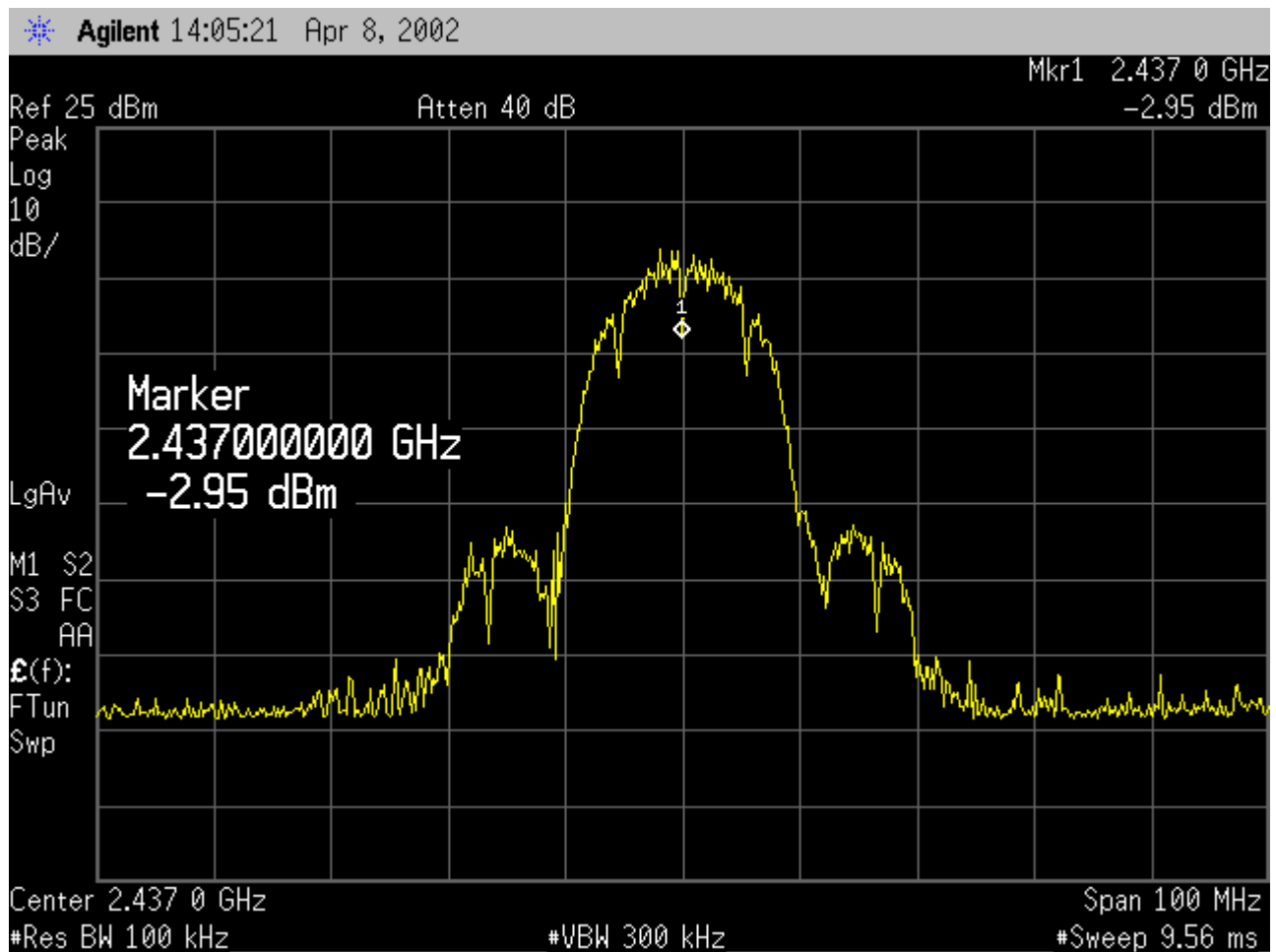
DATE: JUNE 7, 2002
TEST NUMBER: 3
PROCEDURE: 97-114
Low Frequency



OUTPUT POWER

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: CONTINUOUS TRANSMISSION

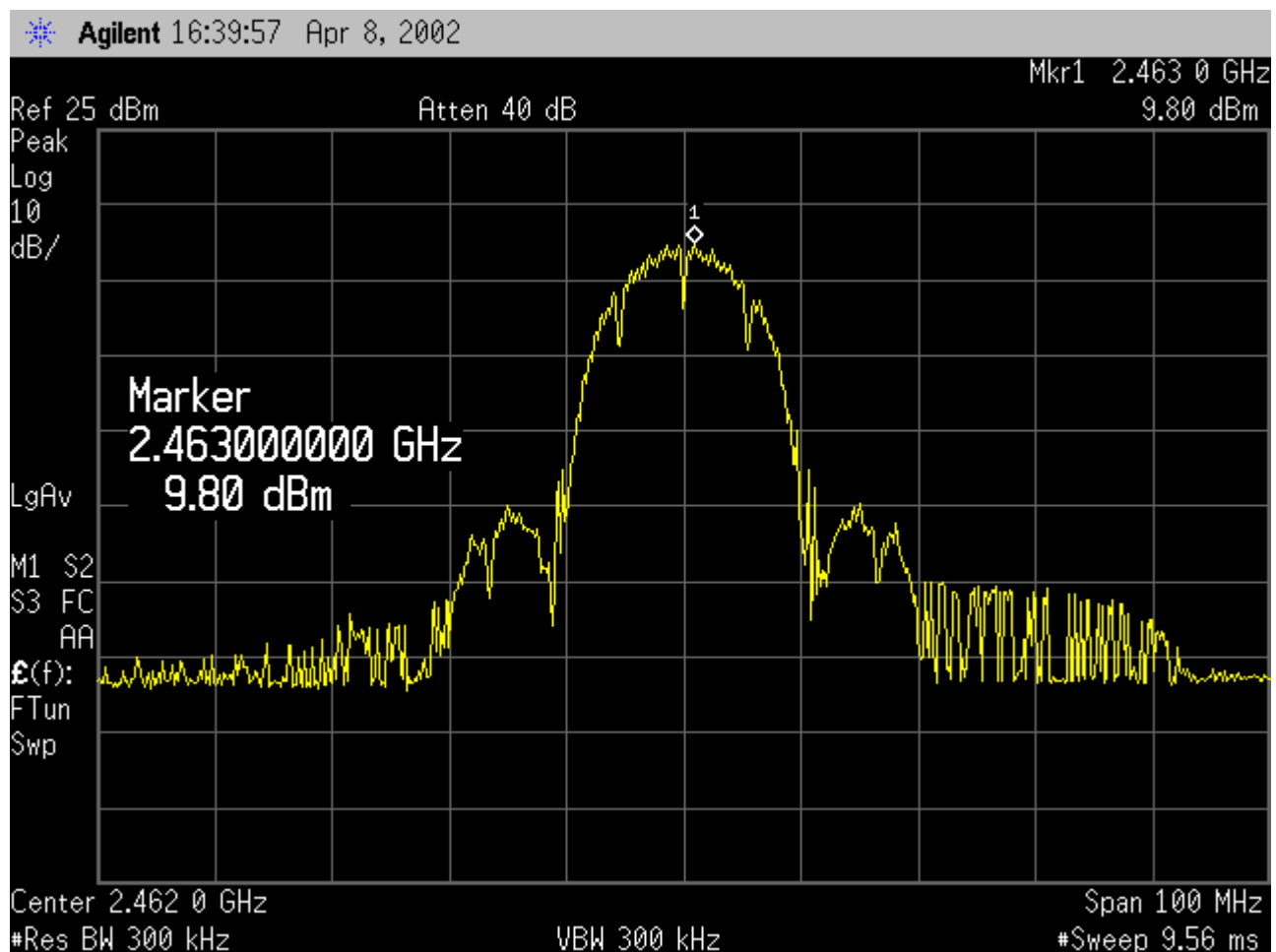
DATE: JUNE 7, 2002
TEST NUMBER: 3
PROCEDURE: 97-114
Mid Frequency



OUTPUT POWER

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: CONTINUOUS TRANSMISSION

DATE: JUNE 7, 2002
TEST NUMBER: 3
PROCEDURE: 97-114
Low Frequency



3.4 FCC Part 15 Subpart C Field Strength of Fundamental**3.4.1 Equipment Used**

Equipment Used	Asset #	Serial #	Cal Date
Tektronix 496 Spectrum Analyzer	56	B010206	4/03
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02
EMCO 3115 Microwave Horn Antenna	376	2796	1/03

3.4.2 Test Conditions

The field strength of the fundamental was measured by placing the Access Wireless Point Device set up on a wooden table above the turntable at a distance of 3 meters from a tuned dipole antenna within Open Area Test Site A.

The Access Wireless Point Device was configured to operate in the continuous mode of operation to maximize the emissions. The Access Wireless Point Device was set up and powered by 48VDC for radiated emission tests.

The Access Wireless Point Device has optional antennas that can be connected to it. The following antennas were tested:

14dBi Sector Panel Antenna
 8dBi Omni Directional Antenna
 2.2dBi Omni Directional Antenna

3.4.3 Test Method

The test method of ANSI C63.4 was followed, for the field strength of the fundamental emission measurements. A manual scan was performed. During this scan, the antenna, turntable and the EUT' were manipulated to maximize the emission level.

3.4.4 Results

The VPN Access Wireless Point Device meets the FCC Part 15 Subpart C field strength fundamental.

3.4.5 Test Data

FIELD STRENGTH OF THE FUNDAMENTAL

CUSTOMER: VPN

EQUIPMENT: TRANSCEIVER TOWER

TESTED BY: ROBERT FOSTER

OPERATING MODE: FULL POWER

ANTENNA DISTANCE: 3 METERS

DATE: JUNE 7, 2002

TEST NUMBER: 4

PROCEDURE: ANSI C63.4 & FCC 97-114

TEST SPEC: FCC PART 15 SUBPART C

14dBi Sector Panel Antenna

FREQUENCY GHz	PEAK MEASURED LEVEL -dBm	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE Loss dB	FIELD LEVEL dBuV/m
2.412	18	1.0	0	V	27.9	9.9
2437	20	1.0	0	V	27.9	7.9
2462	18	1.0	0	V	27.9	9.9

FORM CTS-DS-001R

8dBi Omni Directional Antenna

FREQUENCY GHz	PEAK MEASURED LEVEL -dBm	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE Loss dB	FIELD LEVEL dBuV/m
2.412	23	1.0	0	V	27.9	4.9
2437	25	1.0	0	V	27.9	2.5
2462	24	1.0	0	V	27.9	3.9

FORM CTS-DS-001R

2.2dBi Omni Directional Antenna

FREQUENCY GHz	PEAK MEASURED LEVEL -dBm	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE Loss dB	FIELD LEVEL dBuV/m
2.412	27	1.0	0	V	27.9	0.9
2437	31	1.0	0	V	27.9	-3.1
2462	29	1.0	0	V	27.9	-1.1

FORM CTS-DS-001R

3.5 FCC Part 15 Subpart C 15.247 Spurious Emissions**3.5.1 Equipment Used**

Test Equipment	Asset #	Serial #	Cal Date
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02
EMCO 3115 Microwave Horn Antenna	376	2796	1/03

3.5.2 Test Conditions

Spurious Emissions measurement test was performed with the Access Wireless Point Device placed on top of a wooden turntable with its output connected to a spectrum analyzer. The Access Wireless Point Device was configured to operate in the continuous full power mode of operation. The test was performed at the low, mid, and high frequencies.

3.5.3 Test Method

The test method of “Guidance on Measurements for Direct Sequence Spread Spectrum Systems” Appendix C of Docket No. 96-8 FCC 97-114 was followed.

The Spurious emissions of the Access Wireless Point Device were measured with the output of the transceiver directly connected to the input of the Spectrum Analyzer.

3.5.4 Results

The VPN Access Wireless Point Device meets the spurious requirements of FCC Part 15 Subpart C 15.247.

3.5.5 Test Data

SPURIOUS MEASUREMENTS

CUSTOMER: VPN

EQUIPMENT: ACCESS WIRELESS POINT DEVICE

TESTED BY: ROBERT FOSTER

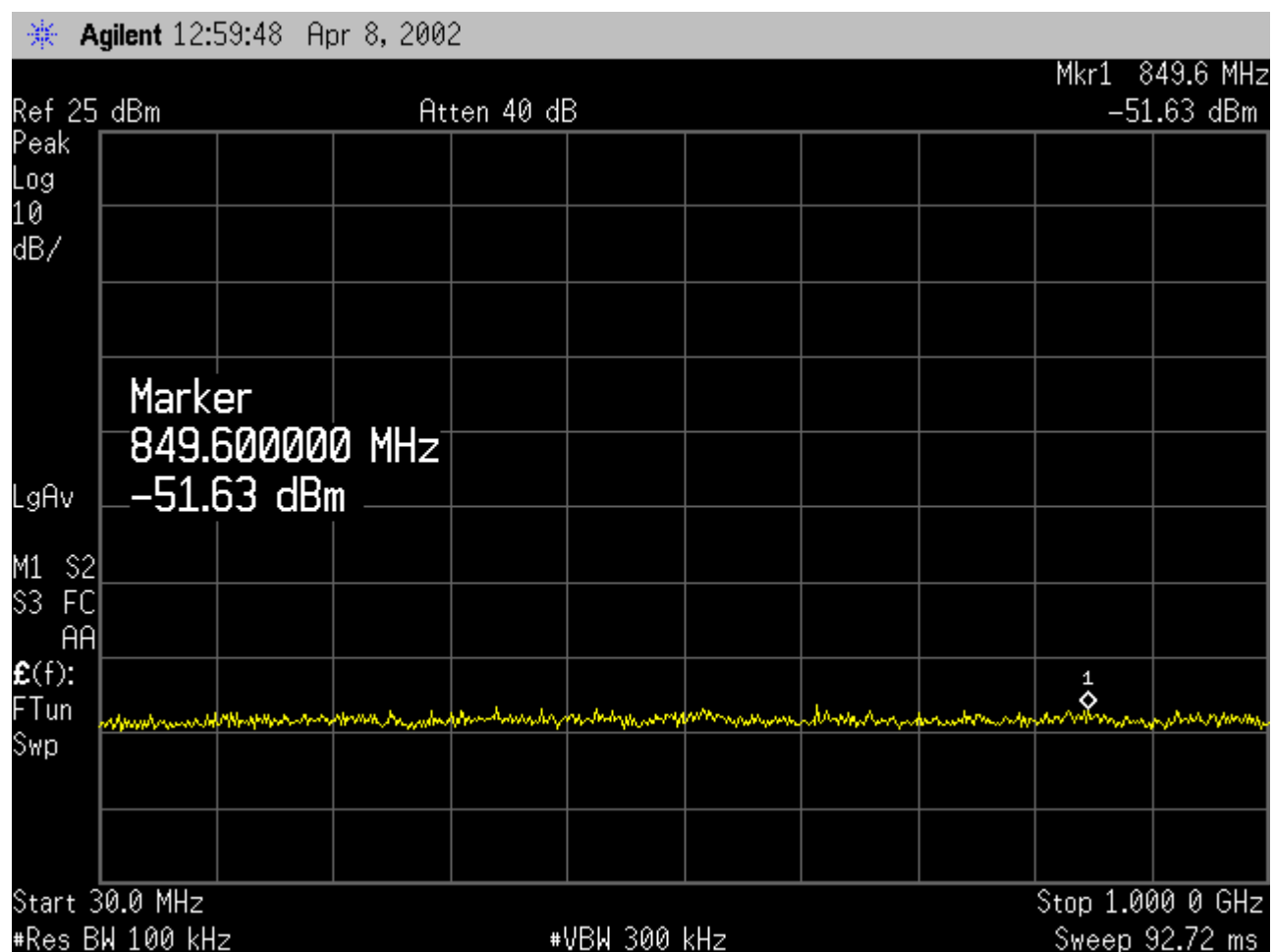
OPERATING MODE: NORMAL

DATE: JUNE 7, 2002

TEST NUMBER: 5

PROCEDURE: 97-114

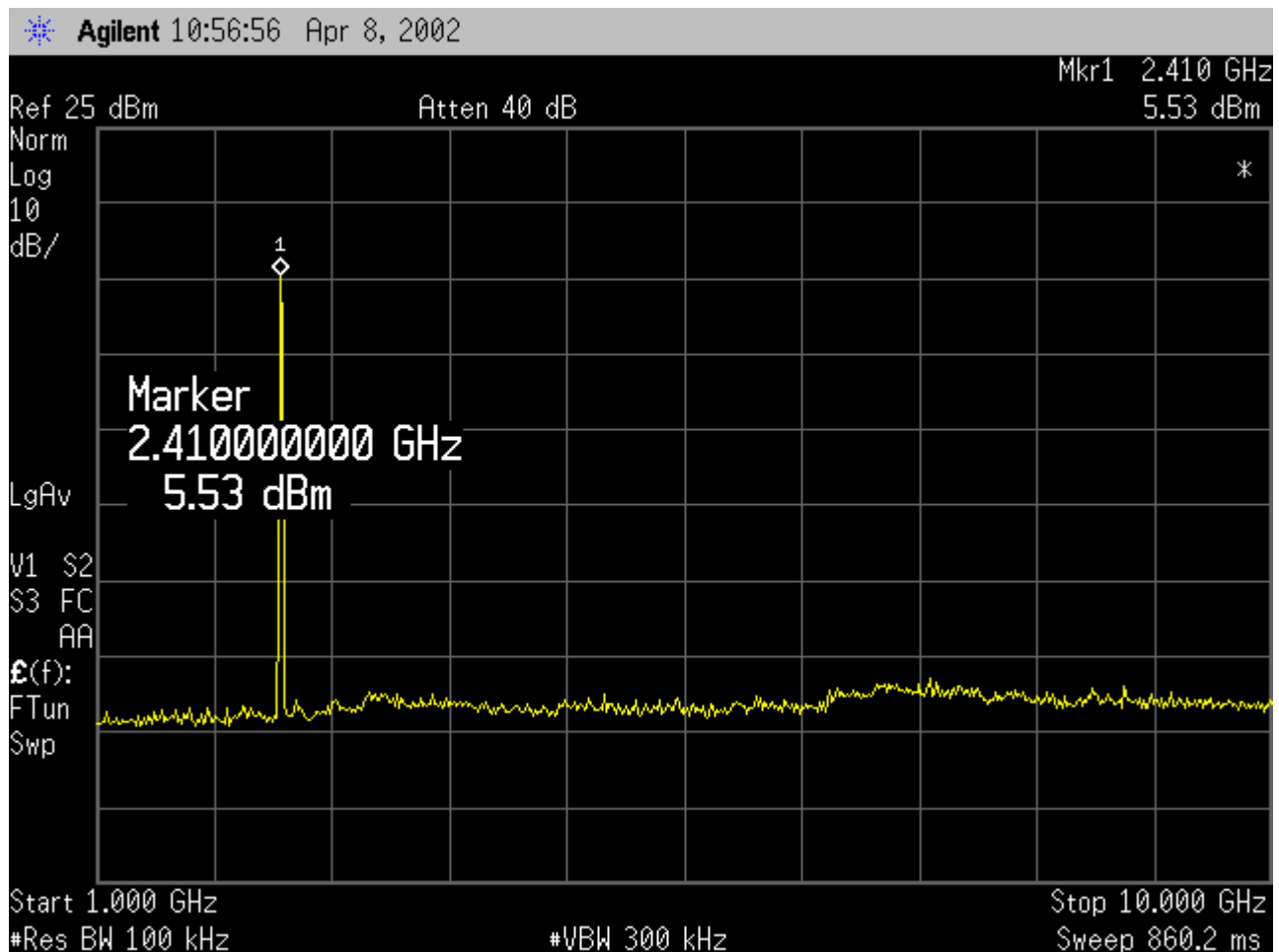
Low Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

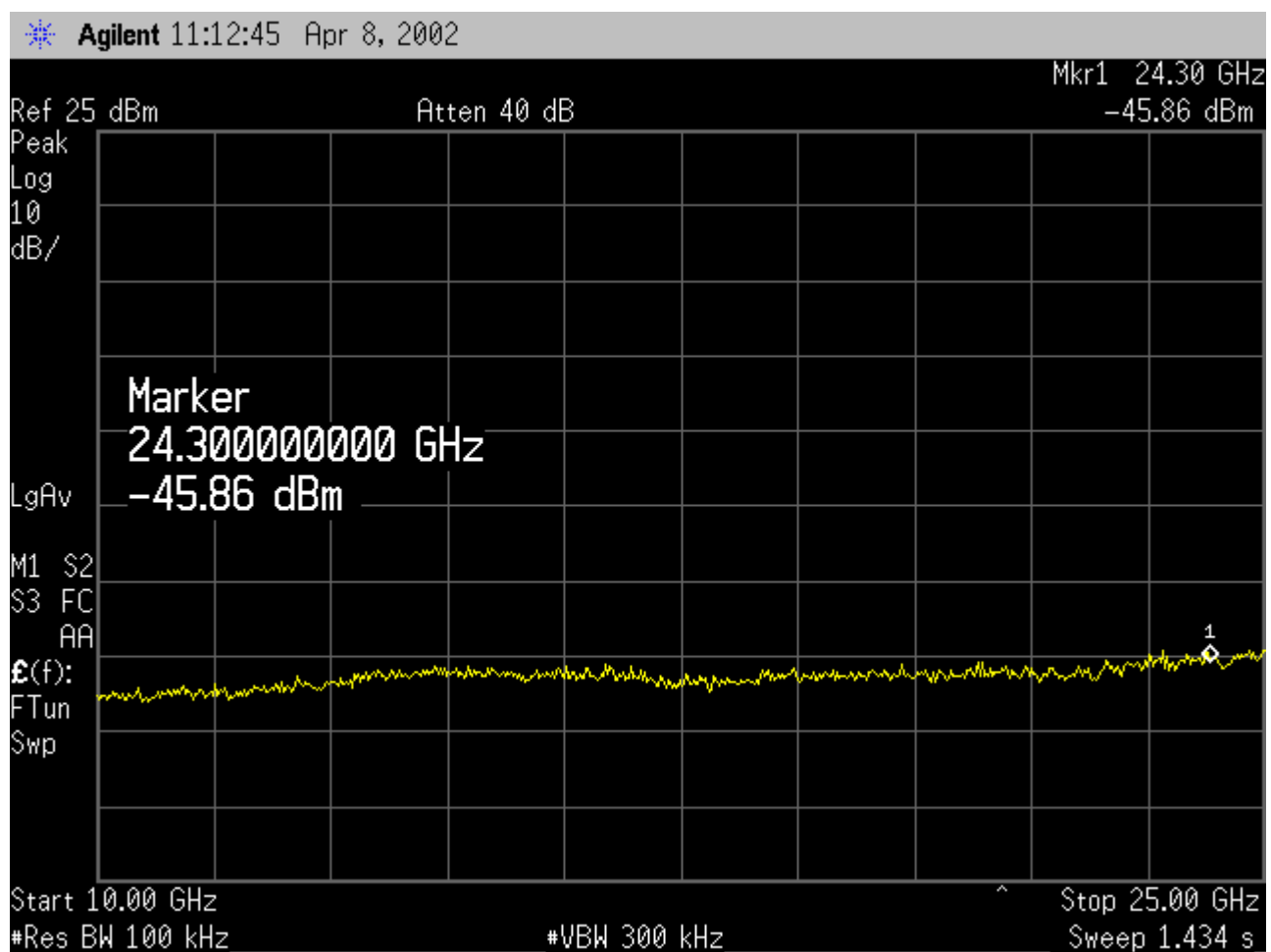
DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
Low Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

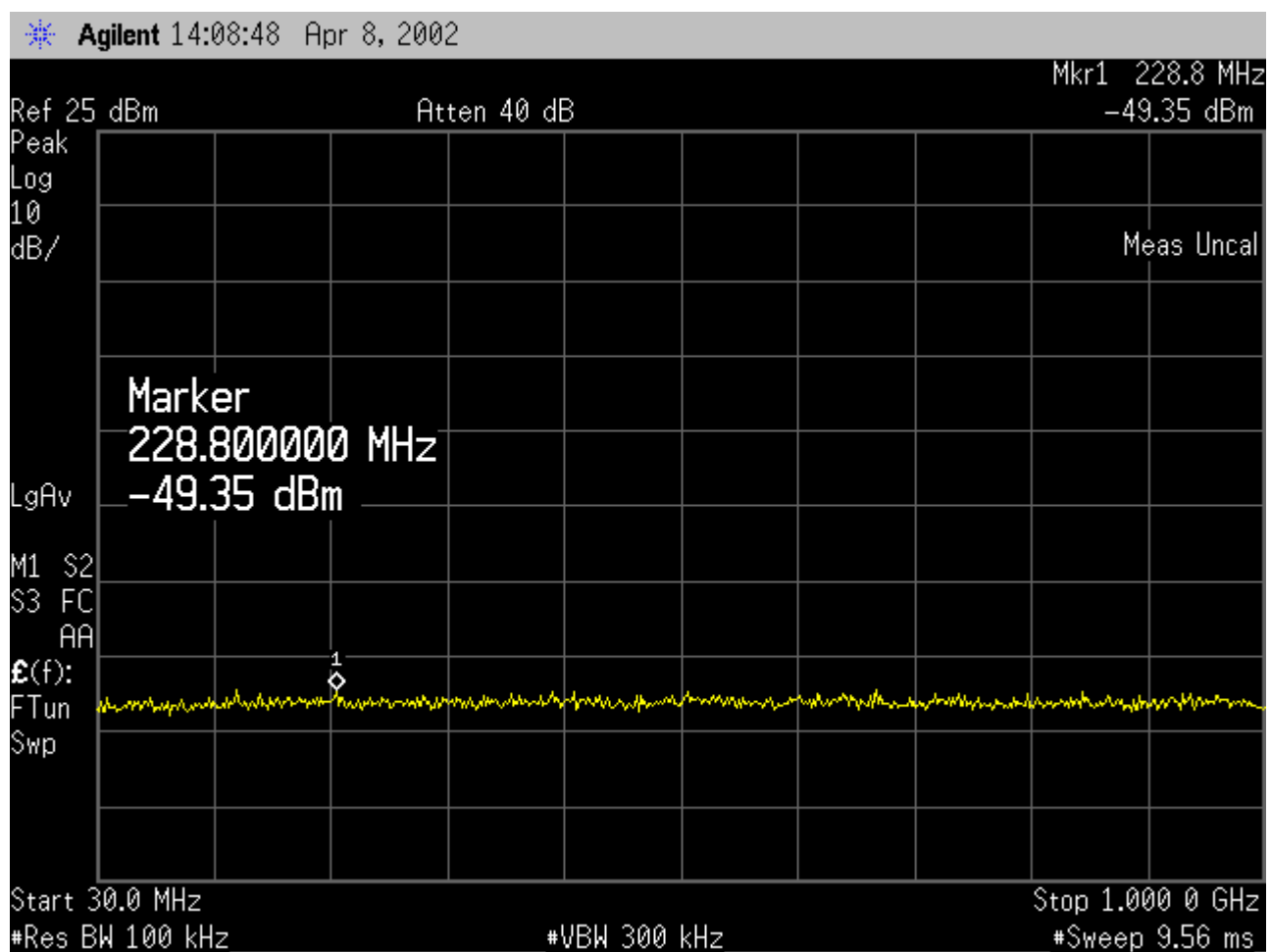
DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
Low Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

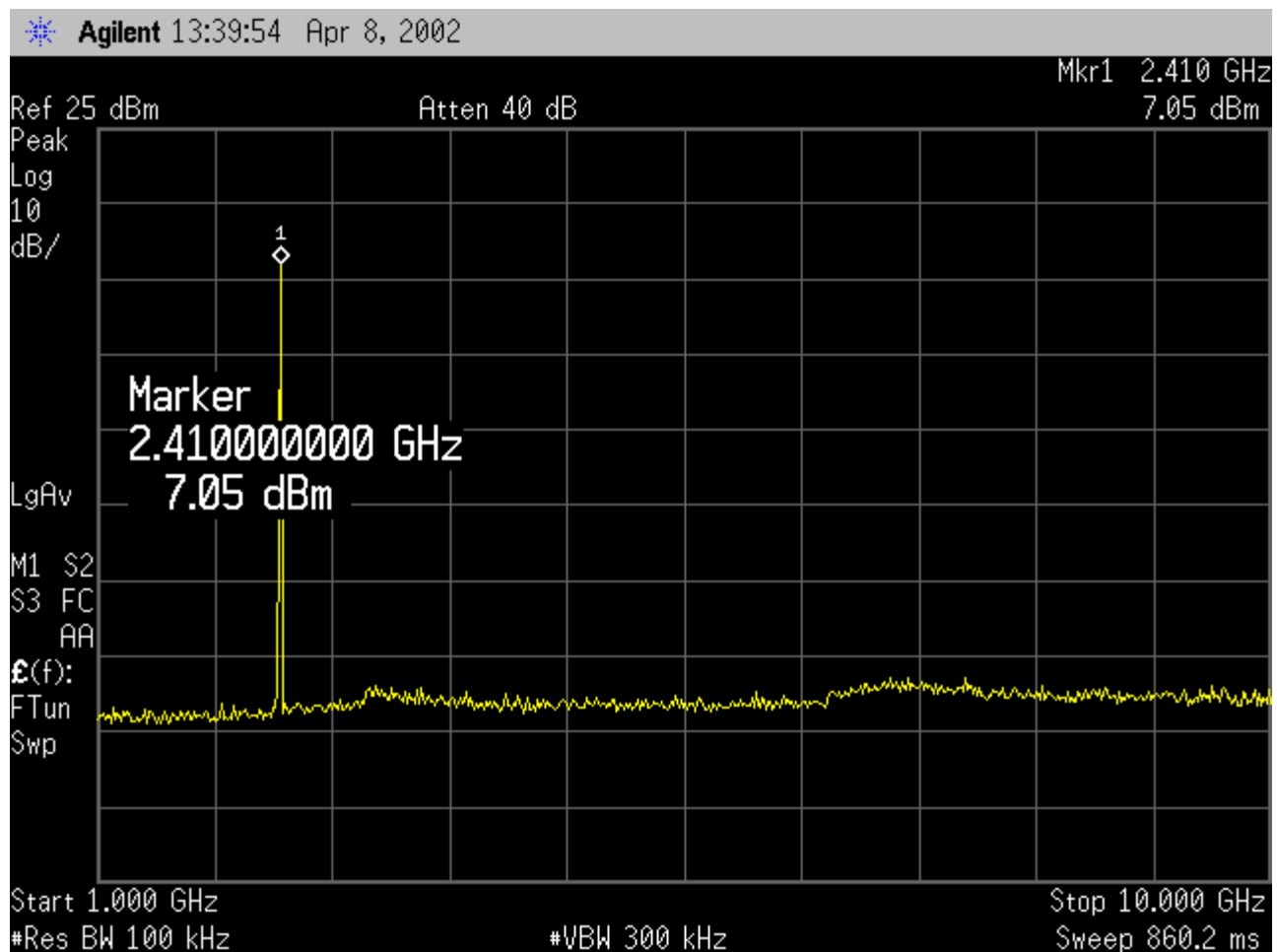
DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
Mid. Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

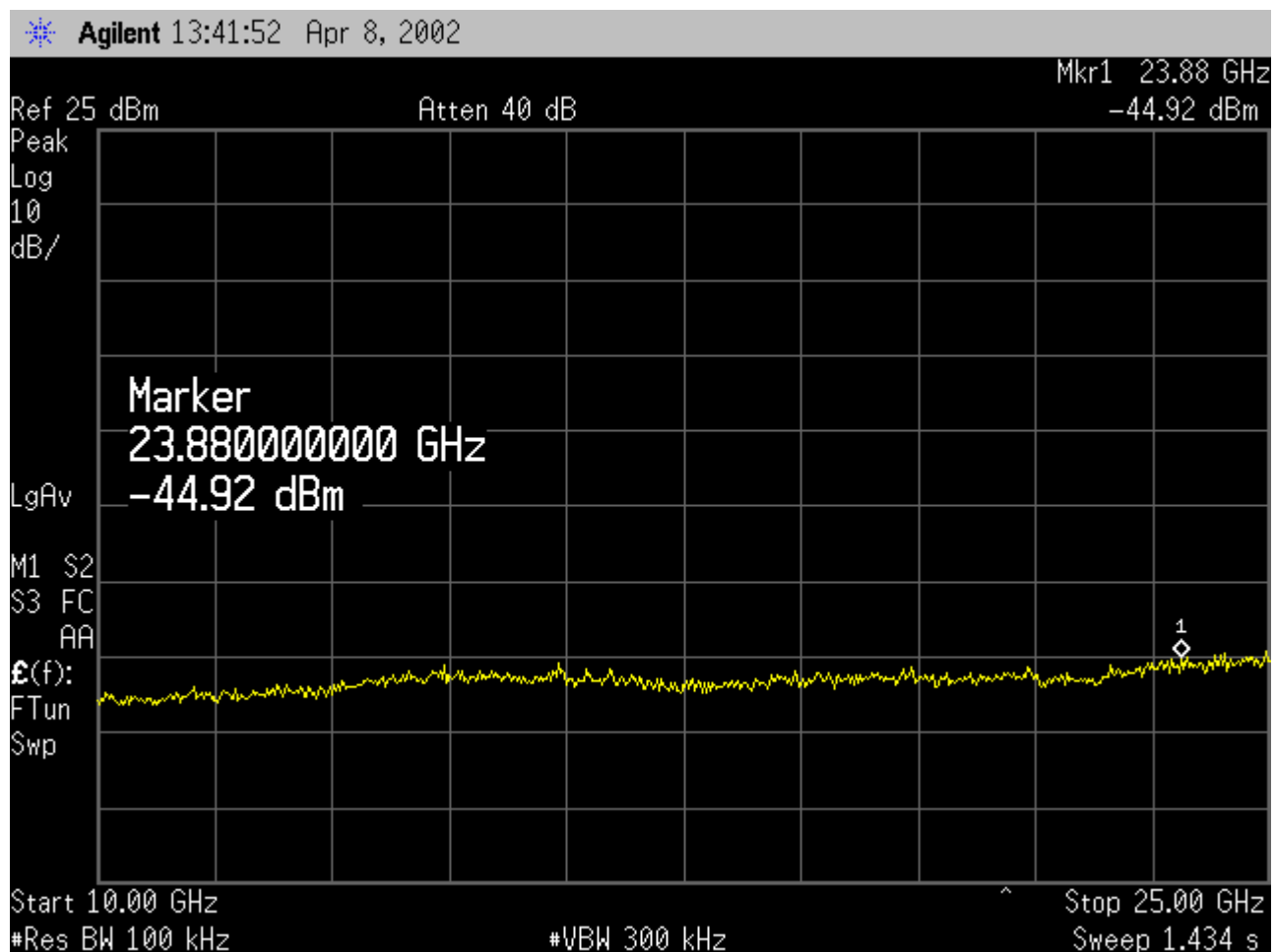
DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
Mid. Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

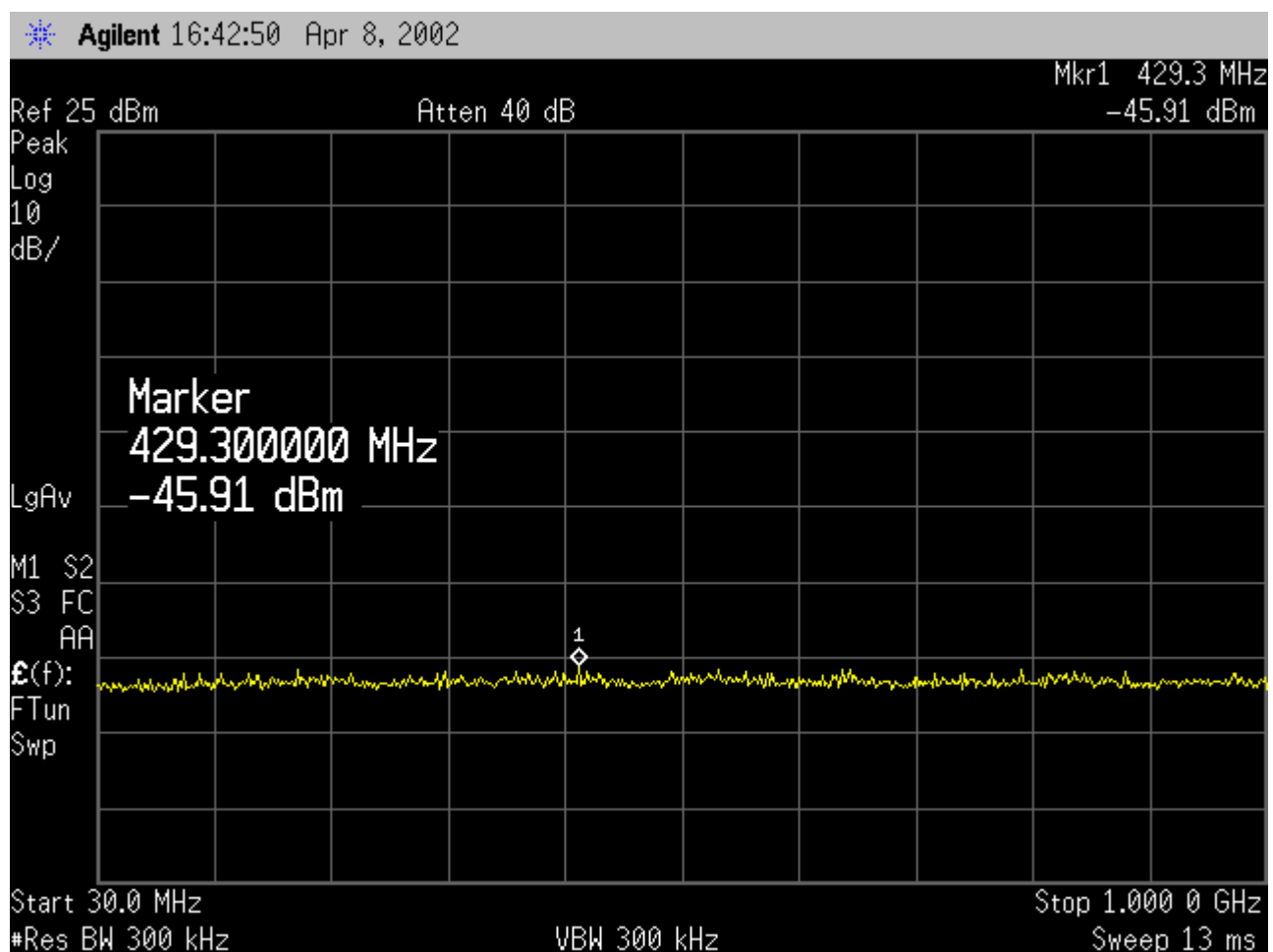
DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
Mid. Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

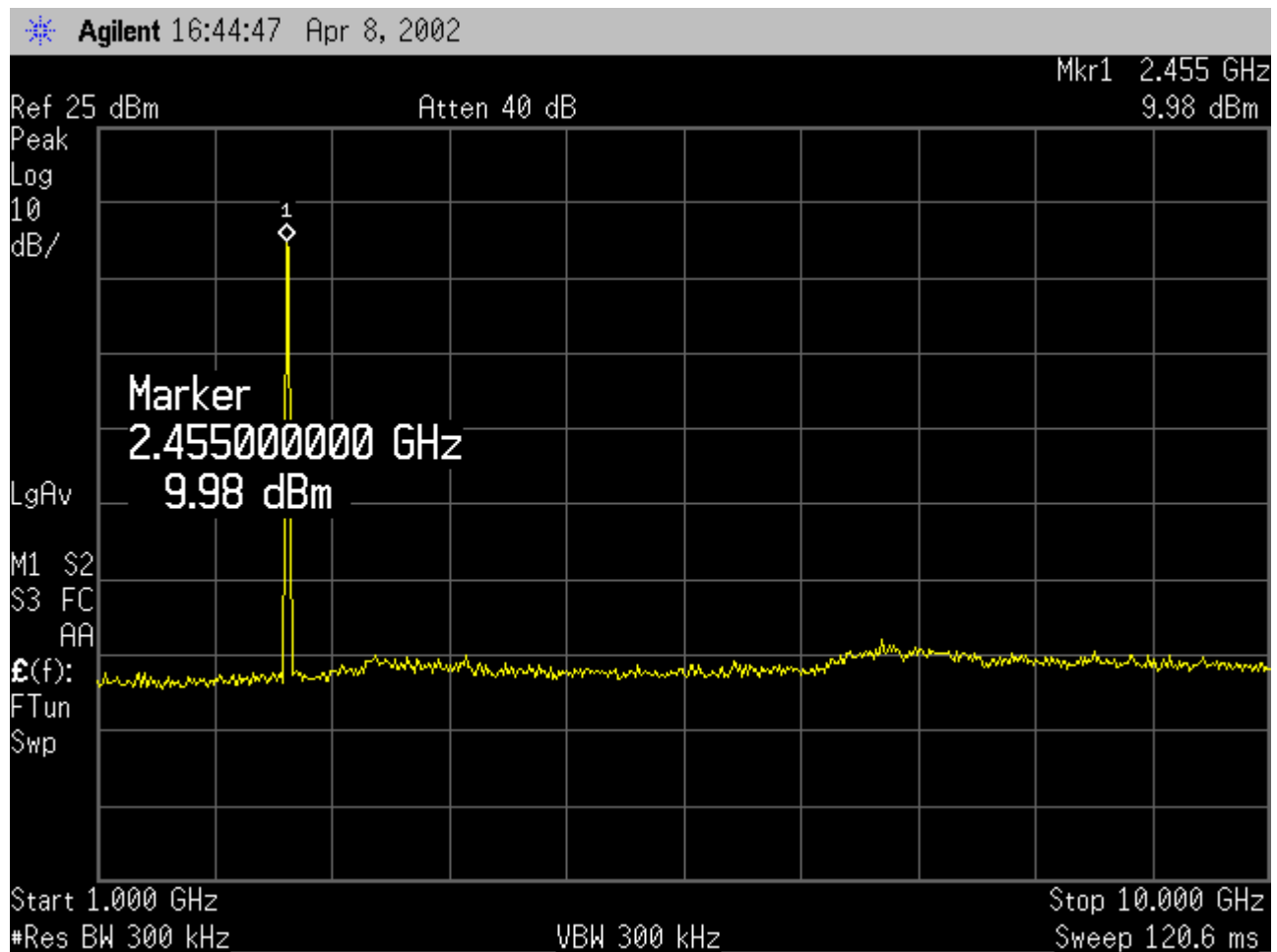
DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
High Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

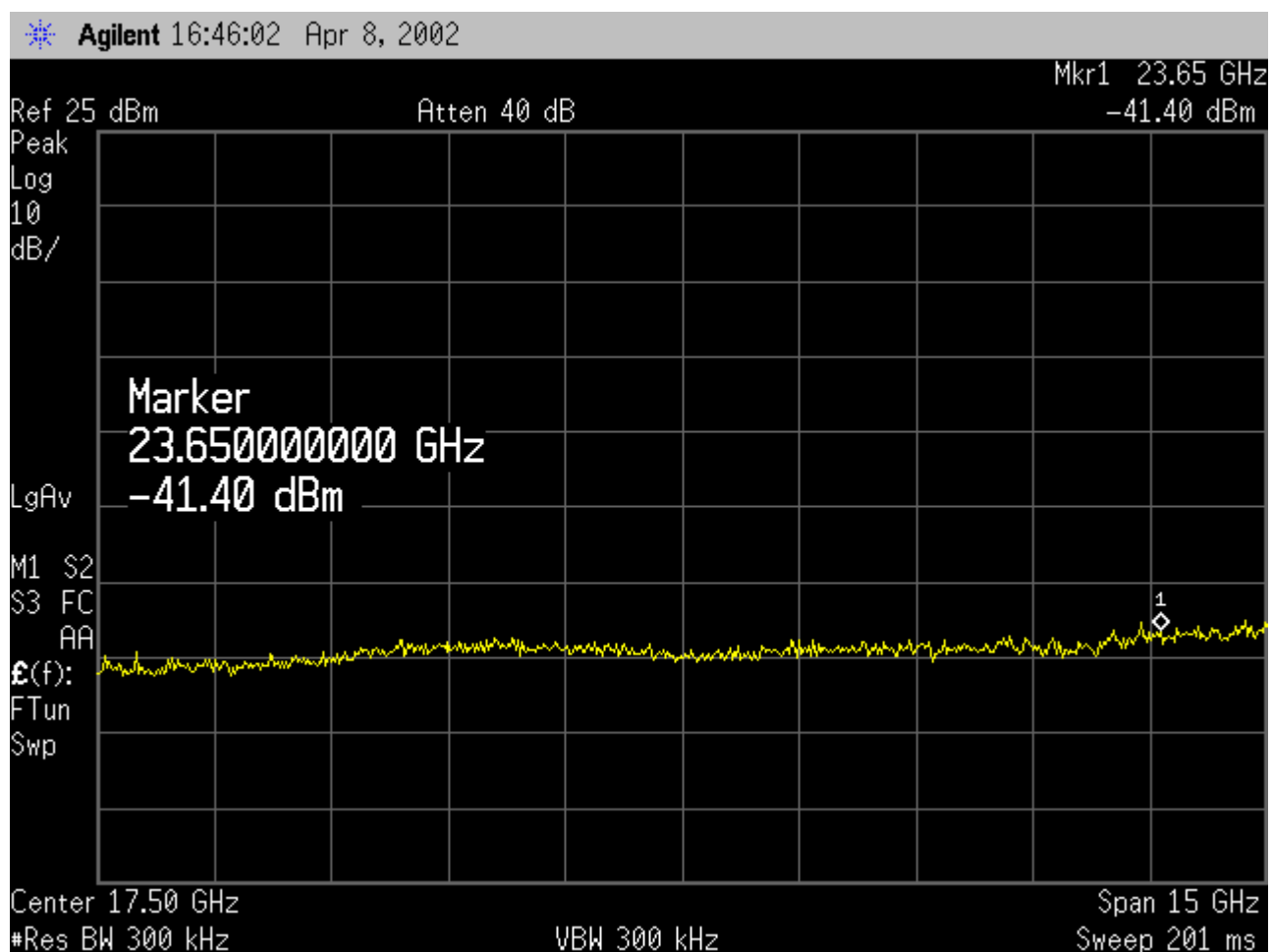
DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
High Frequency



SPURIOUS MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

DATE: JUNE 7, 2002
TEST NUMBER: 5
PROCEDURE: 97-114
High Frequency



3.6 FCC Part 15 Subpart C 15.247 Band Edge**3.6.1 Equipment Used**

Test Equipment	Asset #	Serial #	Cal Date
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02
EMCO 3115 Microwave Horn Antenna	376	2796	1/03

3.6.2 Test Conditions

Band Edge measurements were performed with the Access Wireless Point Device placed on top of a wooden turntable with its output connected to a spectrum analyzer. The Access Wireless Point Device was configured to operate in the continuous full power mode of operation.

3.6.3 Test Method

The test method of “Guidance on Measurements for Direct Sequence Spread Spectrum Systems” Appendix C of Docket No. 96-8 FCC 97-114 was followed.

3.6.4 Results

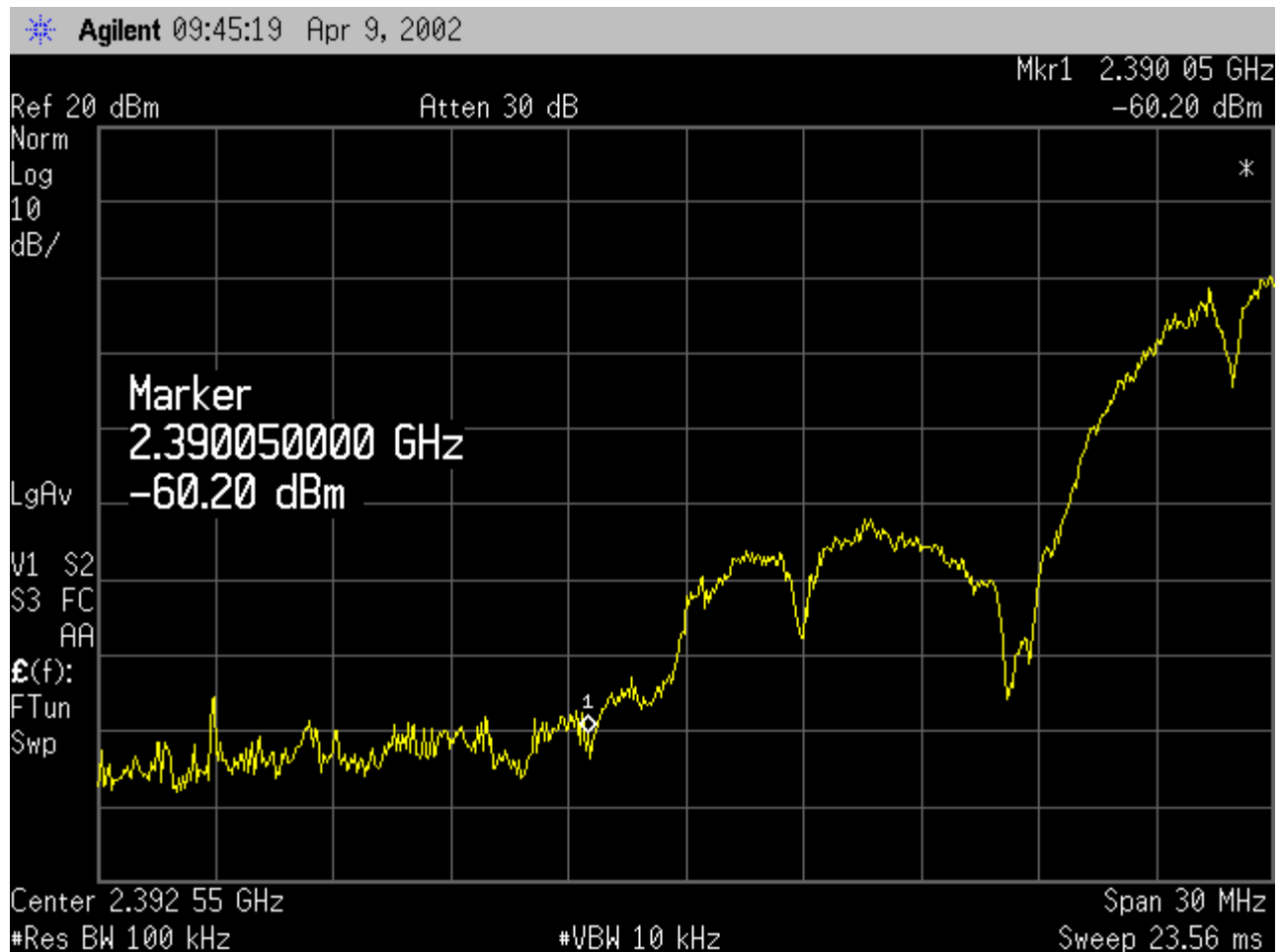
The VPN Access Wireless Point Device meets the Band Edge requirements of FCC Part 15 Subpart C 15.247.

3.6.5 Test Data

BAND EDGE MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

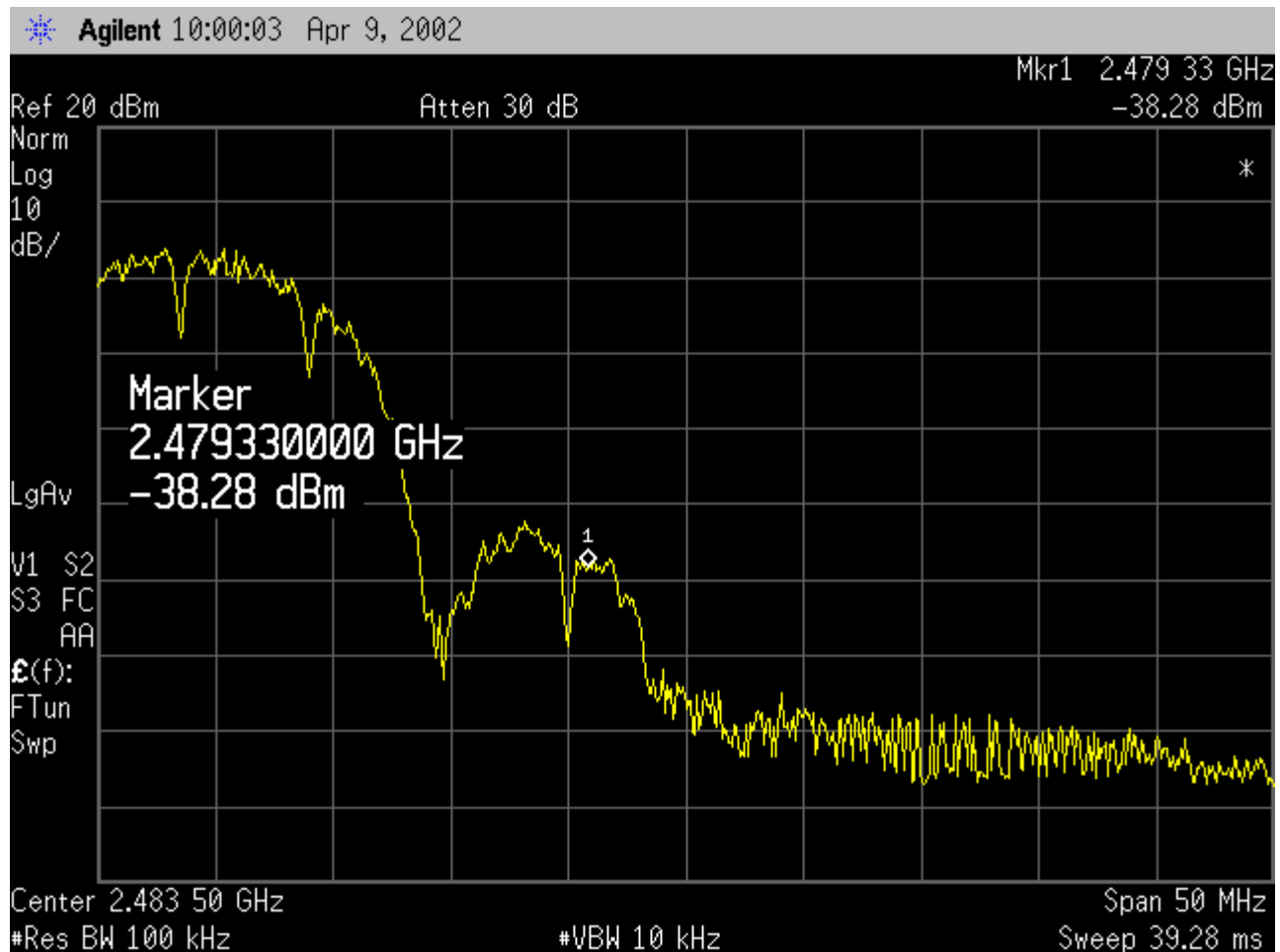
DATE: JUNE 18, 2002
TEST NUMBER: 6
PROCEDURE: 97-114
Low Band



BAND EDGE MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

DATE: JUNE 18, 2002
TEST NUMBER: 6
PROCEDURE: 97-114
High Band



3.7 FCC Part 15 Subpart C 15.247 Power Spectral Density**3.7.1 Equipment Used**

Test Equipment	Asset #	Serial #	Cal Date
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02

3.7.2 Test Conditions

Power Spectral Density tests were performed on the VPN Access Wireless Point Device.

Power Spectral Density measurement test was performed with the Access Wireless Point Device placed on a wooden turntable with the output connected to the spectrum analyzer. The Access Wireless Point Device was configured to operate in the continuous full power mode of operation.

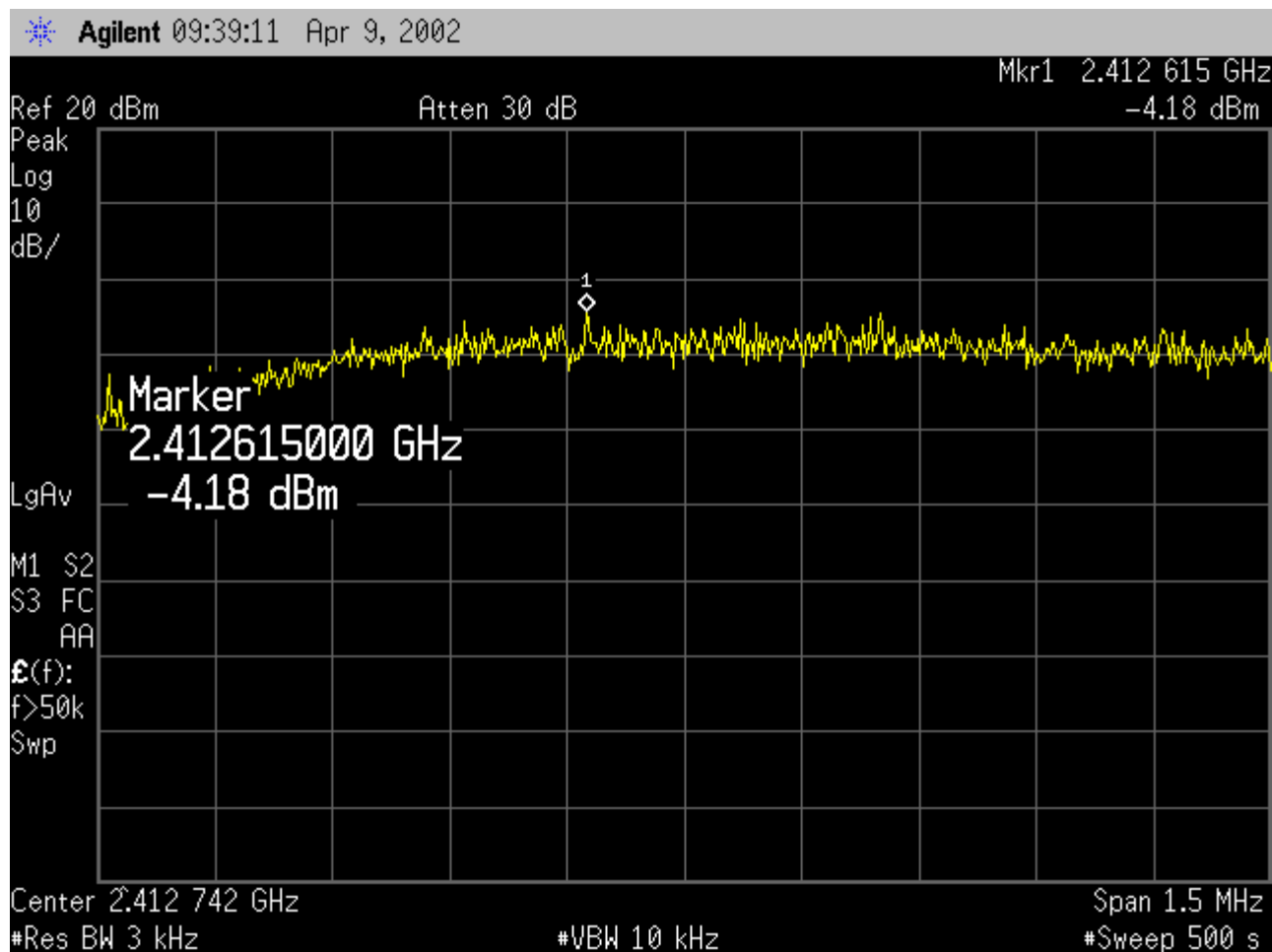
3.7.3 Test Method

The test method of “Guidance on Measurements for Direct Sequence Spread Spectrum Systems” Appendix C of Docket No. 96-8 FCC 97-114 was followed.

The Spurious of the Transceiver Tower was measured with the output of the transceiver directly connected to the in put of the Spectrum Analyzer.

3.7.4 Results

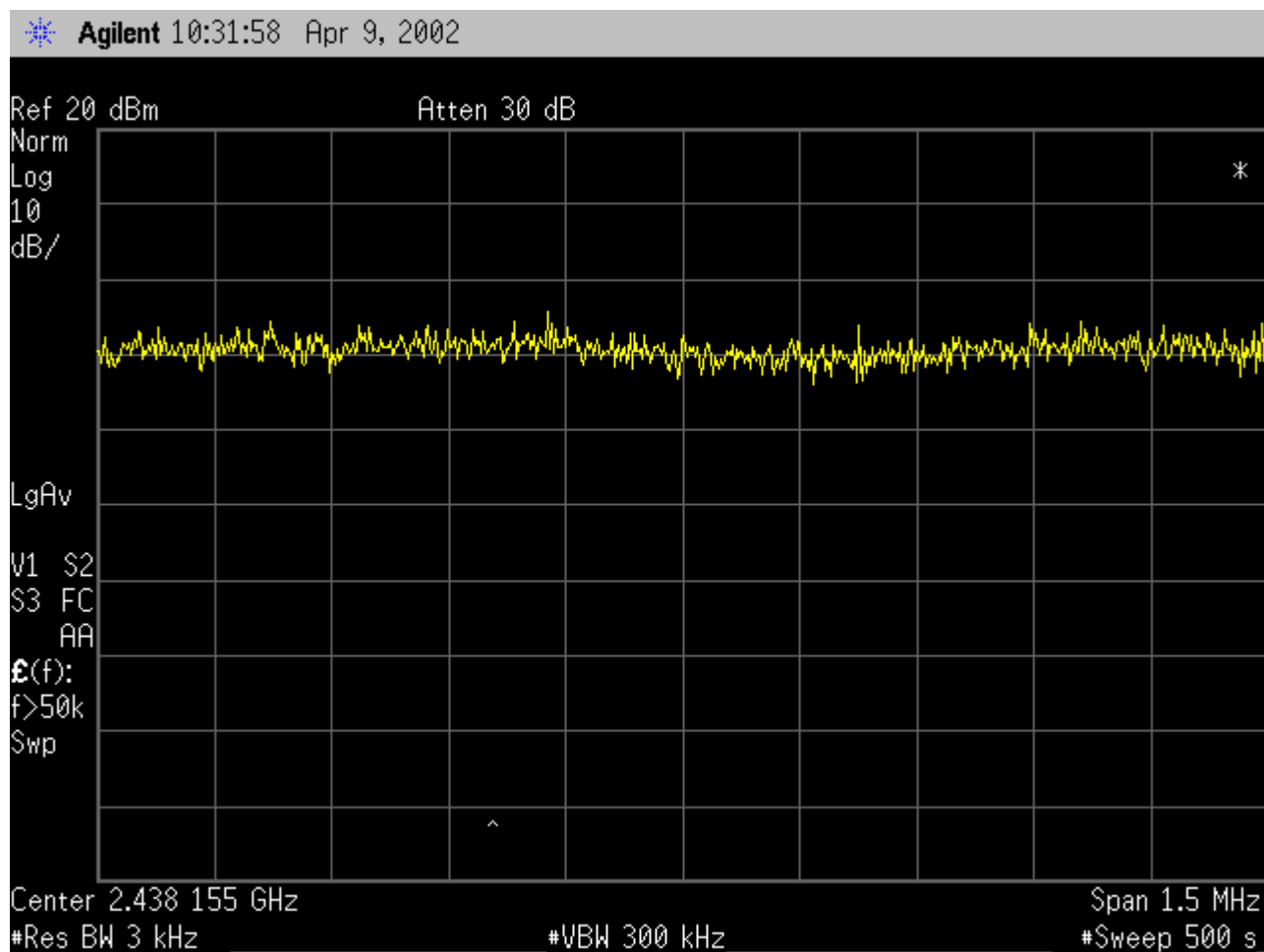
The VPN Access Wireless Point Device meets the spurious requirements of FCC Part 15 Subpart C 15.247.

3.7.5 Test Data**POWER SPECTRAL DENSITY MEASUREMENTS****CUSTOMER: VPN****EQUIPMENT: ACCESS WIRELESS POINT DEVICE****TESTED BY: ROBERT FOSTER****OPERATING MODE: NORMAL****DATE: JUNE 18, 2002****TEST NUMBER: 7****PROCEDURE: 97-114****Low Frequency**

POWER SPECTRAL DENSITY MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: SPURIOUS

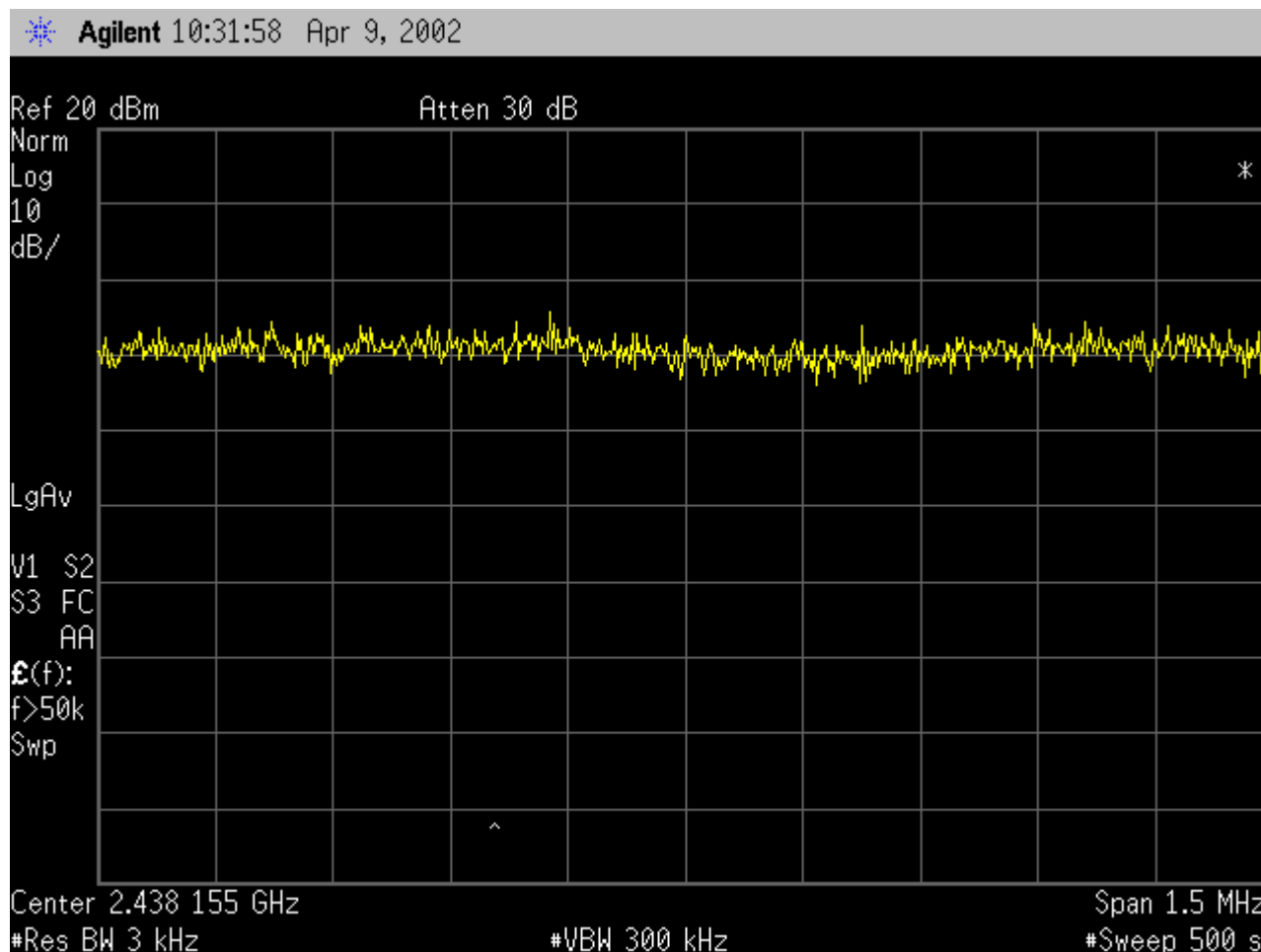
DATE: JUNE 18, 2002
TEST NUMBER: 7
PROCEDURE: 97-114
Mid. Frequency



POWER SPECTRAL DENSITY MEASUREMENTS

CUSTOMER: VPN
EQUIPMENT: ACCESS WIRELESS POINT DEVICE
TESTED BY: ROBERT FOSTER
OPERATING MODE: NORMAL

DATE: JUNE 18, 2002
TEST NUMBER: 7
PROCEDURE: 97-114
High Frequency



3.8 FCC Part 15 Subpart C Field Strength Harmonics**3.8.1 Equipment Used**

Equipment Used	Asset #	Serial #	Cal Date
Tektronix 496 Spectrum Analyzer	56	B010206	4/03
Hewlett Packard 8566B Spectrum Analyzer	47	2637A04064	7/02
Hewlett Packard 8566 Display Analyzer Main	46	2648A14289	7/02
Hewlett Packard 85685A RF Preselector	48	2648A00483	7/02
Eaton 94626-1 Horn Antenna	334	145	1/03
EMCO 3115 Microwave Horn Antenna	376	2796	1/03

3.8.2 Test Conditions

Field Strength of harmonics emissions testing were performed with the Access Wireless Point Device set up on a wooden table above the turntable at a distance of 3 meters from a tuned dipole antenna within Open Area Test Site A. The Access Wireless Point Device was configured to operate in the continuous mode of operation to maximize the emissions. The worst case signals detected were recorded.

3.8.3 Test Method

The test method of ANSI C63.4 was followed. A manual scan was performed from 30MHz to 25GHz. During this scan, the antenna, turntable and the EUT's cable positions were manipulated to maximize the emission levels in a given frequency band displayed on the spectrum analyzer.

3.8.4 Results

The VPN Access Wireless Point Device meets the FCC Part 15 Subpart C Harmonics Field Strength requirements.

3.8.5 Test Data

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: VPN

EQUIPMENT: ACCESS WIRELESS POINT DEVICE

TESTED BY: ROBERT FOSTER

OPERATING MODE: CONTINUOUS TRANSMIT

FREQUENCY RANGE: 30MHZ – 25 GHz

DATE: JUNE 19, 2002

TEST NUMBER: 8

TEST PROCEDURE: ANSI C63.4 & FCC 97-114

TEST SPEC: FCC PART 15 SUBPART C

FREQUENCY MHz	PEAK MEASURED LEVEL -dBm	QUASI- PEAK MEASURED LEVEL dBuV	ANTENNA HEIGHT (METERS)	TURNTABLE AZIMUTH (DEGREES)	ANTENNA H/V	ANTENNA FAC/CABLE LOSS dB	FIELD LEVEL dBuV/m ✧	LIMIT dBuV/m (QP)
No harmonic emissions were detected								

✧ All signals greater than 3dB from the limit are calculate to the nearest whole number.

✧ Field Level (dBuV/m) = [107 – Measured level (dBm)] + Antenna Factor/Cable Loss (dB)

Ambient Temperature: 68°F

Humidity: 25 %

Atmospheric Pressure: 29.8 "

FORM CTS-DS-001R

VPN Access Wireless Point Device

Document #: TR3317.02

Date: July 31, 2002

**APPENDIX A
TEST LOG**

TEST SERVICES

TEST LOG

CUSTOMER: VPN

PROGRAM: FCC CERTIFICATION

EQUIPMENT: OPEN SKY ISM RADIO

TESTED BY: RICHARD BARBARO

Pre-Test Checklist	Date	Comments					
	April 4, 2002	Test Plan/Procedure: ANSI C63.4 & FCC 97-114 Test Specification: FCC Part 15 Subpart B & C Chomerics Procedure: CHO TPEC T1, T2 EUT Power Requirement Verified: Access Wireless Point Device: 120V/60Hz Single phase Access Wireless Point Device: 120V/60Hz Single Phase and 3V DC EUT Functional Operational Check: [X] Pass [] Fail Environmental: Bonding/Grounding: N/A Safety Issues: N/A					
In-Process Test Checklist	Date	Test #	Test Type	Test Equipment Calibrated	Test Performed Properly – Data Accepted	EUT Set-up Check/ Operational Check	EUT Pass/ Fail
	04/04/02	1	Rad Emis Subpart B	Yes	Yes	Yes	Pass
Post Test Checklist	Date: April 4, 2002	EUT Functional Operation Check: [X] Pass [] Fail		Test Engineer/Tech Approved Signatory			

FORM CTS-010

VPN Access Wireless Point Device
Document #: TR3317.02
Date: July 31, 2002

TEST SERVICES

TEST LOG

CUSTOMER: VPN

PROGRAM: FCC CERTIFICATION

EQUIPMENT: OPEN SKY ISM RADIO

TESTED BY: ROBERT FOSTER

Pre-Test Checklist	Date	Comments					
	June 5, 2002	Test Plan/Procedure: ANSI C63.4 & FCC 97-114 Test Specification: FCC Part 15 Subpart B & C Chomerics Procedure: CHO TPEC T1, T2 EUT Power Requirement Verified: Access Wireless Point Device: 120V/60Hz Single phase Access Wireless Point Device: 120V/60Hz Single Phase and 3V DC EUT Functional Operational Check: [X] Pass [] Fail Environmental: Bonding/Grounding: N/A Safety Issues: N/A					
In-Process Test Checklist	Date	Test #	Test Type	Test Equipment Calibrated	Test Performed Properly – Data Accepted	EUT Set-up Check/ Operational Check	EUT Pass/ Fail
	06/05/02	1	Rad Emis Subpart B	Yes	Yes	Yes	Pass
	06/06/02	2	Bandwidth Subpart C	Yes	Yes	Yes	Pass
	06/07/02	3	Power Output Subpart C	Yes	Yes	Yes	Pass
	06/07/02	4	Field Strength of Fundamental Subpart C	Yes	Yes	Yes	Pass
	06/07/02	5	Spurious Subpart C	Yes	Yes	Yes	Pass
	06/18/02	6	Band Edge Subpart C	Yes	Yes	Yes	Pass
	06/18/02	7	Power Spectral Density Subpart C	Yes	Yes	Yes	Pass
	06/19/02	8	Field Strength of Harmonic Subpart C	Yes	Yes	Yes	Pass
Post Test Checklist	Date: June 19, 2002	EUT Functional Operation Check: [X] Pass [] Fail		Test Engineer/Tech Approved Signatory			

FORM CTS-010

VPN Access Wireless Point Device
Document #: TR3317.02
Date: July 31, 2002