Cert. No. 1152.01
Electrical (EMC)

DATE: 25 February 2008

I.T.L. (PRODUCT TESTING) LTD.

FCC EMC/Radio Test Report

for

MobileAccess Networks

Equipment under test:

WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points

860M With WCE*

* See customer's declaration on page 7.

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
E. Pitt, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Cert. No. 1152.01
Electrical (EMC)

Measurement/Technical Report for

MobileAccess Networks

WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points

860M With WCE

FCC ID: OJFMA860WAR

25 February 2008

This report concerns: Original Grant x Class II change

Class B verification ___ Class A verification_____Class I change

Equipment type: Direct Sequence Spread Spectrum Transmitter

Request Issue of Grant:

x Immediately upon completion of review

Limits used:

CISPR 22 _____ Part 15 x

Measurement procedure used is ANSI C63.4-2003.

Application for Certification prepared by:

Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
D.N. Shimshon 99780
Israel
e-mail Sraz@itl.co.il

Applicant for this device: (different from "prepared by")

Steve Blum
Mobile Access Networks
8391 Old Courthouse Rd., Suite #300
Vienna, VA. 22182
U.S.A.
Tel: +1-541-758-2880
Fax: +1-703-848-0260
e-mail: sblum@mobileaccess.com

TABLE OF CONTENTS

1. General Information

1.1 Administrative Information

Manufacturer:	MobileAccess Networks
Manufacturer's Address:	8391 Old Courthouse Rd. Suite #300 Vienna, VA 22182 U.S.A. Tel: +1-541-758-2880 Fax: +1-703-848-0260
Manufacturer's Representative:	Steve Blum
Equipment Under Test (E.U.T):	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Equipment Model No.:	860M With WCE (See customer's declaration on following page).
Equipment Serial No.:	1. 860M: 73903D 2. WCE: 739038
Date of Receipt of E.U.T:	11.02.08
Start of Test:	11.02.08
End of Test:	25.02.08
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	See Section 2

Note: Tests using the spectrum analyzer HP 8592L, S/N 3826A01204, were performed between 11-21 February 2008.

15/11/2007

DECLARATION

I HEREBY DECLARE THAT THE FOLLOWING PRODUCT:

860M

IS IDENTICAL ELECTRONICALLY, PHYSICALLY, AND MECHANICALLY TO:

MA-860

Please relate to them all (from an EMC point of view) as the same product.

Thank you,

Signature: _____

Shai Rachamim
Verification Engineer
MobileAccess Networks
Ofek One Center,Bldg.2
Northern Industrial Zone
Lod, Israel 71293

E-mail: ShaiR@MobileAccess.com
Wired: +972-8-9183804
Unwired: +972-52-6994548

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The MobileAccess 860 WLAN Solution delivers pervasive WLAN coverage throughout enterprise environments using a unique multi-service wireless architecture. With the MA-860 approach, enterprises can seamlessly translate their WLAN investments and design expertise into a comprehensive, multi-service wireless solution.

The MA-860 combines WLAN services with signals from other wireless sources, including voice and data services from multiple wireless operators, public safety, and building automation applications. It then distributes the combined RF signals over a common set of broadband cables and antennas. One-Click calibration between the MA-860 module and the MobileAccess Wi-Fi Coverage Expander (WCE) ensures optimal coverage by mirroring the coverage footprint and system behavior of "AP-on-Ceiling" deployments for 802.11a and 802.11b/g WLAN services.

This Wire-it-Once™ approach spreads WLAN deployment costs across multiple wireless service needs, providing facility-wide coverage for WLAN and all other wireless services while creating a flexible infrastructure that adapts to evolving technology requirements.

In addition, the MA-860 WLAN solution locates Access Points (APs) in secure telecom closets alongside other LAN internetworking equipment, yielding significant operational benefits:

Provides physical security of the APs

Makes APs more accessible to IT staff

Reduces ongoing operational expenses

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing August 22, 2006).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ±4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. System Test Configuration

2.1 Justification

The EUT consists of the 860M, WCE and 4 identical access points. The system combines 802.11 signals with the cellular signals. The cellular signal are represented in the setup by the CELL and PCS portion of the setup, which were connected to the EUT through MobileAccess standard infrastructure (i.e. RIU, BU, RHU and a controller) to represent a normal installation of the EUT.

An “Exercise” SW on the laptops was used to trigger the access points to transmit continuously, while the EUT output was connected to the spectrum analyzer.

2.2 EUT Exercise Software

The Access Points (APs) (as part of the EUT) were triggered to transmit using an “Exercise SW”.

The program “Air Magnet” was used to trigger the AP to continuously transmit packets.

2.3 Special Accessories

No special accessories were needed to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order o achieve compliance.

2.5 Configuration of Tested System

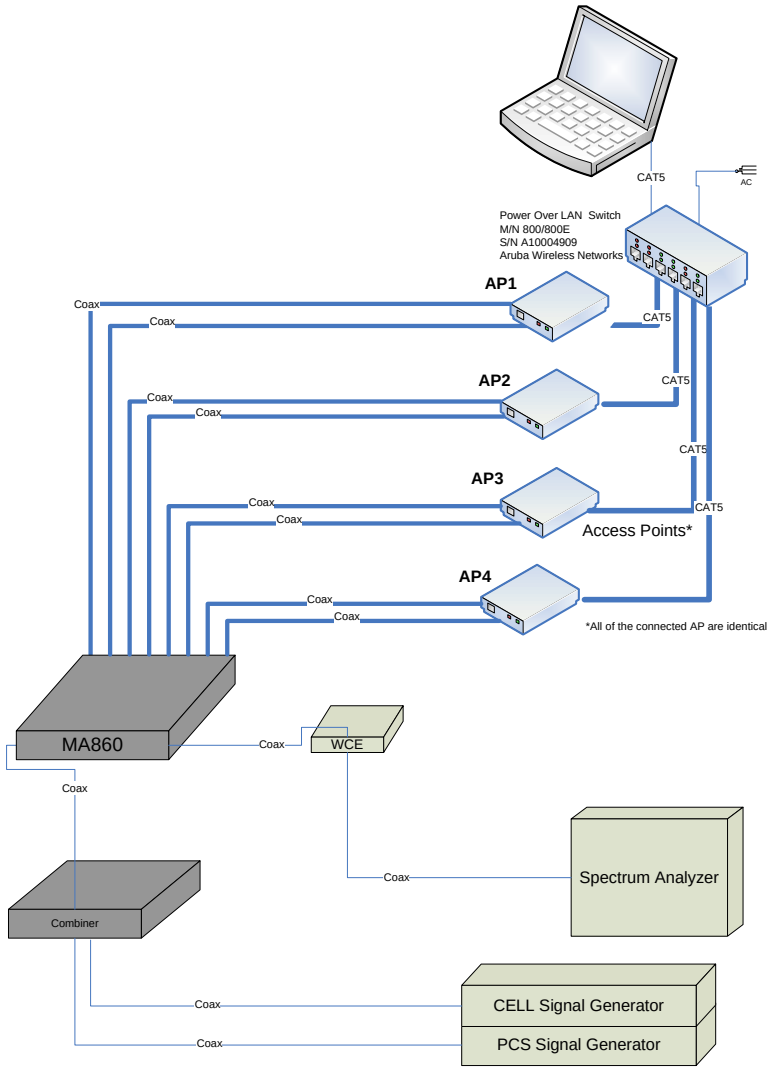


Figure 1. Configuration of Tested System

Note: The system was tested using four identical Aruba Access Points M/N AP70, S/N: A50018293, S/N: A50076283, S/N: A50027193, S/N: A50018295, FCC ID: Q9DARUBA70.

3. Theory of Operation

3.1 Theory of Operation

mobileaccess

Making Wireless an Indoor State of Mind

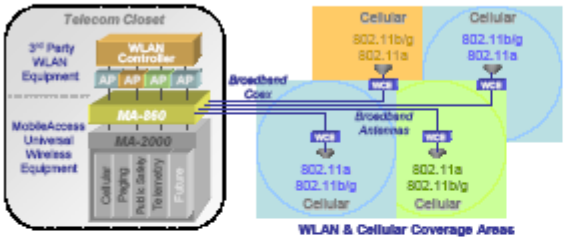
MA-860 WLAN Solution

MA-860 Solution Overview

The MobileAccess 860 WLAN Solution delivers pervasive WLAN coverage throughout enterprise environments using a unique multi-service wireless architecture. With the MA-860 approach, enterprises can seamlessly translate their WLAN investments and design expertise into a comprehensive, multi-service wireless solution.

The MA-860 combines WLAN services with signals from other wireless sources, including voice and data services from multiple wireless operators, public safety, and building automation applications. It then distributes the combined RF signals over a common set of broadband cables and antennas. One-Click calibration between the MA-860 module and the MobileAccess Wi-Fi Coverage Expander (WCE) ensures optimal coverage by mirroring the coverage footprint and system behavior of "AP-on-Ceiling" deployments for 802.11a and 802.11b/g WLAN services.

This Wire-it-Once™ approach spreads WLAN deployment costs across multiple wireless service needs, providing facility-wide coverage for WLAN and all other wireless services while creating a flexible infrastructure that adapts to evolving technology requirements.



WLAN & Cellular Coverage Areas

In addition, the MA-860 WLAN solution locates Access Points (APs) in secure telecom closets alongside other LAN internetworking equipment, yielding significant operational benefits:

- Provides physical security of the APs
- Makes APs more accessible to IT staff
- Reduces ongoing operational expenses

MobileAccess 860 WLAN Module

Benefits

Cost-Effective Multi-Service Solution
- Delivers WLAN and other wireless RF signals over a single multi-service infrastructure
- Spreads WLAN deployment costs across multiple wireless services

Dependable WLAN Coverage
- MobileAccess WLAN architecture mirrors the behaviors and coverage footprint of "AP-on-Ceiling" deployment
- One-Click compensation ensures optimal 802.11b/g and 802.11a coverage
- Dedicated AP to antenna relationships ensure transparent support for WLAN applications such as VOIP and location services (RTLS)
- Redundant power option

Centralized & Secure AP Management
- Lowers operating expenses
- Provides physical security and simplifies management

Proactive End-to-End Monitoring
- Remote SNMP monitoring for status, alerting, and fault detection
- Monitoring extends to attached multi-service antennas

Simplified IT Deployment Model
- Uses standard WLAN design techniques

CISCO PARTNER Technology Developer

8391 Old Courthouse Road, Suite 300, Vienna, VA 22182
Tel: (866)436-9266, (703) 848-0200 TAC:(800) 787-1266 Fax:(703) 848-0280
www.mobileaccess.com

MA-860 Product Specifications

802.11 RF Parameters

860(M/R) with Wi-Fi Coverage Expander (WCE):

	802.11a	802.11b/g
Gain TX (dB)	0	0
Output Power (dBm)	17	b: 20 g: 17
Gain RX (dB)	4	4
NF RX (dB)	5	5
Flatness (dB)	+/- 2.0	+/- 1.5

860(M/R) Module Standalone:

	802.11a	802.11b/g
Insertion Loss (dB)	3	2
Flatness (dB)	+/- 1.0	+/- 1.0

Mobile Services Parameters

	Cell			PCS
Band (MHz)	698-960			1710-1990
Insertion Loss (dB)				
MA-860	1.0			2.5
WCE	1.2			3.5
System	2.2			6.0

RF Connections

860(M/R)

802.11 b/g	(4) SMA Female, 50 ohm
802.11 a	(4) SMA Female, 50 ohm
Mobile Services	(4) SMA Female, 50 ohm
Antenna Ports	(4) N-type Female, 50 ohm

WCE

Coax (860 facing)	(1) N-type Male
Coax (Ant facing)	(1) N-type Female

Standards and Approvals

FCC–47, CFR 15.109, Part 15 Sections B, C, and E
UL / IEC 60950 -1
UL1950 Fire Safety requirements
UL2043 Fire/Plenum (WCE)
CE EN 60950
CAN/CSA C22.2 No 60950

Management

The 860(M/R) can be configured and monitored through either a local RS-485 connection or a Web browser application via an RJ-45 Ethernet connection

Power

Power	2 DC Power Inputs DC-1 = 28V Mandatory DC Power, 66 Watts DC-2= 9.8V Optional Redundant Power, 40 Watts

Physical Specifications

Dimensions	860(M/R):	242 mm x 279 mm x 38 mm (9.54 in x 10.98 in x 1.5 in)
	WCE:	130 mm x 120 mm x 20 mm (5.12 in x 4.73in x 0.8 in)
Weight	860(M/R):	2.82 kg (6.2 lb)
	WCE:	0.80 kg (1.8 lb)

Environmental Specifications

Temperature	
Operating	0°C to +50°C (32°F to 122°F)
Storage	-20°C to +85°C (-4°C to 185°C)
Humidity	
Operating	95% (non-condensing)
Storage	95% (non-condensing)

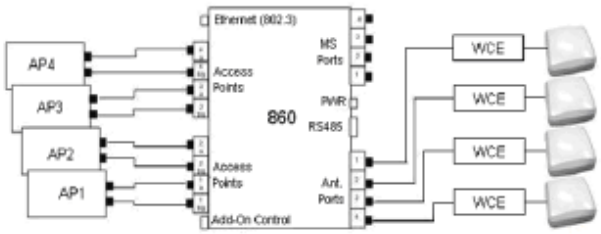
Ordering Information

860M	860 WLAN Module
860R	860 WLAN Module - Redundant Power Supply Option
WCE	Wi-Fi Coverage Expander

Accessory Kits for mounting 860(M/R):

AK-860-1000	860 with MA-1000
AK-860-1200	860 with MA-1200
AK-860-MDLT	860 with ModuLite
AK-860-2000	860 with MA-2000
AK-860-SA	860 stand alone
AK-860-2000L	860 with MA-2000 Lite
AK-860-PWR	Redundant Power Supply

Wiring Diagram



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www.mobileaccess.com

4. Spurious Radiated Emission in the Restricted Band, Below 1 GHz 2.4GHz Transmitter 802.11b/g+802.11a Signals

4.1 Test Specification

9kHz-1000 MHz, F.C.C., Part 15, Subpart C

4.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 9 kHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30 MHz, the loop antenna was rotated on its vertical axis, The antenna height (center of loop) was 1 meter.

In the frequency range 30-1000 MHz, the readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

Turning the E.U.T on and off.
Using a frequency span less than 10 MHz.
Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T. was tested at the operating frequencies of 2412, 2437, and 2462 MHz using the following modulations: DBPSK, BPSK, CCK, and 64QAM.

4.3 Test Data

JUDGEMENT: Passed by 1.5 dB.

The margin between the emission level and the specification limit is 1.5 dB in the worst case at the frequency of 250.03 MHz, vertical polarization.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

The results for all three operating frequencies and modulations were the same.

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	66.823250	36.2	34.2	-5.8			10.2
2	79.993600	31.1	26.4	-13.6			10.5
3	175.032600	35.0	25.8	-17.7			15.9
4	250.031550	47.8	44.5	-1.5			20.9
5	267.263050	42.8	38.7	-7.3			21.7

Figure 2. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
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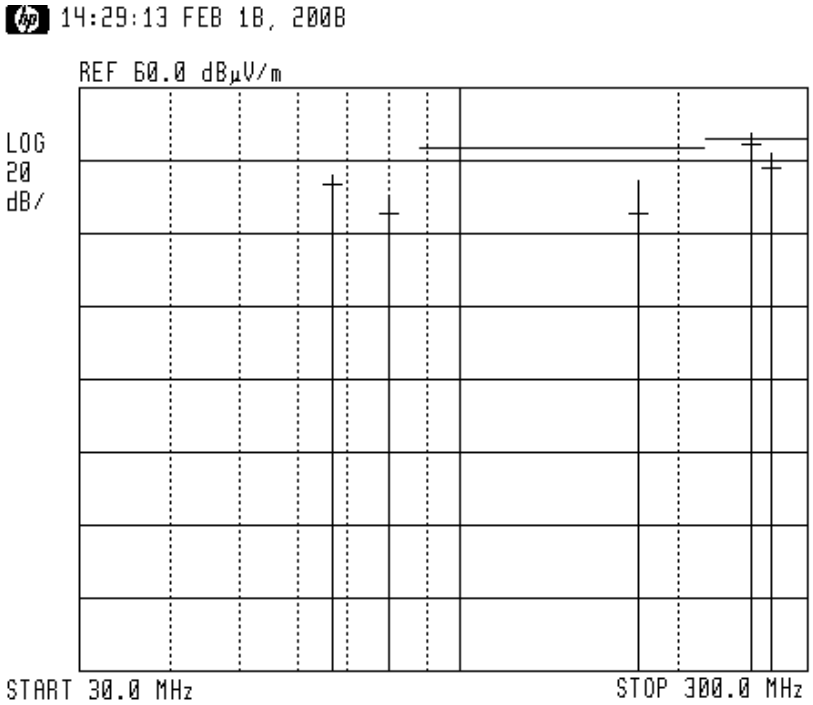

Figure 3. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	47.7	44.0	-2.0			19.6
2	500.037500	47.9	40.4	-5.6			21.0
3	625.067500	40.7	36.6	-9.4			24.7
4	700.000000	38.3	35.0	-11.0			25.3
5	750.062500	41.2	37.1	-8.9			25.8
6	960.000000	39.6	34.2	-19.8			29.5

Figure 4. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
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Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

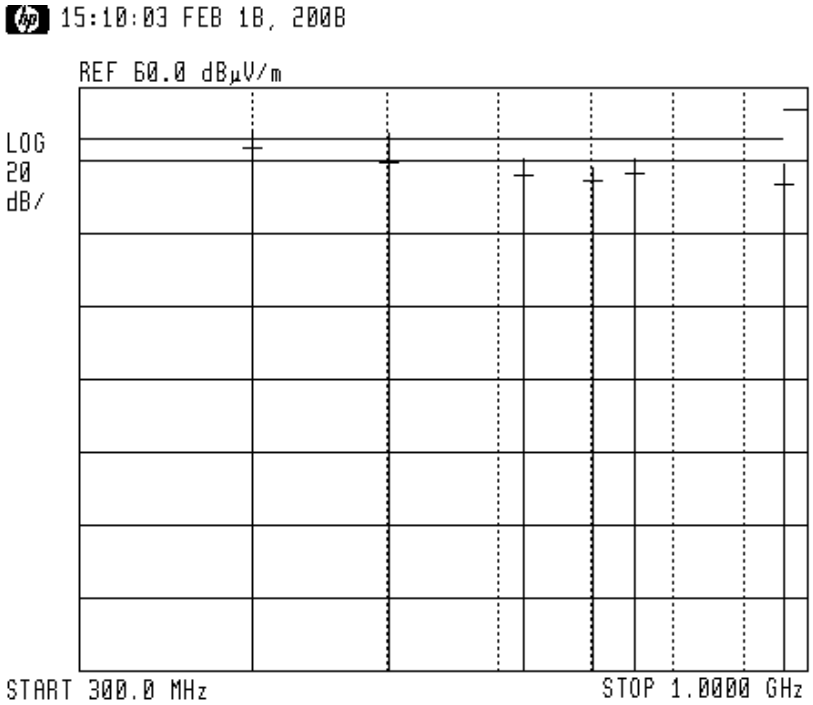

Figure 5. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
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Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	47.768400	28.2	21.0	-19.0			12.0
2	66.823250	38.8	36.4	-3.6			10.2
3	175.032600	32.0	25.6	-17.9			15.9
4	250.031550	43.9	40.6	-5.4			20.9
5	267.263050	37.9	34.4	-11.6			21.7

Figure 6. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
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Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
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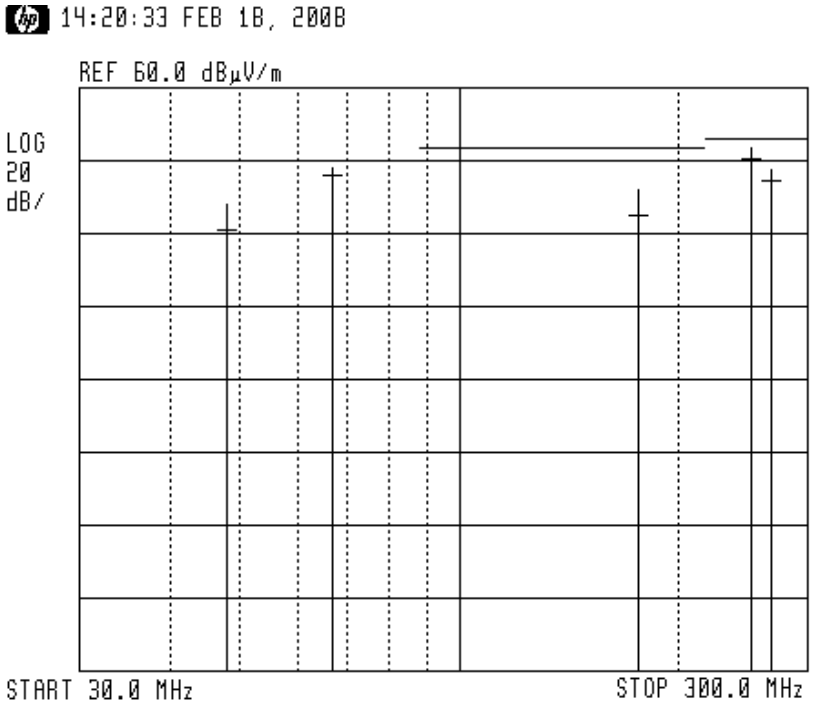

Figure 7. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
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Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	43.0	40.8	-5.2			19.6
2	500.037500	43.6	40.1	-5.9			21.0
3	625.050000	45.3	34.1	-11.9			24.7
4	700.000000	39.7	37.1	-8.9			25.3
5	701.612500	36.1	32.4	-13.6			25.3
6	750.000000	36.5	31.5	-14.5			25.8

Figure 8. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

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Antenna: 3 meters distance

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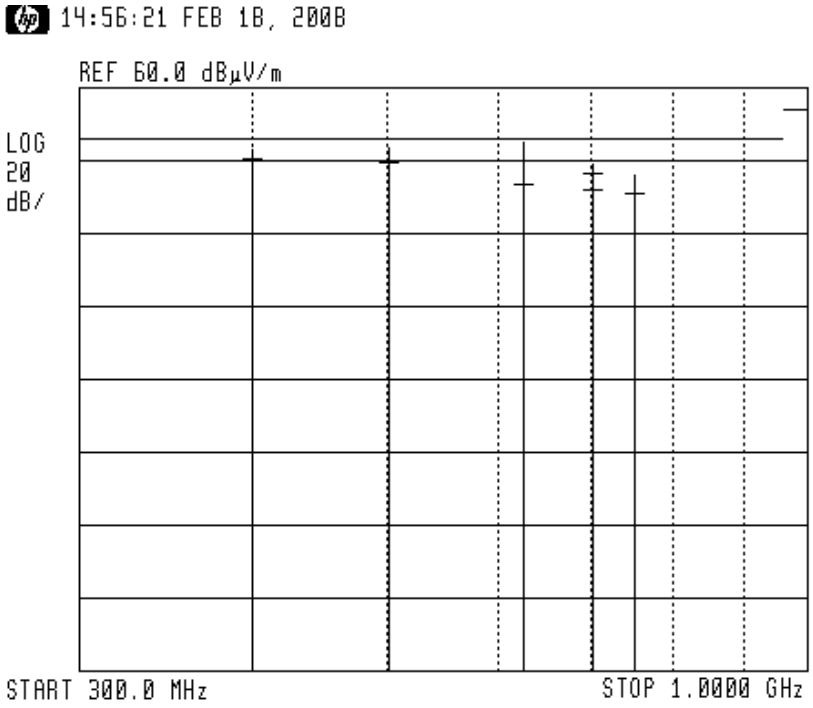


Figure 9. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

4.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	November 12, 2007	1 year
RF Section	HP	85420E	3427A00103	November 12, 2007	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 22, 2007	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 15, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

4.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[dB\mu v/m]\ FS = RA + AF + CF$$

FS: Field Strength [dBμv/m]
RA: Receiver Amplitude [dBμv]
AF: Receiving Antenna Correction Factor [dB/m]
CF: Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

5. Spurious Radiated Emission in the Restricted Band, Above 1 GHz 2.4GHz Transmitter 802.11 b/g + 802.11a Signals

5.1 Radiated Emission Above 1 GHz

The E.U.T operation mode and test set-up are as described in Section 3.

See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.
In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used.
In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.
The test distance was 3 meters.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was tested at the operating frequencies of 2412, 2437, and 2462 MHz using the following modulations: DBPSK, BPSK, CCK, and 64QAM.

5.2 Test Data

JUDGEMENT: Passed by 7.3 dB

For the operation frequency of 2412 MHz, the margin between the emission level and the specification limit is 7.4 dB in the worst case at the frequency of 4824.00 MHz, horizontal polarization.

For the operation frequency of 2437 MHz, the margin between the emission level and the specification limit is 9.0 dB in the worst case at the frequency of 4874.00 MHz, vertical polarization.

For the operation frequency of 2462 MHz, the margin between the emission level and the specification limit is 7.3 dB in the worst case at the frequency of 4924.00 MHz, horizontal polarization.

The results for all modulations were the same.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak
Operation Frequency: 2412 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4824.00	H	49.9*	74.0	-24.1
4824.00	V	46.5*	74.0	-27.5

Figure 10. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average
Operation Frequency: 2412 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4824.00	H	46.6*	54.0	-7.4
4824.00	V	44.2*	54.0	-9.8

Figure 11. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Average Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak
Operation Frequency: 2437 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4874.00	H	48.6*	74.0	-25.4
4874.00	V	49.7*	74.0	-24.3

Figure 12. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average
Operation Frequency: 2437 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4874.00	H	43.9*	54.0	-10.1
4874.00	V	45.0*	54.0	-9.0

Figure 13. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Average Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak
Operation Frequency: 2462 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4924.00	H	50.0*	74.0	-24.0
4924.00	V	49.1*	74.0	-24.9

Figure 14. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average
Operation Frequency: 2462 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4924.00	H	46.7*	54.0	-7.3
4924.00	V	45.6*	54.0	-8.4

Figure 15. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Average Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

5.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	November 12, 2007	1 year
RF Section	HP	85420E	3427A00103	November 12, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2007	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2008	1 year
Low Noise Amplifier	MK Milliwave	MKT6-3000 400-30-13P	399	January 9, 2008	1 year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Spectrum Analyzer	HP	8546E	3442A00275	November 14, 2007	1 year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

6. 26 dB Bandwidth 2.4 GHz Transmitter 802.11 b/g + 802.11a Signals

6.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. was measured and recorded.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

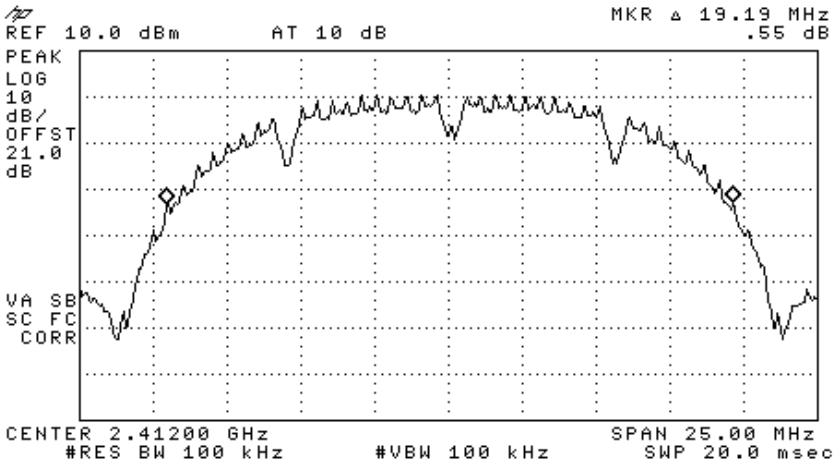


Figure 16 —2412 MHz DBPSK

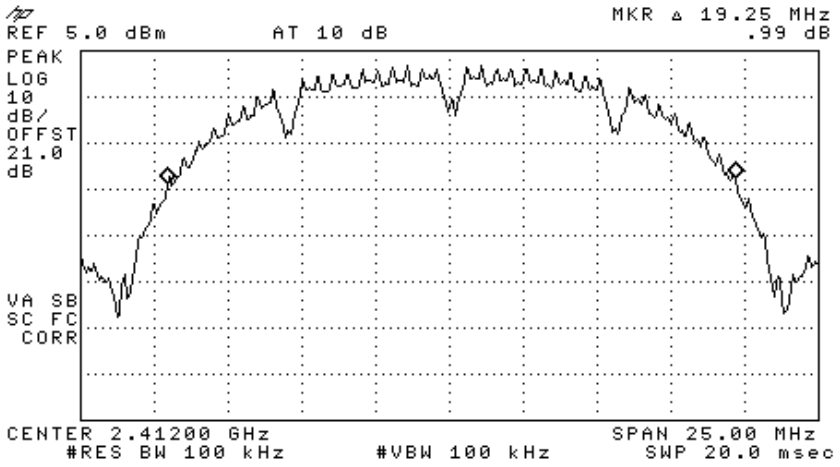


Figure 17 —2412 MHZ BPSK

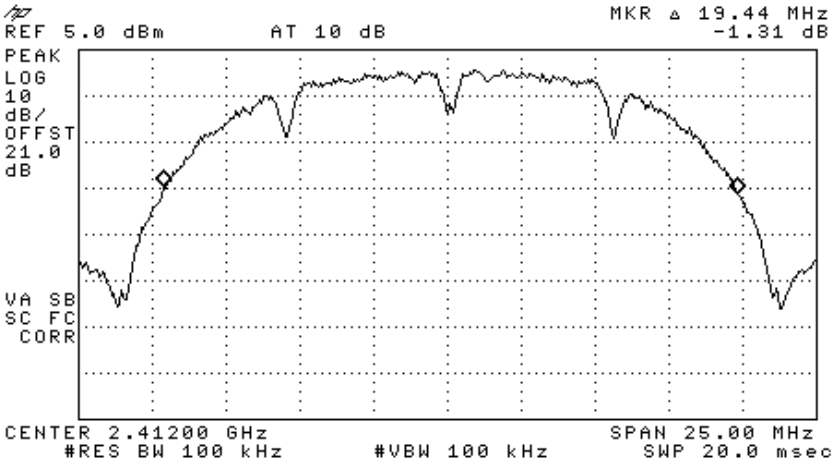


Figure 18 —2412 MHz CCK

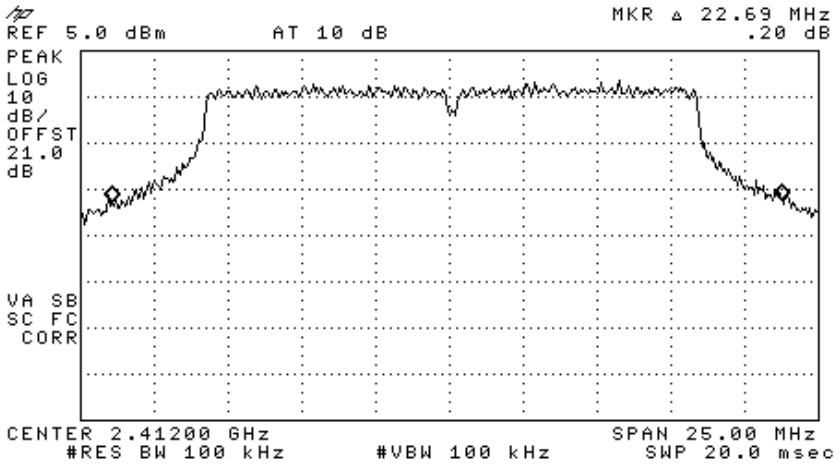


Figure 19 —2412 MHZ 64QAM

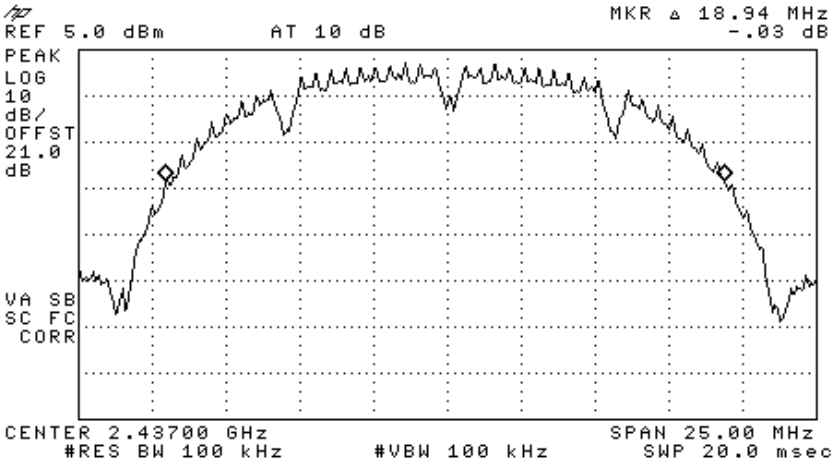


Figure 20 —2437 MHz DBPSK

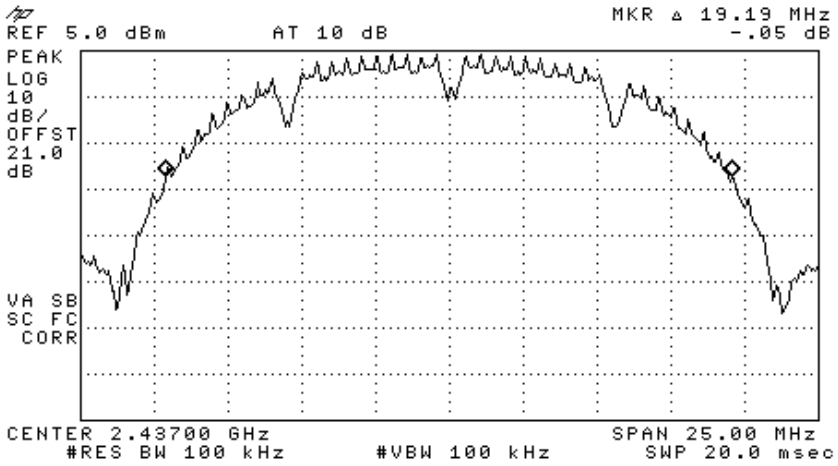


Figure 21 —2437 MHZ BPSK

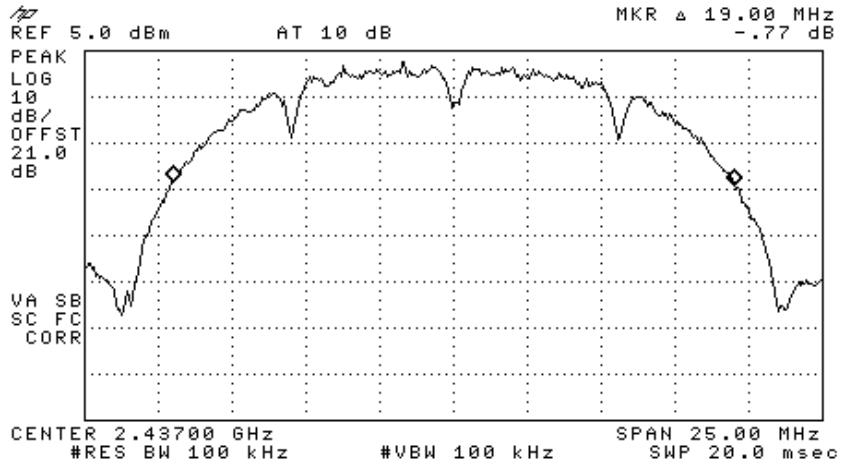


Figure 22 —2437 MHz CCK

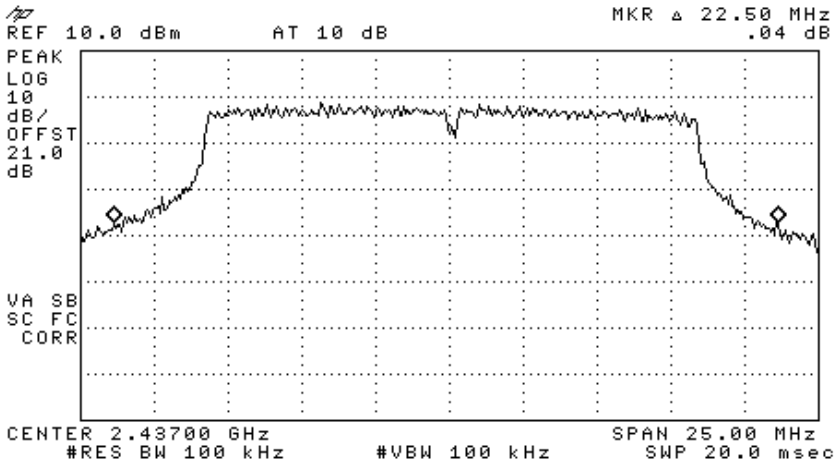


Figure 23 —2437 MHZ 64QAM

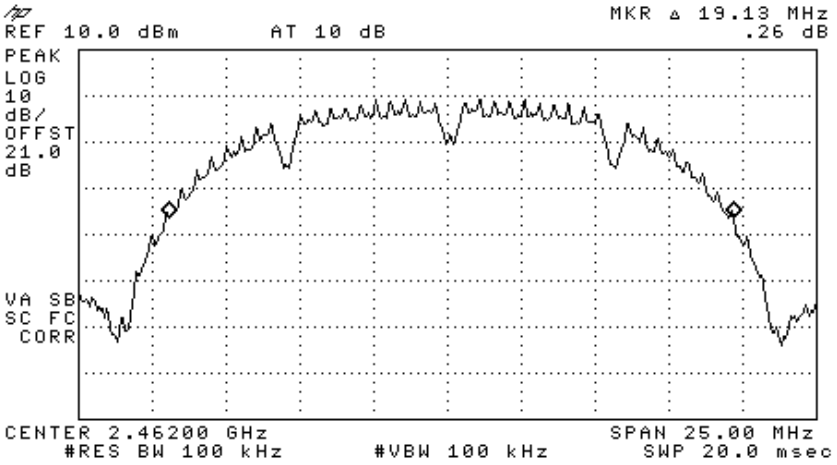


Figure 24 —2462 MHz DBPSK

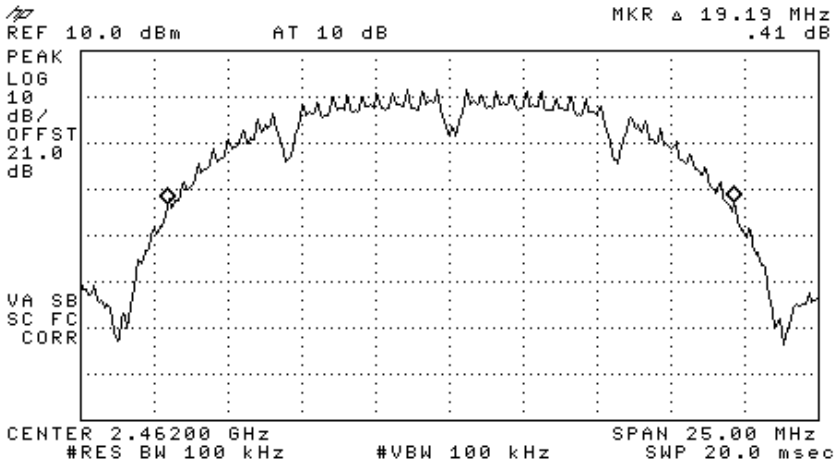


Figure 25 —2462 MHZ BPSK

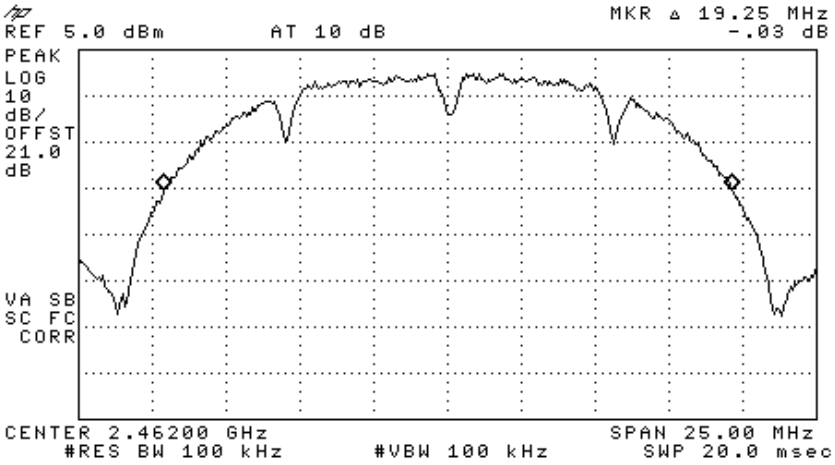


Figure 26 —2462 MHz CCK

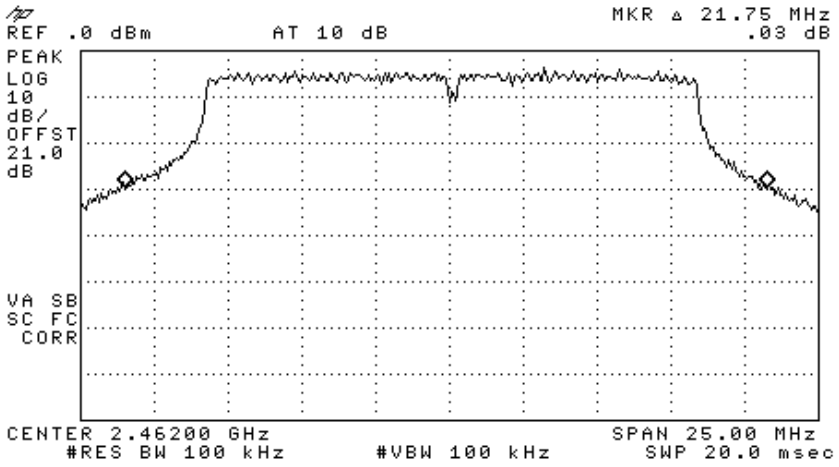


Figure 27 —2462 MHZ 64QAM

Operation Frequency (MHz)	Modulation	26 dB Bandwidth (dBm)
2412	DBPSK	19.19
	BPSK	19.25
	CCK	19.44
	64QAM	22.69
2437	DBPSK	18.94
	BPSK	19.19
	CCK	19.00
	64QAM	22.50
2462	DBPSK	19.13
	BPSK	19.19
	CCK	19.25
	64QAM	21.75

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

6.2 Test Equipment Used.

26 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 28 Test Equipment Used

7. Maximum Transmitted Peak Power Output 2.4 GHz Transmitter 802.11 b/g + 802.11a Signals

7.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The Spectrum Analyzer was set to 1.0 MHz resolution BW. Peak power level was measured at selected operation frequencies.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

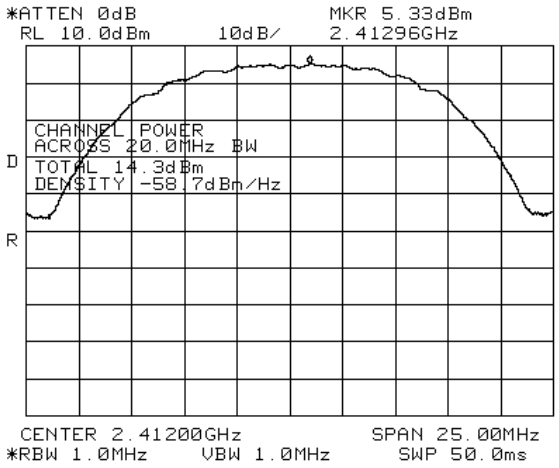


Figure 29 2412 DBPSK

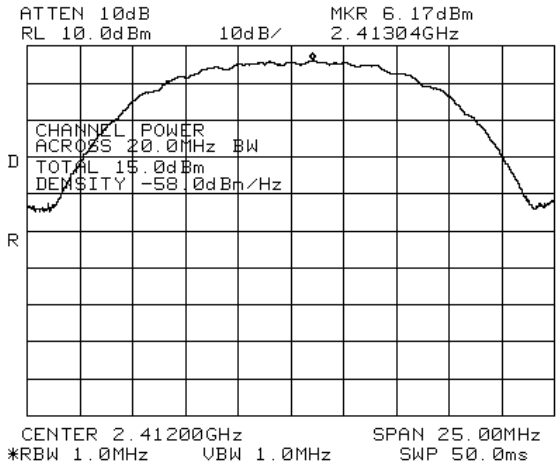


Figure 30 2412 MHz BPSK

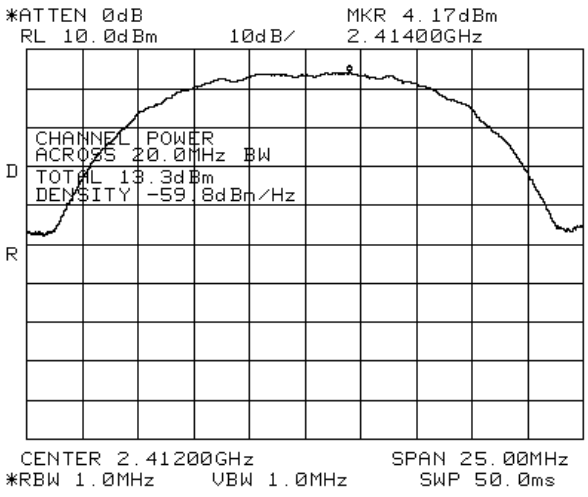


Figure 31 2412 MHz CCK

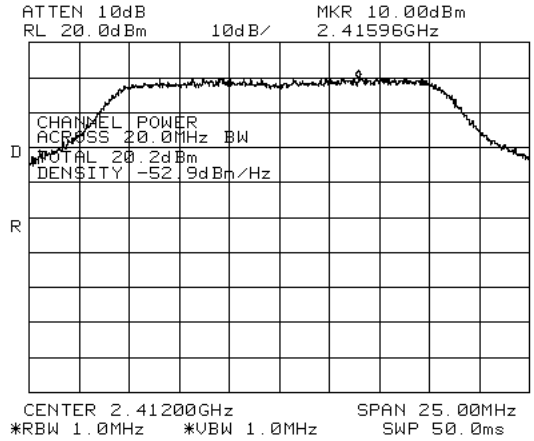


Figure 32 2412 MHz 64QAM

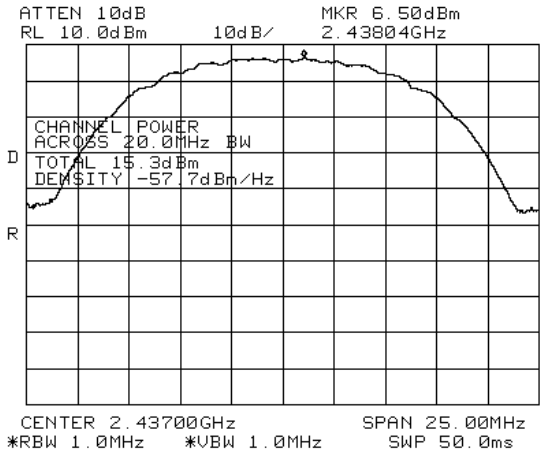


Figure 33 2437 MHz DBPSK

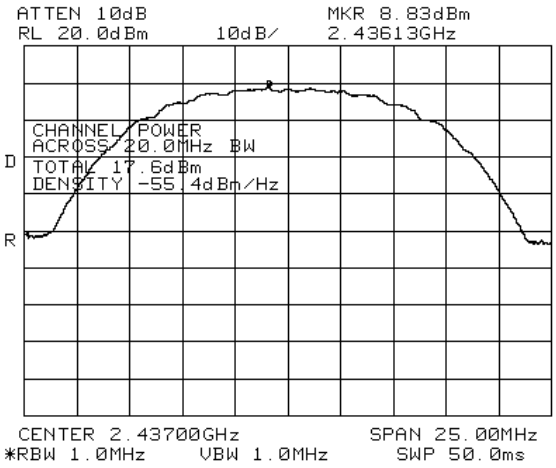


Figure 34 2437 MHz BPSK

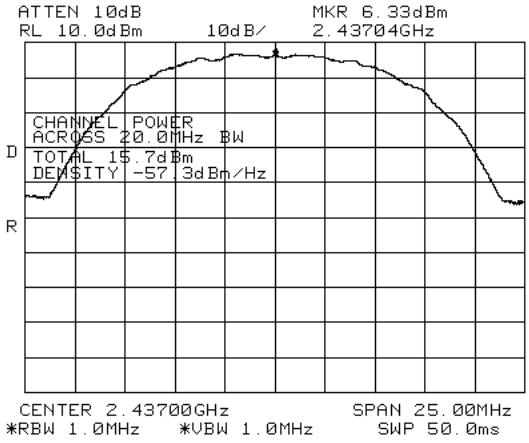


Figure 35 2437 MHz CCK

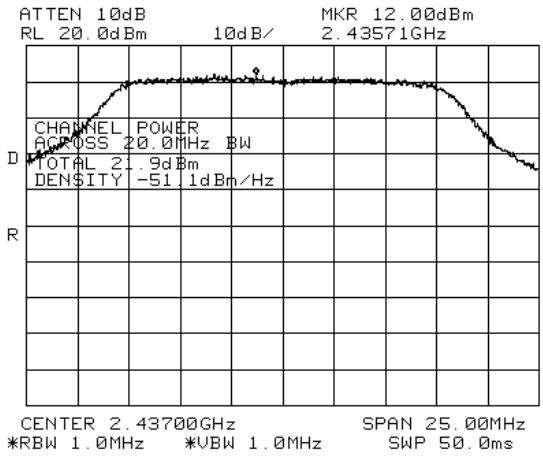


Figure 36 2437 MHz 64QAM

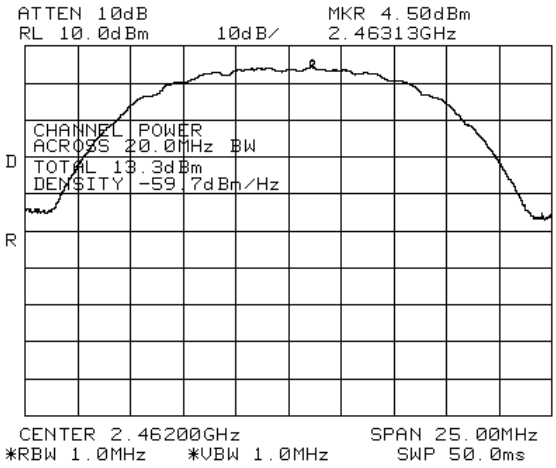


Figure 37 2462 MHz DBPSK

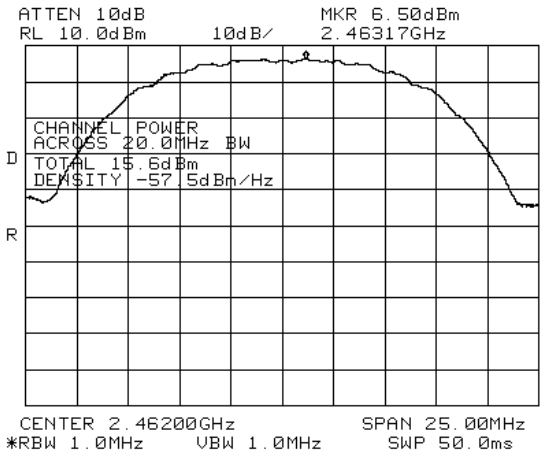


Figure 38 2462 MHz BPSK

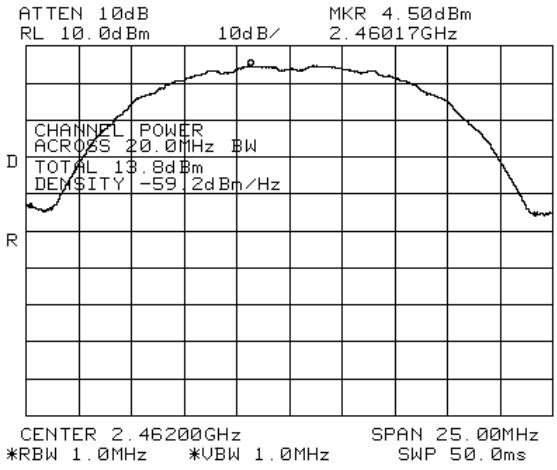


Figure 39 2462 MHz CCK

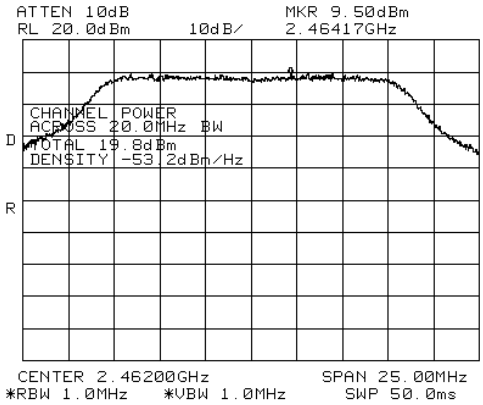


Figure 40 2462 MHz 64QAM

7.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D 2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Modulation	Power (dBm)	Specification (dBm)	Margin (dB)
2412	DBPSK	14.3	29.0	-14.7
	BPSK	15.0	29.0	-14.0
	CCK	13.3	29.0	-15.7
	64QAM	20.2	29.0	-8.8
2437	DBPSK	15.3	29.0	-13.7
	BPSK	17.6	29.0	-11.4
	CCK	15.7	29.0	-13.3
	64QAM	21.9	29.0	-7.1
2462	DBPSK	13.3	29.0	-15.7
	BPSK	15.6	29.0	-13.4
	CCK	13.8	29.0	-15.2
	64QAM	19.8	29.0	-9.2

Figure 41 Maximum Peak Power Output

Note: Antenna Gain is 7 dBi

JUDGEMENT: Passed by 7.1 dB

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: E. Pitt

7.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2007	1 year

Figure 42 Test Equipment Used

8. Peak Power Output Out of 2400-2483.5 MHz Band 2.4 GHz Transmitter 802.11 b/g +a Signals

8.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW except for the frequency range
9 kHz-150 kHz where the RBW was set to 1kHz and the frequency range
150 kHz-10 MHz where the RBW was set to 10kHz. The frequency range from 9 kHz to 25 GHz was scanned. Level of spectrum components out of the 2400-2483.5 MHz was measured at the selected operation frequencies.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

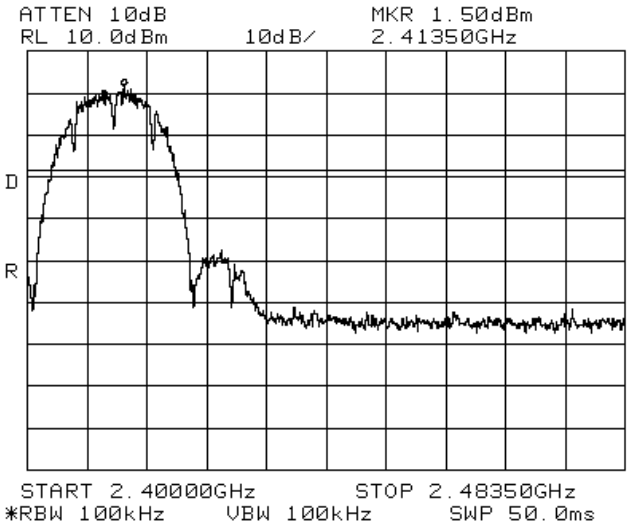


Figure 43 —2412 MHz DBPSK

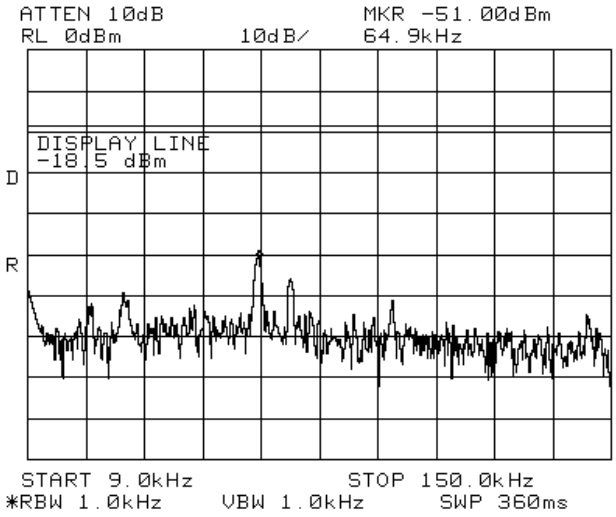


Figure 44 —2412 MHz DBPSK

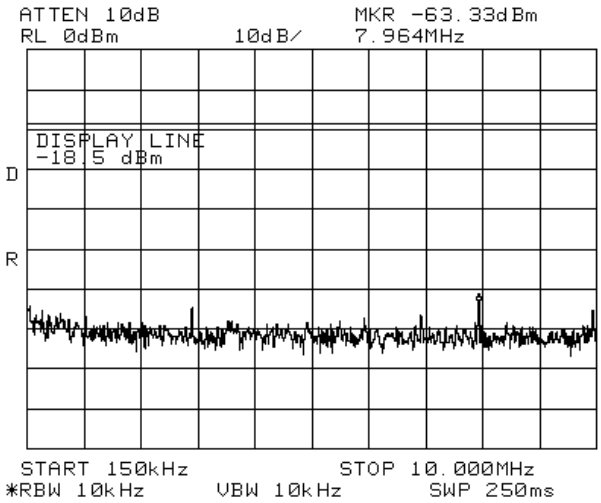


Figure 45 —2412 MHz DBPSK

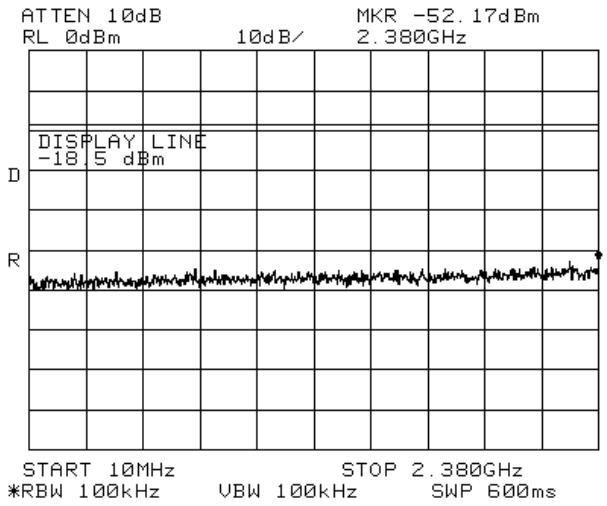


Figure 46 —2412 MHz DBPSK

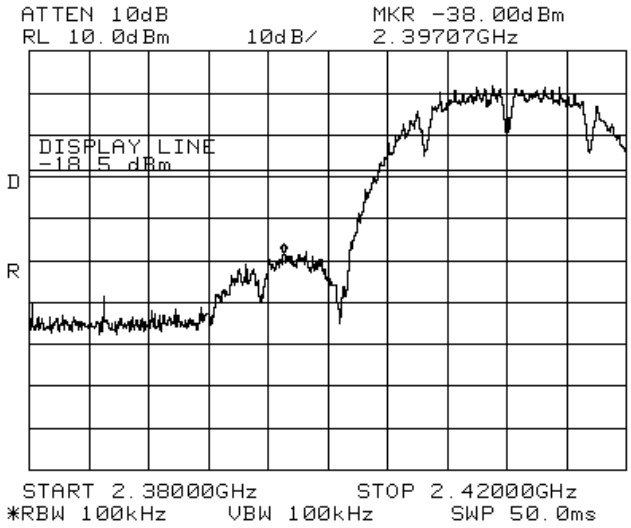


Figure 47 —2412 MHz DBPSK

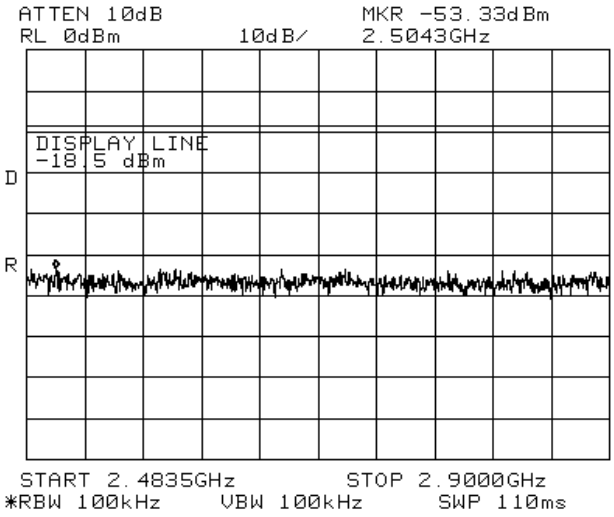


Figure 48 —2412 MHz DBPSK

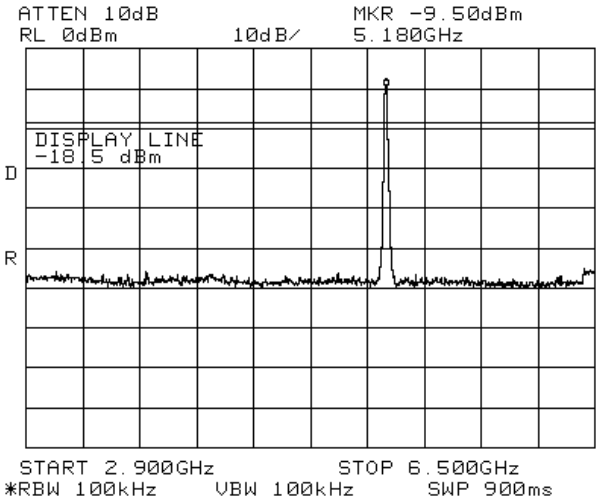


Figure 49 —2412 MHz DBPSK

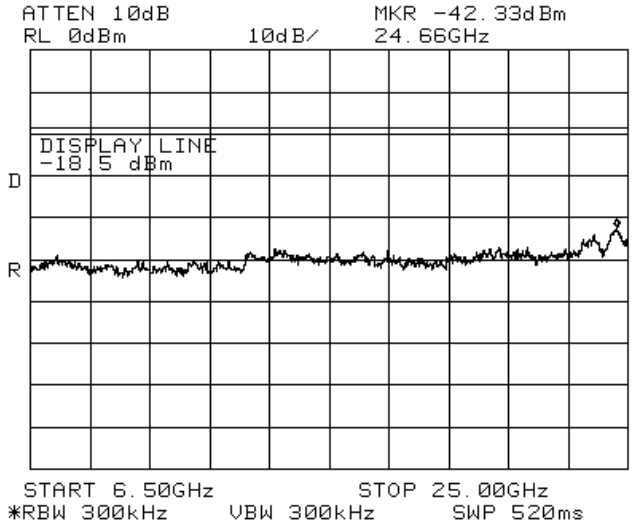


Figure 50 —2412 MHz DBPSK

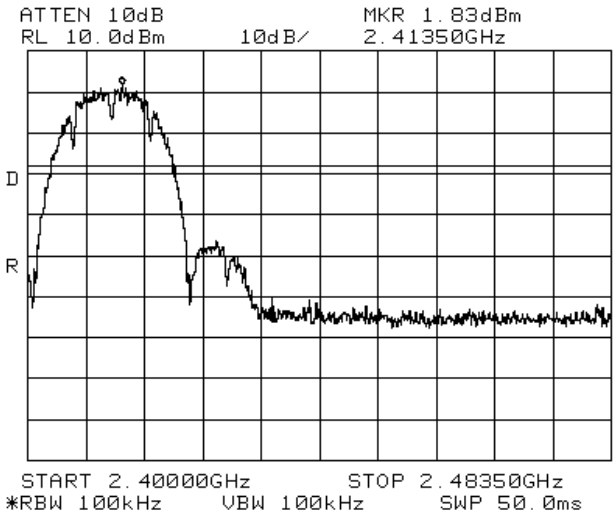


Figure 51 —2412 MHz BPSK

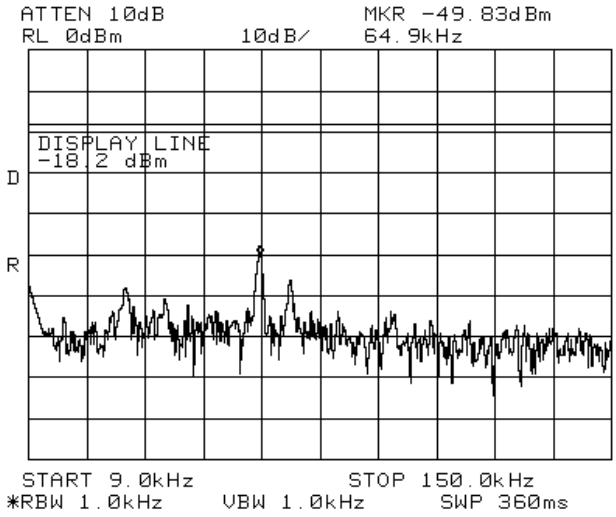


Figure 52 —2412 MHz BPSK

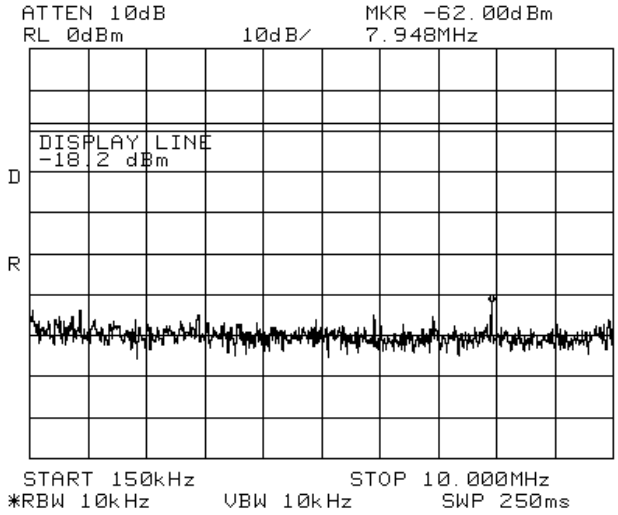


Figure 53 —2412 MHz BPSK

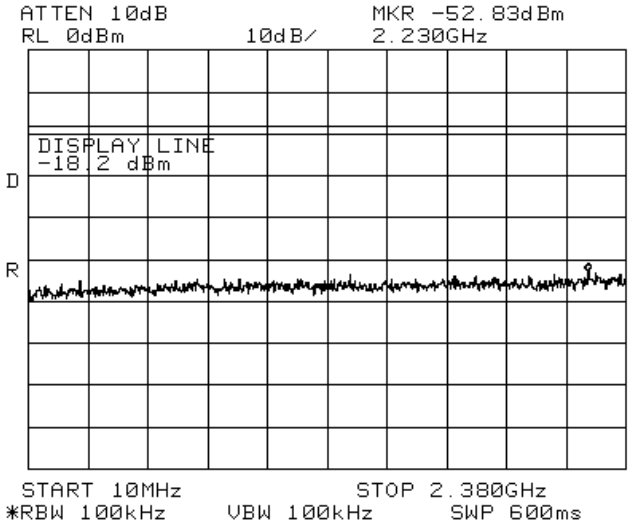


Figure 54 —2412 MHz BPSK

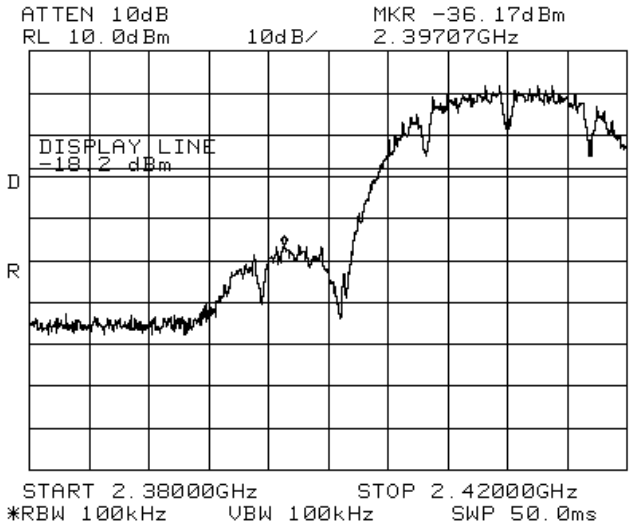


Figure 55 —2412 MHz BPSK

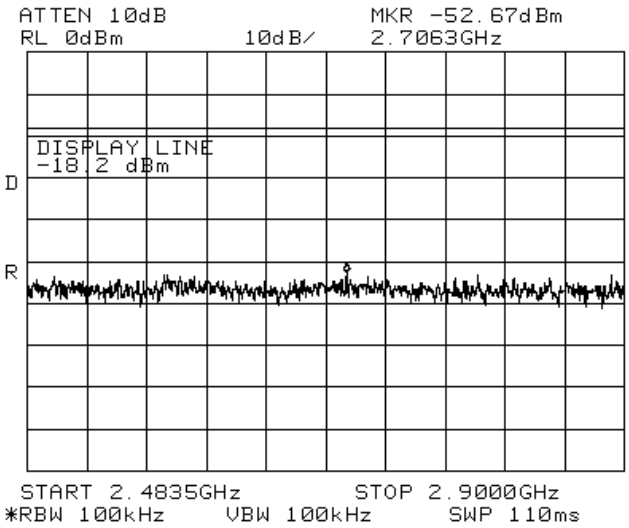


Figure 56 —2412 MHz BPSK

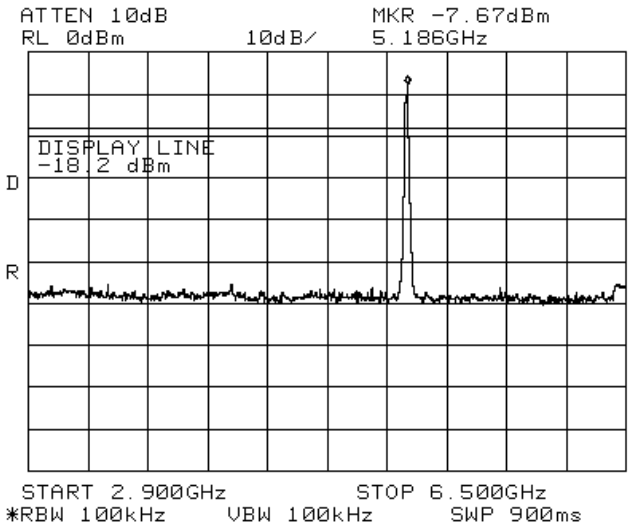


Figure 57 —2412 MHz BPSK

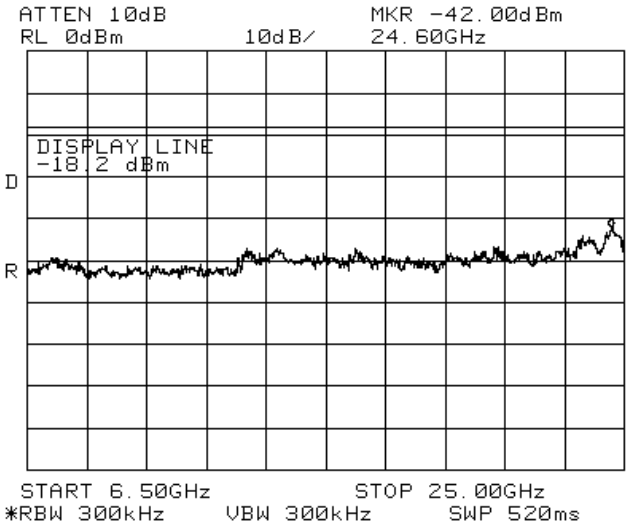


Figure 58 —2412 MHz BPSK

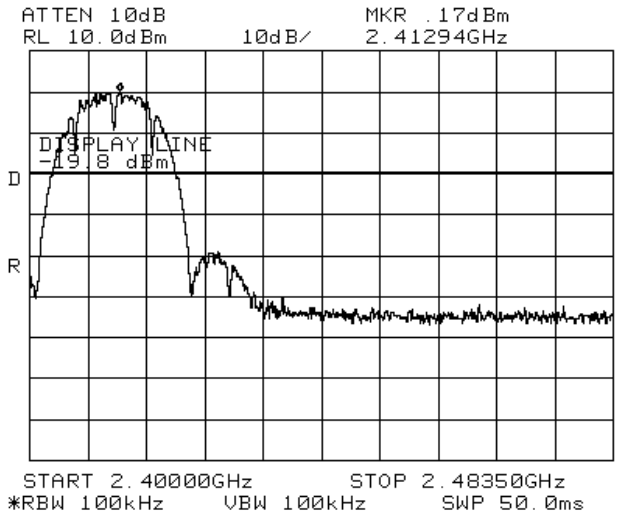


Figure 59 —2412 MHz CCK

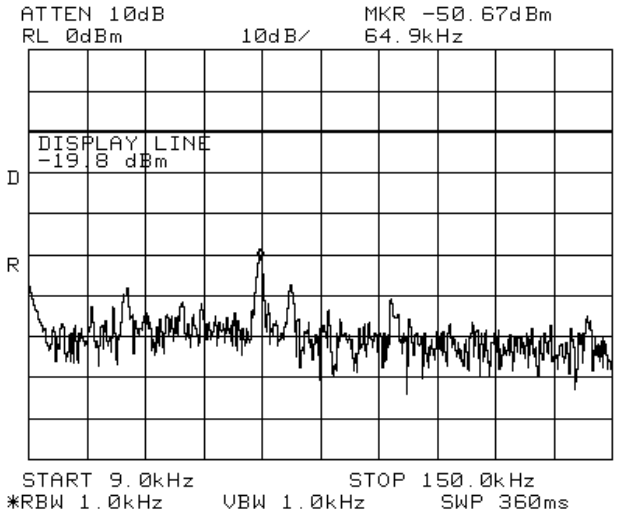


Figure 60 —2412 MHz CCK

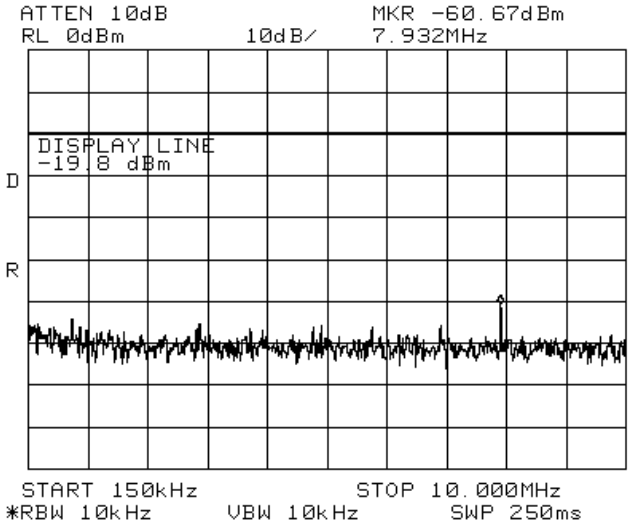


Figure 61 —2412 MHz CCK

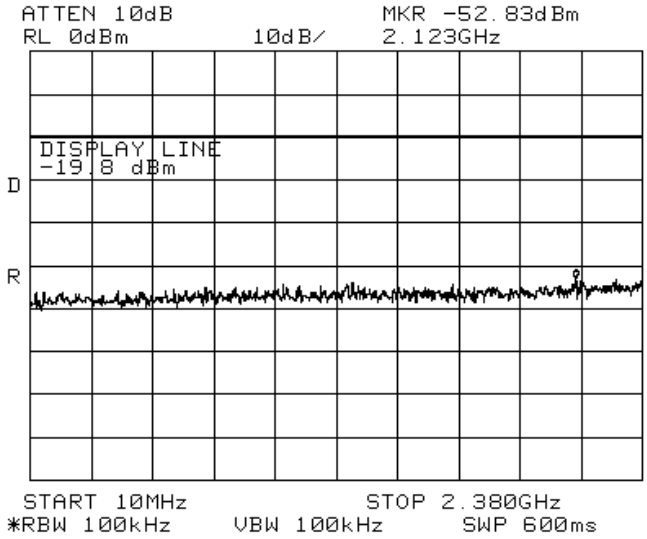


Figure 62 —2412 MHz CCK

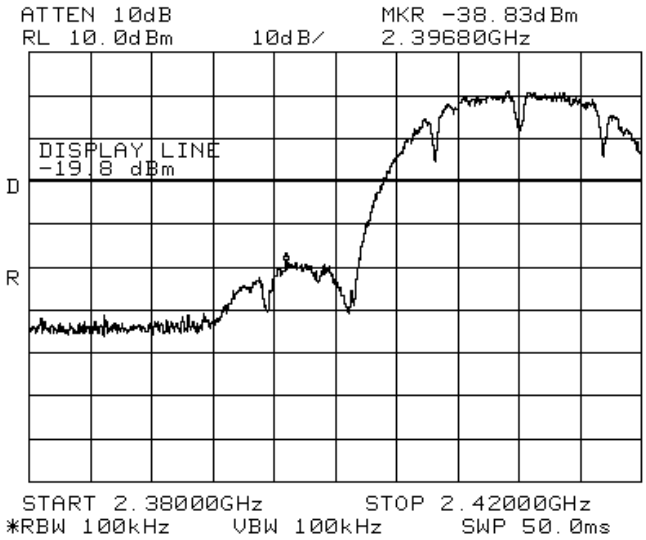


Figure 63 —2412 MHz CCK

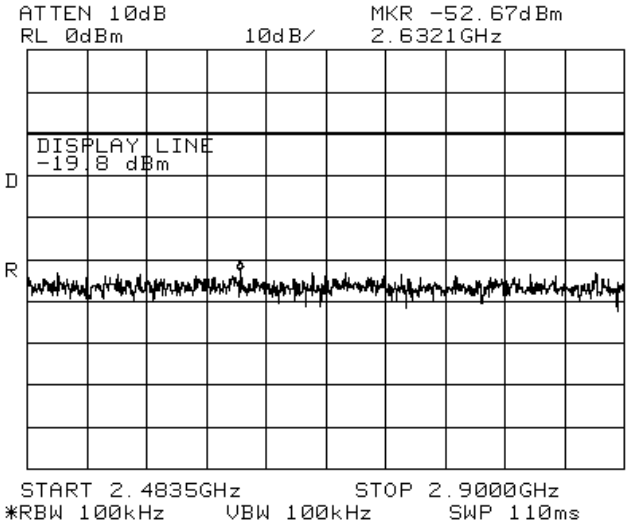


Figure 64 —2412 MHz CCK

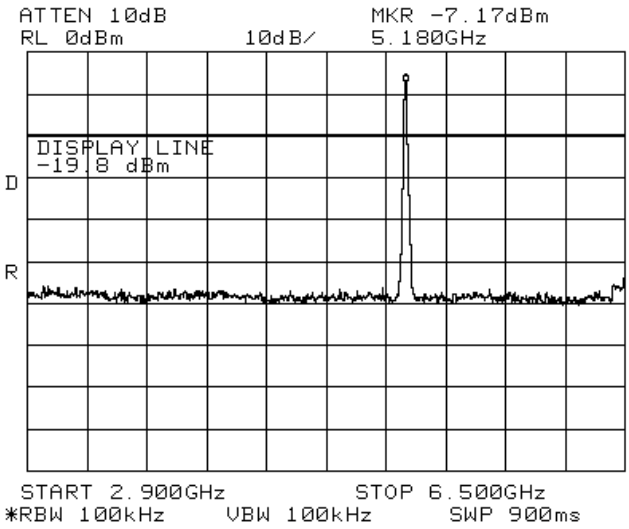


Figure 65 —2412 MHz CCK

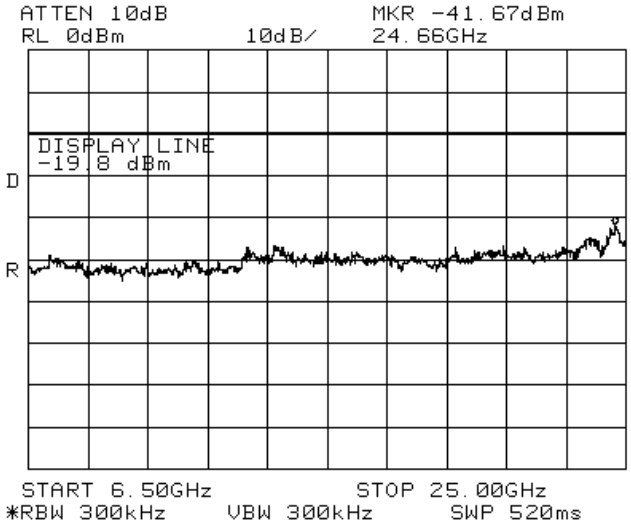


Figure 66 —2412 MHz CCK

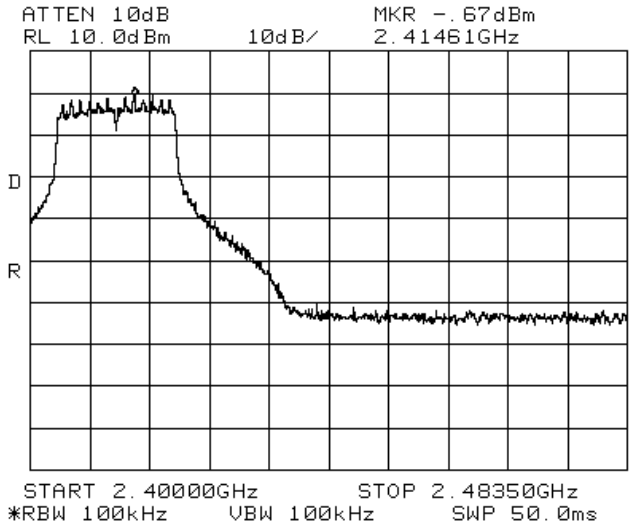


Figure 67 —2412 MHz 64QAM

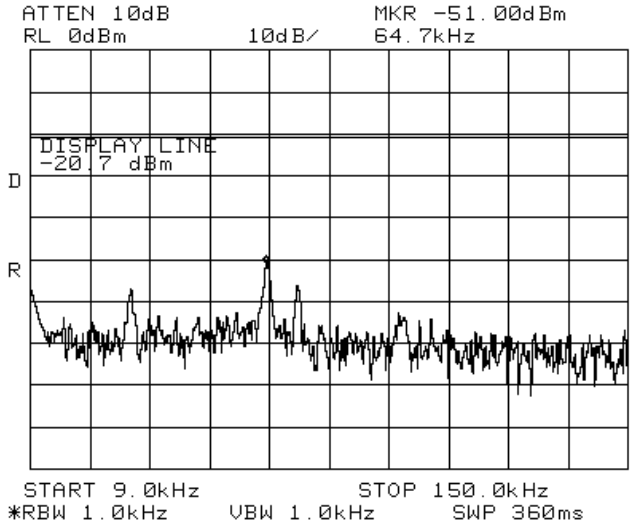


Figure 68 —2412 MHz 64QAM

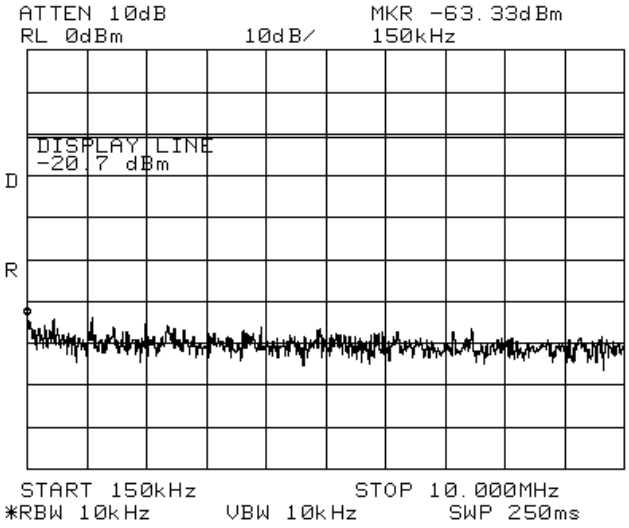


Figure 69 —2412 MHz 64QAM

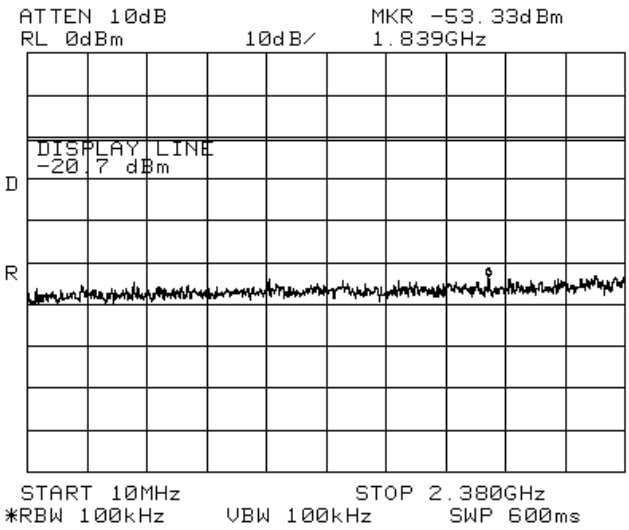


Figure 70 —2412 MHz 64QAM

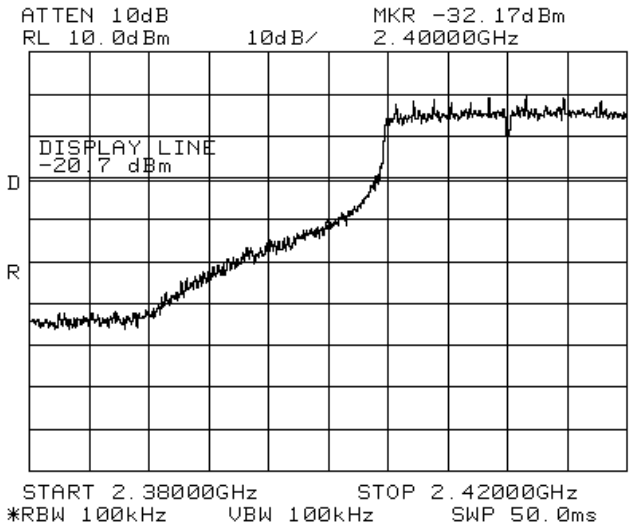


Figure 71 —2412 MHz 64QAM

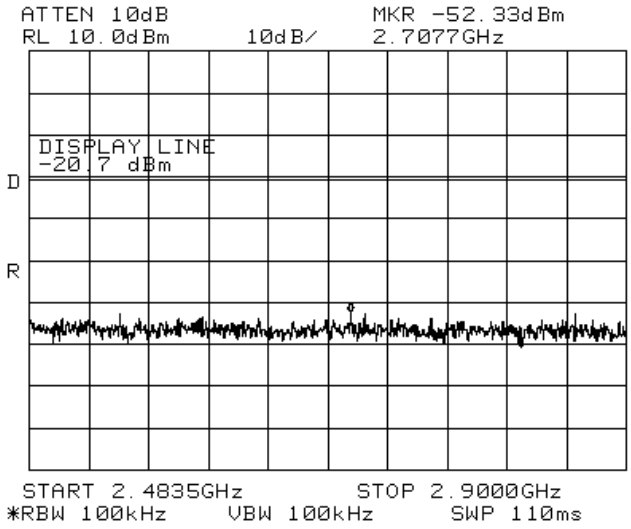


Figure 72 —2412 MHz 64QAM

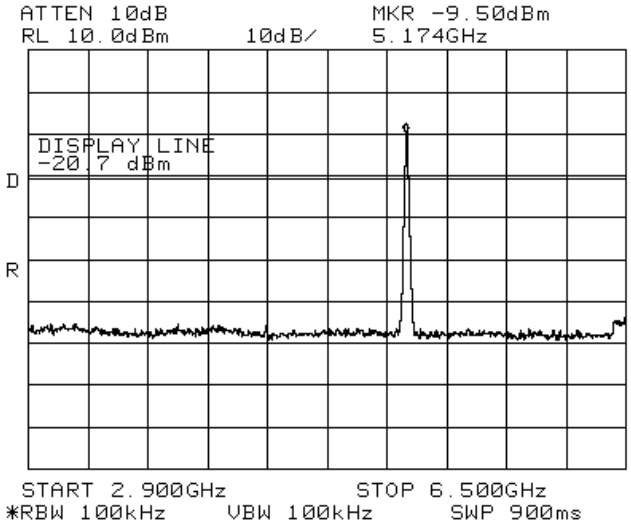


Figure 73 —2412 MHz 64QAM

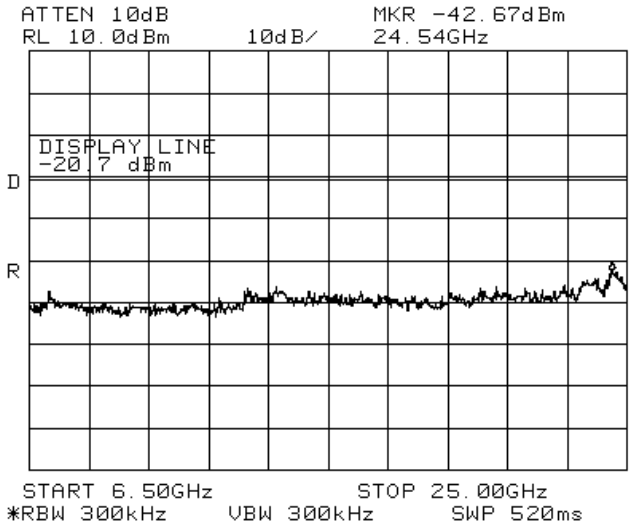


Figure 74 —2412 MHz 64QAM

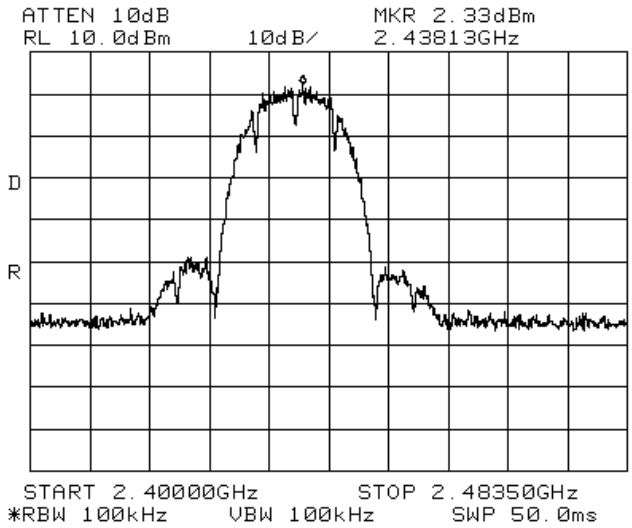


Figure 75 —2437 MHz DBPSK

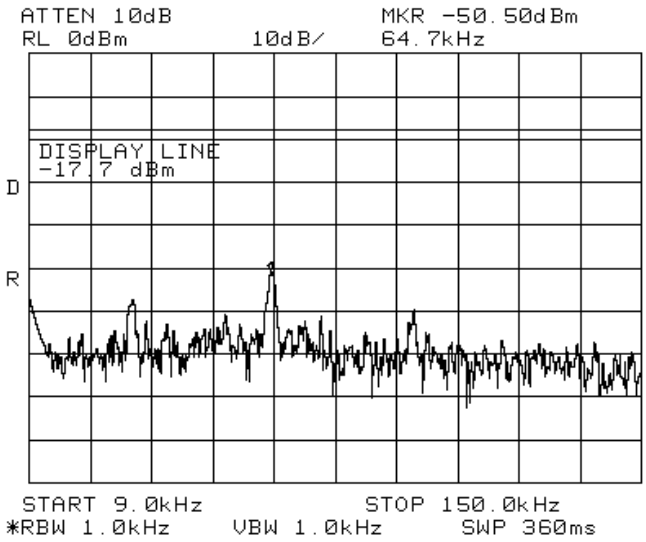


Figure 76 —2437 MHz DBPSK

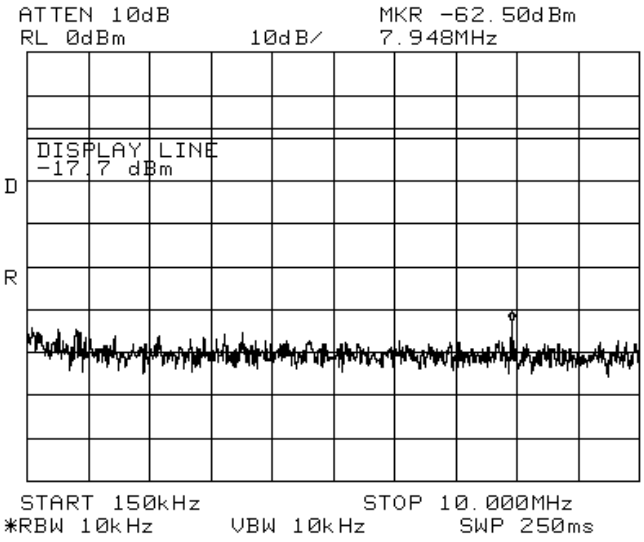


Figure 77 —2437 MHz DBPSK

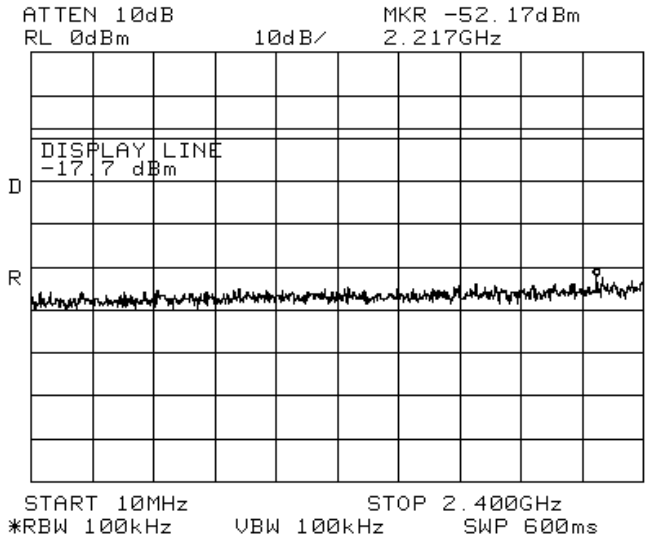


Figure 78 —2437 MHz DBPSK

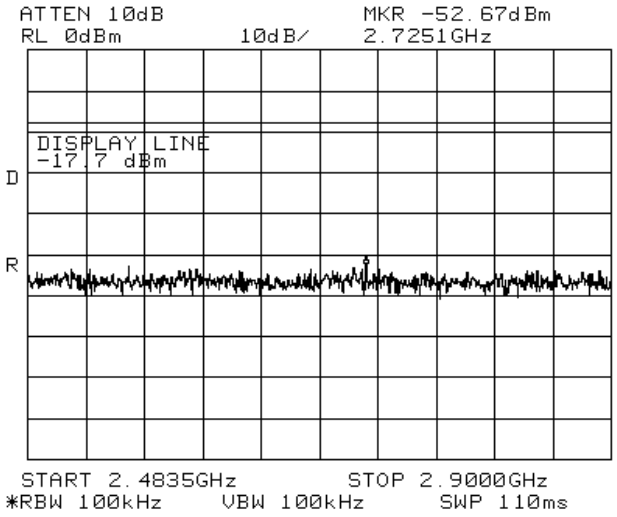


Figure 79 —2437 MHz DBPSK

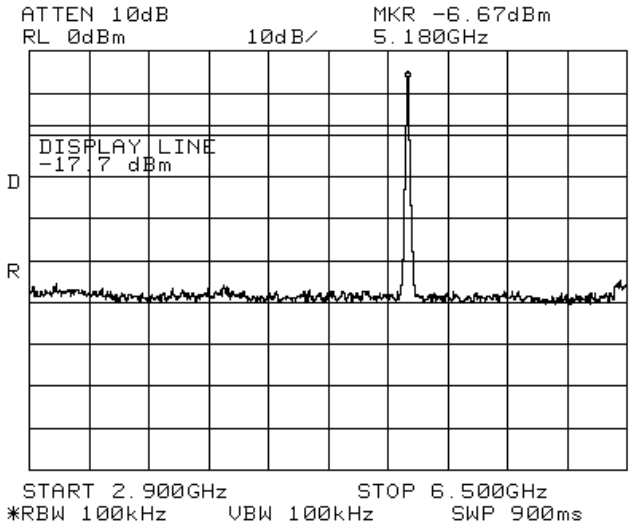


Figure 80 —2437 MHz DBPSK

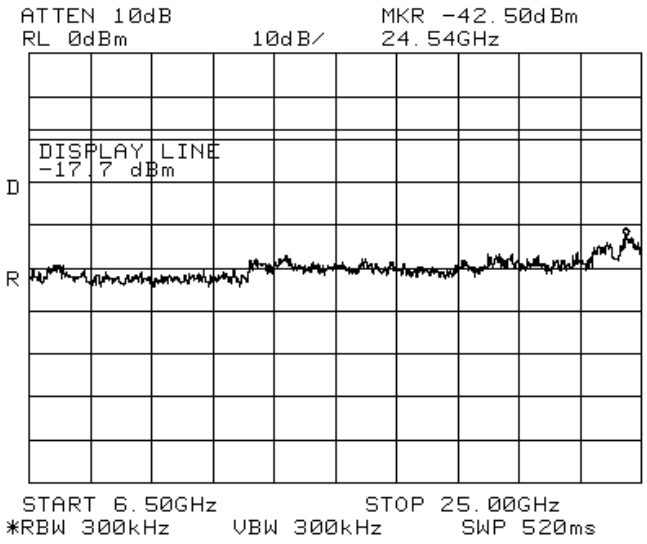


Figure 81 —2437 MHz DBPSK

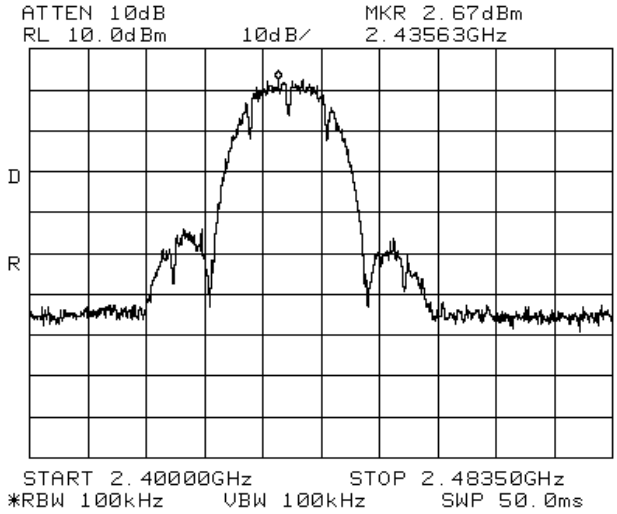


Figure 82 —2437 MHz BPSK

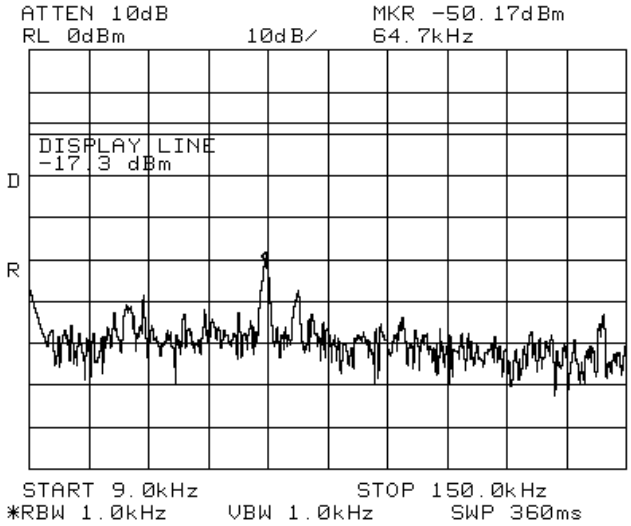


Figure 83 —2437 MHz BPSK

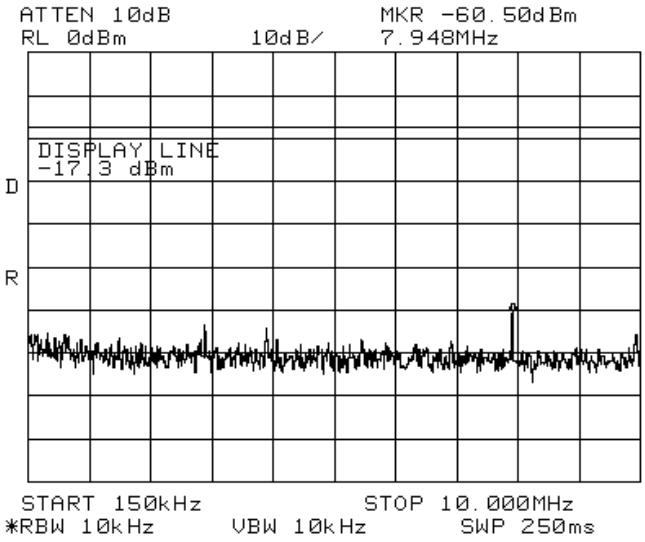


Figure 84 —2437 MHz BPSK

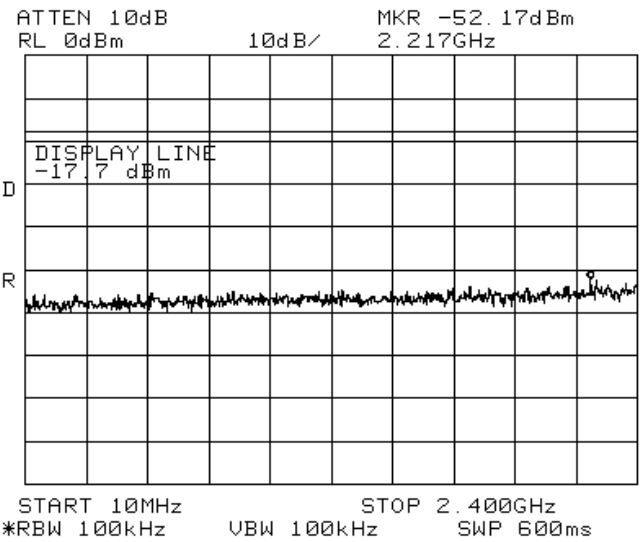


Figure 85 —2437 MHz BPSK

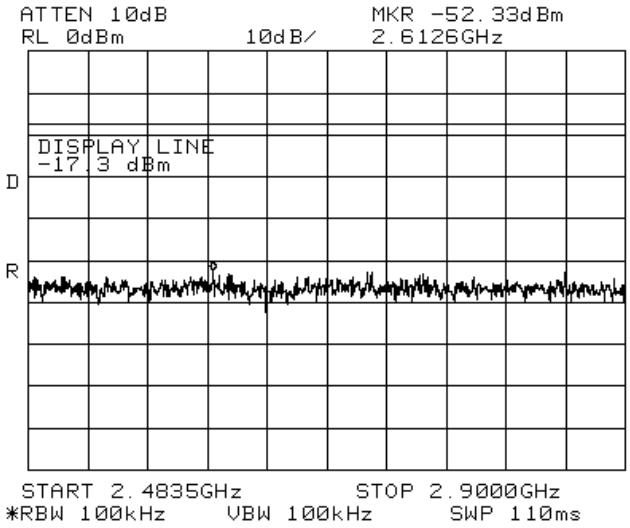


Figure 86 —2437 MHz BPSK

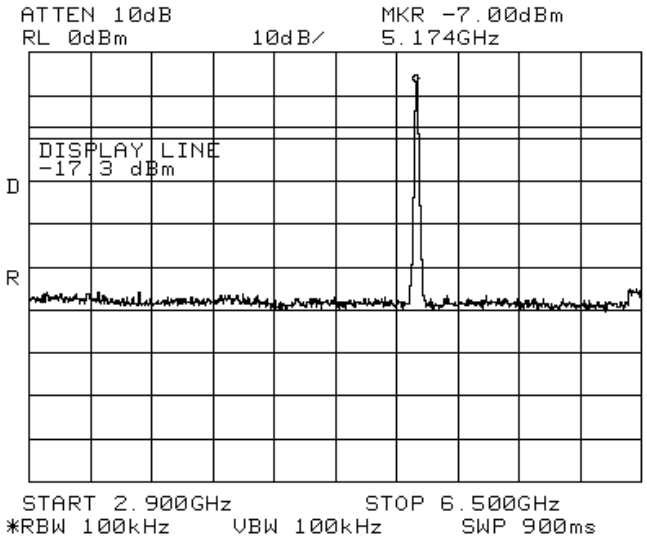


Figure 87 —2437 MHz BPSK

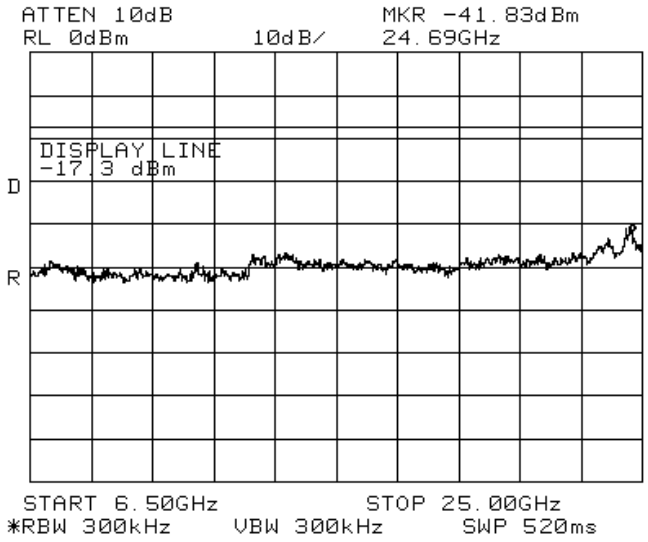


Figure 88 —2437 MHz BPSK

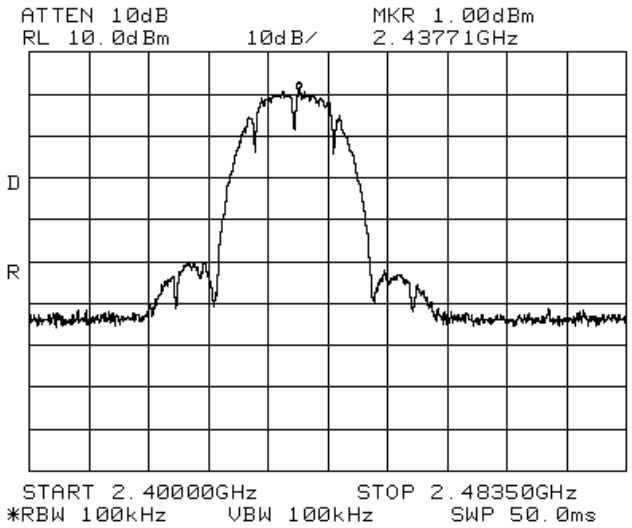


Figure 89 —2437 MHz CCK

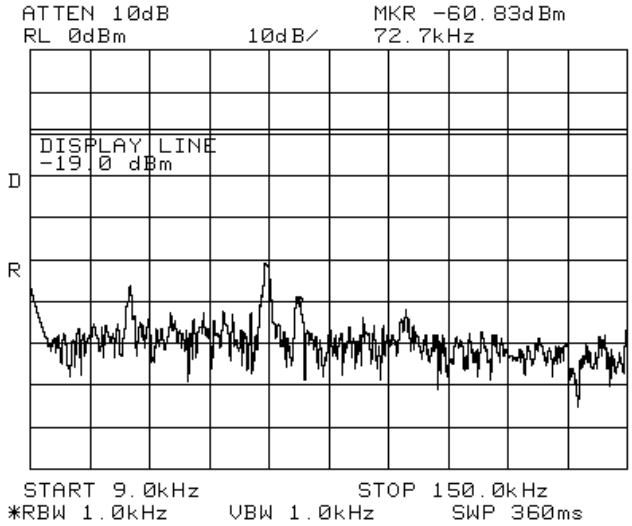


Figure 90 —2437 MHz CCK

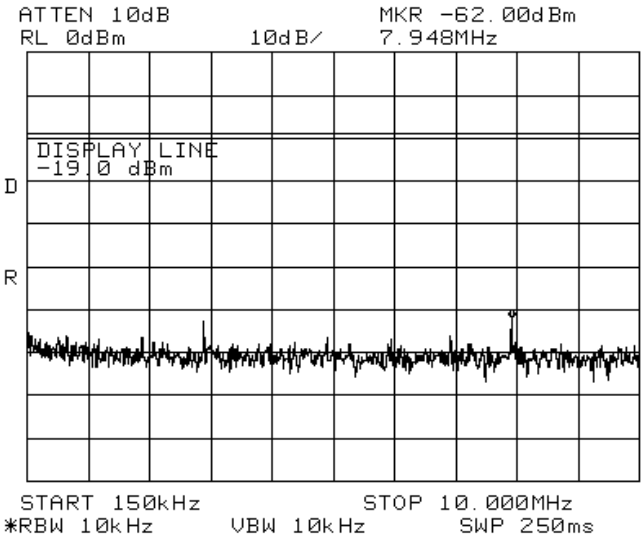


Figure 91 —2437 MHz CCK

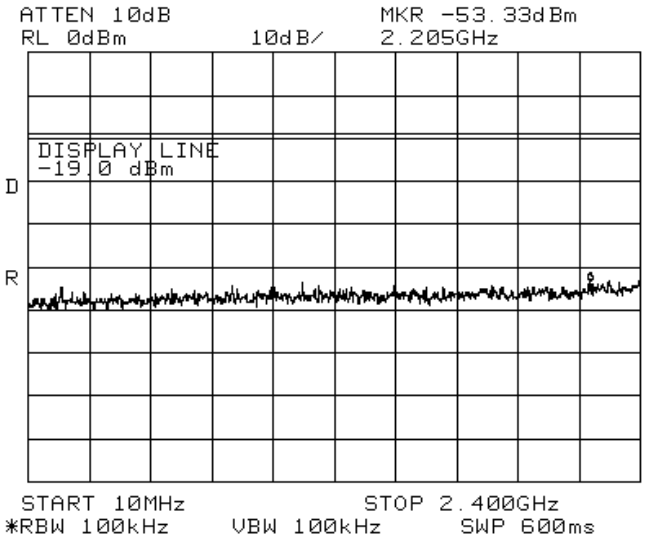


Figure 92 —2437 MHz CCK

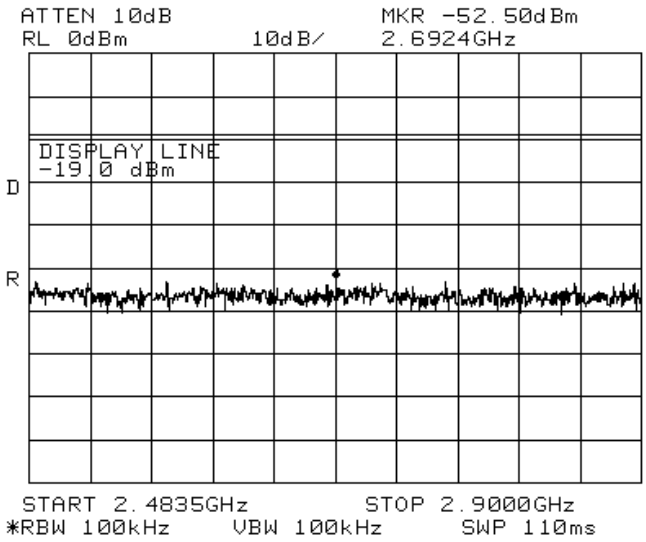


Figure 93 —2437 MHz CCK

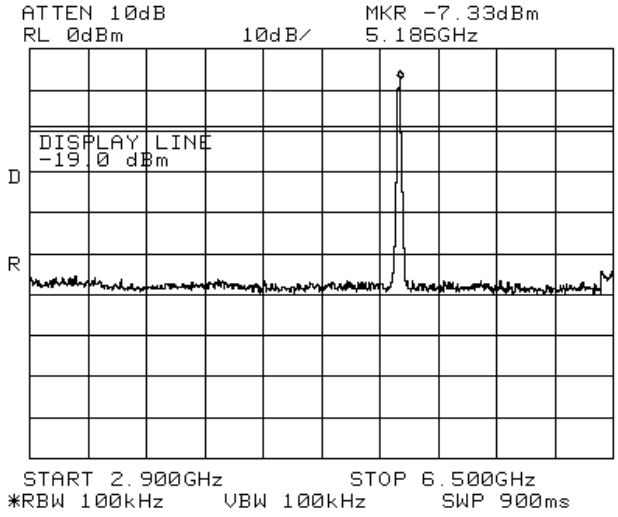


Figure 94 —2437 MHz CCK

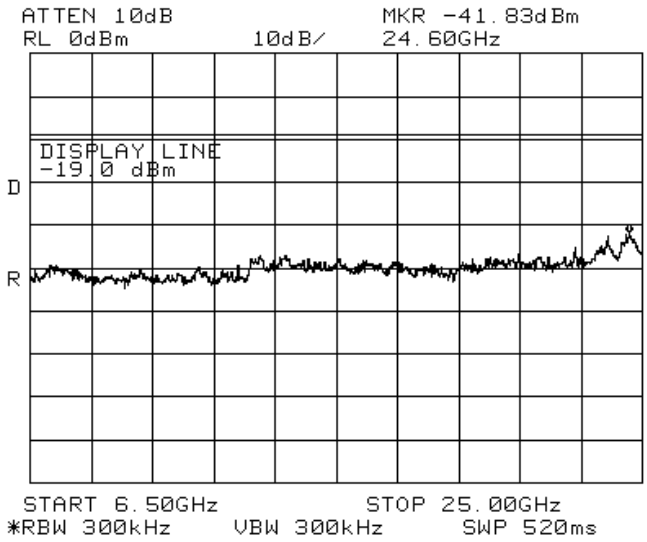


Figure 95 —2437 MHz CCK

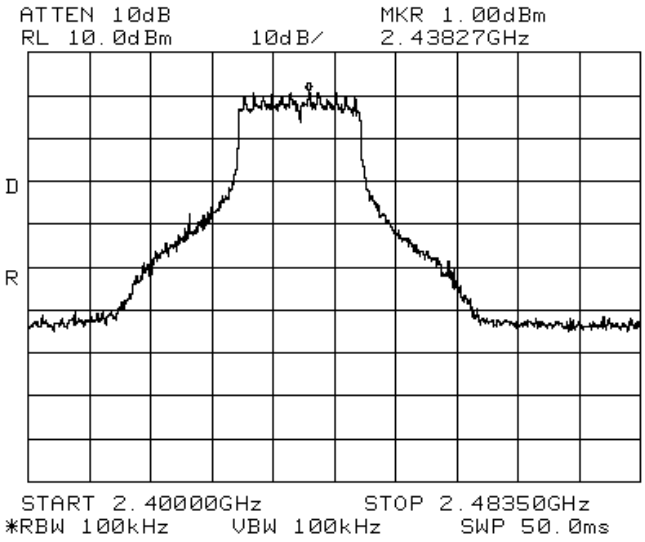


Figure 96 —2437 MHz 64QAM

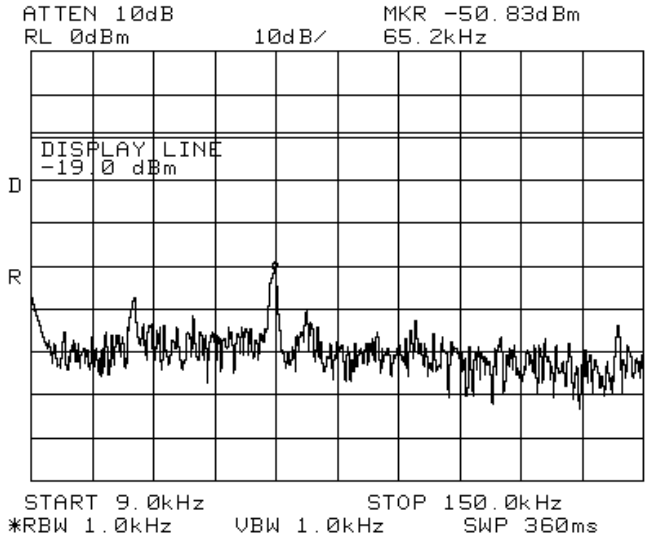


Figure 97 —2437 MHz 64QAM

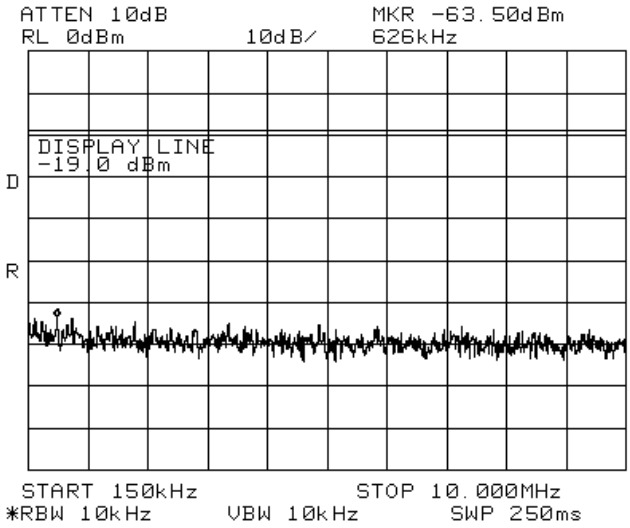


Figure 98 —2437 MHz 64QAM

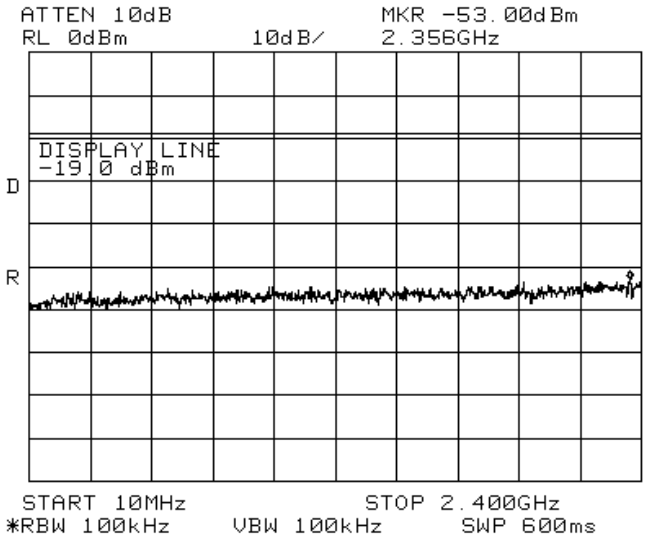


Figure 99 —2437 MHz 64QAM

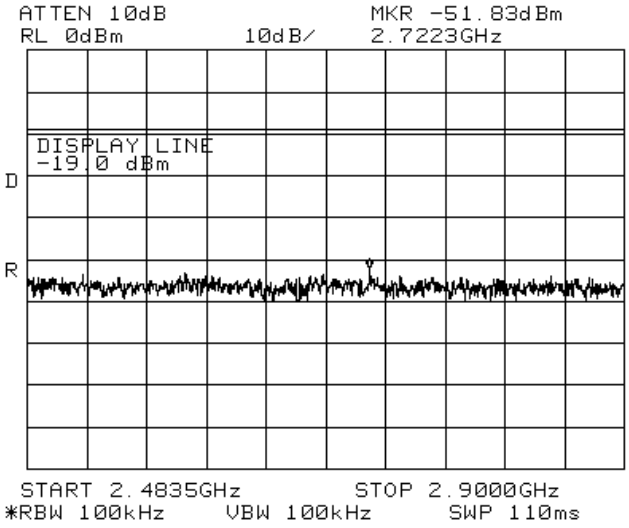


Figure 100 —2437 MHz 64QAM

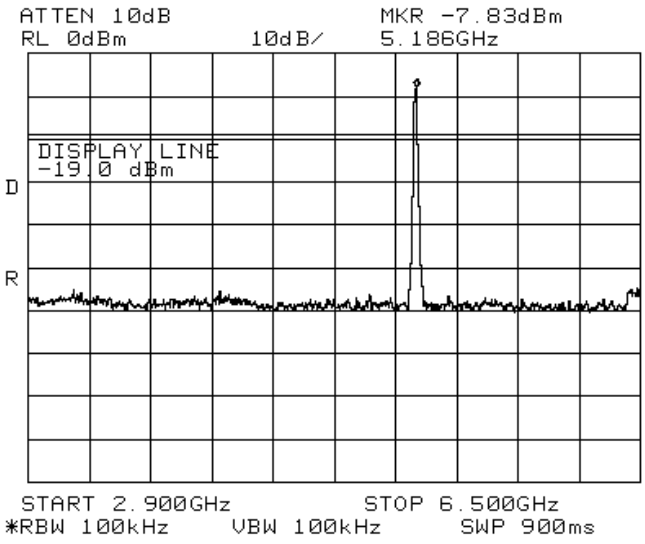


Figure 101 —2437 MHz 64QAM

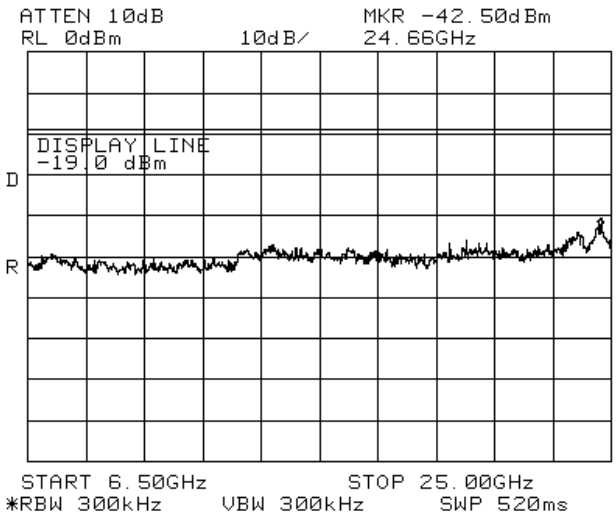


Figure 102 —2437 MHz 64QAM

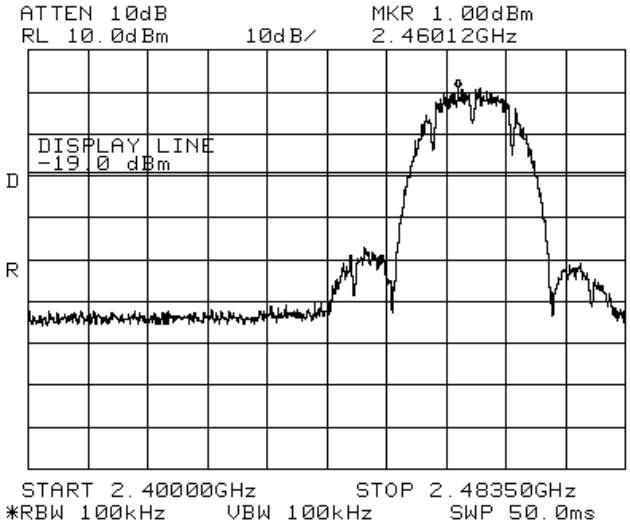


Figure 103 —2462 MHz DBPSK

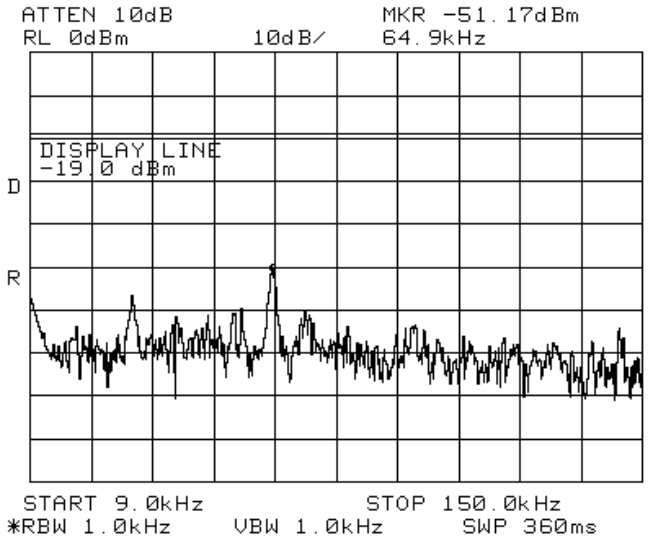


Figure 104 —2462 MHz DBPSK

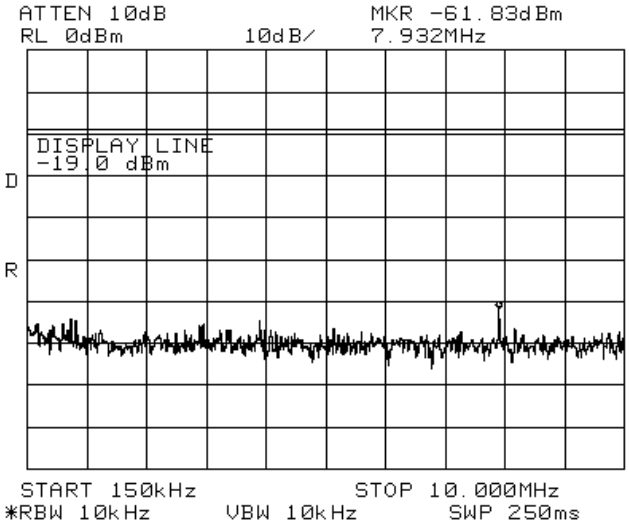


Figure 105 —2462 MHz DBPSK

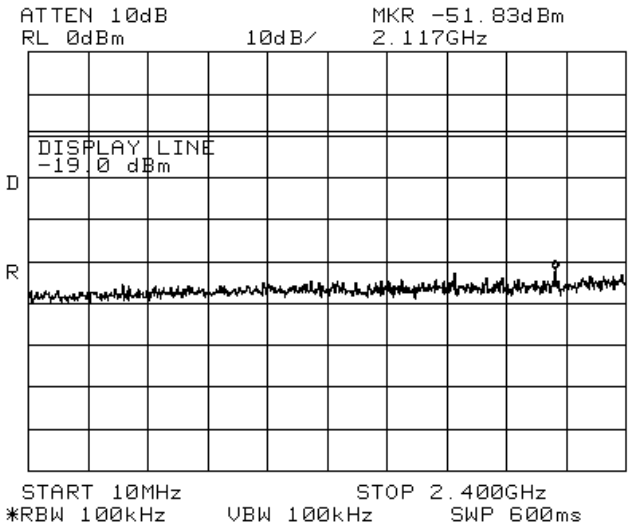


Figure 106 —2462 MHz DBPSK

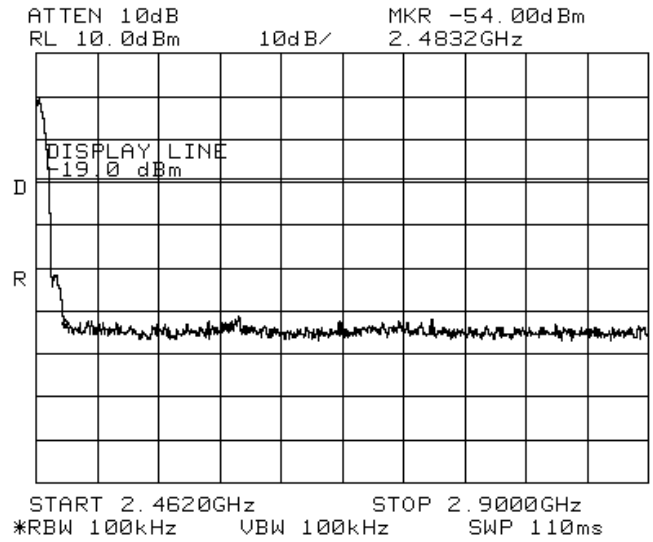


Figure 107 —2462 MHz DBPSK

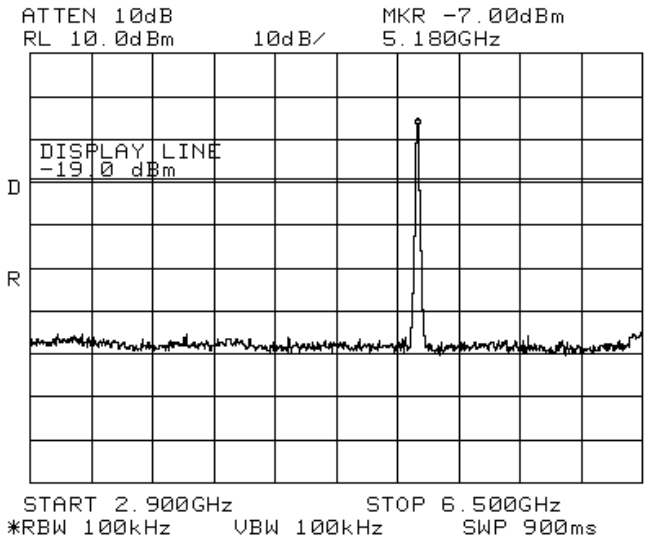


Figure 108 —2462 MHz DBPSK

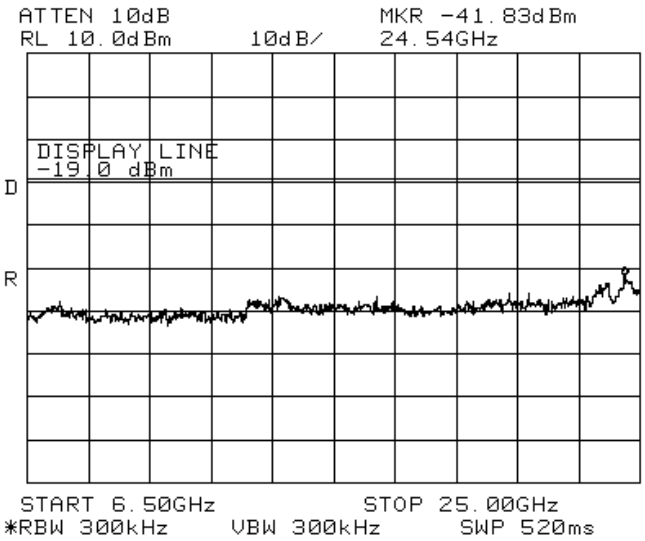


Figure 109 —2462 MHz DBPSK

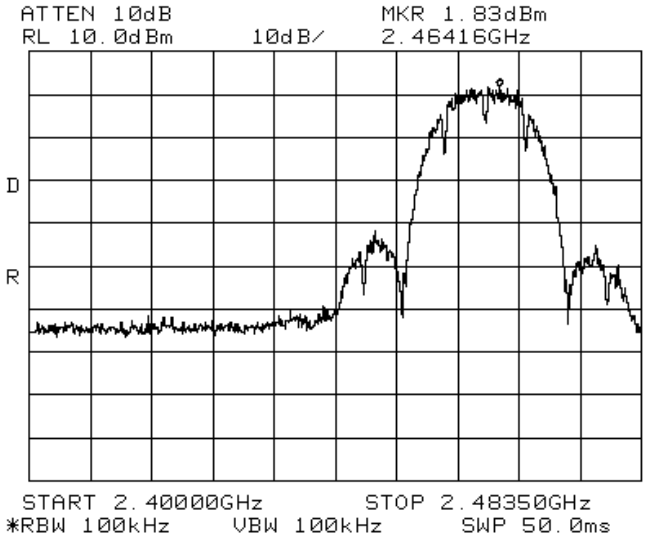


Figure 110 —2462 MHz BPSK

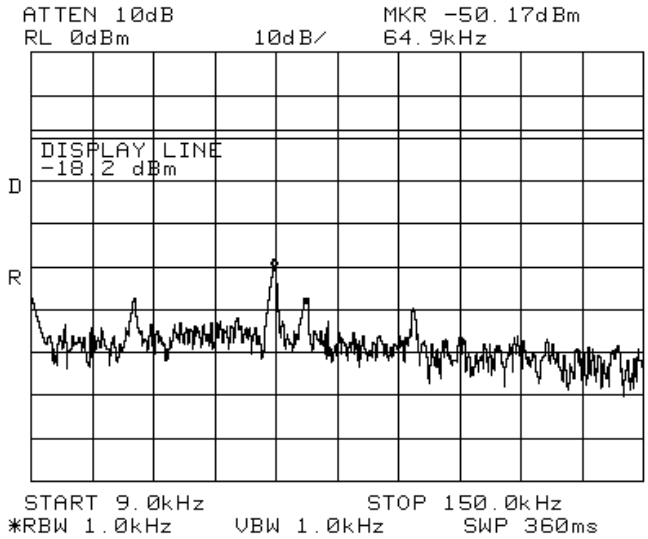


Figure 111 —2462 MHz BPSK

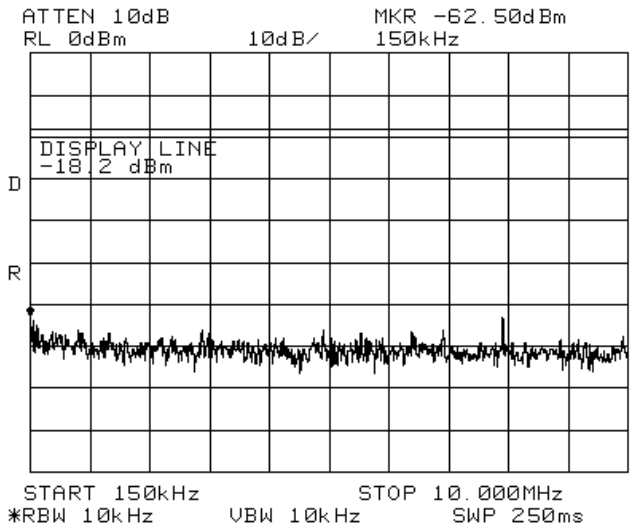


Figure 112 —2462 MHz BPSK

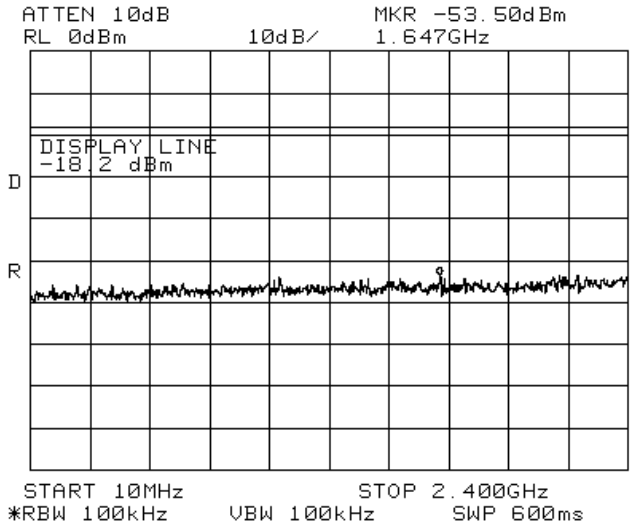


Figure 113 —2462 MHz BPSK

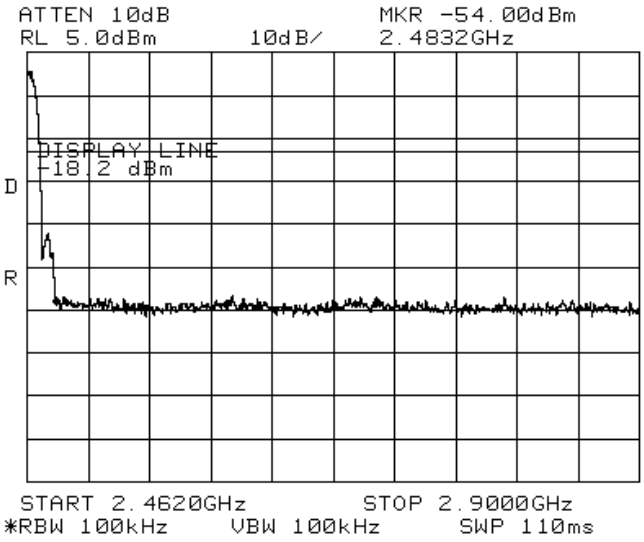


Figure 114 —2462 MHz BPSK

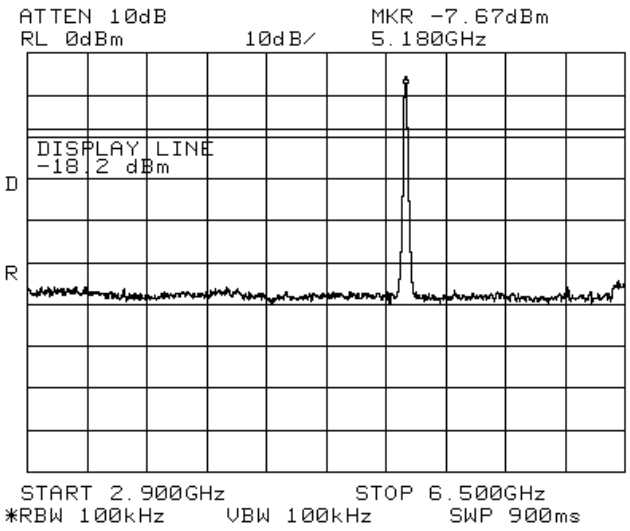


Figure 115 —2462 MHz BPSK

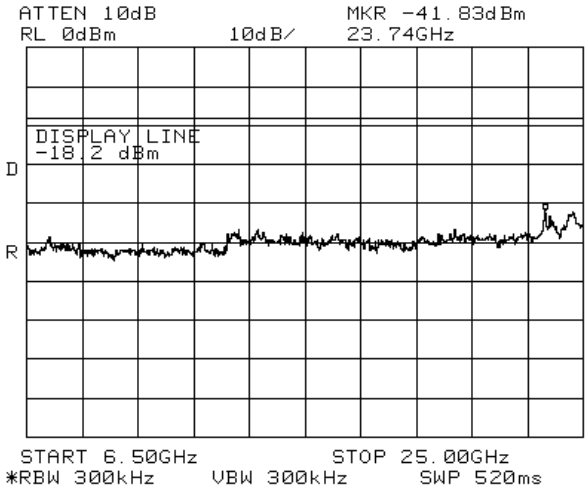


Figure 116 —2462 MHz BPSK

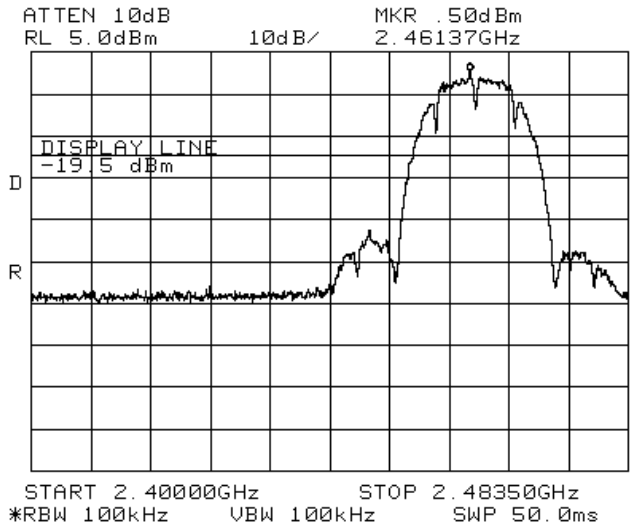


Figure 117 —2462 MHz CCK

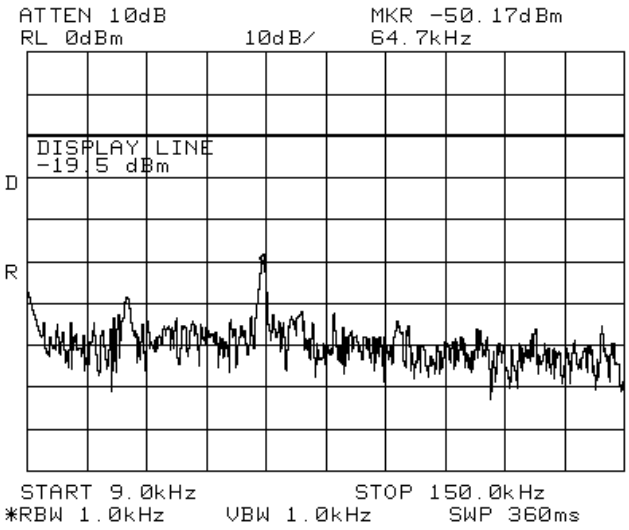


Figure 118 —2462 MHz CCK

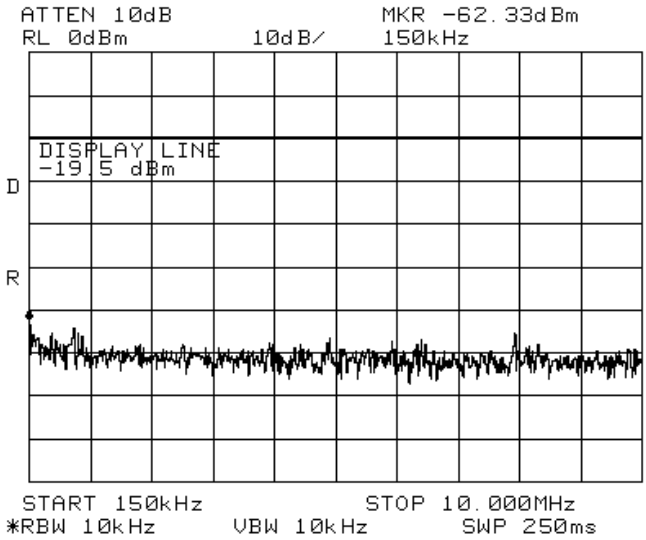


Figure 119 —2462 MHz CCK

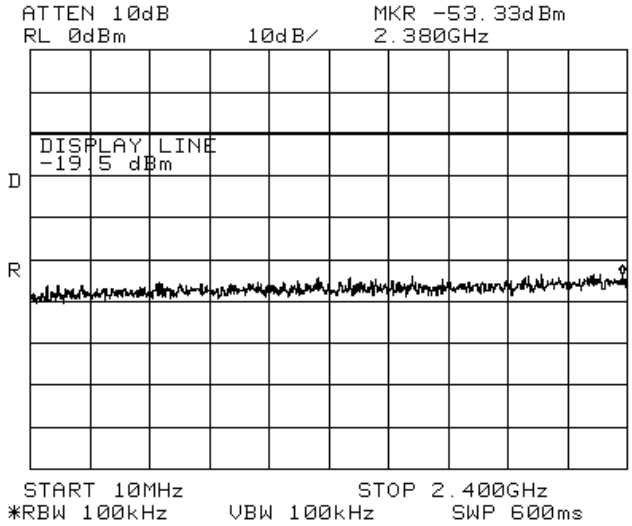


Figure 120 —2462 MHz CCK

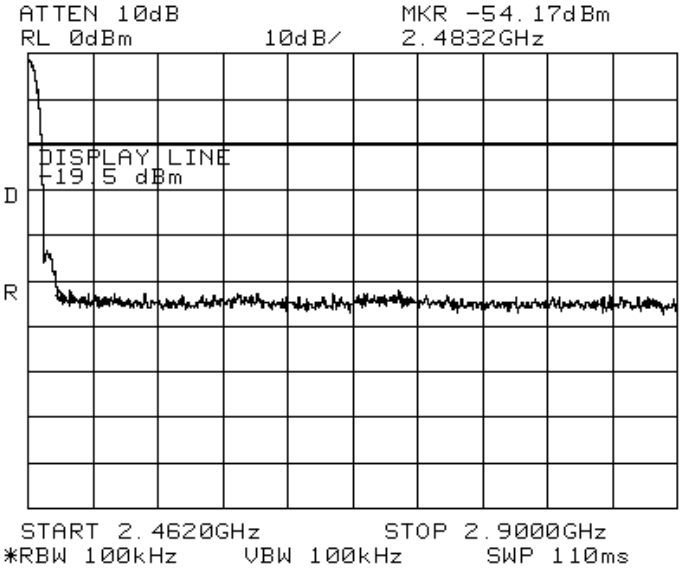


Figure 121 —2462 MHz CCK

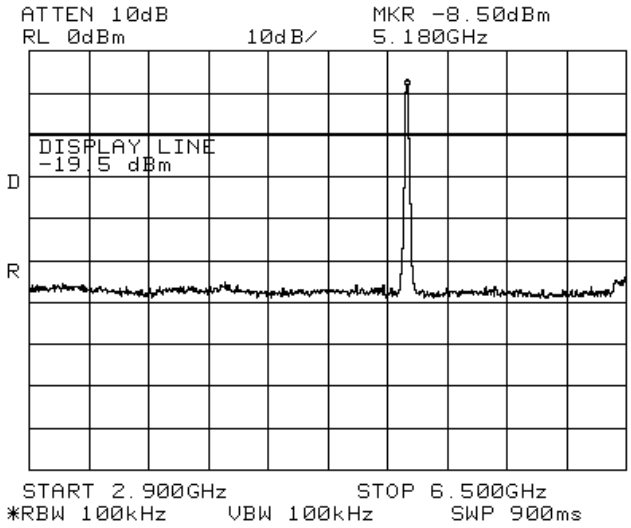


Figure 122 —2462 MHz CCK

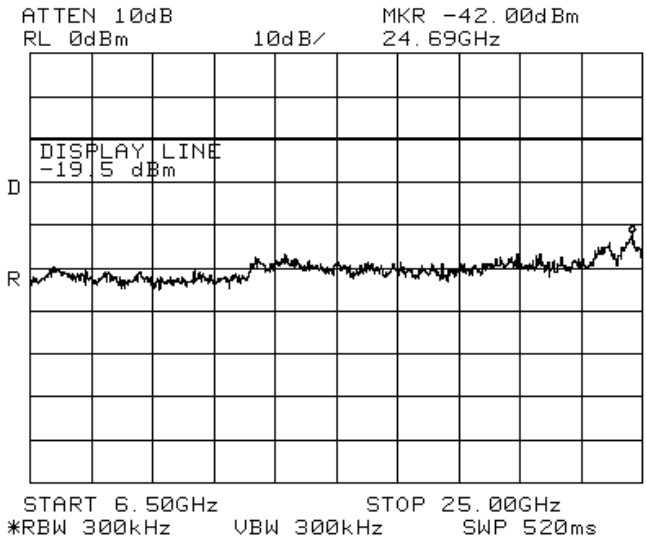


Figure 123 —2462 MHz CCK

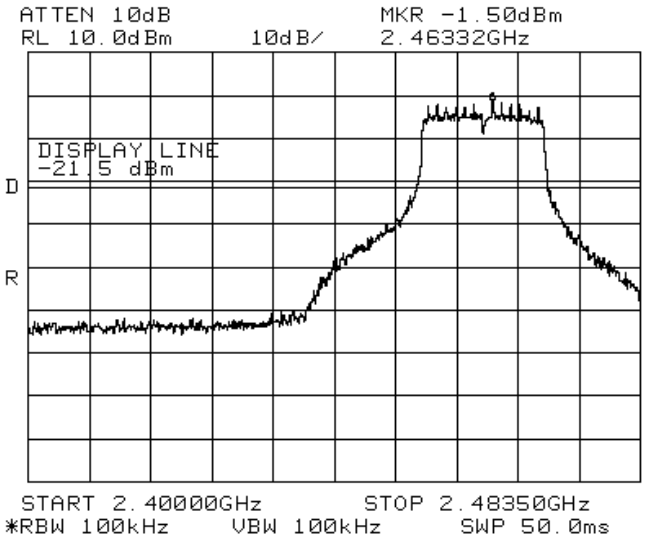


Figure 124 —2462 MHz 64QAM

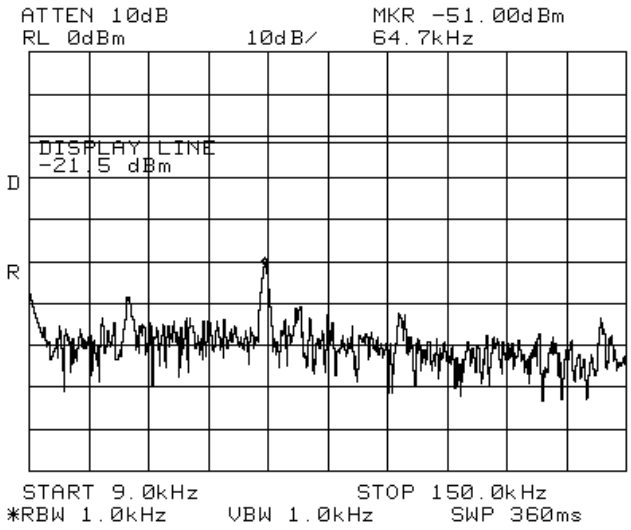


Figure 125 —2462 MHz 64QAM

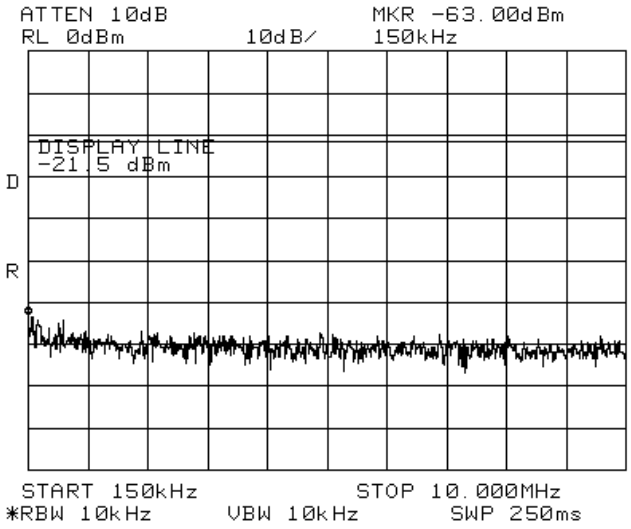


Figure 126 —2462 MHz 64QAM

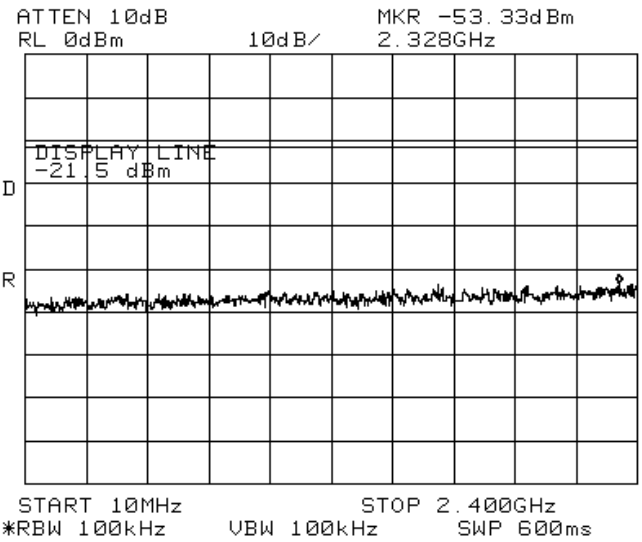


Figure 127 —2462 MHz 64QAM

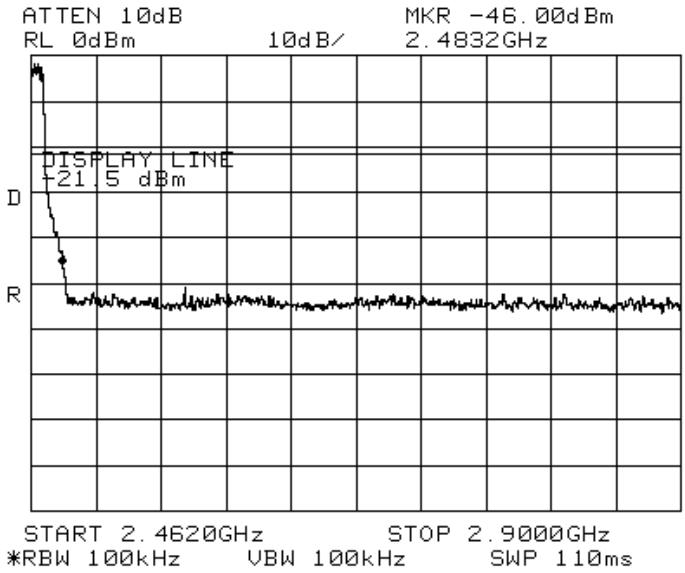


Figure 128 —2462 MHz 64QAM

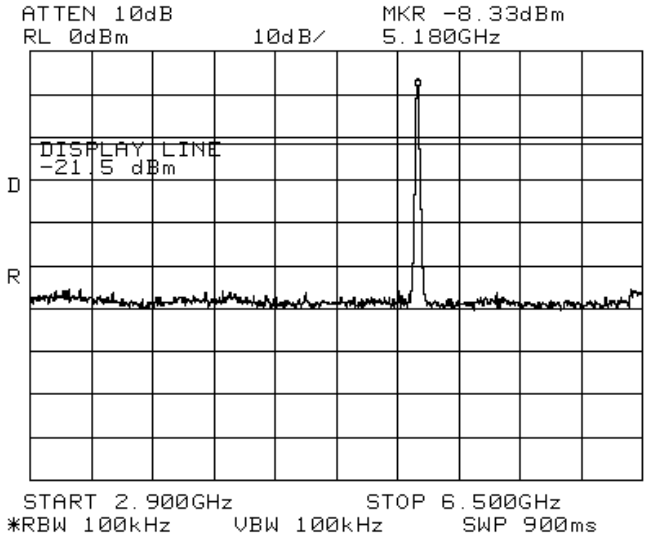


Figure 129 —2462 MHz 64QAM

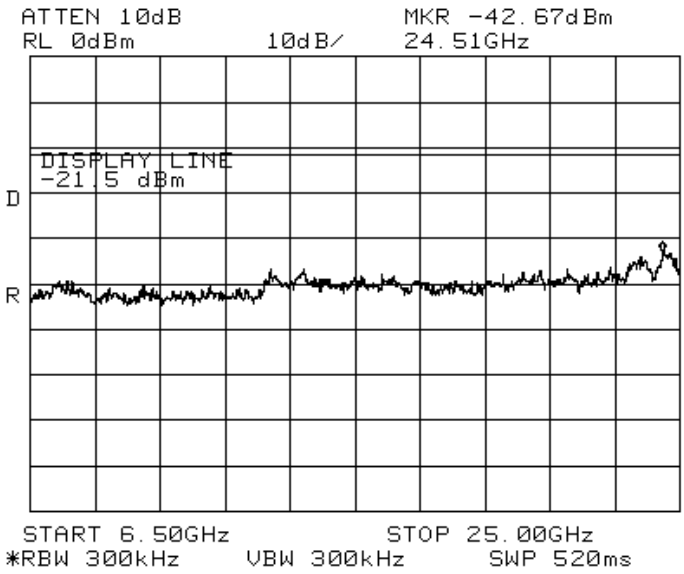


Figure 130 —2462 MHz 64QAM

8.2 Results table

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading (dBc)	Specification (dBc)	Margin (dB)
2412	DBPSK	39.5	20.0	-19.50
	BPSK	37.97	20.0	-17.97
	CCK	39.03	20.0	-19.03
	64QAM	31.47	20.0	-11.47
2437	DBPSK	44.8	20.0	-24.80
	BPSK	44.53	20.0	-24.53
	CCK	42.83	20.0	-22.83
	64QAM	43.50	20.0	-23.50
2462	DBPSK	42.83	20.0	-22.83
	BPSK	43.63	20.0	-23.63
	CCK	42.5	20.0	-22.50
	64QAM	41.17	20.0	-21.17

Figure 131 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 11.47 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 25.02.08

Typed/Printed Name: E. Pitt

8.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 132 Test Equipment Used

9. 6 dB Minimum Bandwidth 2.4GHz Transmitter 802.11b/g + 802.11a Signals

9.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

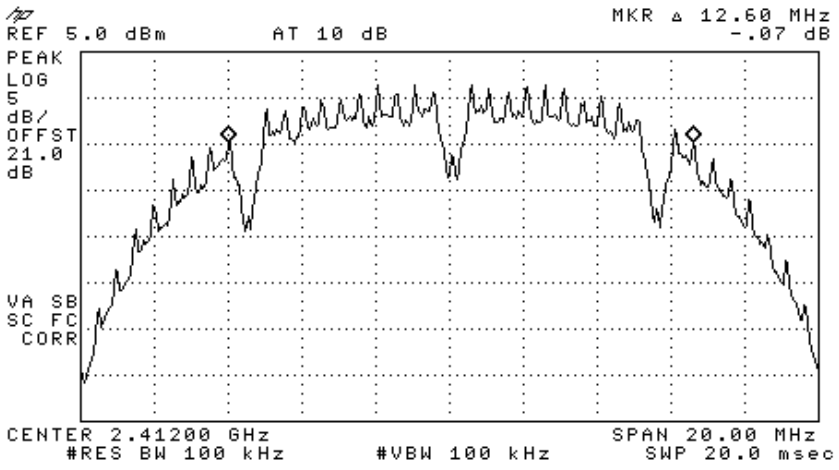


Figure 133 —2412 MHz DBPSK

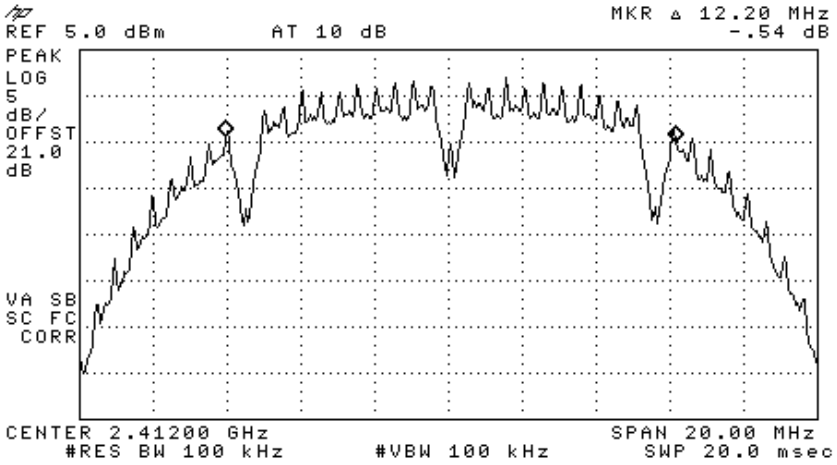


Figure 134 —2412 MHz BPSK

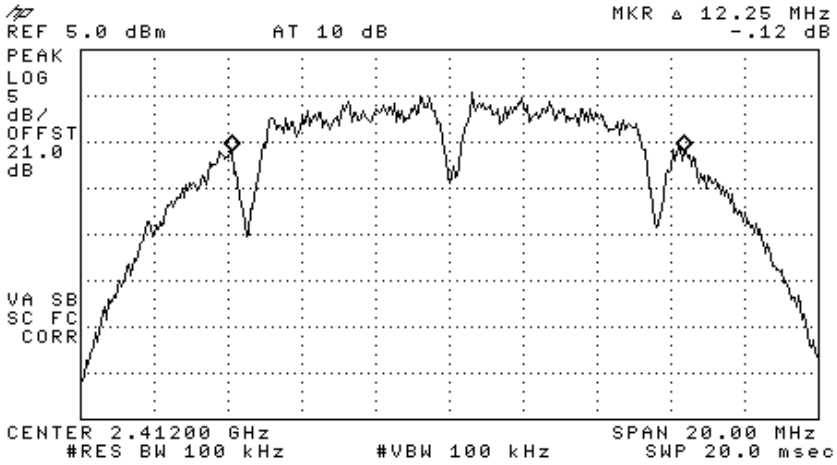


Figure 135 —2412 MHz CCK

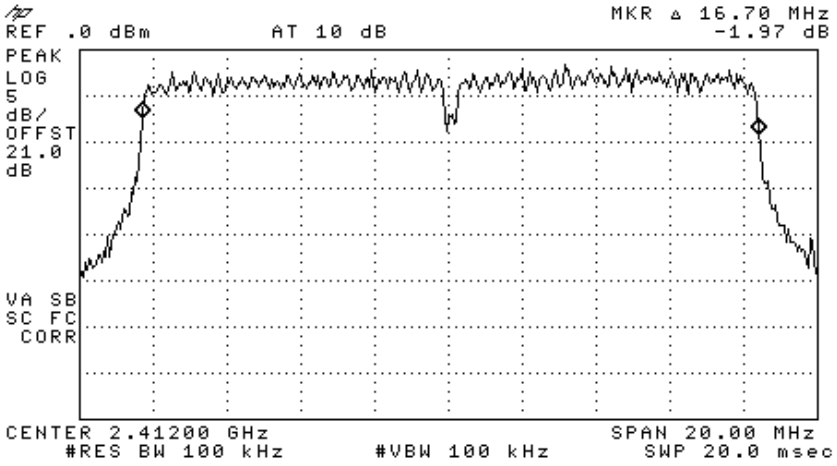


Figure 136 —2412 MHz 64QAM

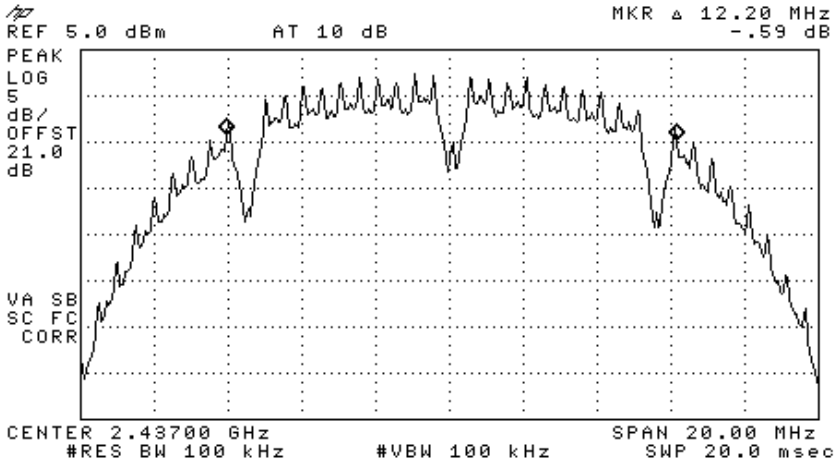


Figure 137 —2437 MHz DBPSK

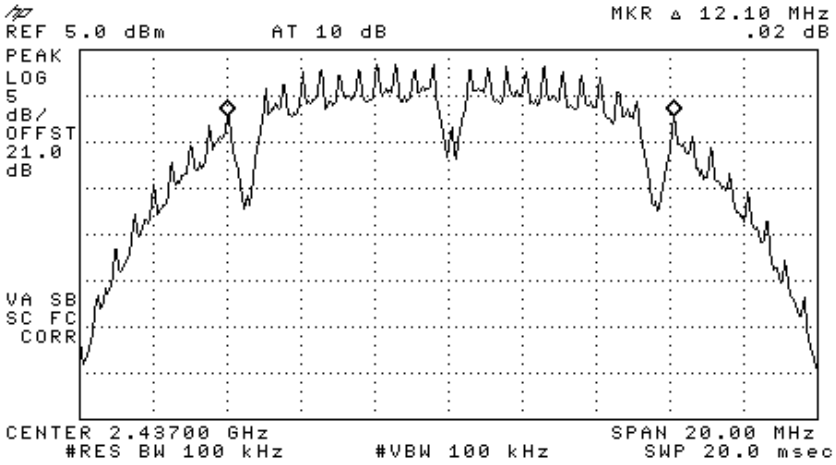


Figure 138 —2437 MHz BPSK

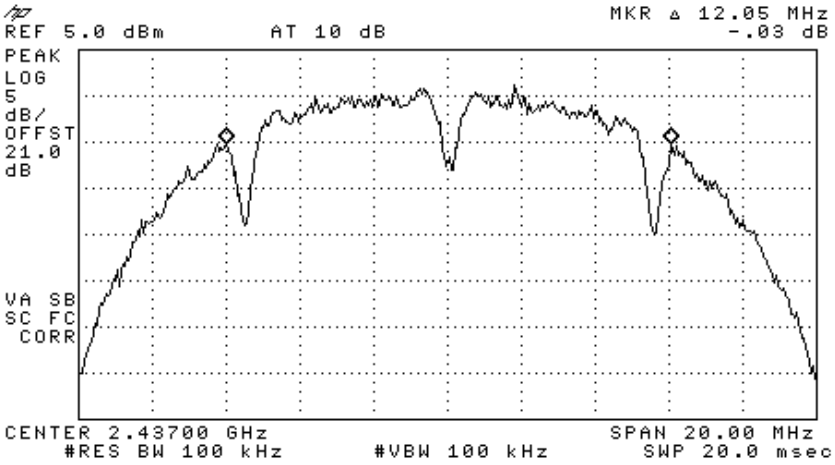


Figure 139 —2437 MHz CCK

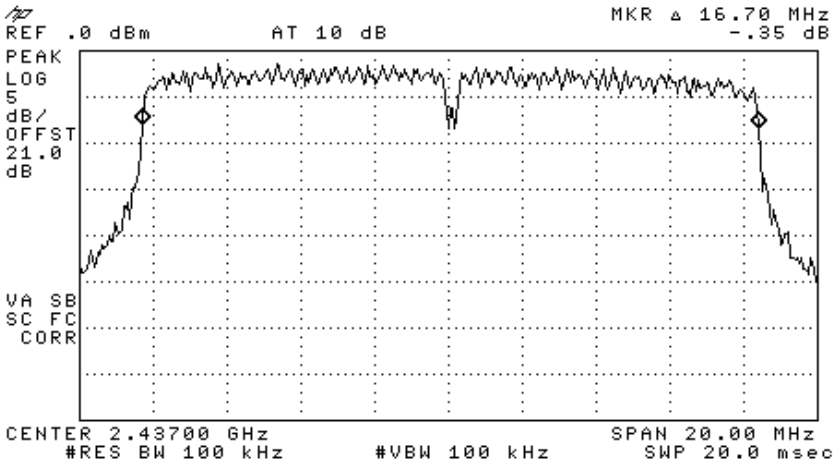


Figure 140 —2437 MHz 64QAM

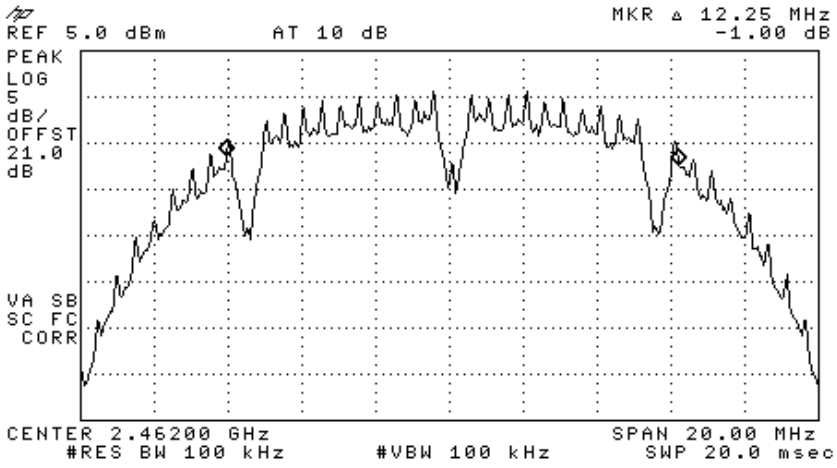


Figure 141 —2462 MHz DBPSK

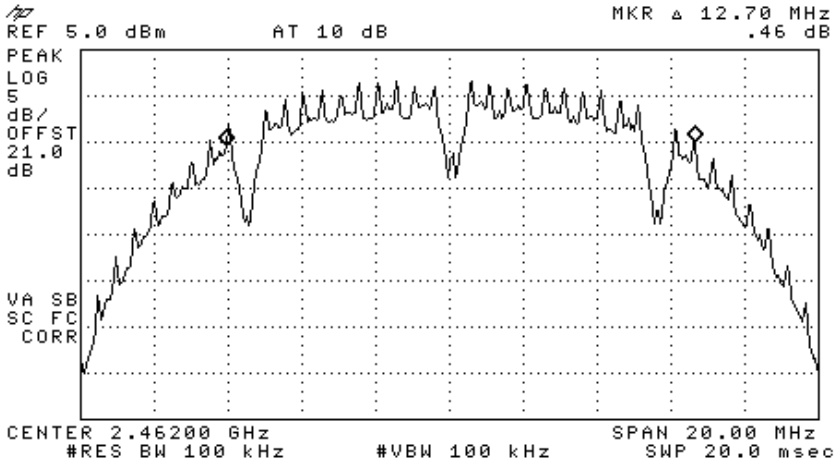


Figure 142 —2462 MHz BPSK

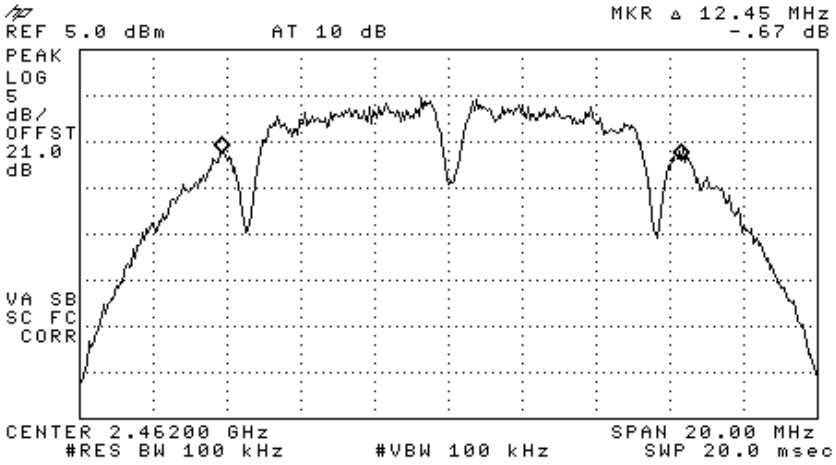


Figure 143 —2642 MHz CCK

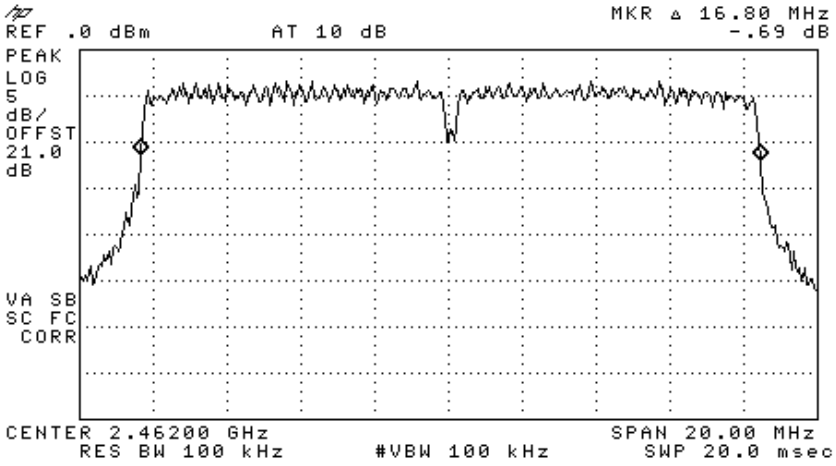


Figure 144 —2462 MHz 64QAM

9.2 Results table

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Modulation	Reading (MHz)	Specification (MHz)
2412	DBPSK	12.60	0.5
	BPSK	12.20	0.5
	CCK	12.25	0.5
	64QAM	16.70	0.5
2437	DBPSK	12.20	0.5
	BPSK	12.10	0.5
	CCK	12.05	0.5
	64QAM	16.70	0.5
2462	DBPSK	12.25	0.5
	BPSK	12.70	0.5
	CCK	12.45	0.5
	64QAM	16.80	0.5

Figure 145 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

9.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 146 Test Equipment Used

10. Band Edge Spectrum 2.4GHz Transmitter 802.11b/g + 802.11a Signals

[In Accordance with section 15.247(c)]

10.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2412 MHz, and 2462 MHz correspondingly.

The E.U.T. was tested using the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

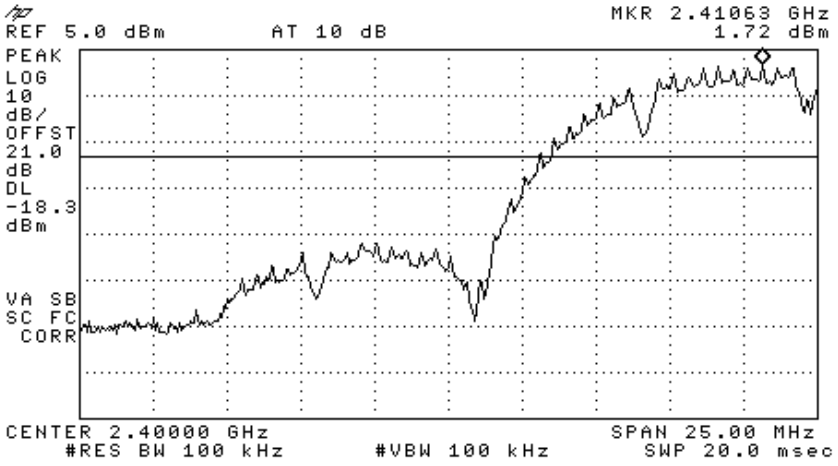


Figure 147 —2412 MHz DBPSK

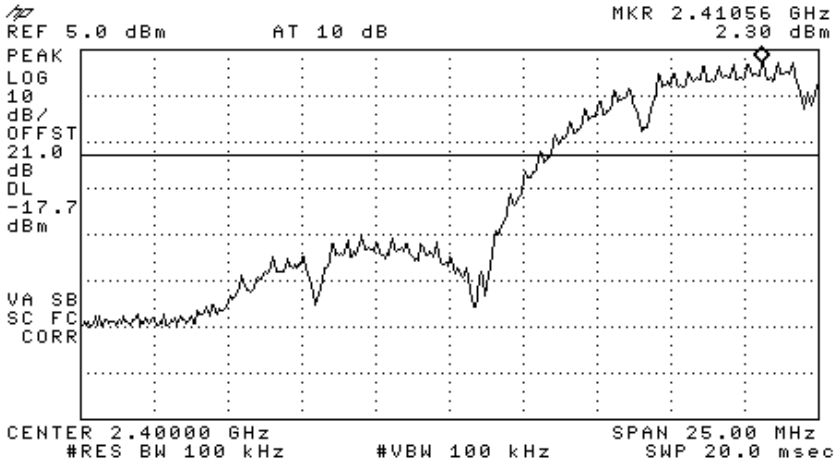


Figure 148 —2412 MHz BPSK

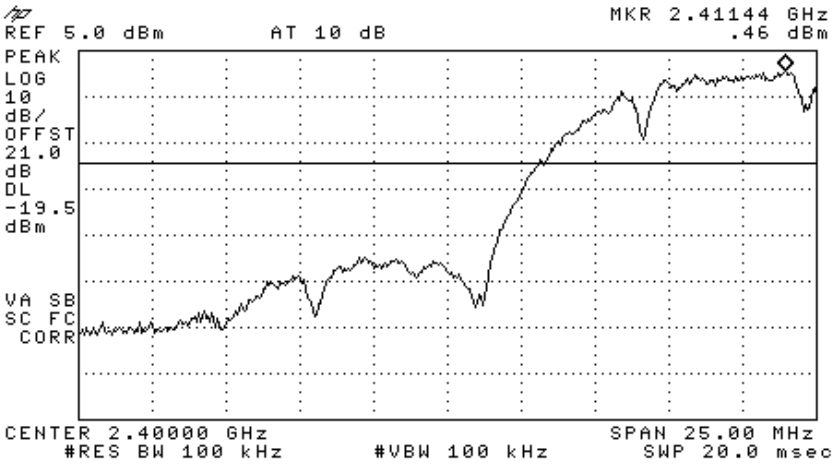


Figure 149 —2412 MHz CCK

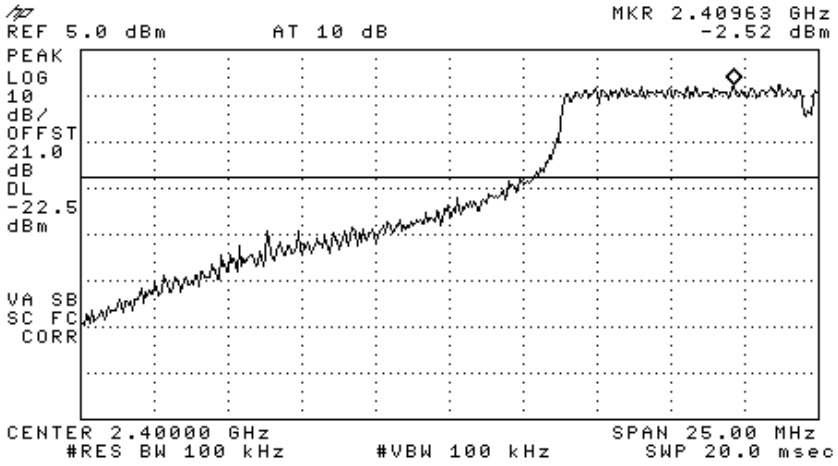


Figure 150 —2412 MHz 64QAM

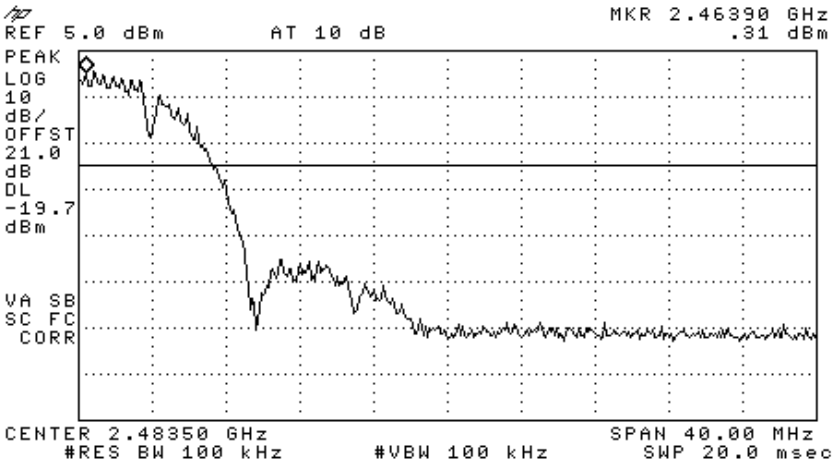


Figure 151 —2462 MHz DBPSK

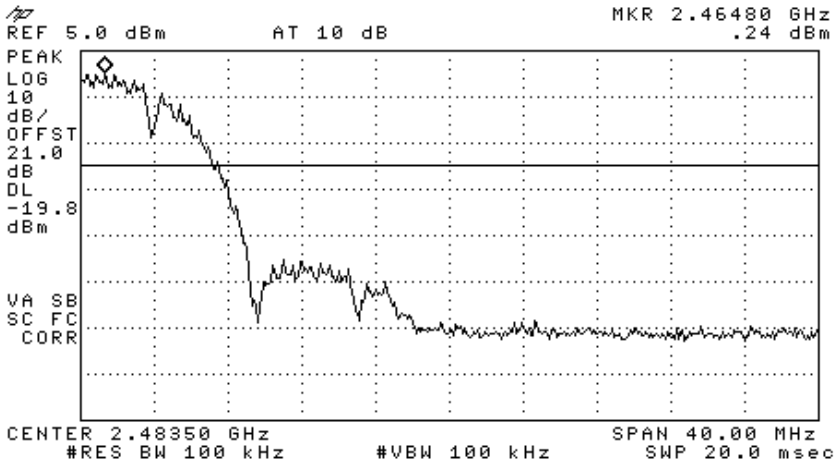


Figure 152 —2462 MHz BPSK

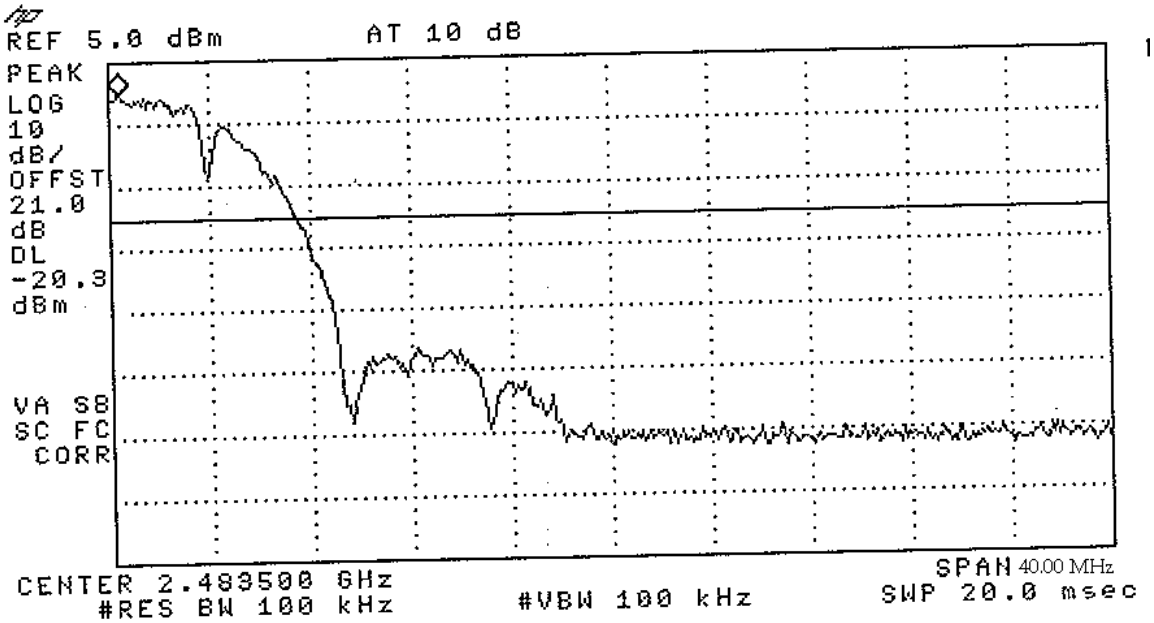


Figure 153 —2462 MHz CCK

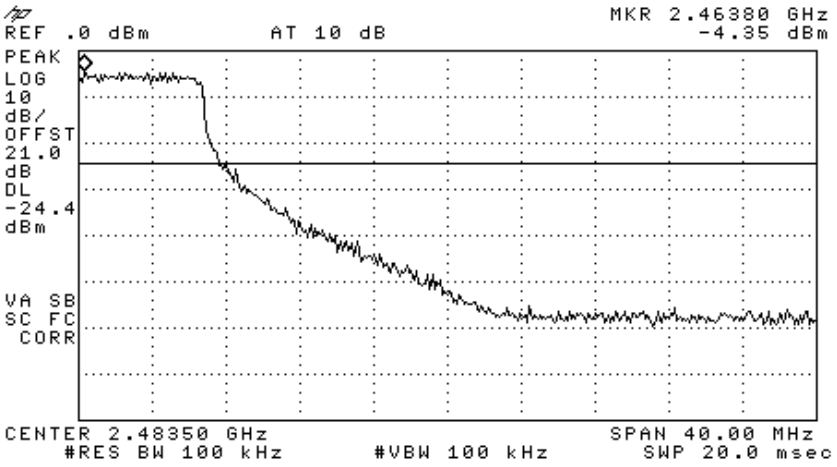


Figure 154 —2462 MHz 64QAM

10.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBc)	Specification (dBc)	Margin (dB)
2412	DBPSK	2.40000	41.7	20.0	-21.7
	BPSK	2.40000	36.7	20.0	-16.7
	CCK	2.40000	41.6	20.0	-21.6
	64QAM	2.40000	26.7	20.0	-6.7
2642	DBPSK	2.48350	56.0	20.0	-36.0
	BPSK	2.48350	55.0	20.0	-35.0
	CCK	2.48350	56.0	20.0	-36.0
	64QAM	2.48350	46.7	20.0	-26.7

Figure 155 Band Edge Spectrum

JUDGEMENT: Passed by 6.7 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

10.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 156 Test Equipment Used

11. Transmitted Power Density 2.4GHz Transmitter 802.11 b/g + a Signals

[In accordance with section 15.247(d)]

11.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 3 kHz resolution BW. and sweep time of 1 second for each 3 kHz “window”. The spectrum peaks were located at each of the 3 operating frequencies.

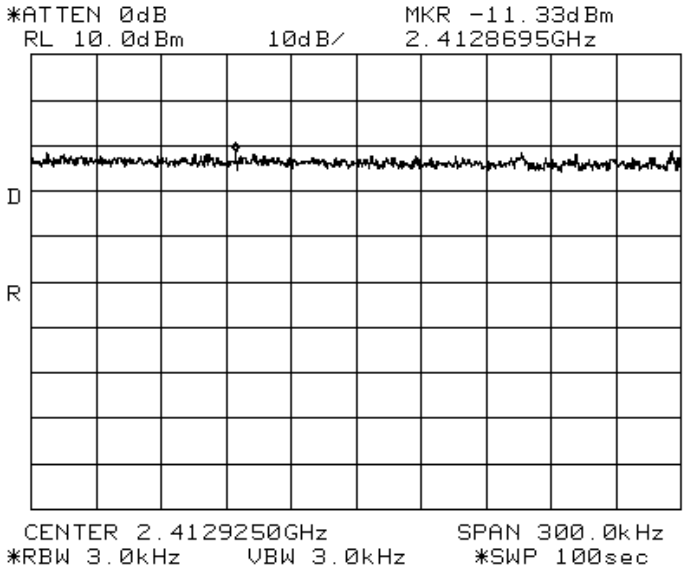


Figure 157 —2412 MHz DBPSK

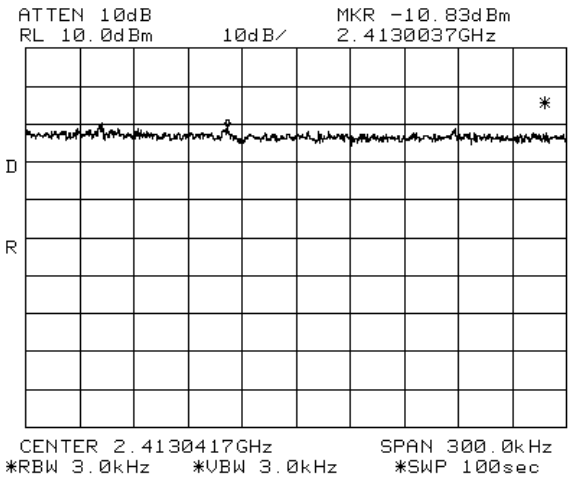


Figure 158 —2412 MHz BPSK

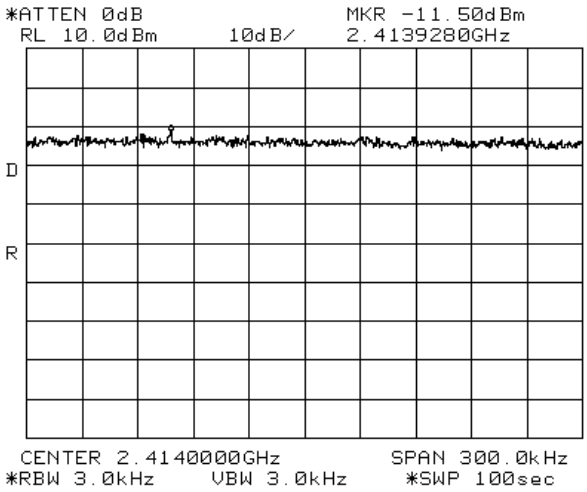


Figure 159 —2412 MHz CCK

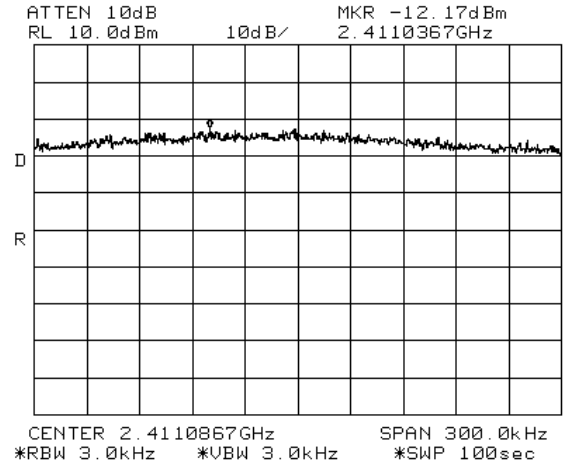


Figure 160 —2412 MHz 64QAM

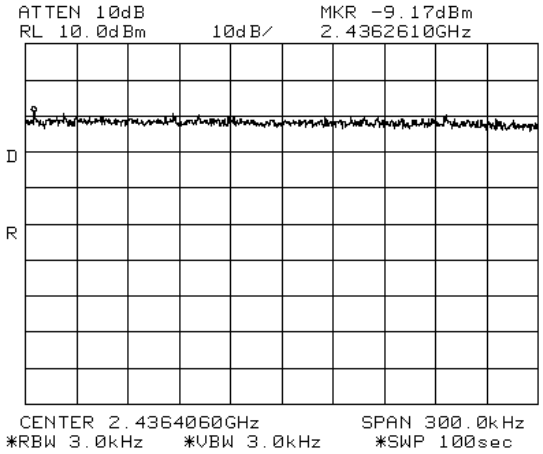


Figure 161 —2437 MHz DBPSK

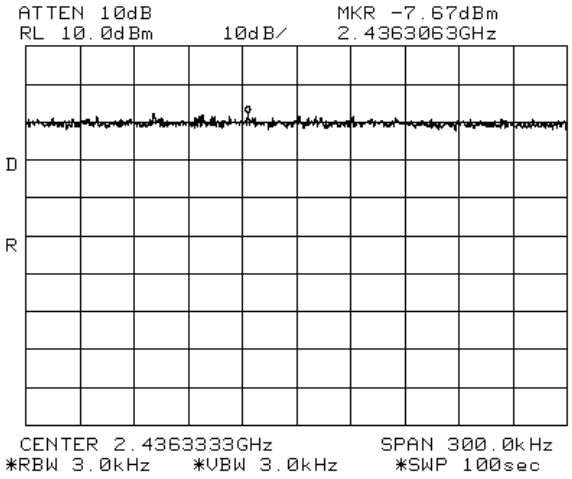


Figure 162 —2437 MHz BPSK

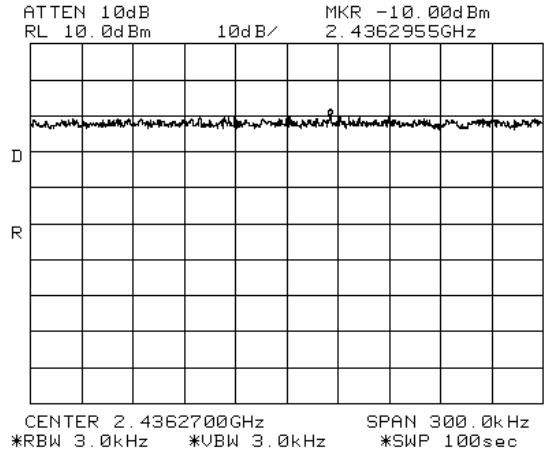


Figure 163 —2437 MHz CCK

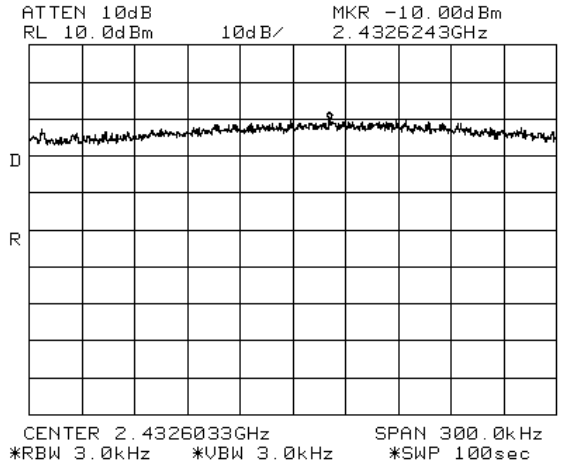


Figure 164 —2437 MHz 64QAM

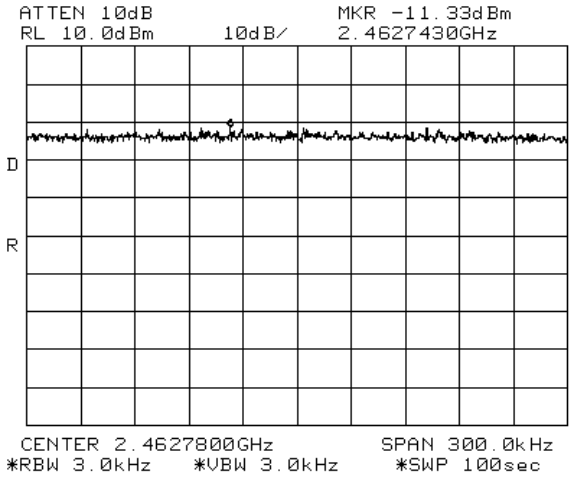


Figure 165 —2462 MHz DBPSK

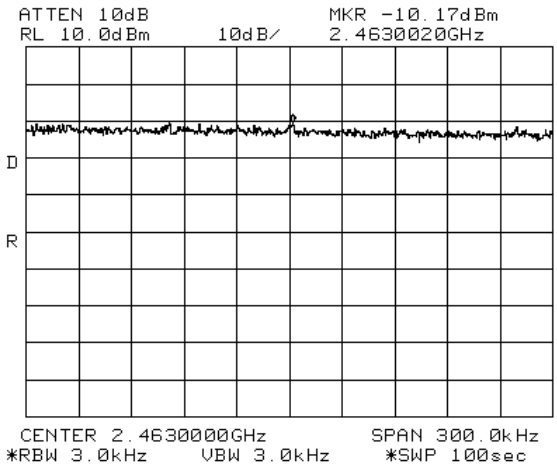


Figure 166 —2462 MHz BPSK

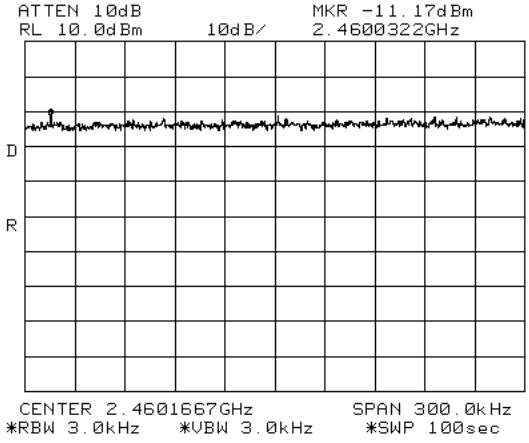


Figure 167 —2462 MHz CCK

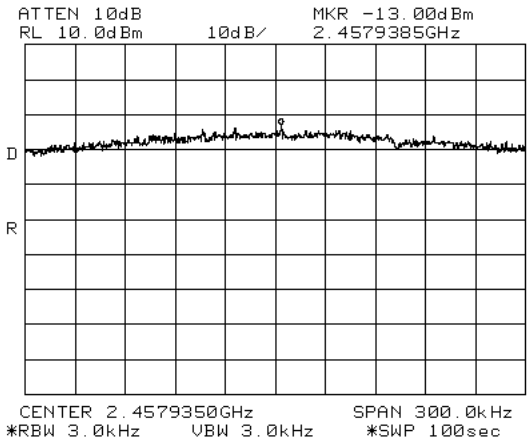


Figure 168 —2462 MHz 64QAM

11.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
2412	DBPSK	-11.33	8.0	-19.33
2412	BPSK	-10.83	8.0	-18.83
2412	CCK	-11.50	8.0	-19.50
2412	64QAM	-12.17	8.0	-20.17
2437	DBPSK	-9.17	8.0	-17.17
2437	BPSK	-7.67	8.0	-15.67
2437	CCK	-10.00	8.0	-18.00
2437	64QAM	-10.00	8.0	-18.00
2462	DBPSK	-11.33	8.0	-19.33
2462	BPSK	-10.17	8.0	-18.17
2462	CCK	-11.17	8.0	-19.17
2462	64QAM	-13.00	8.0	-21.00

Figure 169 Test Results

JUDGEMENT: Passed by 15.67 dB

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: E. Pitt

11.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 170 Test Equipment Used

12. Antenna Gain 2.4GHz Transmitter 802.11 b/g +a Signals

The antenna gain is 7 dBi.

13. R.F Exposure/Safety 2.4GHz Transmitter 802.11 b/g +a Signals

Typical use of the E.U.T. is repeating WiFi signals for DAS. The typical placement of the E.U.T. is on a wall near the ceiling. The typical distance between the E.U.T. and the user in the worst case application, is >1 m.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(a) FCC limits at 2437 MHz is: $1\frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power 154.9mw (Peak) = 21.9dBm

G_T- Antenna Gain, 7 dBi = 5

R- Distance from Transmitter using 1 m worst case

(c) The peak power density is :

$$S_p = \frac{154.9 \times 5}{4\pi(100)^2} = 6.2 \times 10^{-3} \frac{mW}{cm^2}$$

(d) The duty cycle of transmission in actual worst case is 50%.

The average power source is:

$77.45mW$

(e) The averaged power density of the E.U.T. is:

$$S_{AV} = 3.1 \times 10^{-3} \frac{mW}{cm^2}$$

(f) This is 3 orders of magnitude below the FCC limit.

14. Radiated Emission Per FCC Part 15 Sub-Part B Test Data 802.11 b/g +802.11a Signals

14.1 Test Specification

30-25000 MHz, FCC Part 15, Subpart B, CLASS B

14.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 4.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The frequency range 30-25000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 2.9 - 25 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The emissions were measured at a distance of 3 meters.
The E.U.T. was tested in both Rx and Tx modes.
The E.U.T. was tested at the operating frequencies of 2412, 2437, and 2462 MHz using the following modulations: DBPSK, BPSK, CCK, and 64QAM.

14.3 Test Data

JUDGEMENT: Passed by 1.5 dB.

The margin between the emission level and the specification limit is 1.5 dB in the worst case at the frequency of 250.03 MHz, vertical polarization.

The signals in the band 1.0 – 25.0 GHz were more than 20 dB below the specification limit.

The EUT met the requirements of the F.C.C. Part 15, Subpart B, specification.

The results for all three operating frequencies and modulations were the same.

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	66.823250	36.2	34.2	-5.8			10.2
2	79.993600	31.1	26.4	-13.6			10.5
3	175.032600	35.0	25.8	-17.7			15.9
4	250.031550	47.8	44.5	-1.5			20.9
5	267.263050	42.8	38.7	-7.3			21.7

Figure 171. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance
Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

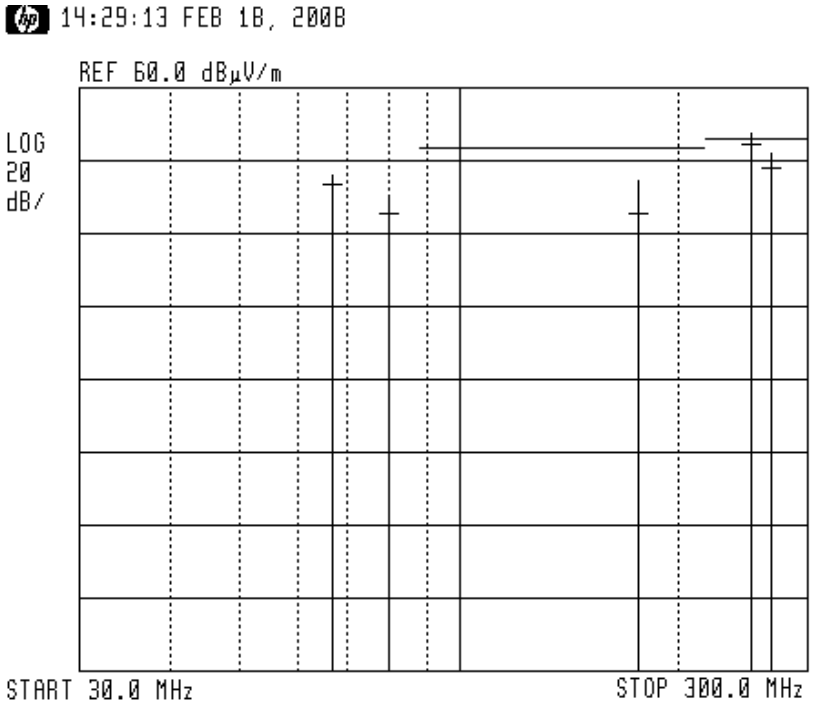


Figure 172. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	47.7	44.0	-2.0			19.6
2	500.037500	47.9	40.4	-5.6			21.0
3	625.067500	40.7	36.6	-9.4			24.7
4	700.000000	38.3	35.0	-11.0			25.3
5	750.062500	41.2	37.1	-8.9			25.8
6	960.000000	39.6	34.2	-19.8			29.5

Figure 173. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

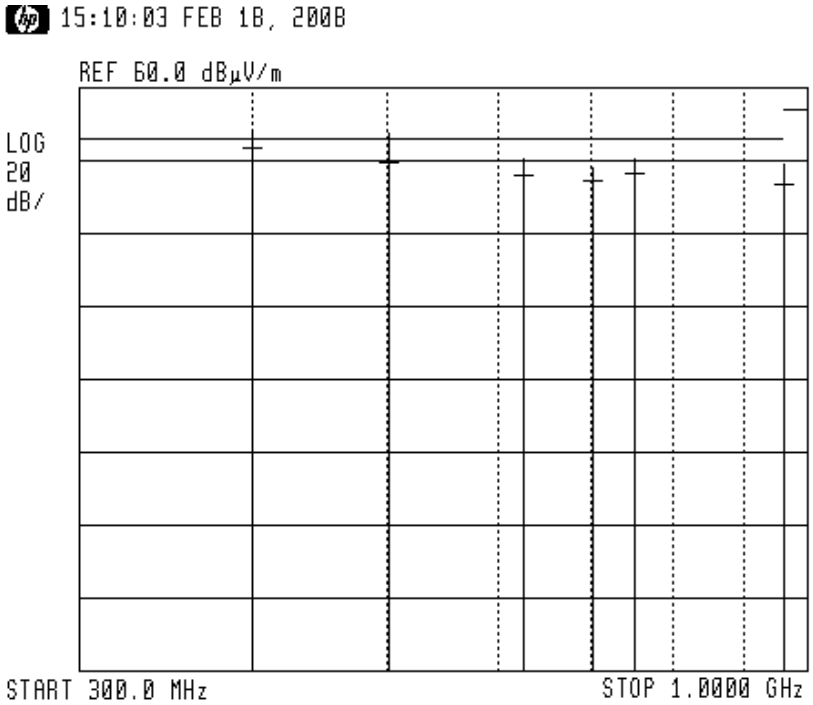


Figure 174. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	47.768400	28.2	21.0	-19.0			12.0
2	66.823250	38.8	36.4	-3.6			10.2
3	175.032600	32.0	25.6	-17.9			15.9
4	250.031550	43.9	40.6	-5.4			20.9
5	267.263050	37.9	34.4	-11.6			21.7

Figure 175. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

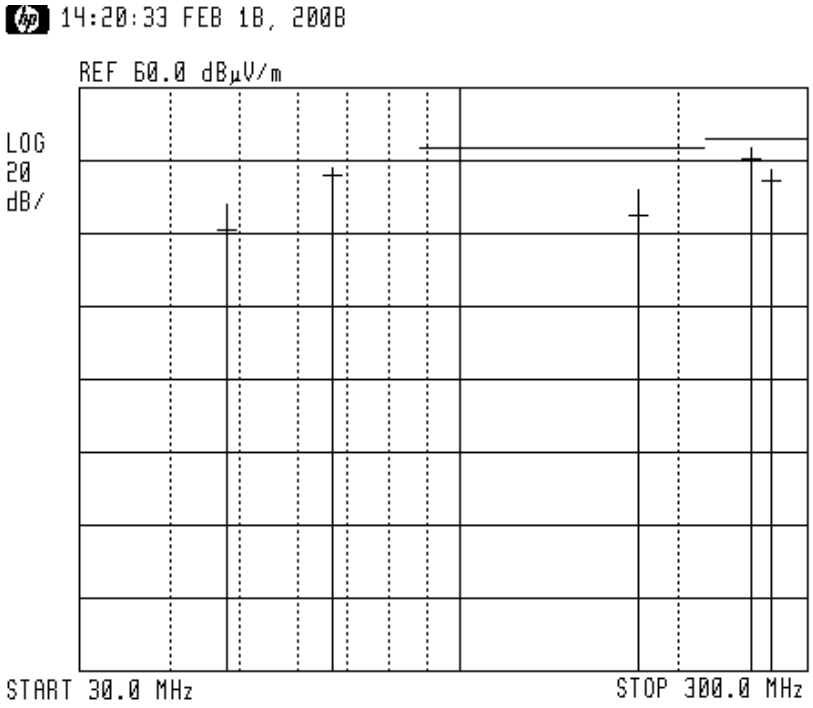


Figure 176. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	43.0	40.8	-5.2			19.6
2	500.037500	43.6	40.1	-5.9			21.0
3	625.050000	45.3	34.1	-11.9			24.7
4	700.000000	39.7	37.1	-8.9			25.3
5	701.612500	36.1	32.4	-13.6			25.3
6	750.000000	36.5	31.5	-14.5			25.8

Figure 177. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

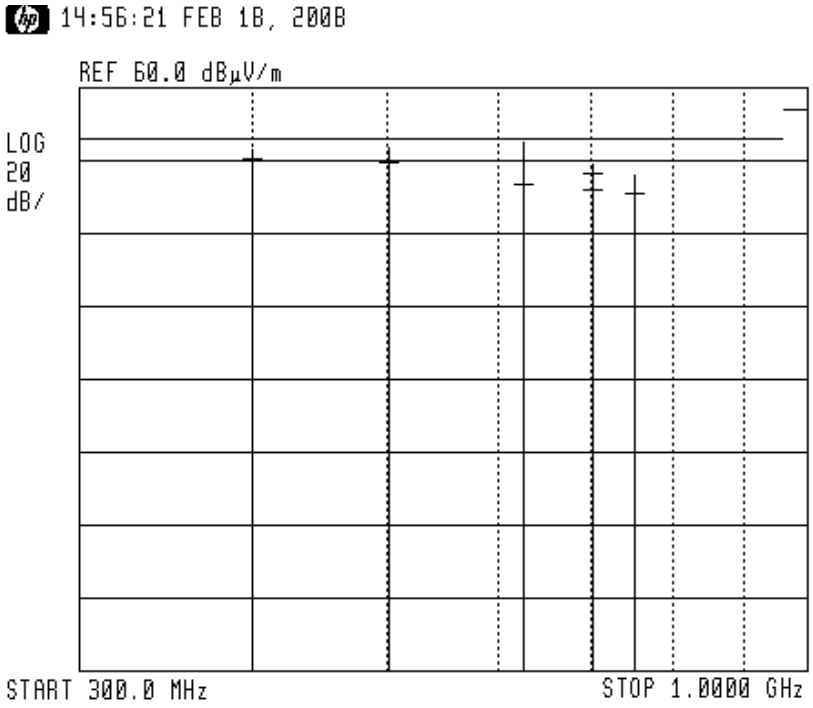


Figure 178. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

14.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1Year
RF Filter Section	HP	85420E	3705A00248	November 12, 2007	1Year
Antenna Biconical	ARA	BCD 235/B	1041	March 22, 2007	1Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	February 4, 2007	2 Years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 Years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2007	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2008	1 Year
Low Noise Amplifier	MK Milliwave	MKT6-3000 4000-30-13P	399	January 9, 2008	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 Year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

14.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

15. Spurious Radiated Emission in the Restricted Band, Below 1 GHz 2.4GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

15.1 Test Specification

9kHz-1000 MHz, F.C.C., Part 15, Subpart C

15.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 9 kHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30 MHz, the loop antenna was rotated on its vertical axis, The antenna height (center of loop) was 1 meter.

In the frequency range 30-1000 MHz, the readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

Turning the E.U.T on and off.
Using a frequency span less than 10 MHz.
Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T. was tested at the operating frequencies of 2412, 2437, and 2462 MHz using the following modulations: DBPSK, BPSK, CCK, and 64QAM.

15.3 Test Data

JUDGEMENT: Passed by 1.5 dB.

The margin between the emission level and the specification limit is 1.5 dB in the worst case at the frequency of 250.03 MHz, horizontal polarization.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

The results for all three operating frequencies and modulations were the same.

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	66.823250	36.2	34.2	-5.8			10.2
2	79.993600	31.1	26.4	-13.6			10.5
3	175.032600	35.0	25.8	-17.7			15.9
4	250.031550	47.8	44.5	-1.5			20.9
5	267.263050	42.8	38.7	-7.3			21.7

Figure 179. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

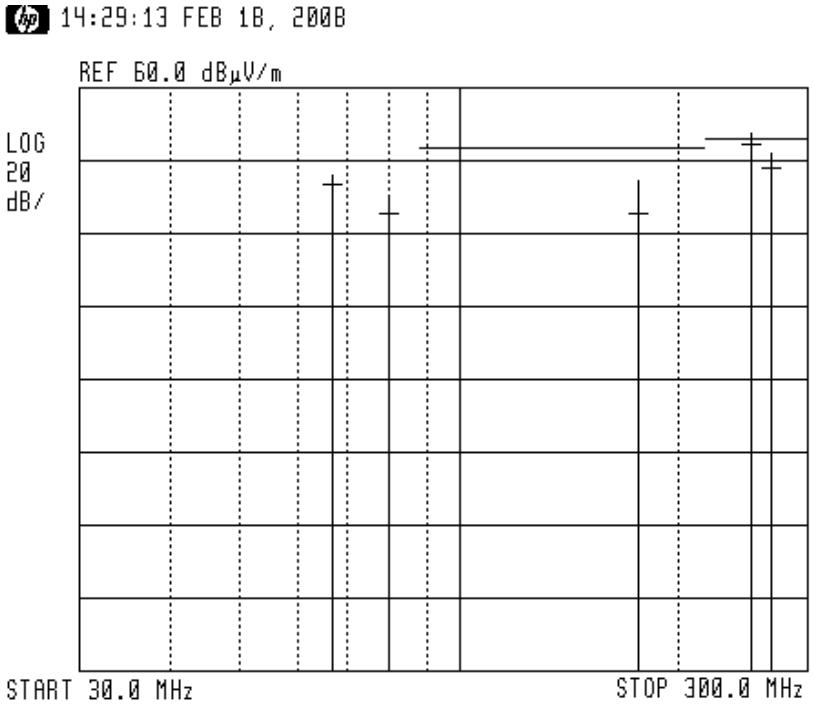


Figure 180. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	47.7	44.0	-2.0			19.6
2	500.037500	47.9	40.4	-5.6			21.0
3	625.067500	40.7	36.6	-9.4			24.7
4	700.000000	38.3	35.0	-11.0			25.3
5	750.062500	41.2	37.1	-8.9			25.8
6	960.000000	39.6	34.2	-19.8			29.5

Figure 181. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

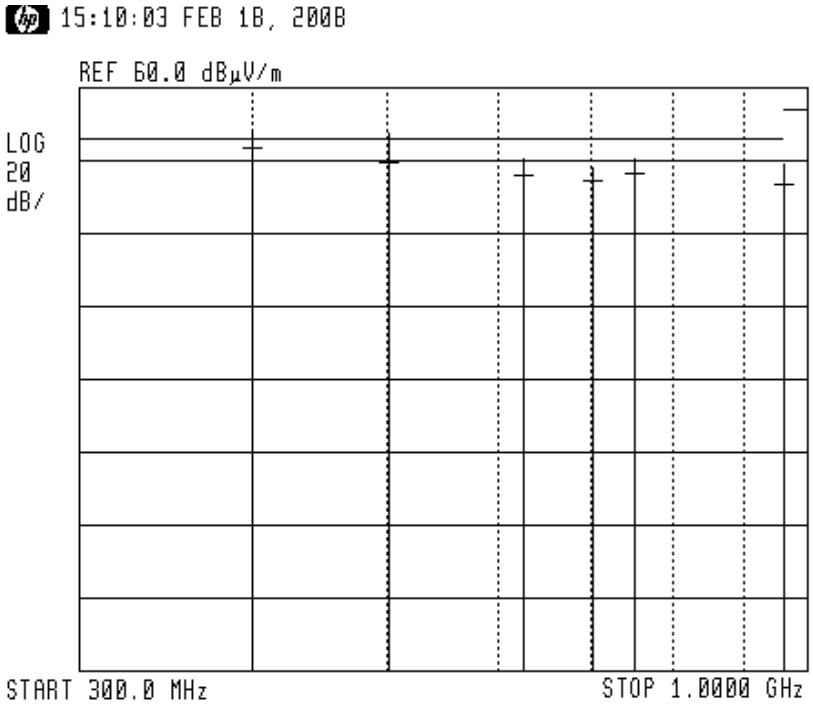


Figure 182. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	47.768400	28.2	21.0	-19.0			12.0
2	66.823250	38.8	36.4	-3.6			10.2
3	175.032600	32.0	25.6	-17.9			15.9
4	250.031550	43.9	40.6	-5.4			20.9
5	267.263050	37.9	34.4	-11.6			21.7

Figure 183. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

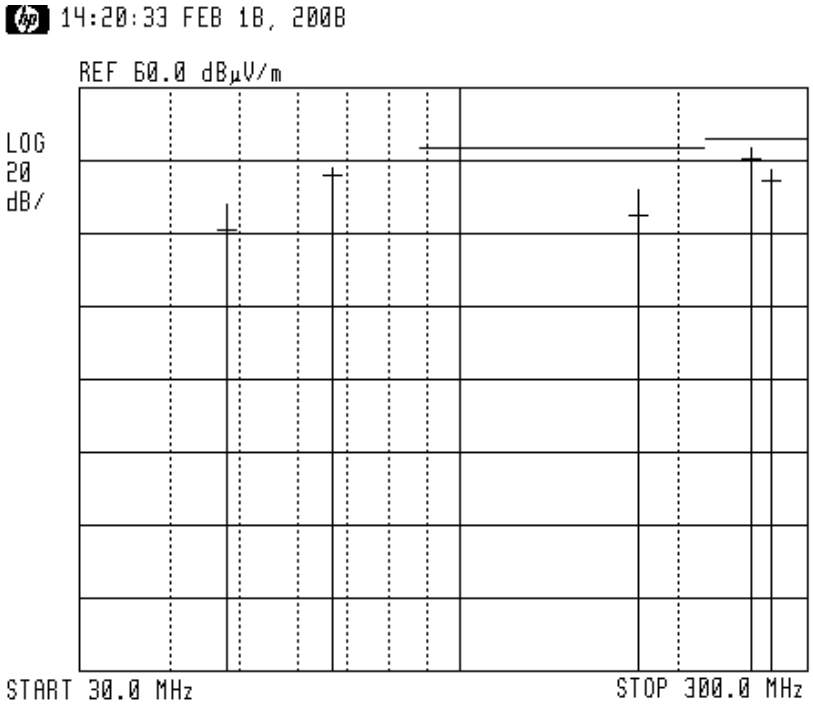


Figure 184. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	43.0	40.8	-5.2			19.6
2	500.037500	43.6	40.1	-5.9			21.0
3	625.050000	45.3	34.1	-11.9			24.7
4	700.000000	39.7	37.1	-8.9			25.3
5	701.612500	36.1	32.4	-13.6			25.3
6	750.000000	36.5	31.5	-14.5			25.8

Figure 185. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

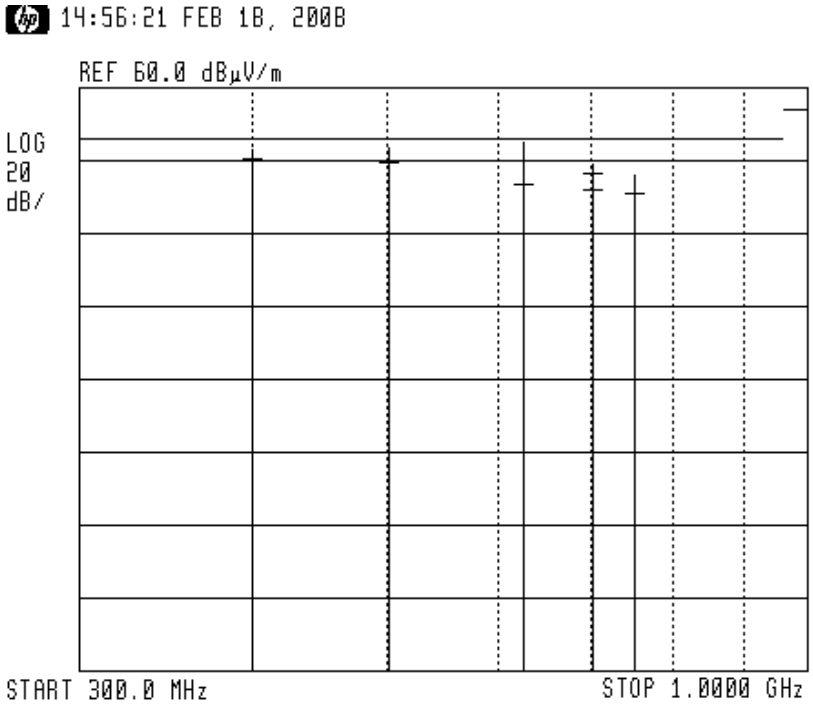


Figure 186. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

15.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	November 12, 2007	1 year
RF Section	HP	85420E	3427A00103	November 12, 2007	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 22, 2007	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 15, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

15.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[dB\mu v/m]\ FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

16. Spurious Radiated Emission in the Restricted Band, Above 1 GHz 2.4GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

16.1 Radiated Emission Above 1 GHz

The E.U.T operation mode and test set-up are as described in Section 3.

See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.
In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used.
In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.
The test distance was 3 meters.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was tested at the operating frequencies of 2412, 2437, and 2462 MHz using the following modulations: DBPSK, BPSK, CCK, and 64QAM.

16.2 Test Data

JUDGEMENT: Passed by dB

For the operation frequency of 2412 MHz, the margin between the emission level and the specification limit is 7.4 dB in the worst case at the frequency of 4824.00 MHz, horizontal polarization.

For the operation frequency of 2437 MHz, the margin between the emission level and the specification limit is 9.0 dB in the worst case at the frequency of 4874.00 MHz, vertical polarization.

For the operation frequency of 2462 MHz, the margin between the emission level and the specification limit is 7.3 dB in the worst case at the frequency of 4924.00 MHz, horizontal polarization.

The results for all modulations were the same.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak
Operation Frequency: 2412 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4824.00	H	49.9*	74.0	-24.1
4824.00	V	46.5*	74.0	-27.5

Figure 187. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average
Operation Frequency: 2412 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4824.00	H	46.6*	54.0	-7.4
4824.00	V	44.2*	54.0	-9.8

Figure 188. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Average Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak
Operation Frequency: 2437 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4874.00	H	48.6*	74.0	-25.4
4874.00	V	49.7*	74.0	-24.3

Figure 189. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average
Operation Frequency: 2437 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4874.00	H	43.9*	54.0	-10.1
4874.00	V	45.0*	54.0	-9.0

Figure 190. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Average Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak
Operation Frequency: 2462 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4924.00	H	50.0*	74.0	-24.0
4924.00	V	49.1*	74.0	-24.9

Figure 191. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average
Operation Frequency: 2462 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak. Margin
(MHz)	(H/V)	(dBµV/m)	(dB µV/m)	(dB)
4924.00	H	46.7*	54.0	-7.3
4924.00	V	45.6*	54.0	-8.4

Figure 192. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Average Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

16.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	November 12, 2007	1 year
RF Section	HP	85420E	3427A00103	November 12, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2007	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2008	1 year
Low Noise Amplifier	MK Milliwave	MKT6-3000 400-30-13P	399	January 9, 2008	1 year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Spectrum Analyzer	HP	8546E	3442A00275	November 14, 2007	1 year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

17. 26 dB Bandwidth 2.4 GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

17.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. was measured and recorded.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

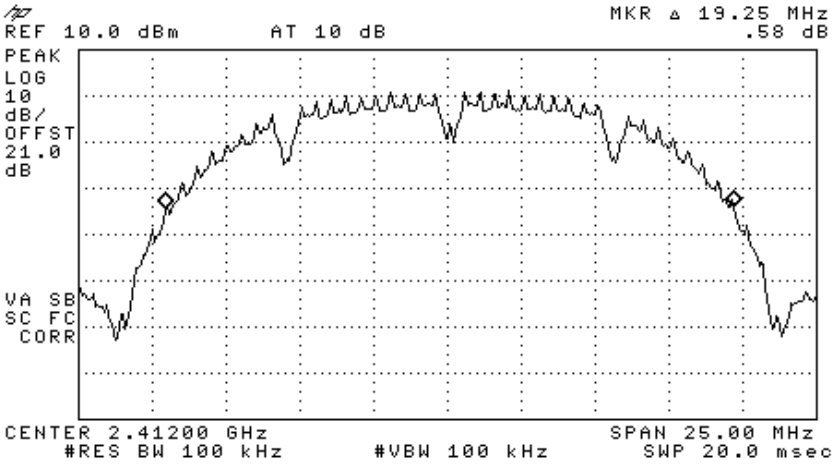


Figure 193 —2412 MHz DBPSK

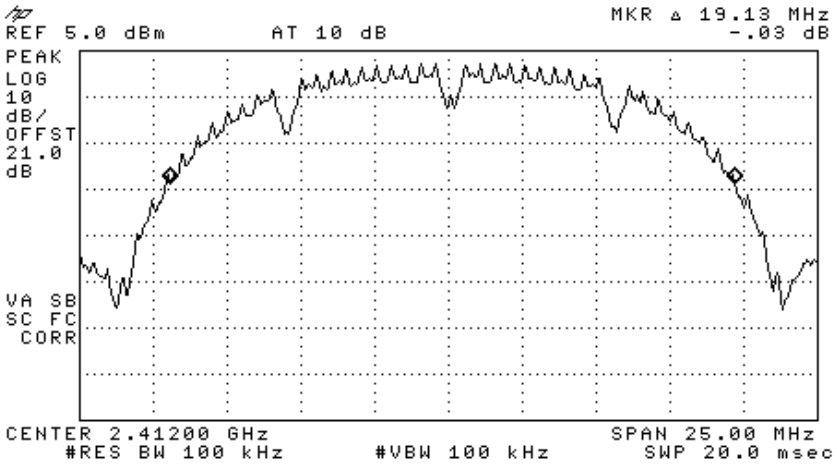


Figure 194 —2412 MHz BPSK

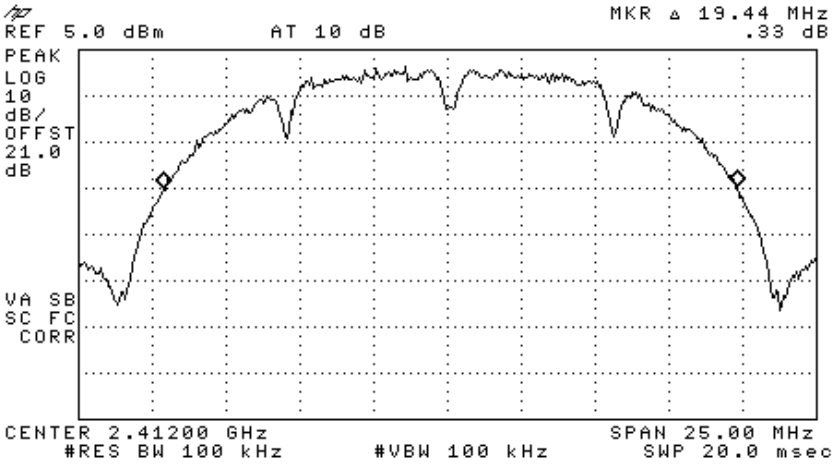


Figure 195 —2412 MHz CCK

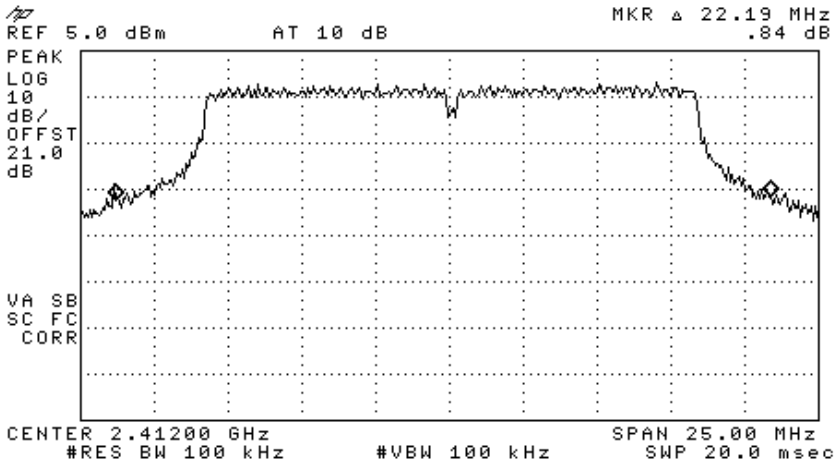


Figure 196 —2412 MHz 64QAM

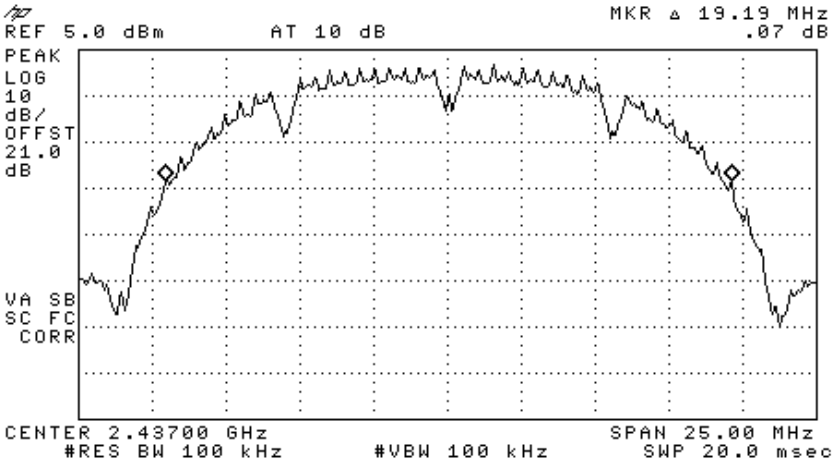


Figure 197 —2437 MHz DBPSK

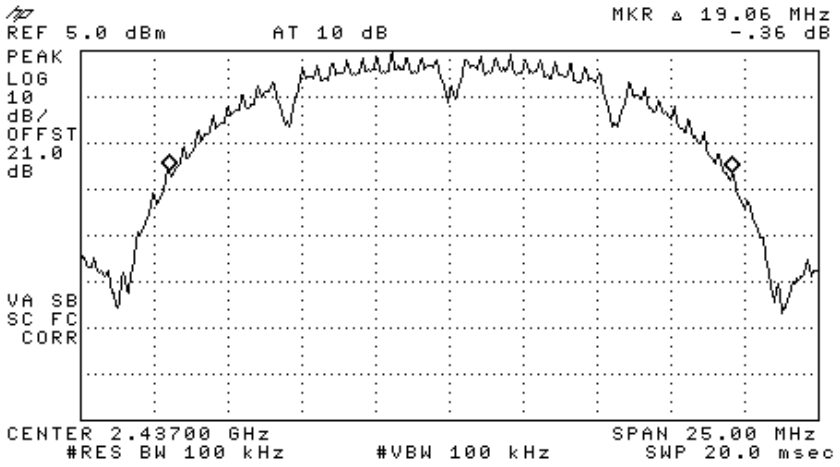


Figure 198 —2437 MHz BPSK

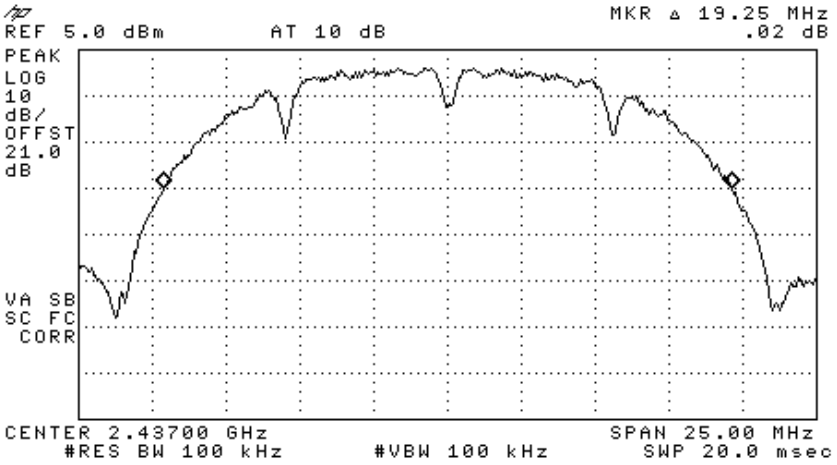


Figure 199 —2437 MHz CCK

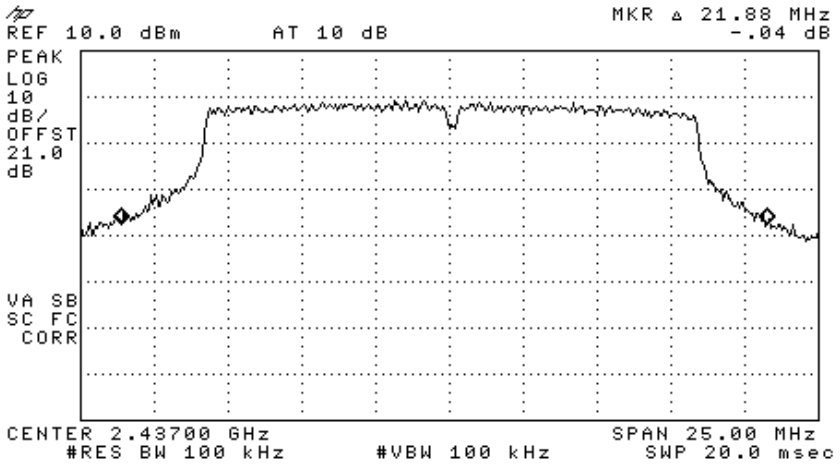


Figure 200 —2437 MHz 64QAM

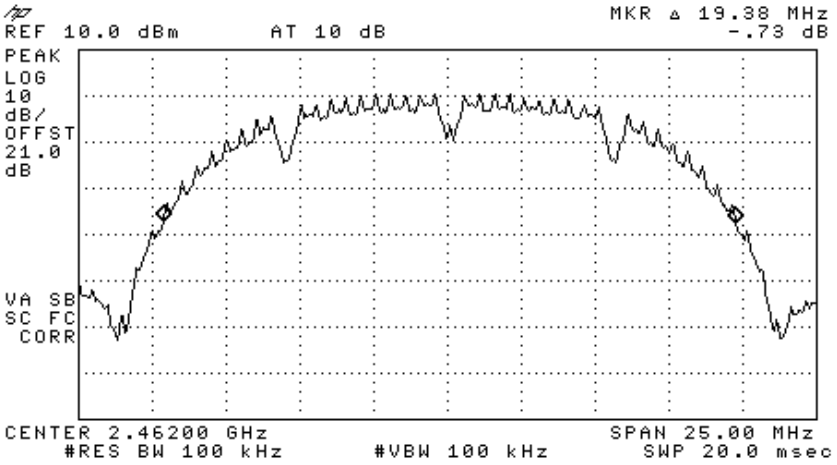


Figure 201 —2462 MHz DBPSK

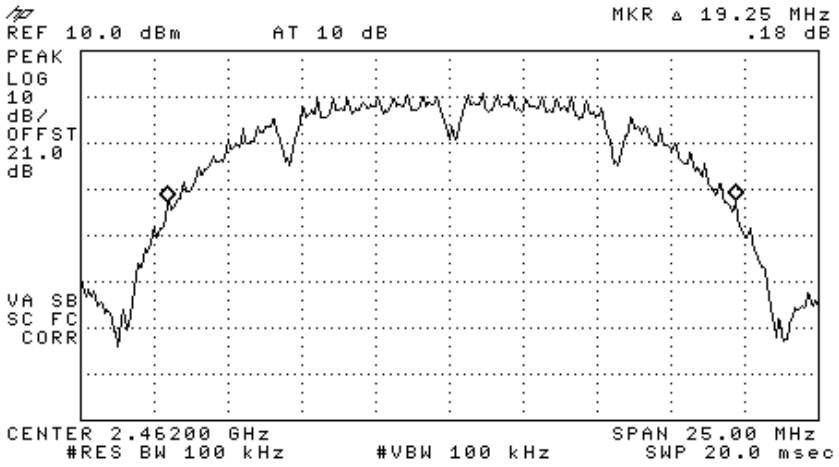


Figure 202 —2462 MHz BPSK

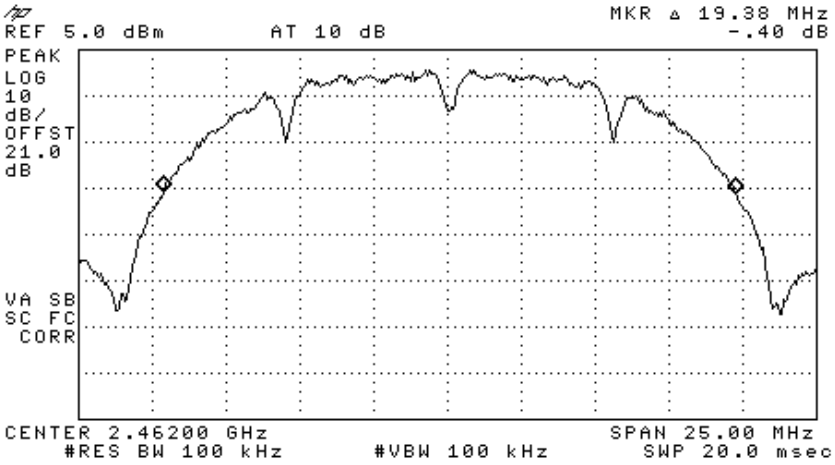


Figure 203 —2462 MHz CCK

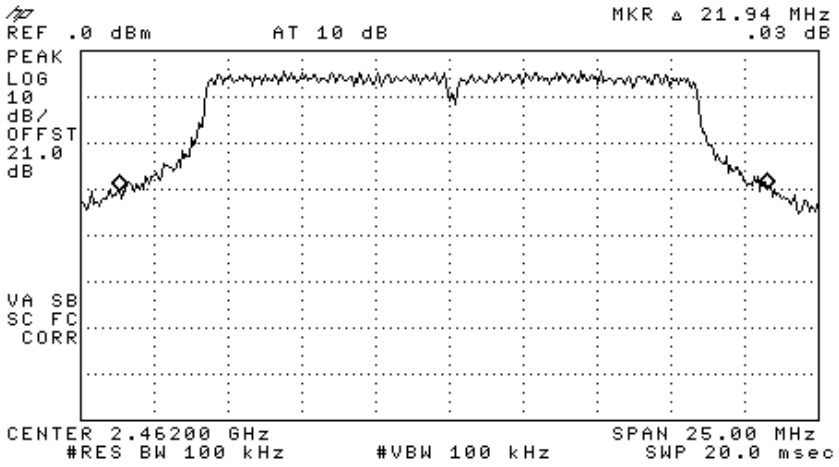


Figure 204 —2462 MHz 64QAM

Operation Frequency (MHz)	Modulation	26 dB Bandwidth (dBm)
2412	DBPSK	19.25
	BPSK	19.13
	CCK	19.44
	64QAM	22.19
2437	DBPSK	19.19
	BPSK	19.06
	CCK	19.25
	64QAM	21.88
2462	DBPSK	19.38
	BPSK	19.25
	CCK	19.38
	64QAM	21.94

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

17.2 Test Equipment Used.

26 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 205 Test Equipment Used

18. Maximum Transmitted Peak Power Output 2.4 GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

18.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The Spectrum Analyzer was set to 1.0 MHz resolution BW. Peak power level was measured at selected operation frequencies.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

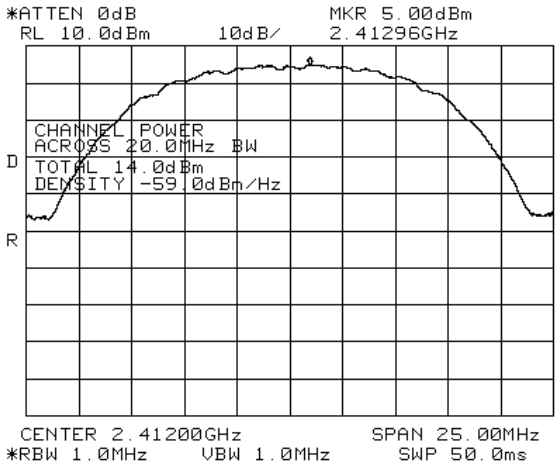


Figure 206 2412 MHz DBPSK

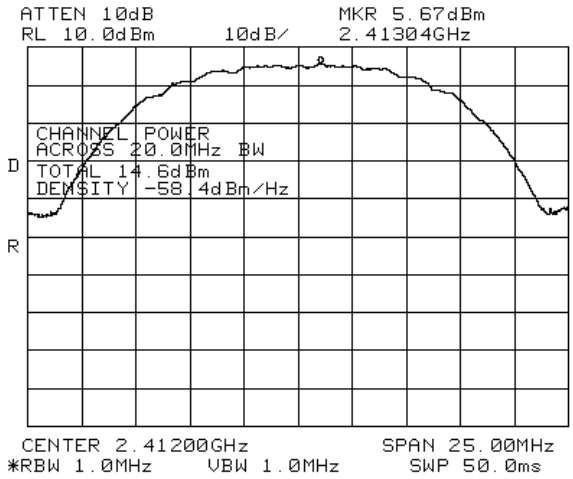


Figure 207 2412 MHz BPSK

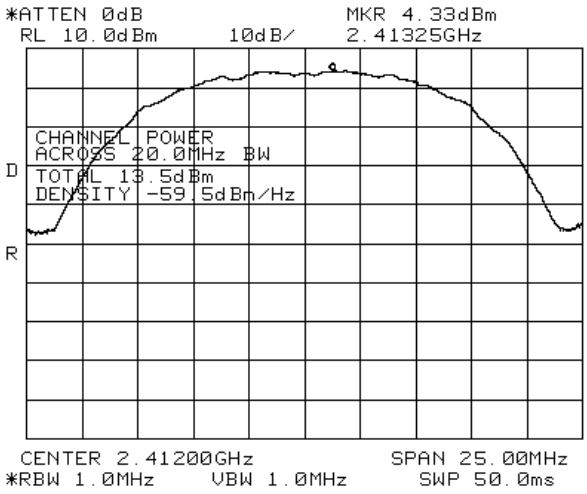


Figure 208 2412 MHz CCK

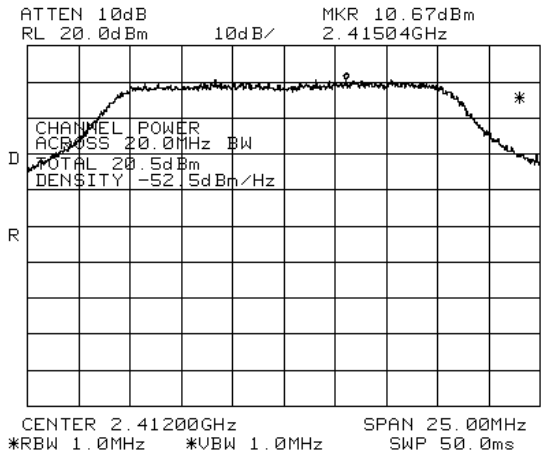


Figure 209 2412 MHz 64QAM

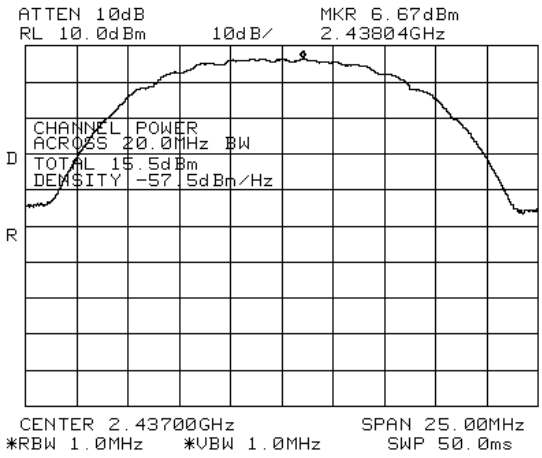


Figure 210 2437 MHz DBPSK

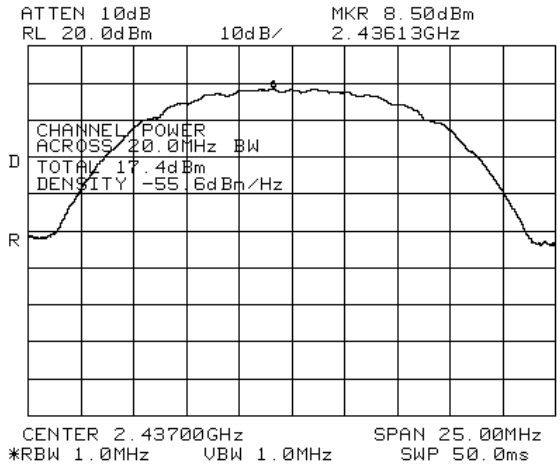


Figure 211 2437 MHz BPSK

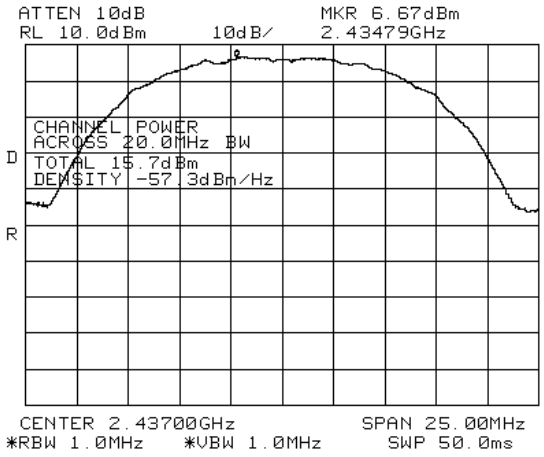


Figure 212 2437 MHz CCK

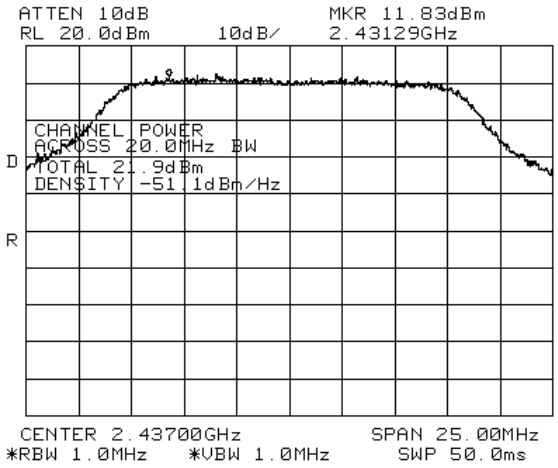


Figure 213 2437 MHz 64QAM

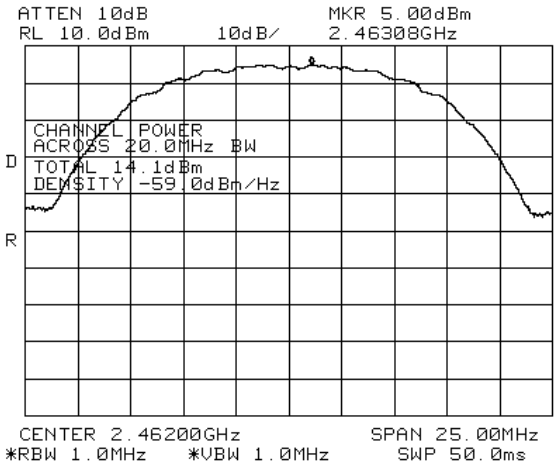


Figure 214 2462 MHz DBPSK

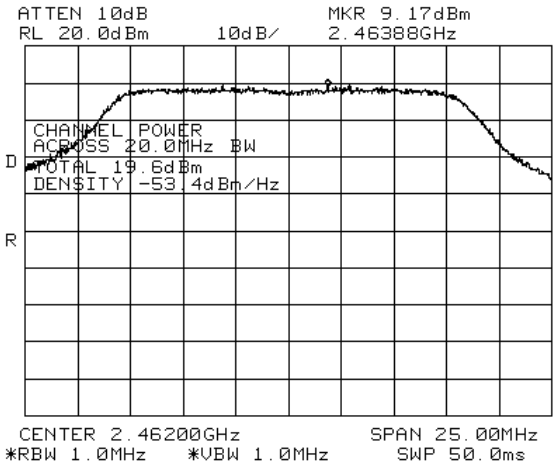


Figure 215 2462 MHz BPSK

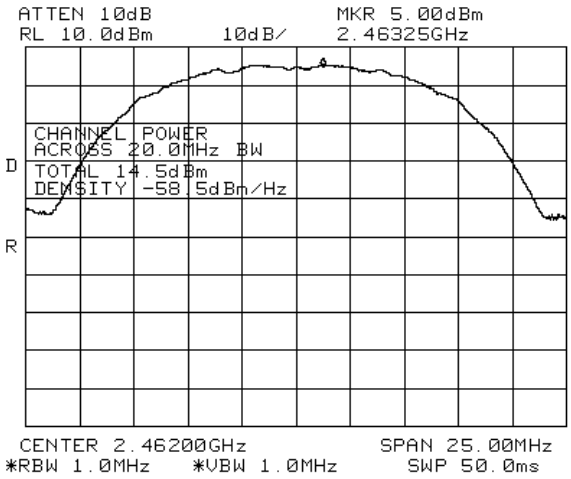


Figure 216 2462 MHz CCK

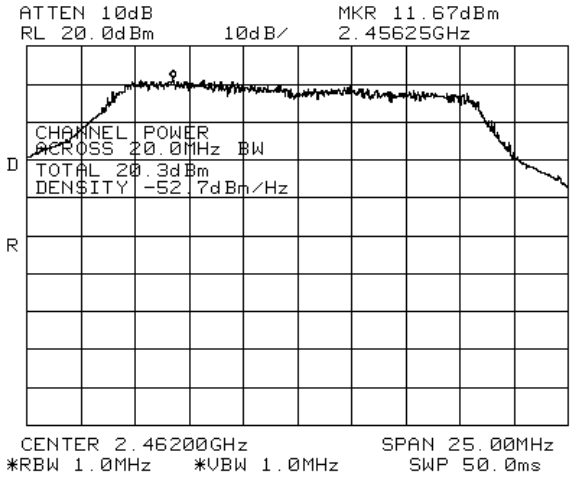


Figure 217 2462 MHz 64QAM

18.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D 2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Modulation	Power (dBm)	Specification (dBm)	Margin (dB)
2412	DBPSK	14.0	29.0	-15.0
	BPSK	14.6	29.0	-14.4
	CCK	13.5	29.0	-15.5
	64QAM	20.5	29.0	-8.5
2437	DBPSK	15.5	29.0	-13.5
	BPSK	17.4	29.0	-11.6
	CCK	15.7	29.0	-13.3
	64QAM	21.9	29.0	-7.1
2462	DBPSK	14.1	29.0	-14.9
	BPSK	19.6	29.0	-9.4
	CCK	14.5	29.0	-14.5
	64QAM	20.3	29.0	-6.7

Figure 218 Maximum Peak Power Output

Note: Antenna Gain is 7 dBi

JUDGEMENT: Passed by 6.7 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

18.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 219 Test Equipment Used

19. Peak Power Output Out of 2400-2483.5 MHz Band 2.4 GHz Transmitter 802.11 b/g +a + CELL + PCS Signals

19.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW except for the frequency range
9 kHz-150 kHz where the RBW was set to 1kHz and the frequency range
150 kHz-10 MHz where the RBW was set to 10kHz. The frequency range from 9 kHz to 25 GHz was scanned. Level of spectrum components out of the 2400-2483.5 MHz was measured at the selected operation frequencies.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

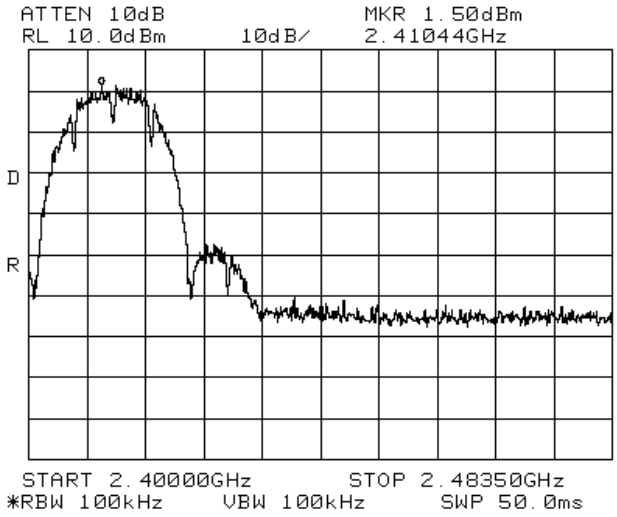


Figure 220 —2412 MHz DBPSK

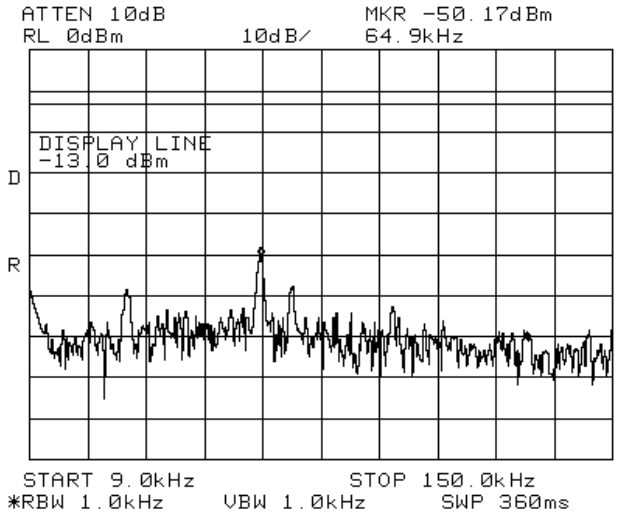


Figure 221 —2412 MHz DBPSK

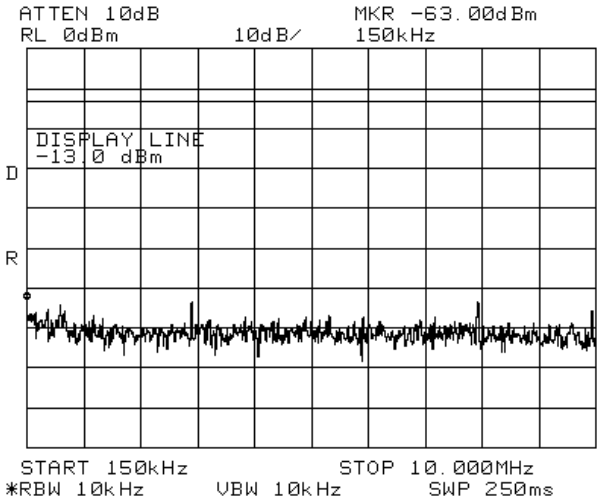


Figure 222 —2412 MHz DBPSK

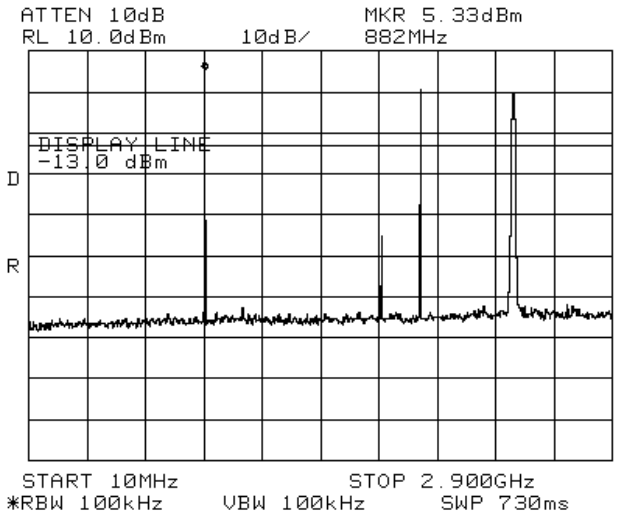


Figure 223 —2412 MHz DBPSK

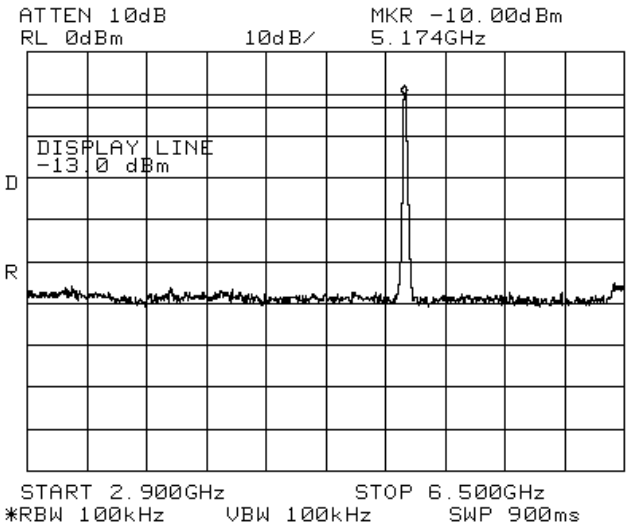


Figure 224 —2412 MHz DBPSK

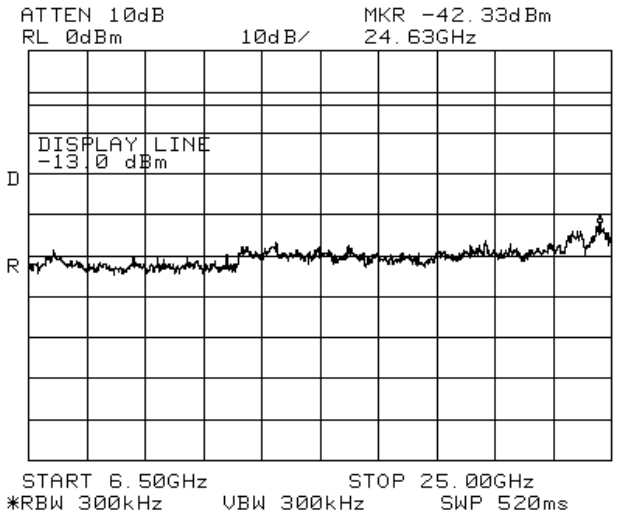


Figure 225 —2412 MHz DBPSK

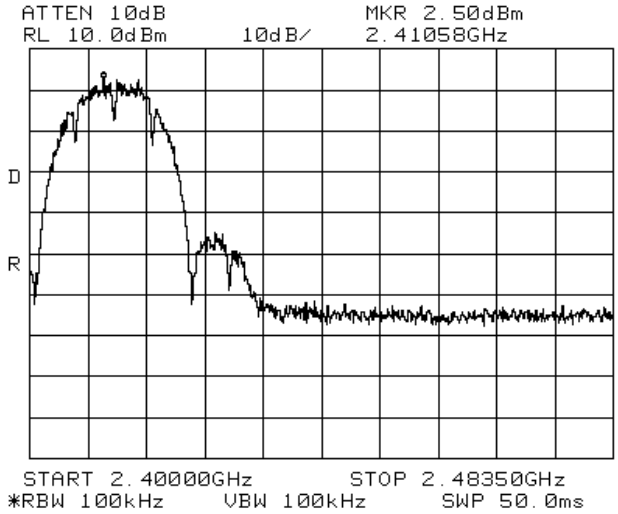


Figure 226 —2412 MHz BPSK

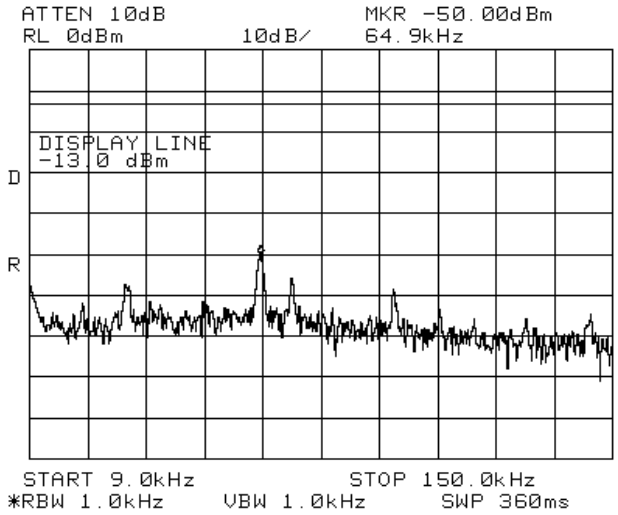


Figure 227 —2412 MHz BPSK

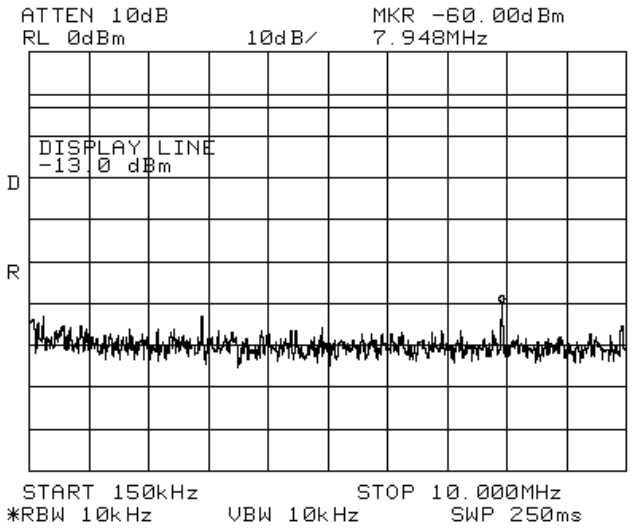


Figure 228 —2412 MHz BPSK

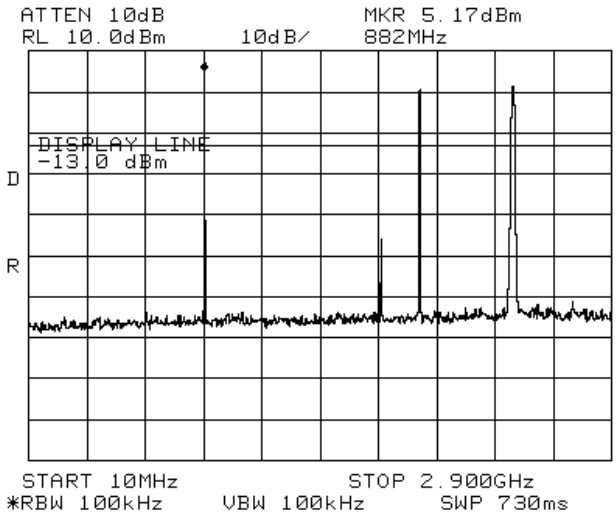


Figure 229 —2412 MHz BPSK

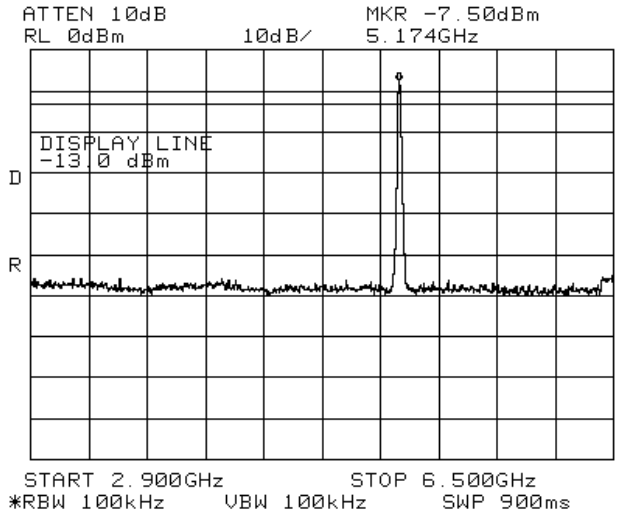


Figure 230 —2412 MHz BPSK

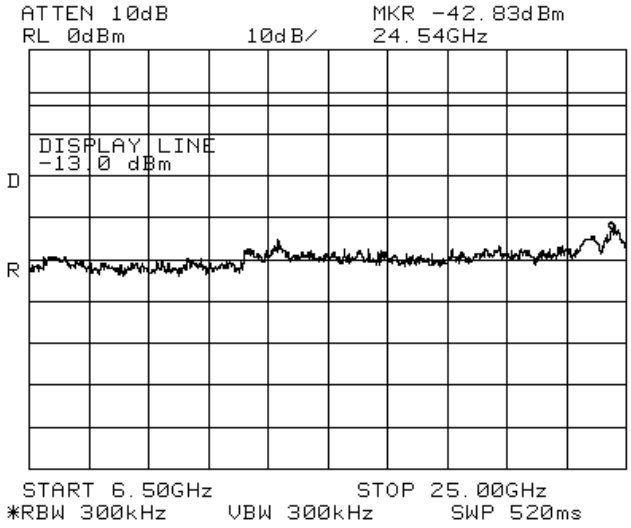


Figure 231 —2412 MHz BPSK

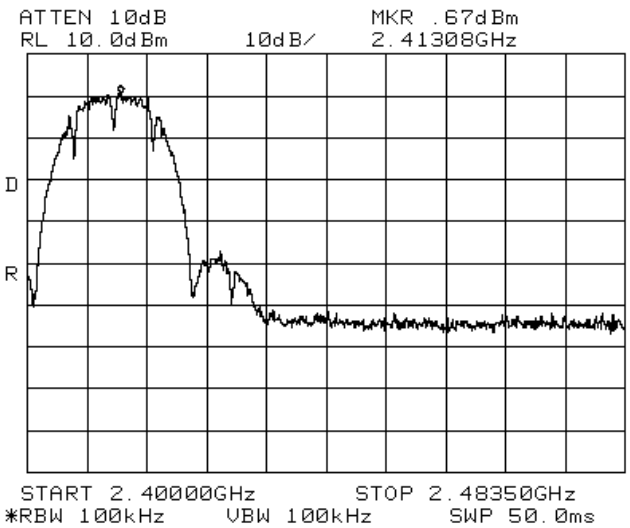


Figure 232 —2412 MHz CCK

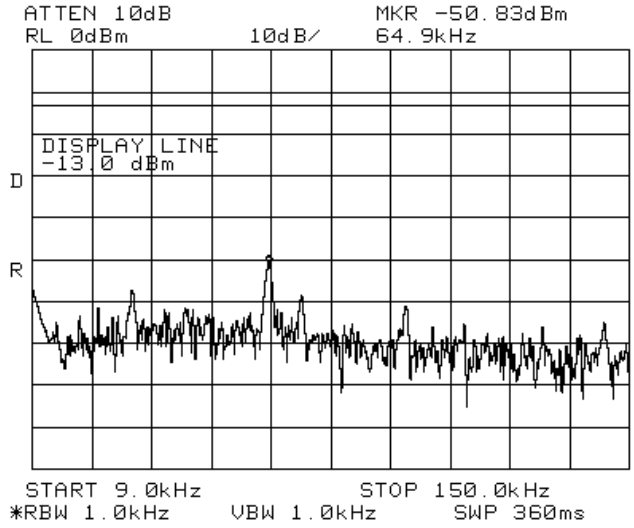


Figure 233 —2412 MHz CCK

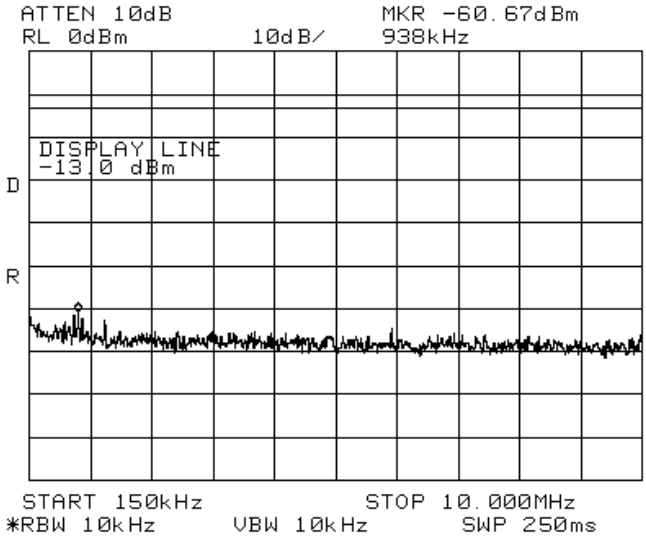


Figure 234 —2412 MHz CCK

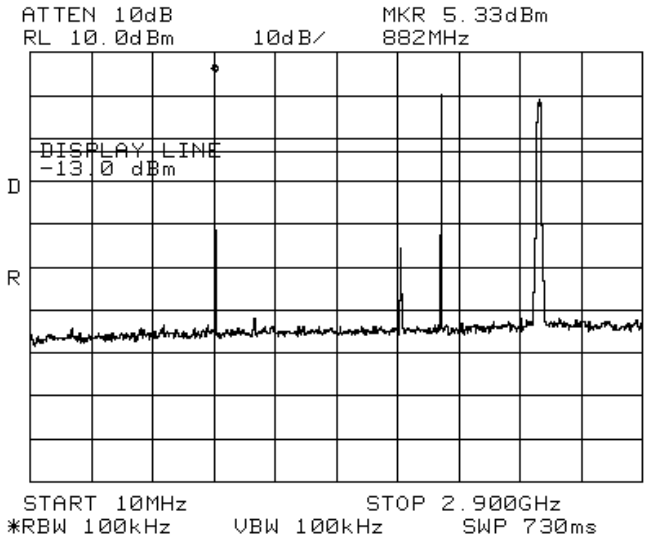


Figure 235 —2412 MHz CCK

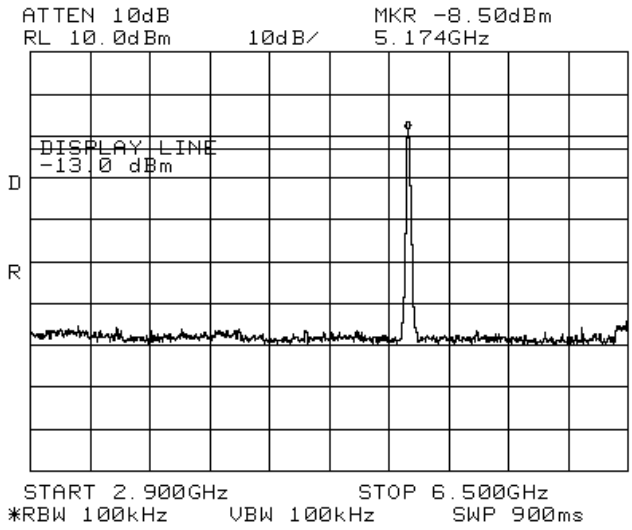


Figure 236 —2412 MHz CCK

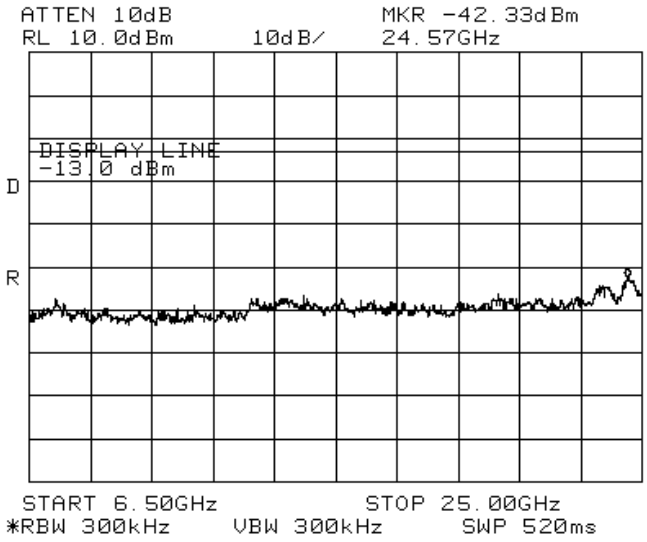


Figure 237 —2412 MHz CCK

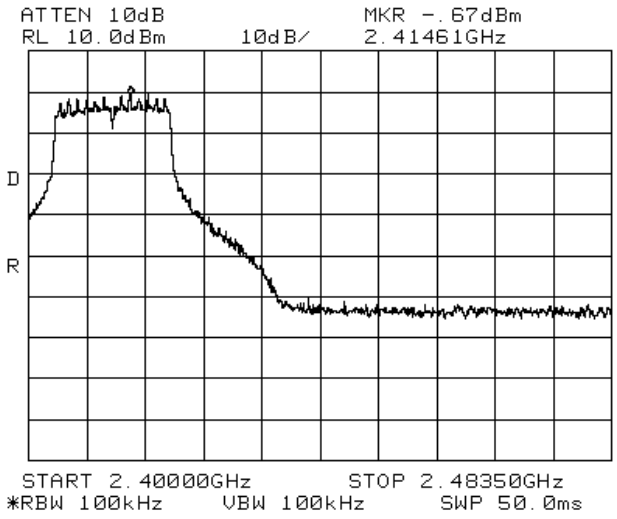


Figure 238 —2412 MHz 64QAM

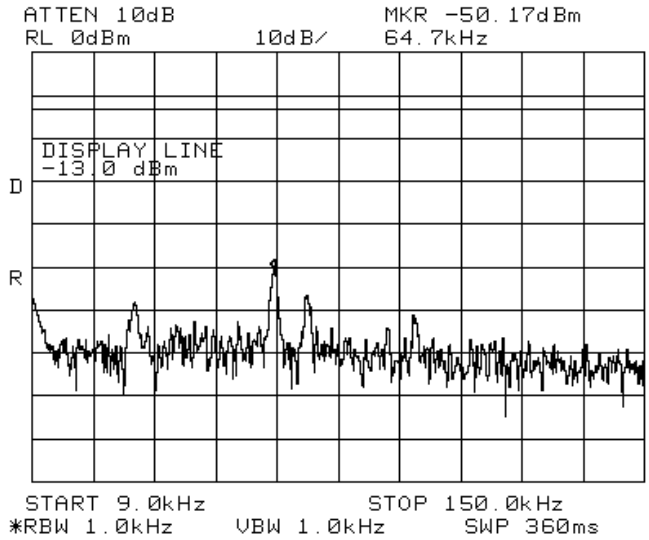


Figure 239 —2412 MHz 64QAM

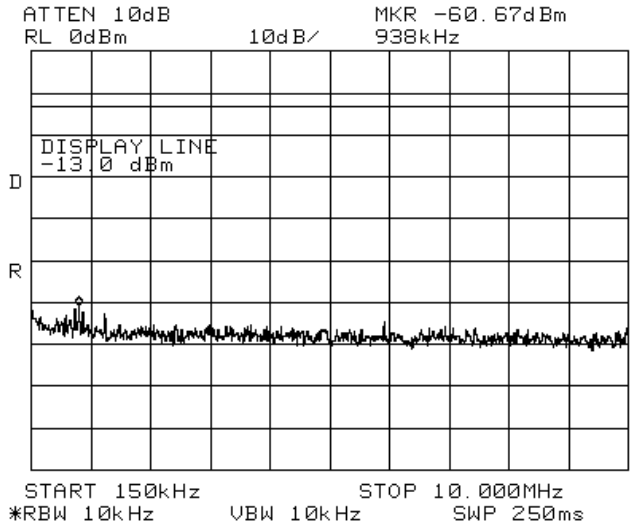


Figure 240 —2412 MHz 64QAM

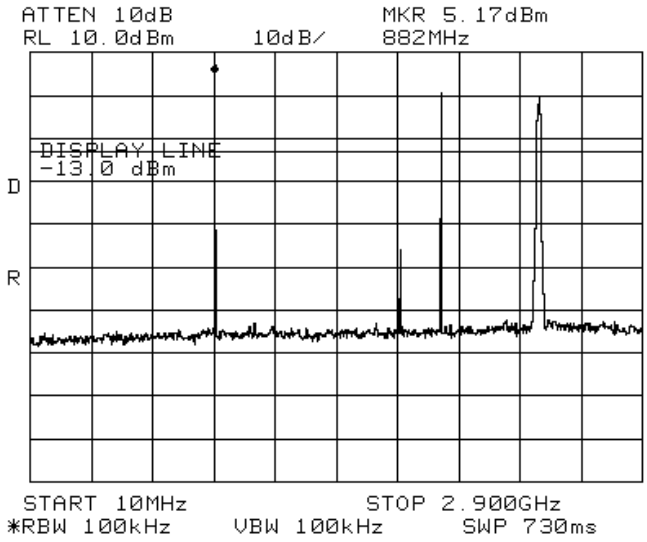


Figure 241 —2412 MHz 64QAM

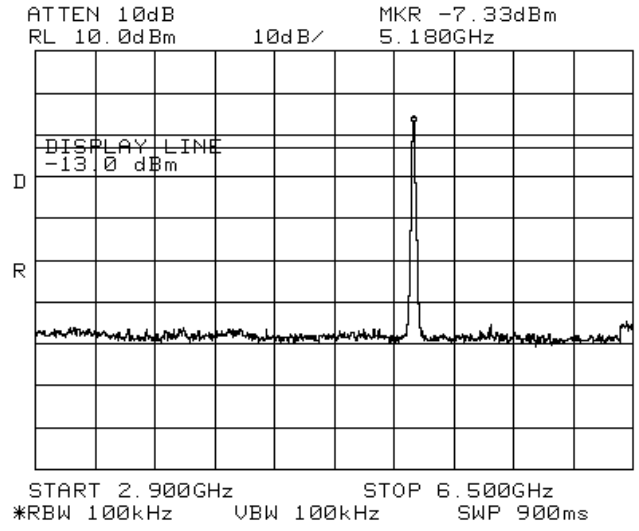


Figure 242 —2412 MHz 64QAM

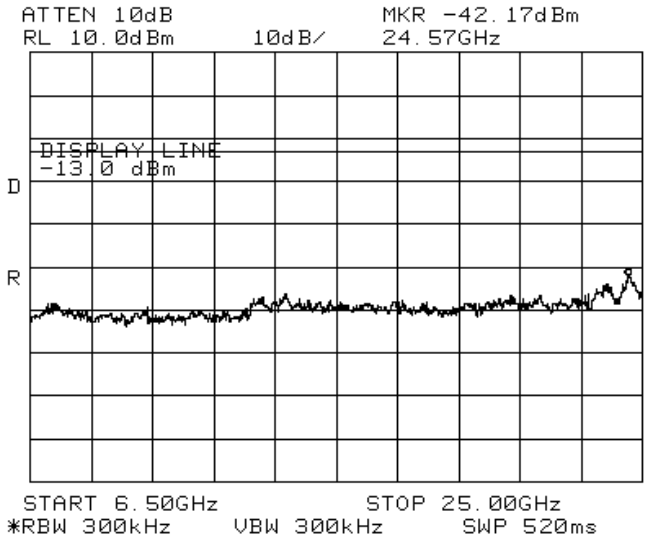


Figure 243 —2412 MHz 64QAM

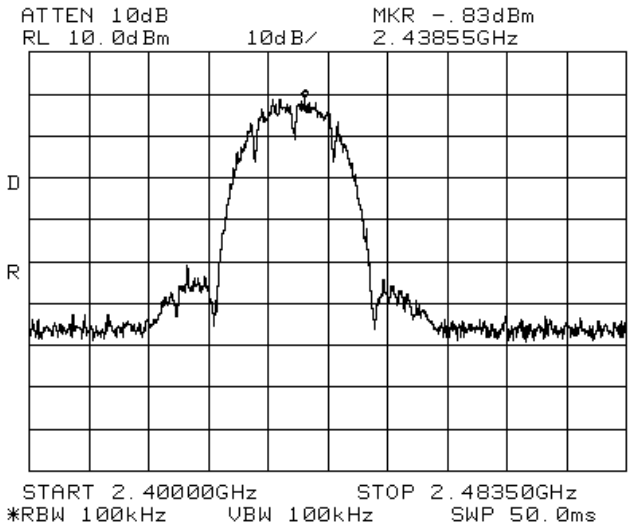


Figure 244 —2437 MHz DBPSK

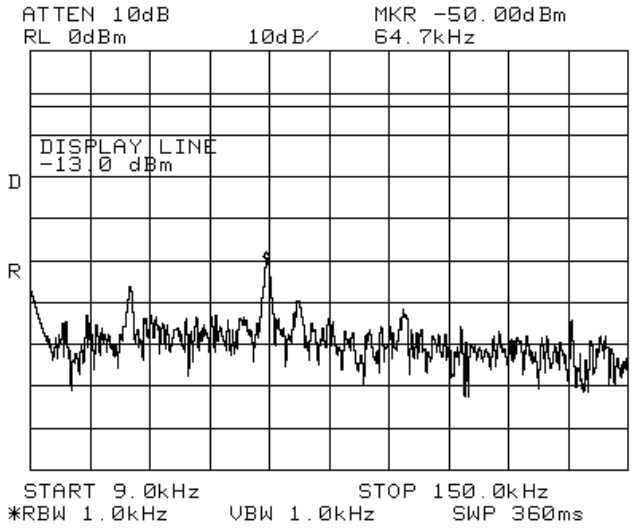


Figure 245 —2437 MHz DBPSK

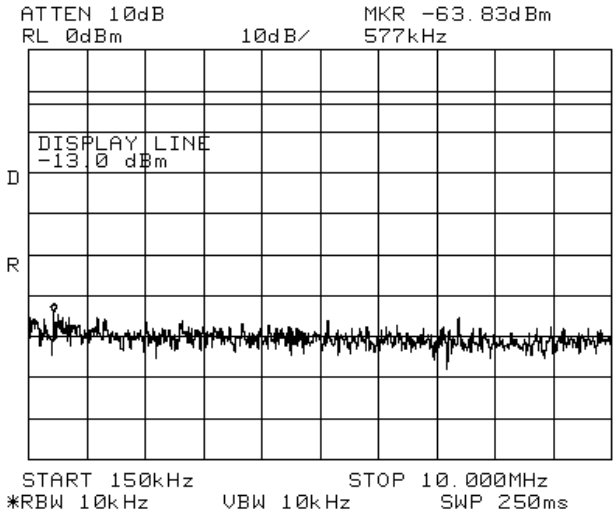


Figure 246 —2437 MHz DBPSK

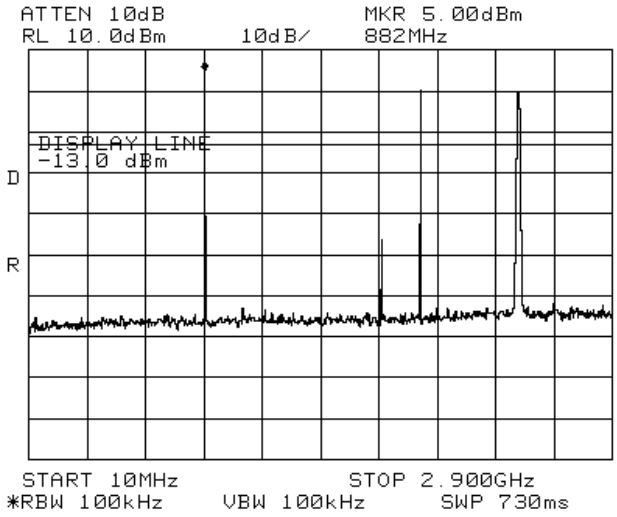


Figure 247 —2437 MHz DBPSK

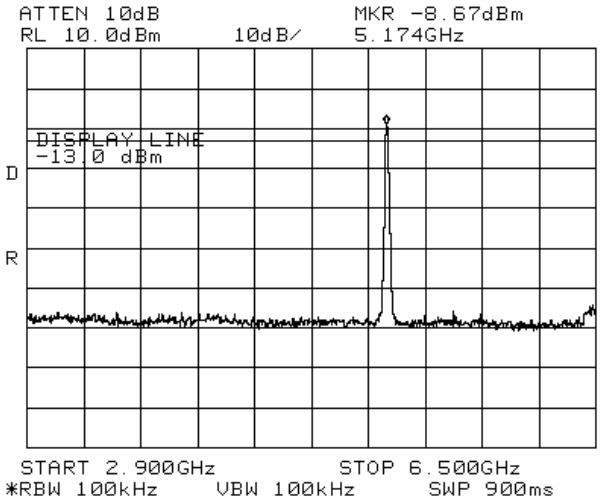


Figure 248 —2437 MHz DBPSK

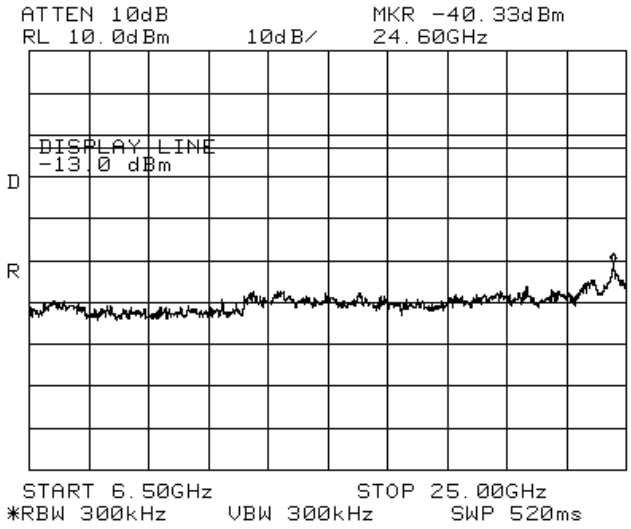


Figure 249 —2437 MHz DBPSK

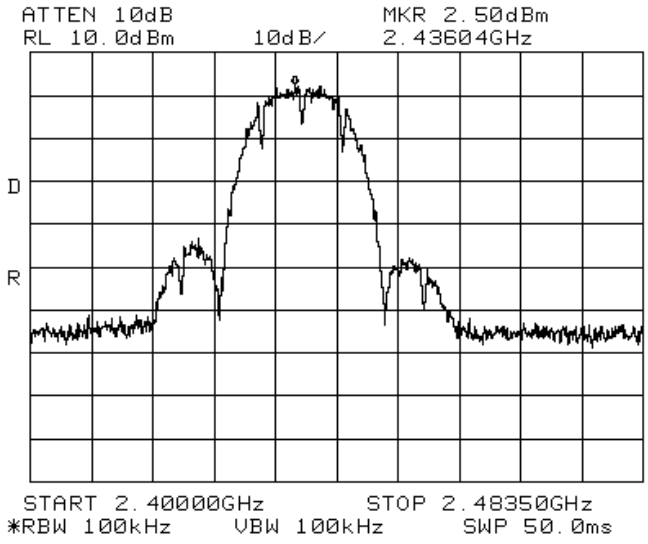


Figure 250 —2437 MHz BPSK

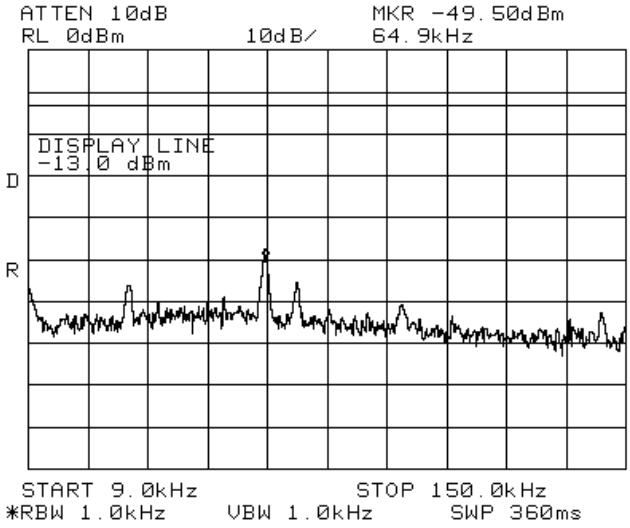


Figure 251 —2437 MHz BPSK

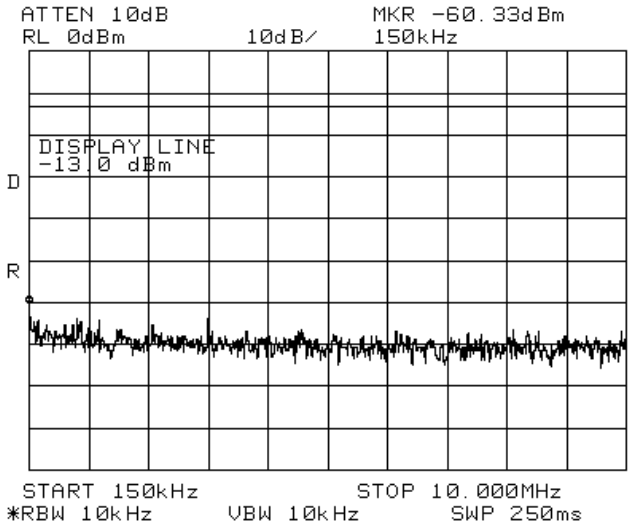


Figure 252 —2437 MHz BPSK

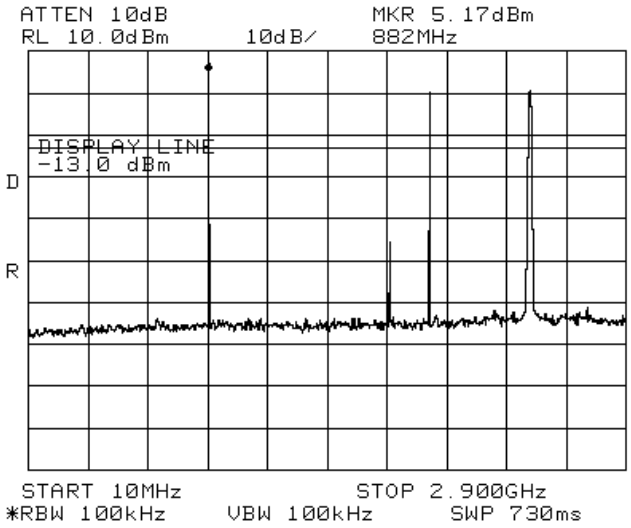


Figure 253 —2437 MHz BPSK

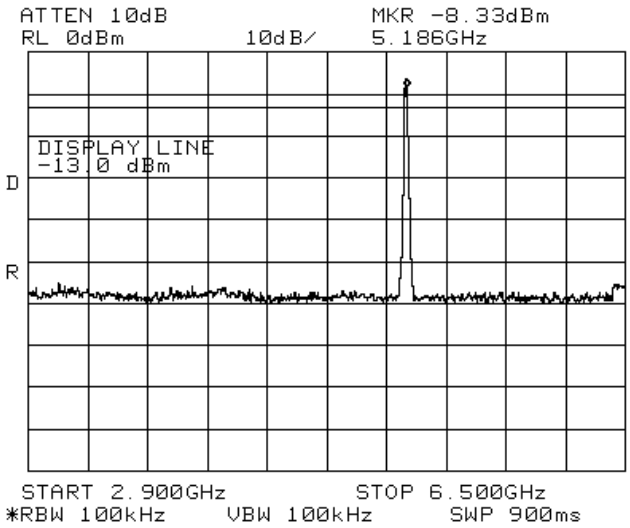


Figure 254 —2437 MHz BPSK

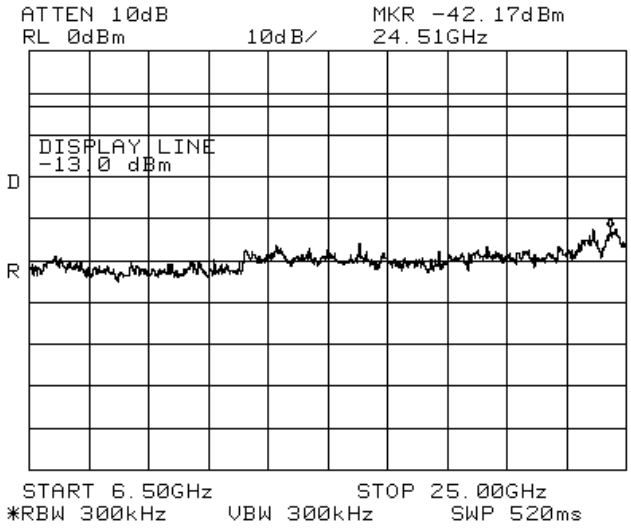


Figure 255 —2437 MHz BPSK

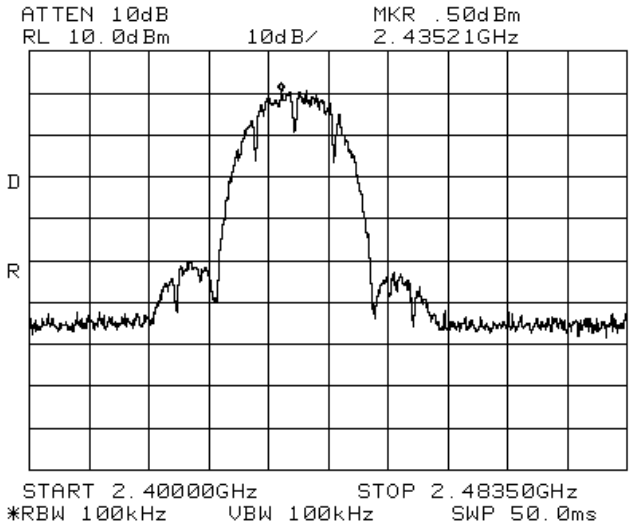


Figure 256 —2437 MHz CCK

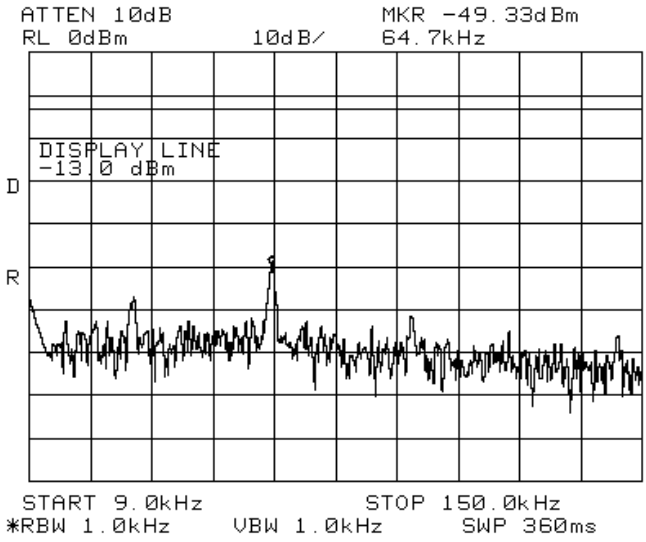


Figure 257 —2437 MHz CCK

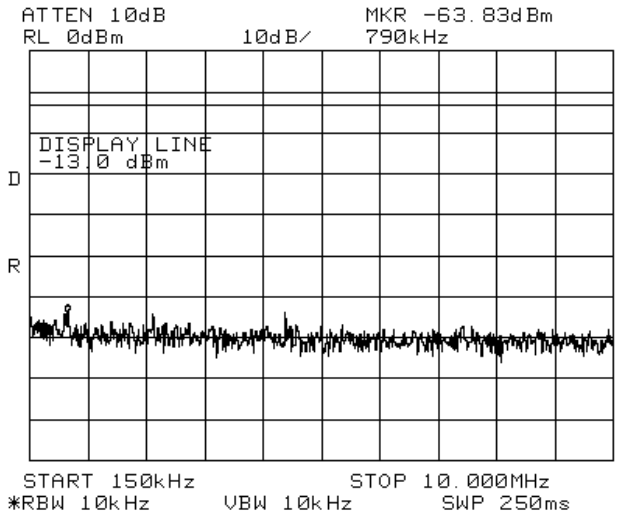


Figure 258 —2437 MHz CCK

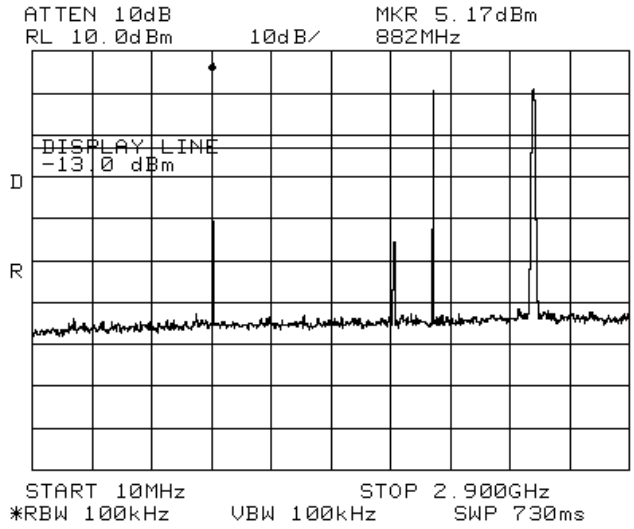


Figure 259 —2437 MHz CCK

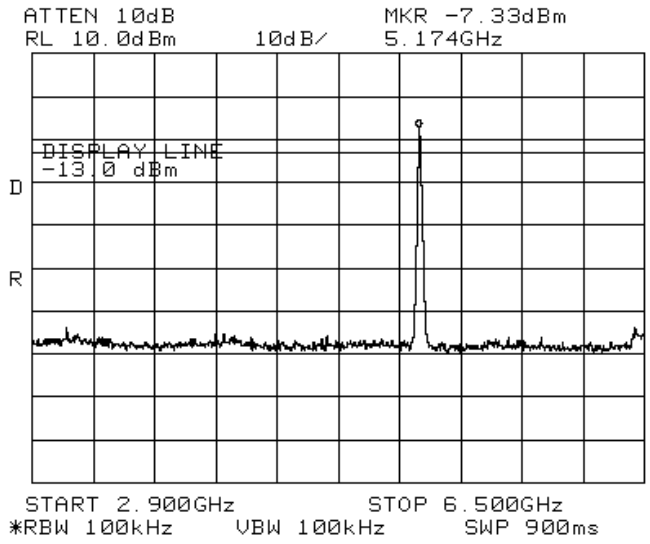


Figure 260 —2437 MHz CCK

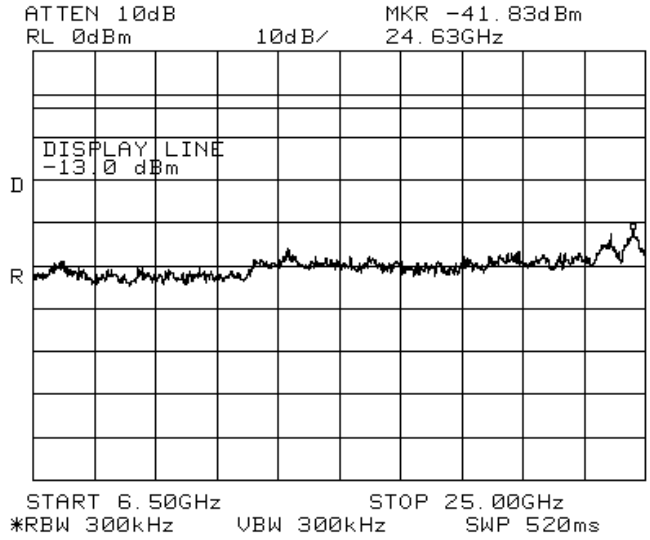


Figure 261 —2437 MHz CCK

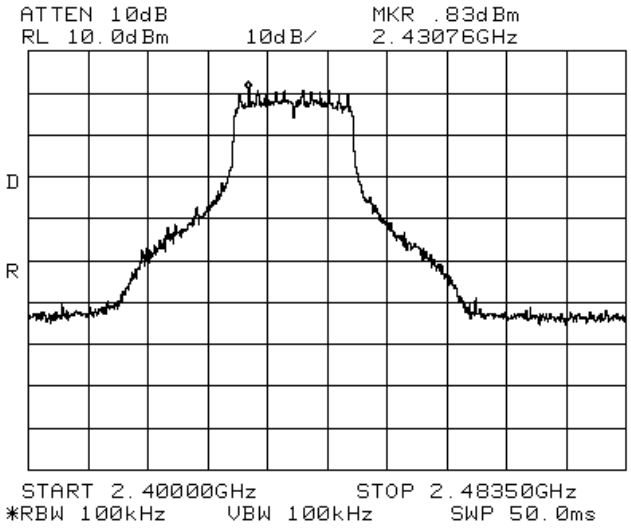


Figure 262 —2437 MHz 64QAM

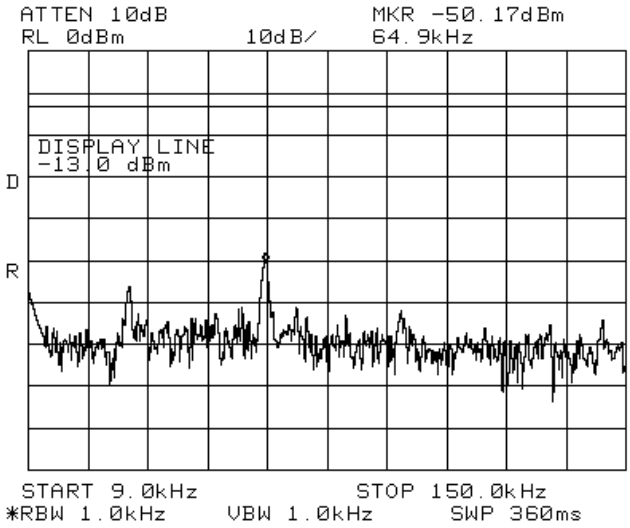


Figure 263 —2437 MHz 64QAM

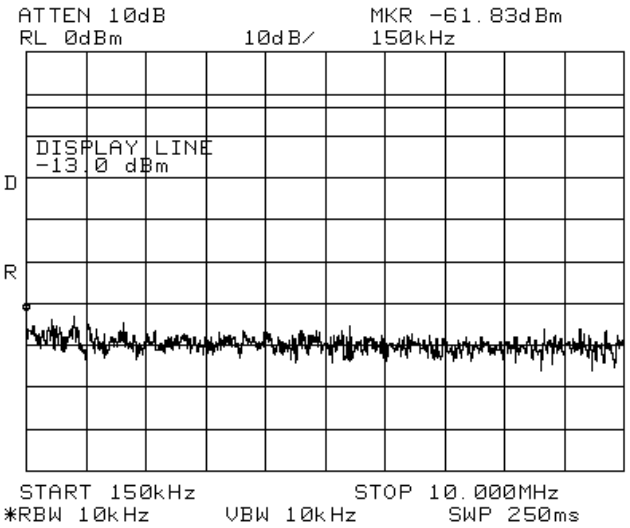


Figure 264 —2437 MHz 64QAM

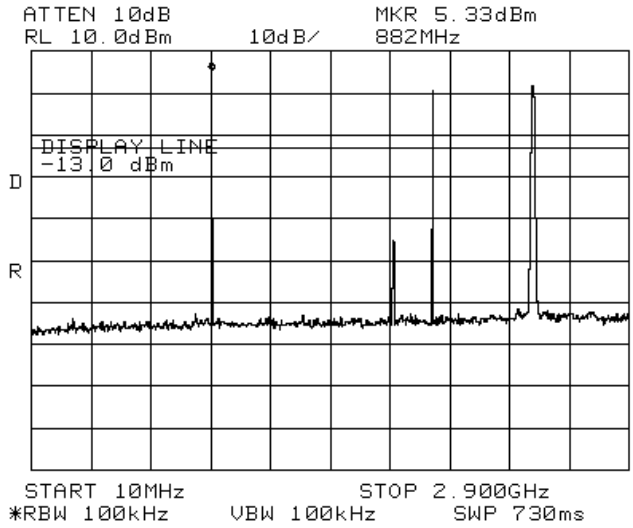


Figure 265 —2437 MHz 64QAM

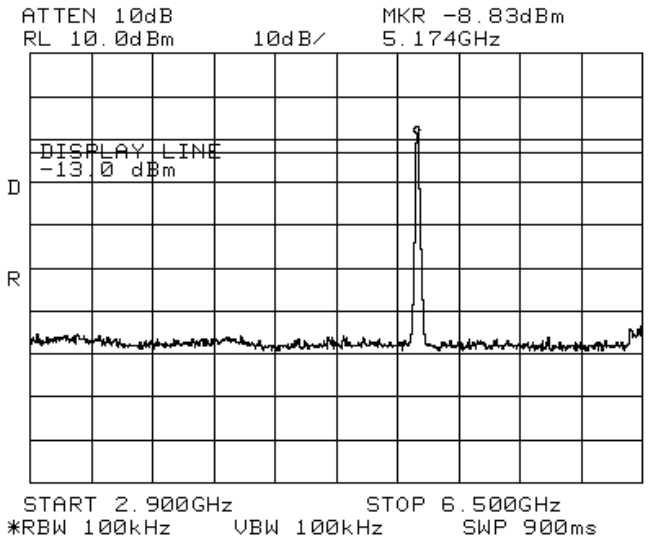


Figure 266 —2437 MHz 64QAM

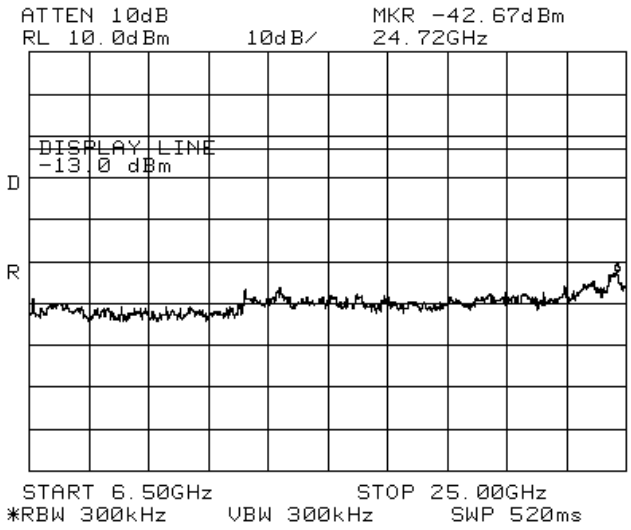


Figure 267 —2437 MHz 64QAM

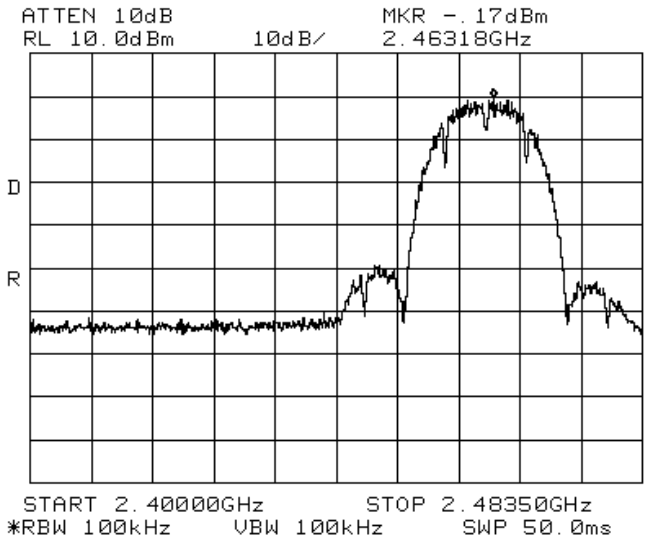


Figure 268 —2462 MHz DBPSK

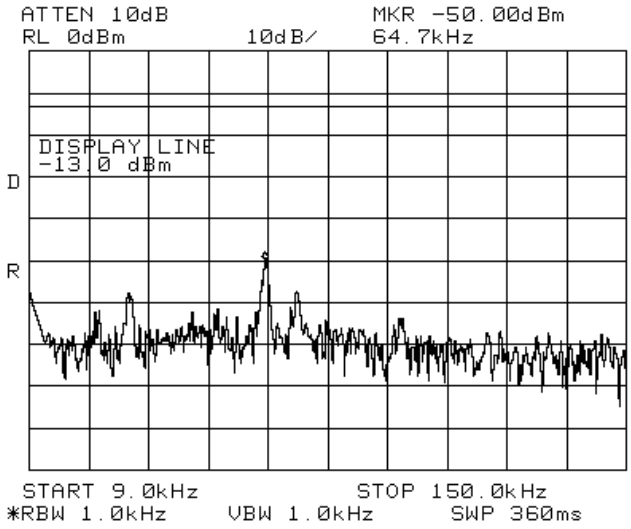


Figure 269 —2462 MHz DBPSK

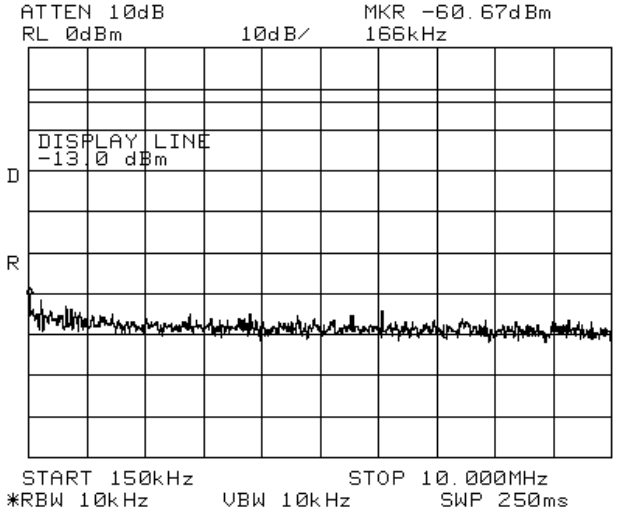


Figure 270 —2462 MHz DBPSK

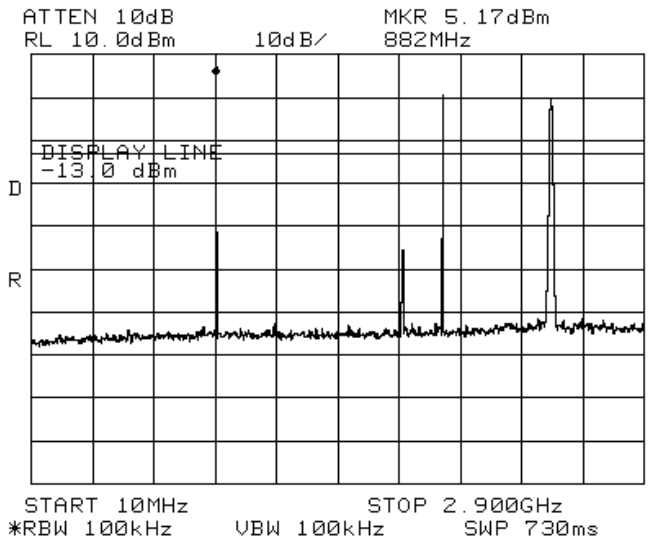


Figure 271 —2462 MHz DBPSK

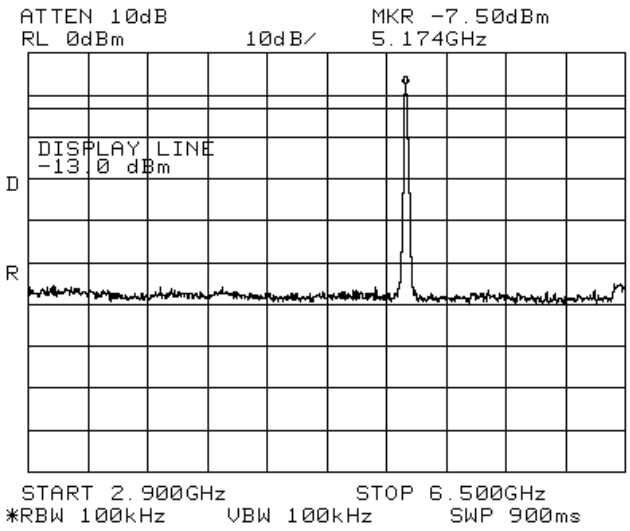


Figure 272 —2462 MHz DBPSK

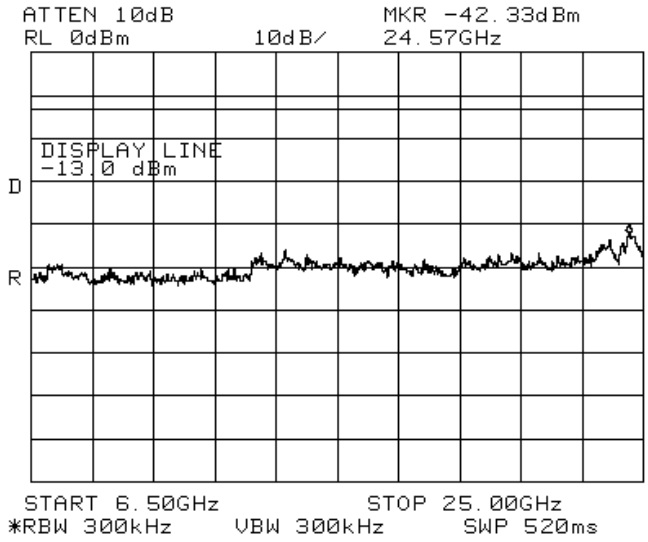


Figure 273 —2462 MHz DBPSK

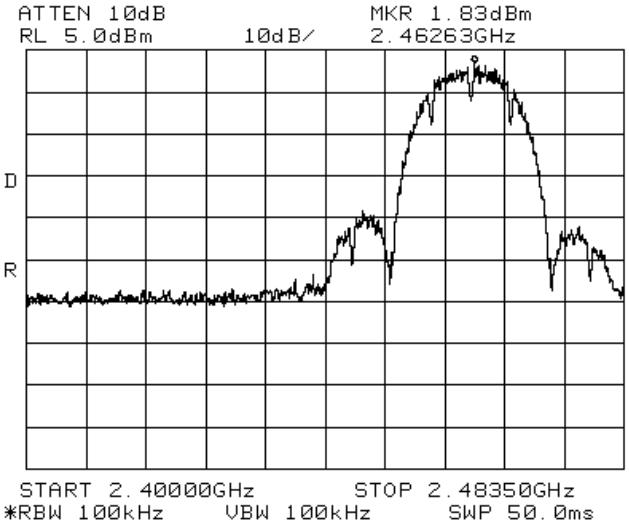


Figure 274 —2462 MHz BPSK

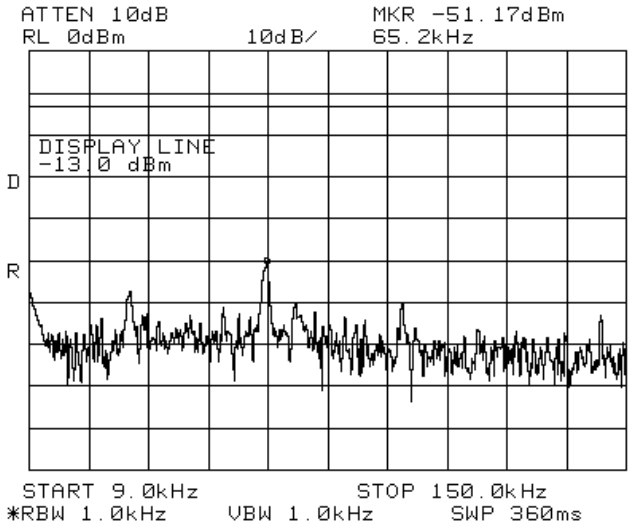


Figure 275 —2462 MHz BPSK

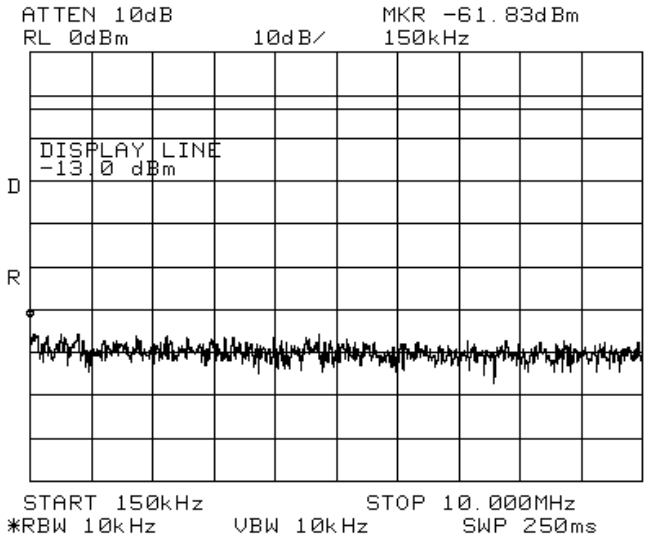


Figure 276 —2462 MHz BPSK

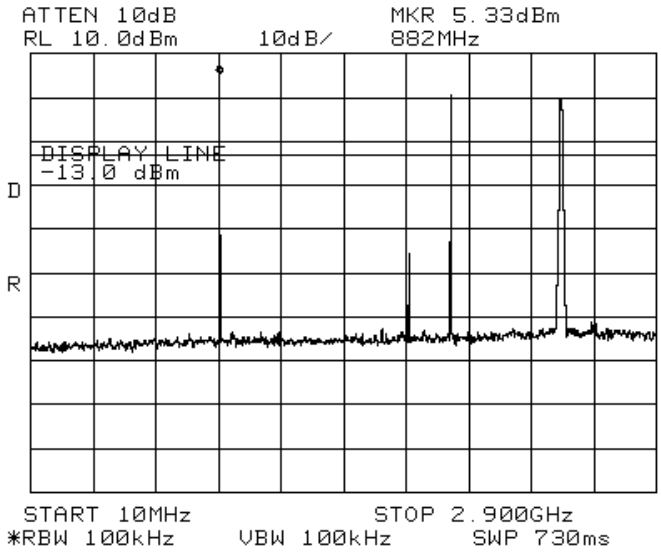


Figure 277 —2462 MHz BPSK

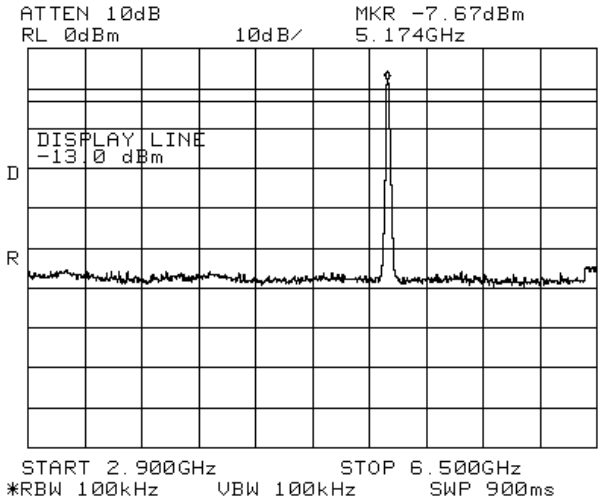


Figure 278 —2462 MHz BPSK

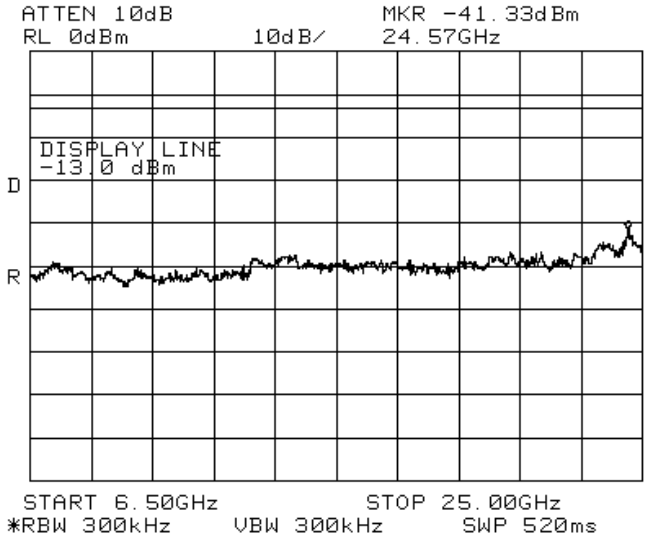


Figure 279 —2462 MHz BPSK

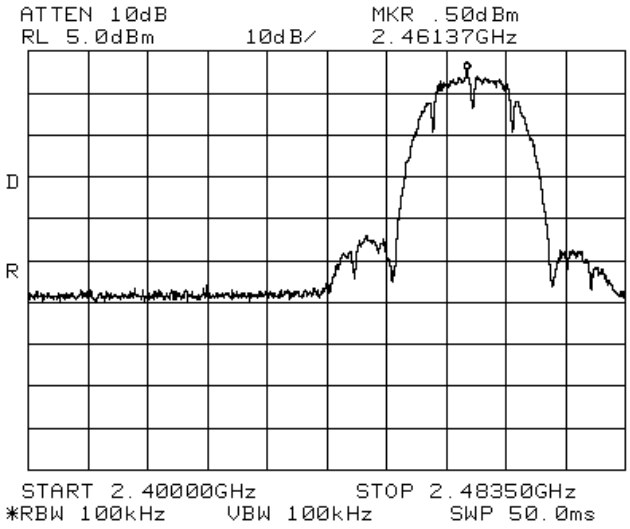


Figure 280 —2462 MHz CCK

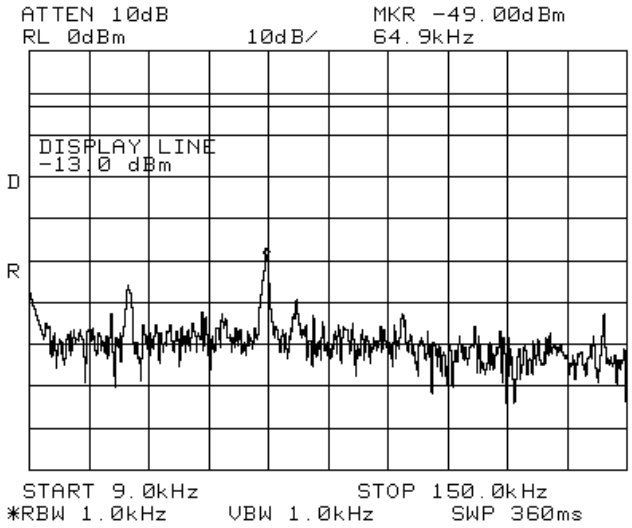


Figure 281 —2462 MHz CCK

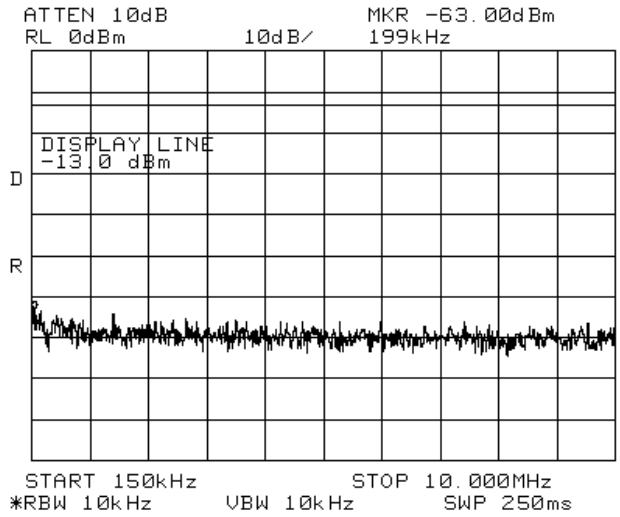


Figure 282 —2462 MHz CCK

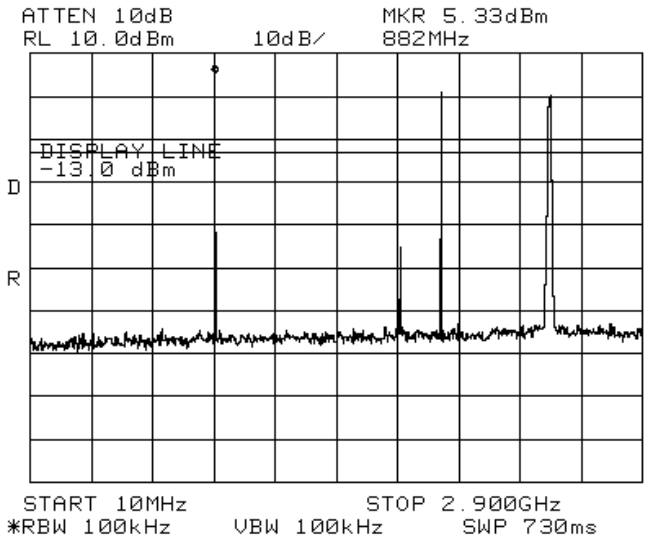


Figure 283 —2462 MHz CCK

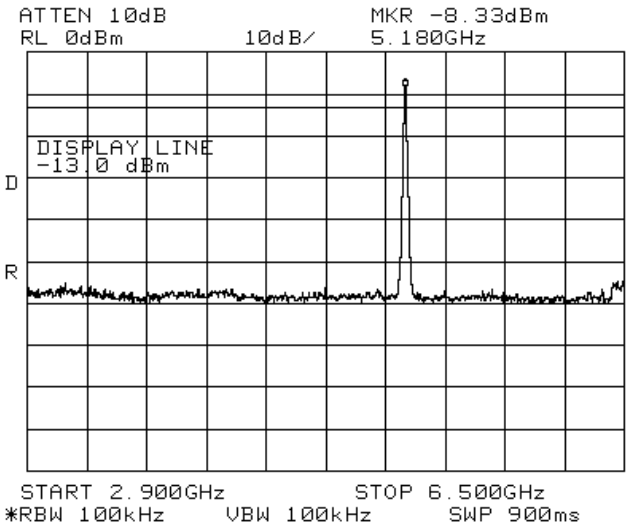


Figure 284 —2462 MHz CCK

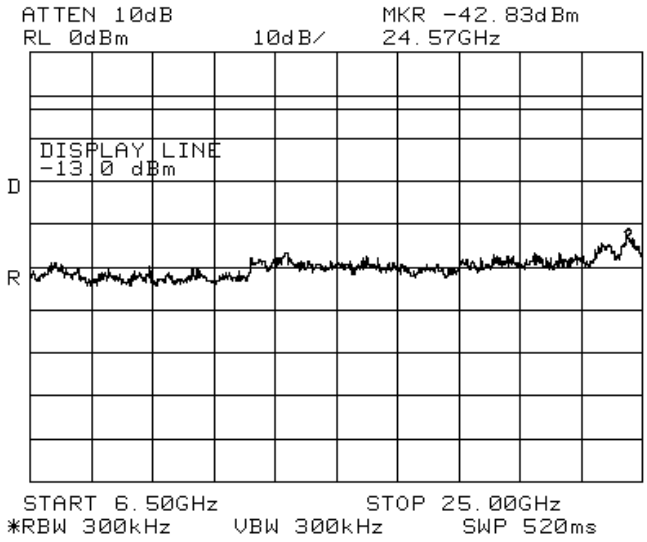


Figure 285 —2462 MHz CCK

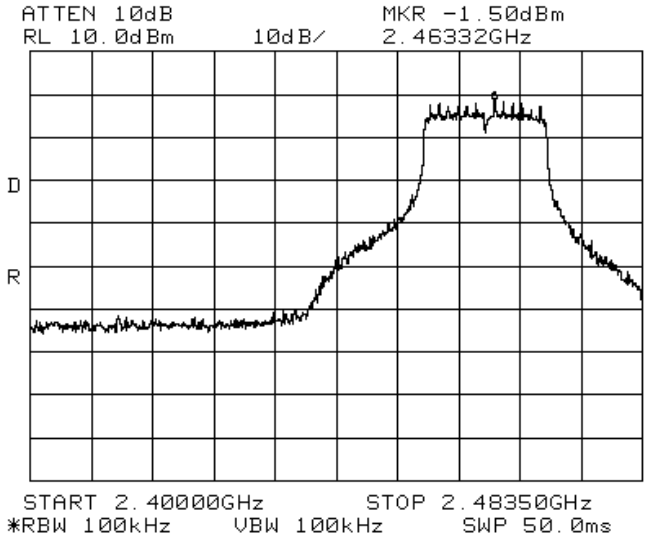


Figure 286 —2462 MHz 64QAM

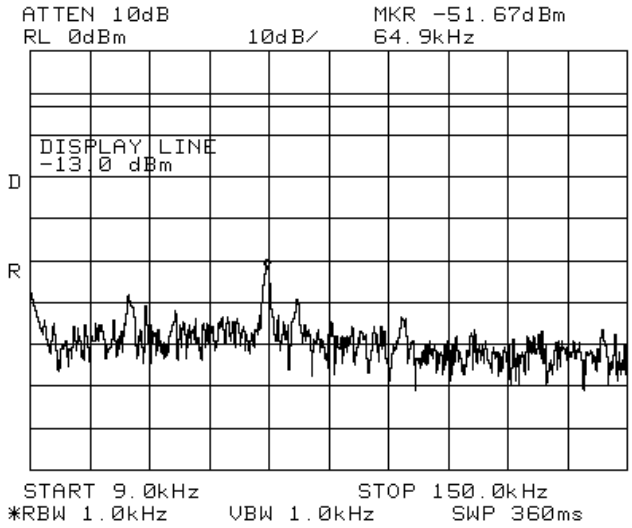


Figure 287 —2462 MHz 64QAM

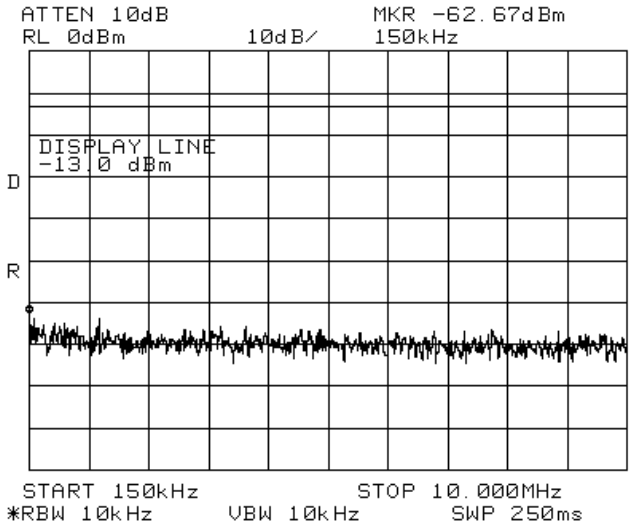


Figure 288 —2462 MHz 64QAM

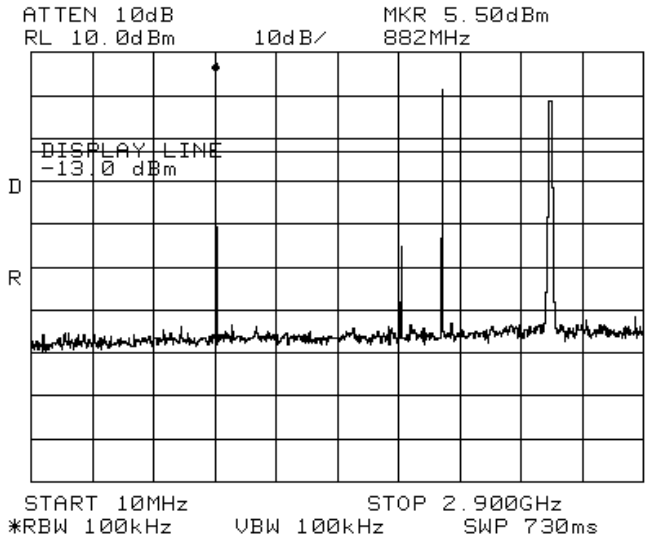


Figure 289 —2462 MHz 64QAM

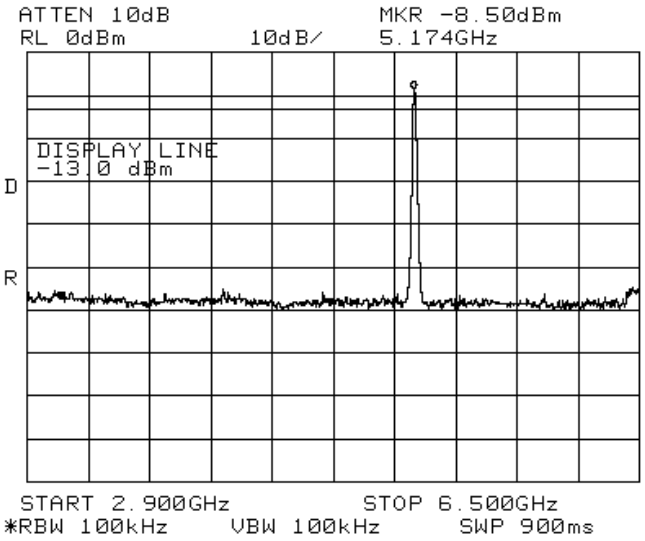


Figure 290 —2462 MHz 64QAM

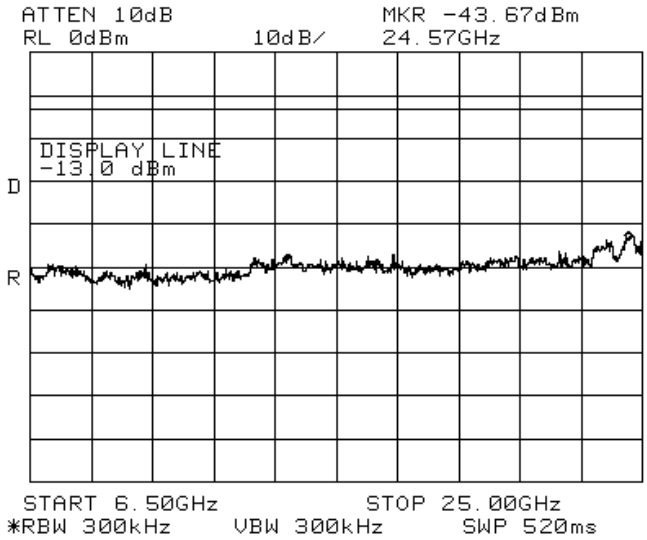


Figure 291 —2462 MHz 64QAM

19.2 Results table

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading (dBm)	Specification (dBm)	Margin (dB)
2412	DBPSK	-42.33	-13.0	-29.33
	BPSK	-42.83	-13.0	-29.83
	CCK	-42.33	-13.0	-29.33
	64QAM	-42.17	-13.0	-29.17
2437	DBPSK	-40.33	-13.0	-27.33
	BPSK	-42.17	-13.0	-29.17
	CCK	-41.83	-13.0	-28.83
	64QAM	-42.67	-13.0	-29.67
2462	DBPSK	-42.33	-13.0	-29.33
	BPSK	-41.33	-13.0	-28.33
	CCK	-42.83	-13.0	-29.83
	64QAM	-43.67	-13.0	-30.67

Figure 292 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 27.33 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 25.02.08

Typed/Printed Name: E. Pitt

19.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 293 Test Equipment Used

20. 6 dB Minimum Bandwidth 2.4GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

20.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

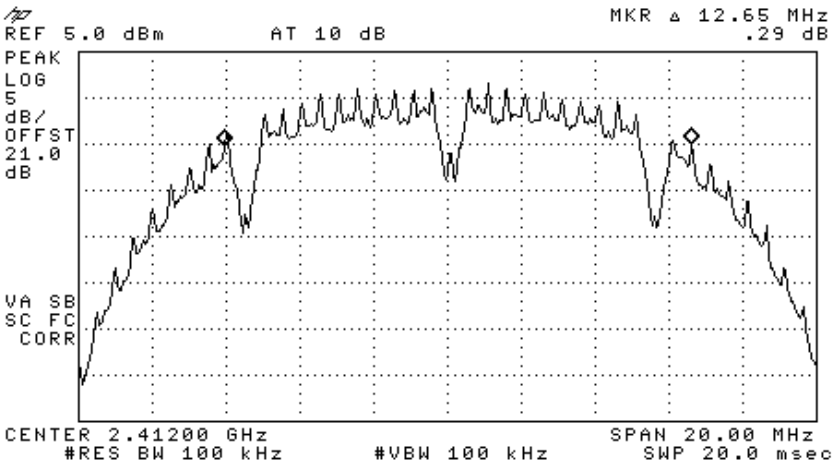


Figure 294 —2412 MHz DBPSK

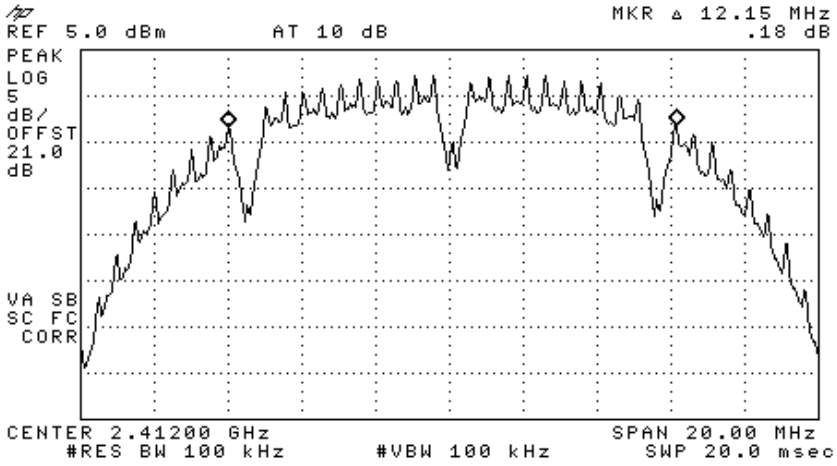


Figure 295 —2412 MHz BPSK

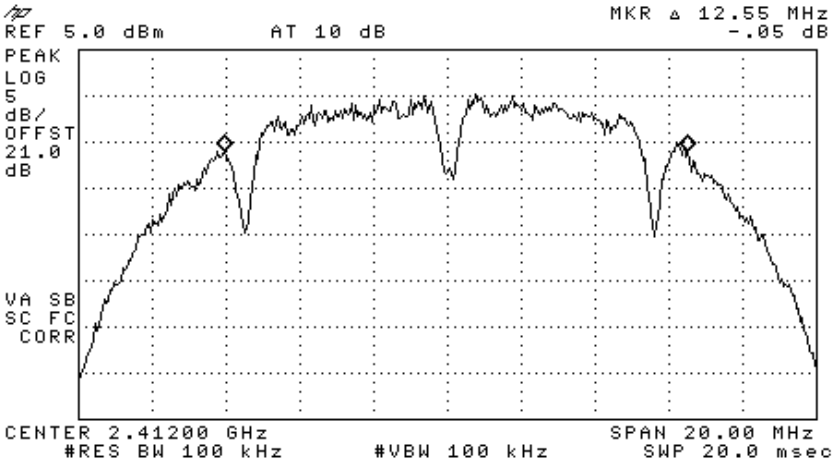


Figure 296 —2412 MHz CCK

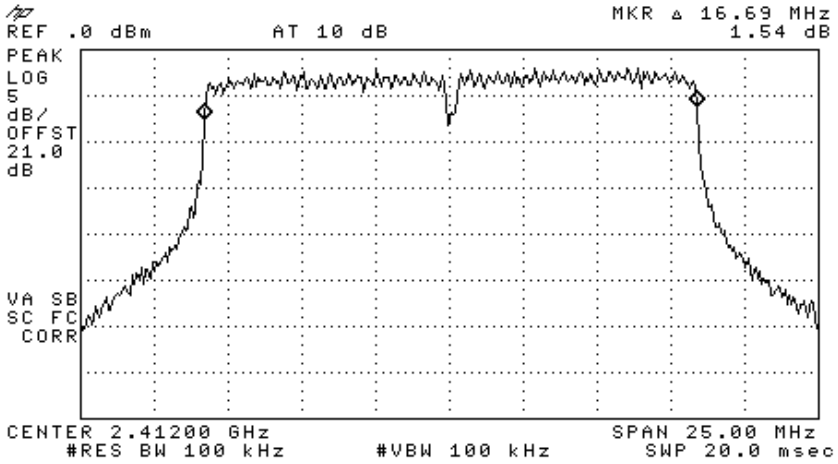


Figure 297 —2412 MHz 64QAM

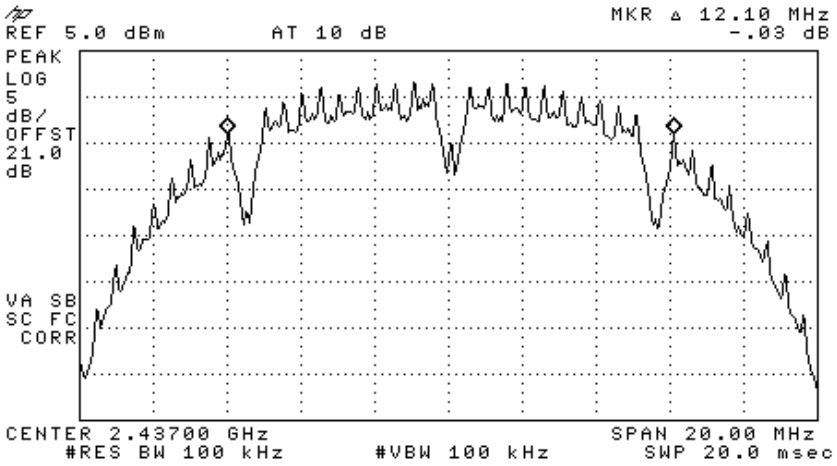


Figure 298 —2437 MHz DBPSK

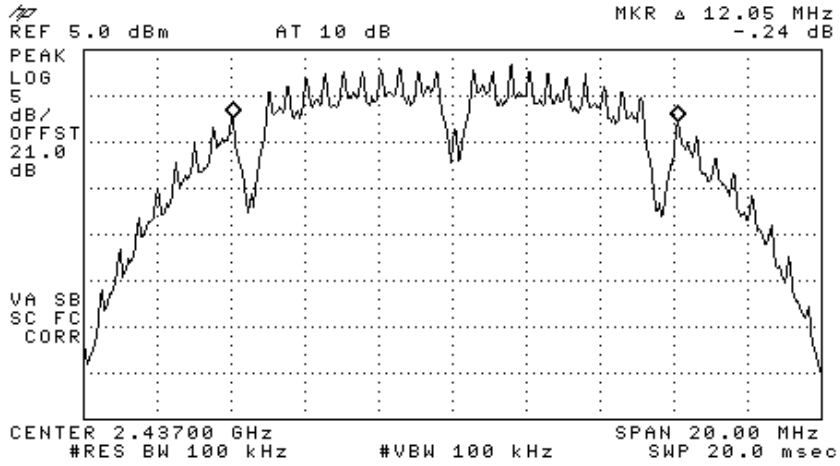


Figure 299 —2437 MHz BPSK

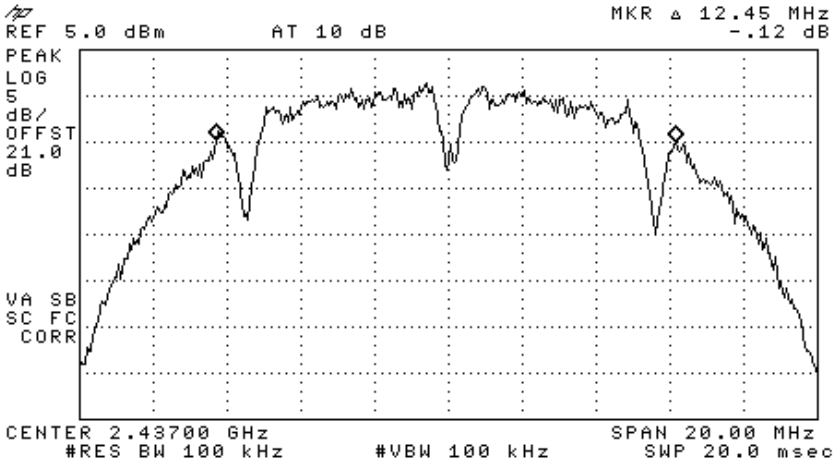


Figure 300 —2437 MHz CCK

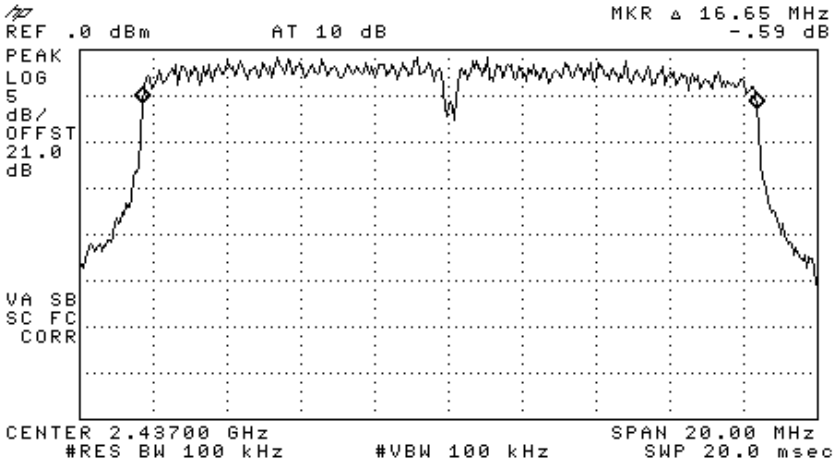


Figure 301 —2437 MHz 64QAM

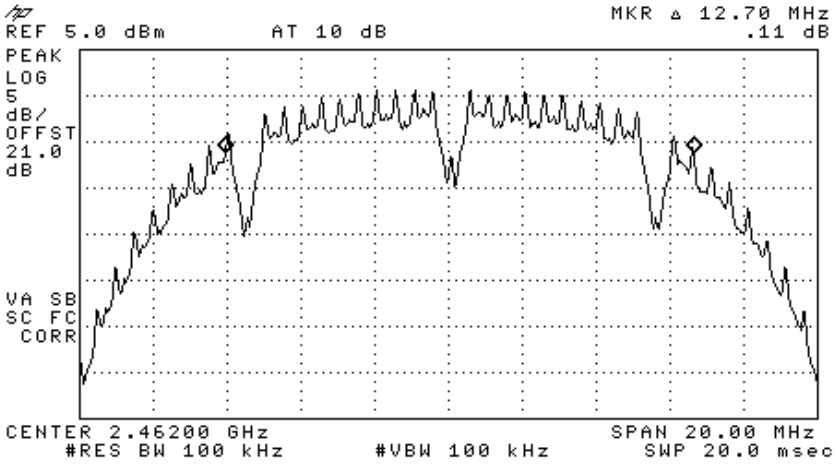


Figure 302 —2462 MHz DBPSK

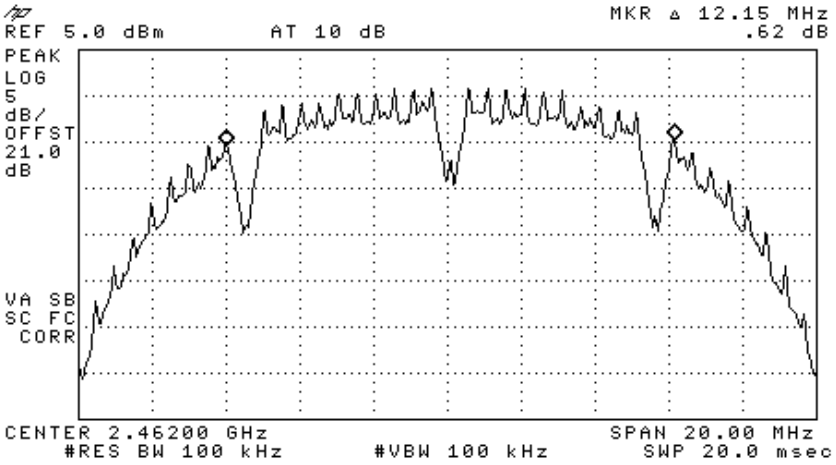


Figure 303 —2462 MHz BPSK

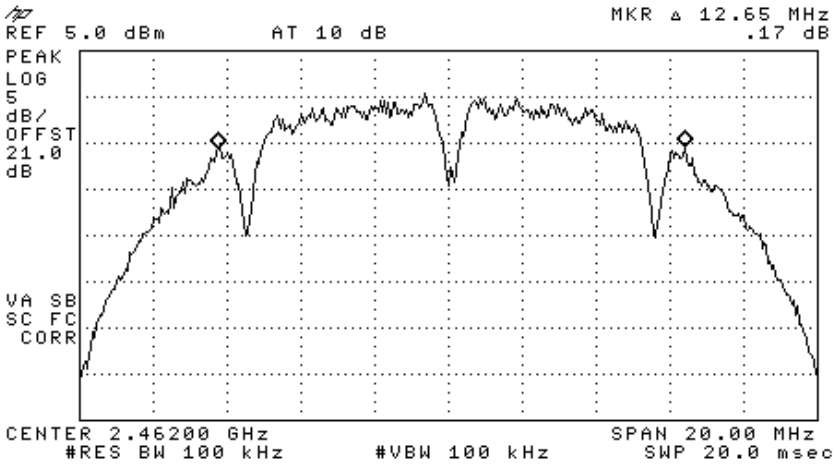


Figure 304 —2642 MHz CCK

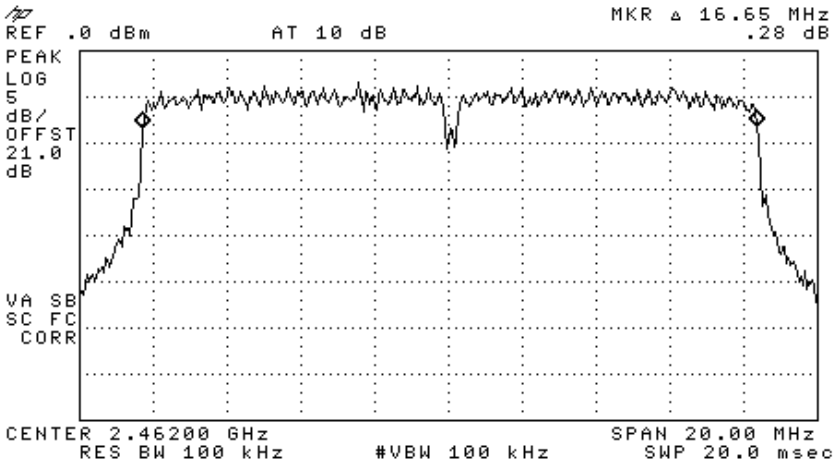


Figure 305 —2462 MHz 64QAM

20.2 Results table

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Modulation	Reading (MHz)	Specification (MHz)
2412	DBPSK	12.65	0.5
	BPSK	12.15	0.5
	CCK	12.55	0.5
	64QAM	16.69	0.5
2437	DBPSK	12.10	0.5
	BPSK	12.05	0.5
	CCK	12.45	0.5
	64QAM	16.65	0.5
2462	DBPSK	12.70	0.5
	BPSK	12.15	0.5
	CCK	12.65	0.5
	64QAM	16.65	0.5

Figure 306 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

20.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 307 Test Equipment Used

21. Band Edge Spectrum 2.4GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

[In Accordance with section 15.247(c)]

21.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2412 MHz, and 2462 MHz correspondingly.

The E.U.T. was tested using the following modulations: DBPSK (1Mbit/sec), BPSK (6Mbit/sec), CCK (11Mbit/sec) and 64QAM (54Mbit/sec).

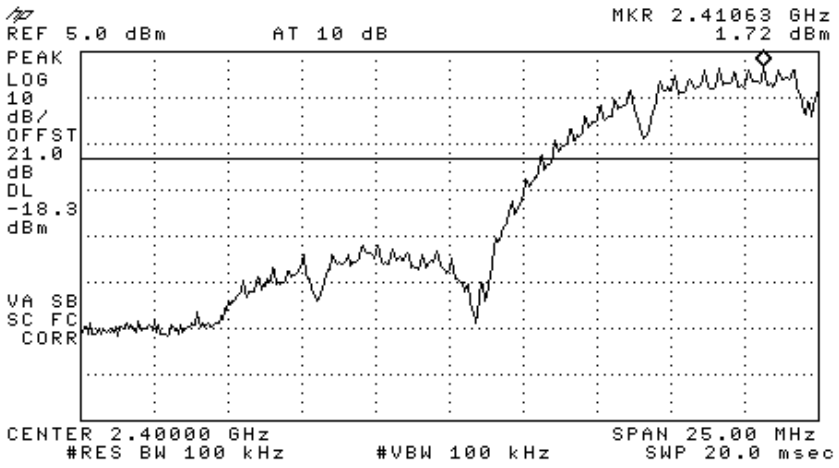


Figure 308 —2412 MHz DBPSK

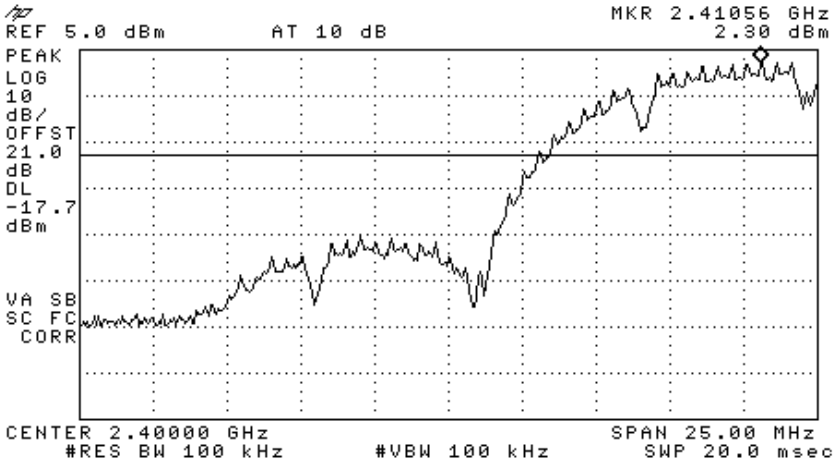


Figure 309 —2412 MHz BPSK

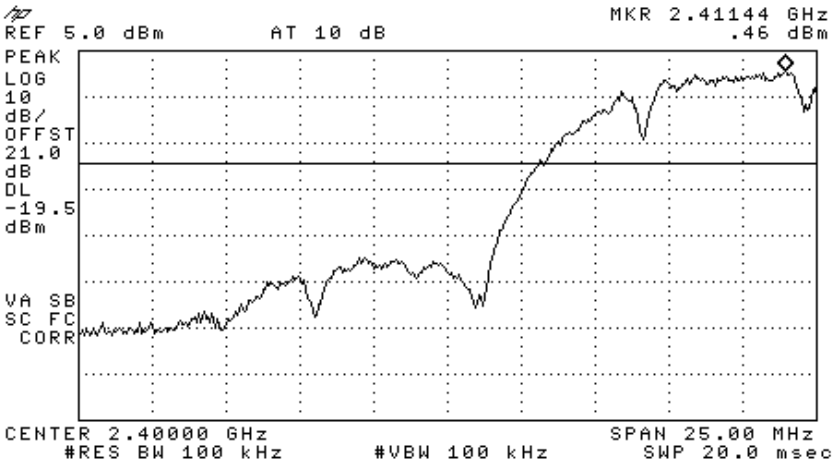


Figure 310 —2412 MHz CCK

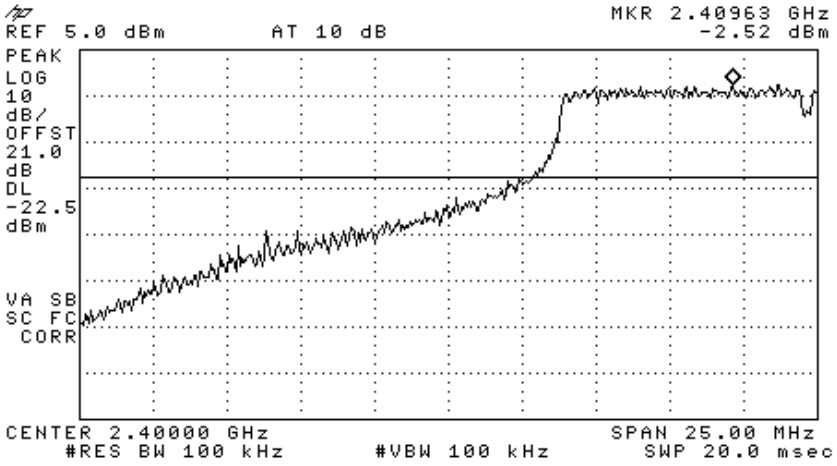


Figure 311 —2412 MHz 64QAM

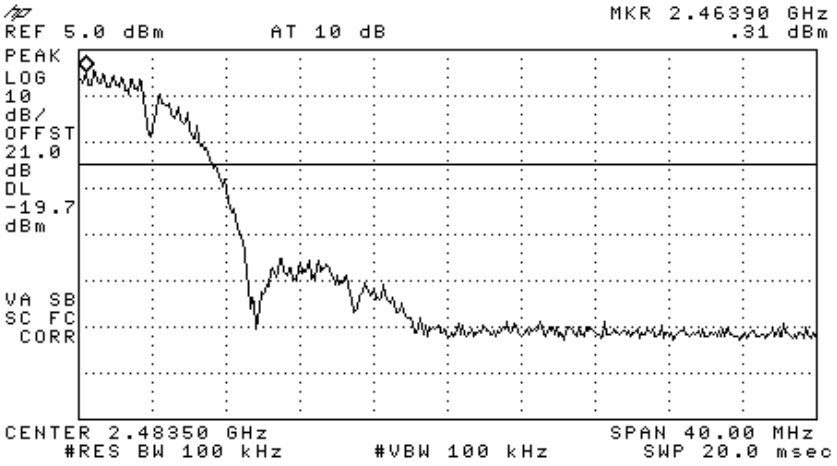


Figure 312 —2462 MHz DBPSK

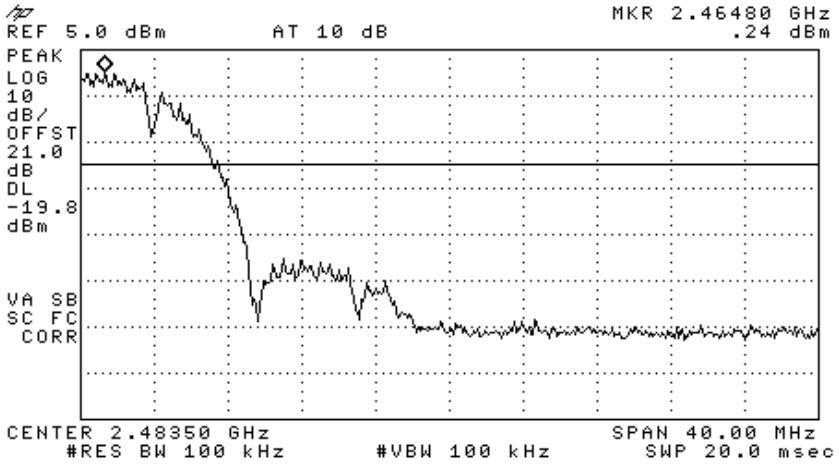


Figure 313 —2462 MHz BPSK

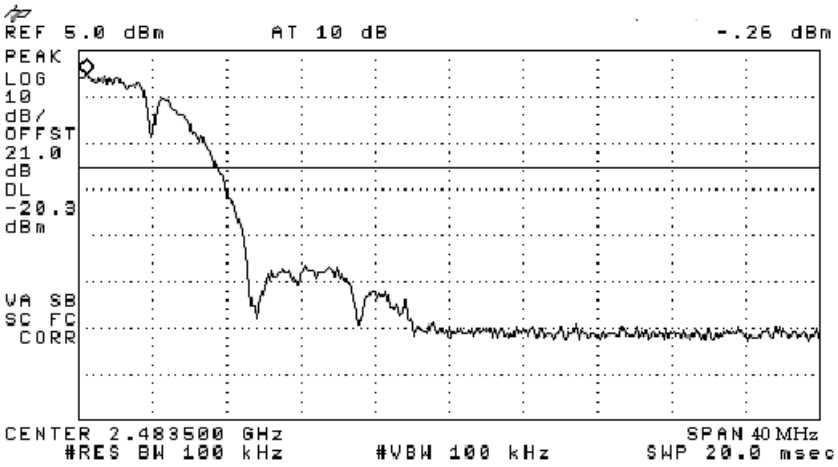


Figure 314 —2462 MHz CCK

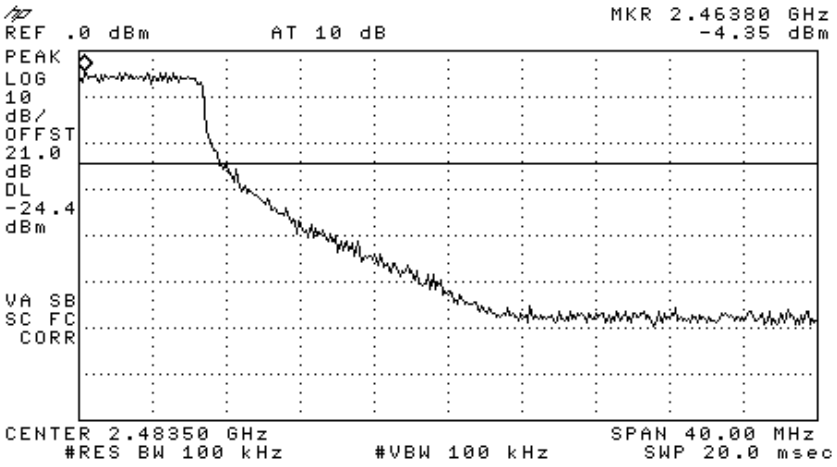


Figure 315 —2462 MHz 64QAM

21.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBc)	Specification (dBc)	Margin (dB)
2412	DBPSK	2410	40.0	20.0	-20.0
	BPSK	2409.4	37.0	20.0	-17.0
	CCK	2409.7	40.0	20.0	-20.0
	64QAM	2400	26.0	20.0	-16.0
2642	DBPSK	2483.5	56.0	20.0	-36.0
	BPSK	2483.5	56.0	20.0	-36.0
	CCK	2483.6	56.0	20.0	-36.0
	64QAM	2483.5	48.0	20.0	-28.0

Figure 316 Band Edge Spectrum

JUDGEMENT: Passed by 17.0 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

21.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 317 Test Equipment Used

22. Transmitted Power Density 2.4GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

[In accordance with section 15.247(d)]

22.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 3 kHz resolution BW. and sweep time of 1 second for each 3 kHz “window”. The spectrum peaks were located at each of the 3 operating frequencies.

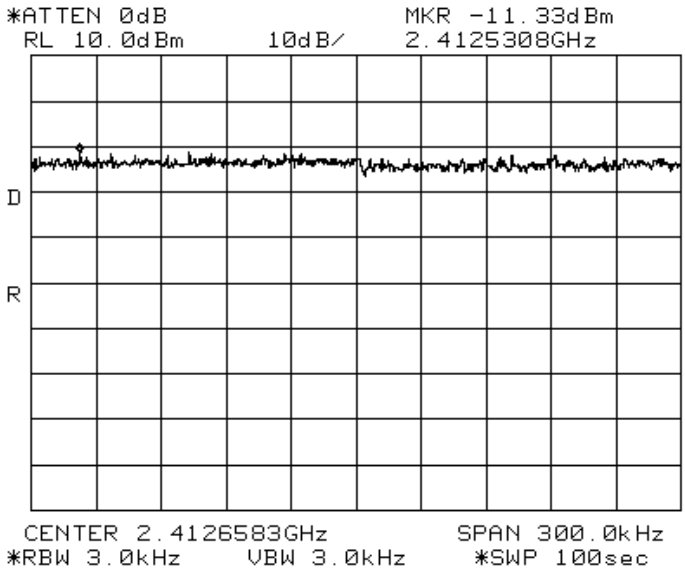


Figure 318 —2412 MHz DBPSK

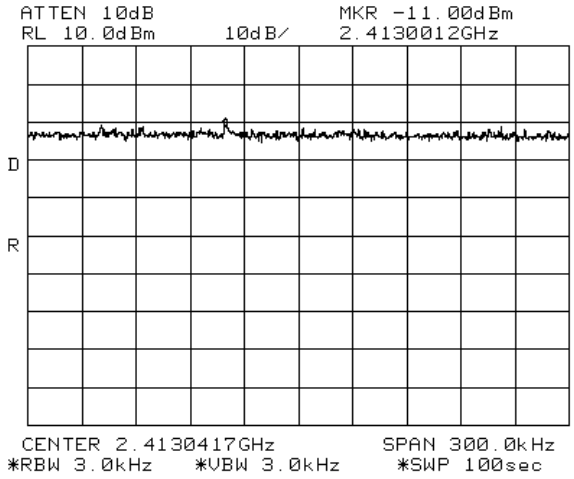


Figure 319 —2412 MHz BPSK

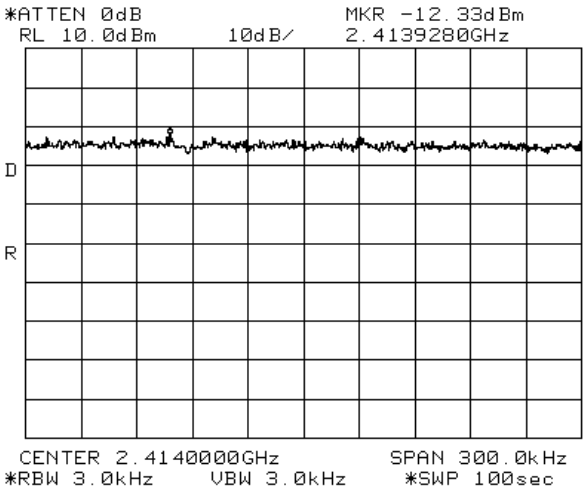


Figure 320 —2412 MHz CCK

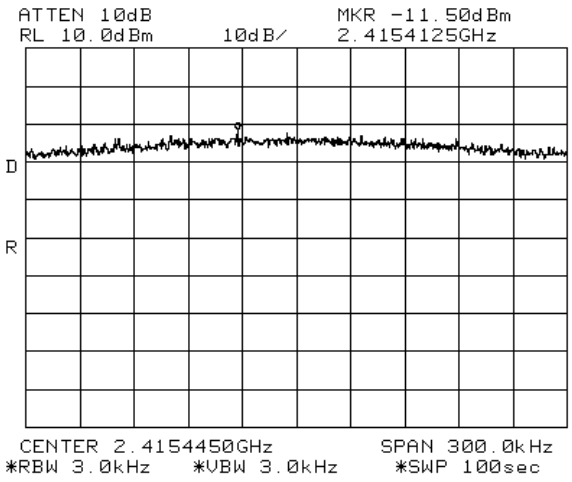


Figure 321 —2412 MHz 64QAM

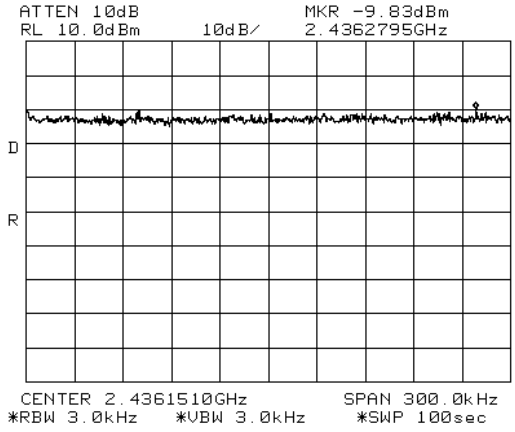


Figure 322 —2437 MHz DBPSK

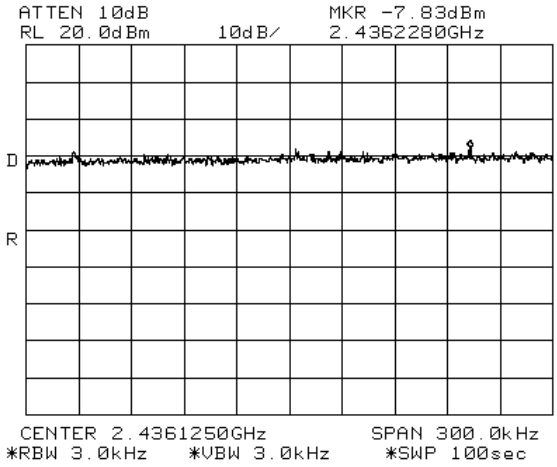


Figure 323 —2437 MHz BPSK

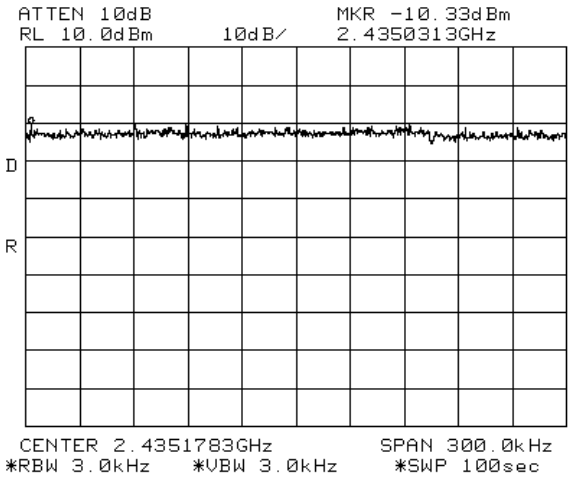


Figure 324 —2437 MHz CCK

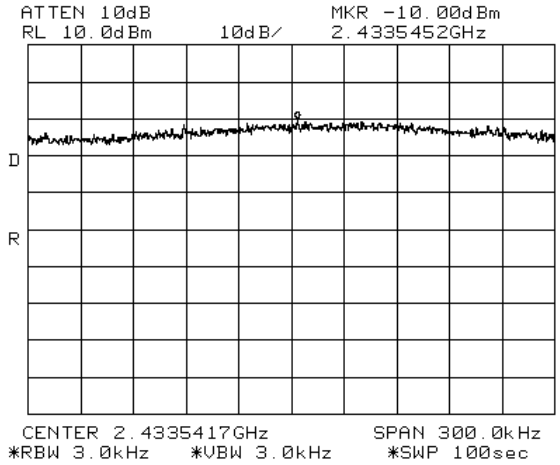


Figure 325 —2437 MHz 64QAM

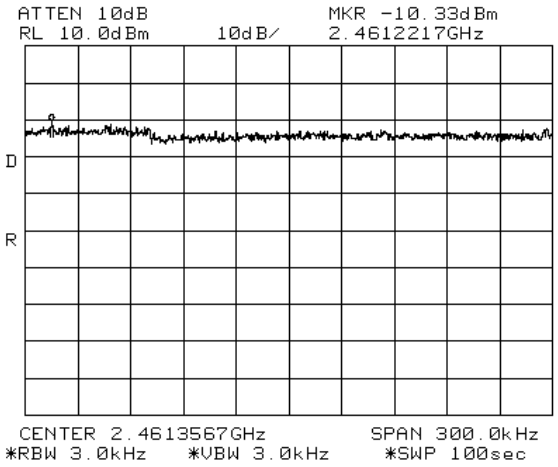


Figure 326 —2462 MHz DBPSK

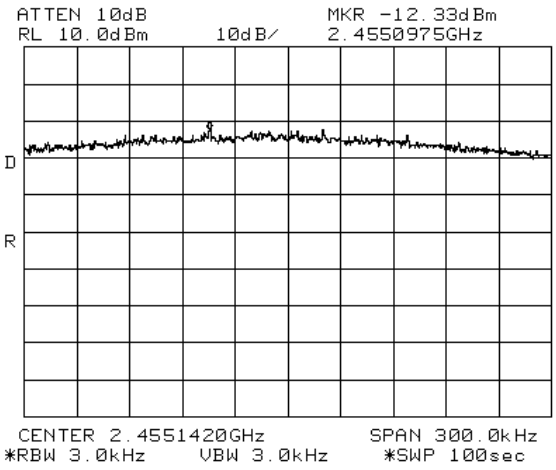


Figure 327 —2462 MHz BPSK

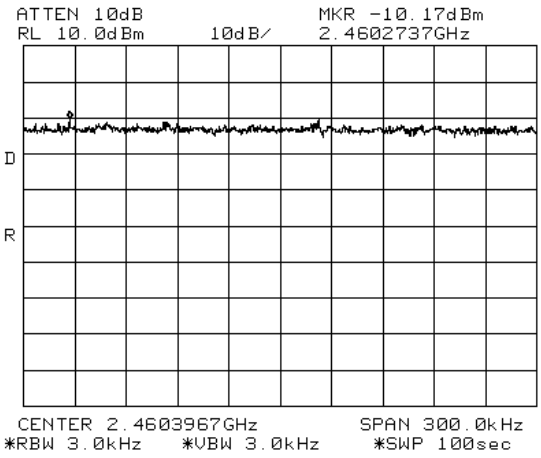


Figure 328 —2462 MHz CCK

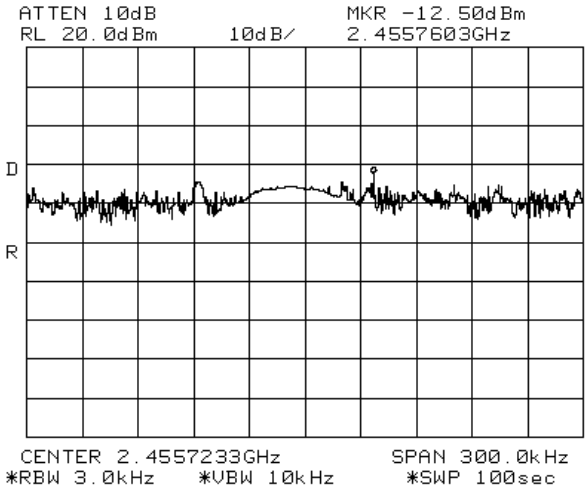


Figure 329 —2462 MHz 64QAM

22.2 Results table

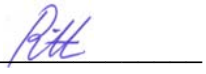
E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Model No.: 860M With WCE
Serial Number: 1. 860M: 73903D
2. WCE: 739038
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
2412	DBPSK	-11.33	8.0	-19.33
2412	BPSK	-11.00	8.0	-19.00
2412	CCK	-12.33	8.0	-20.33
2412	64QAM	-11.50	8.0	-19.50
2437	DBPSK	-9.83	8.0	-17.83
2437	BPSK	-7.83	8.0	-15.83
2437	CCK	-10.33	8.0	-18.33
2437	64QAM	-10.00	8.0	-18.00
2462	DBPSK	-10.33	8.0	-18.33
2462	BPSK	-12.33	8.0	-20.33
2462	CCK	-10.17	8.0	-19.71
2462	64QAM	-12.50	8.0	-20.50

Figure 330 Test Results

JUDGEMENT: Passed by 15.83 dB

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: E. Pitt

22.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 331 Test Equipment Used

23. Antenna Gain 2.4GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

The antenna gain is 7 dBi.

24. R.F Exposure/Safety 2.4GHz Transmitter 802.11b/g + 802.11a + CELL + PCS Signals

Typical use of the E.U.T. is repeating WiFi signals for DAS. The typical placement of the E.U.T. is on a wall near the ceiling. The typical distance between the E.U.T. and the user in the worst case application, is >1 m.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(f) FCC limits at 2437 MHz is: $1\frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(g) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power 154.9 mw (Peak) = 21.9 dBm

G_T- Antenna Gain, 7 dBi = 5

R- Distance from Transmitter using 1 m worst case

(h) The peak power density is :

$$S_p = \frac{154.9 \times 5}{4\pi(100)^2} = 6.2 \times 10^{-3} \frac{mW}{cm^2}$$

(i) The duty cycle of transmission in actual worst case is 50%.

The average power source is:

$77.45mW$

(j) The averaged power density of the E.U.T. is:

$$S_{AV} = 3.1 \times 10^{-3} \frac{mW}{cm^2}$$

(f) This is 3 orders of magnitude below the FCC limit.

25. Radiated Emission Per FCC Part 15 Sub-Part B Test Data 802.11b/g + 802.11a + CELL + PCS Signals

25.1 Test Specification

30-25000 MHz, FCC Part 15, Subpart B, CLASS B

25.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 4.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The frequency range 30-25000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 2.9 - 25 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The emissions were measured at a distance of 3 meters.
The E.U.T. was tested in both Rx and Tx modes.
The E.U.T. was tested at the operating frequencies of 2412, 2437, and 2462 MHz using the following modulations: DBPSK, BPSK, CCK, and 64QAM.

25.3 Test Data

JUDGEMENT: Passed by 1.5 dB.

The margin between the emission level and the specification limit is 1.5 dB in the worst case at the frequency of 250.03 MHz, vertical polarization.

The signals in the band 1.0 – 25.0 GHz were more than 20 dB below the specification limit.

The EUT met the requirements of the F.C.C. Part 15, Subpart B, specification.

The results for all three operating frequencies and modulations were the same.

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	66.823250	36.2	34.2	-5.8			10.2
2	79.993600	31.1	26.4	-13.6			10.5
3	175.032600	35.0	25.8	-17.7			15.9
4	250.031550	47.8	44.5	-1.5			20.9
5	267.263050	42.8	38.7	-7.3			21.7

Figure 332. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

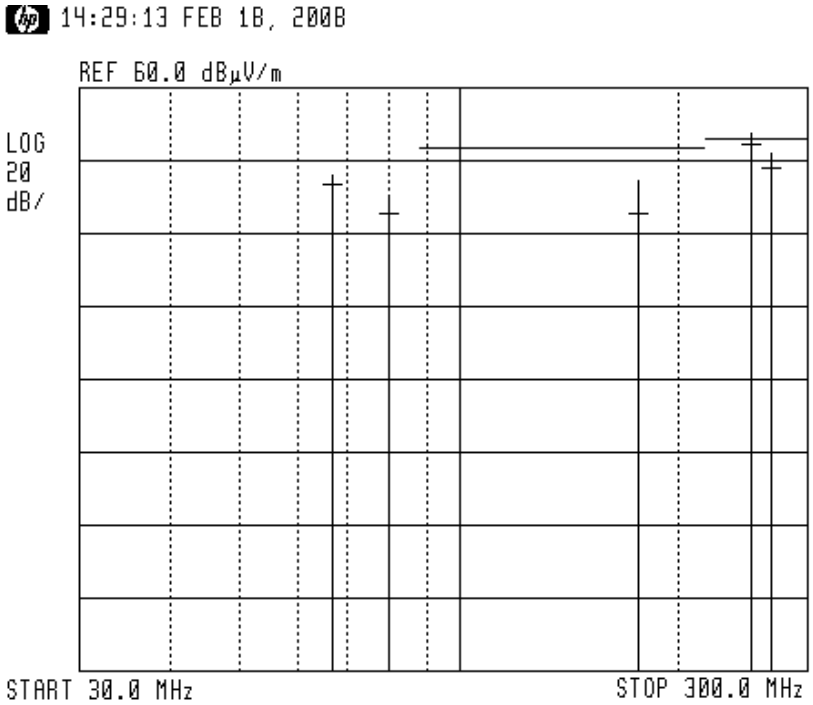


Figure 333. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	47.7	44.0	-2.0			19.6
2	500.037500	47.9	40.4	-5.6			21.0
3	625.067500	40.7	36.6	-9.4			24.7
4	700.000000	38.3	35.0	-11.0			25.3
5	750.062500	41.2	37.1	-8.9			25.8
6	960.000000	39.6	34.2	-19.8			29.5

Figure 334. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

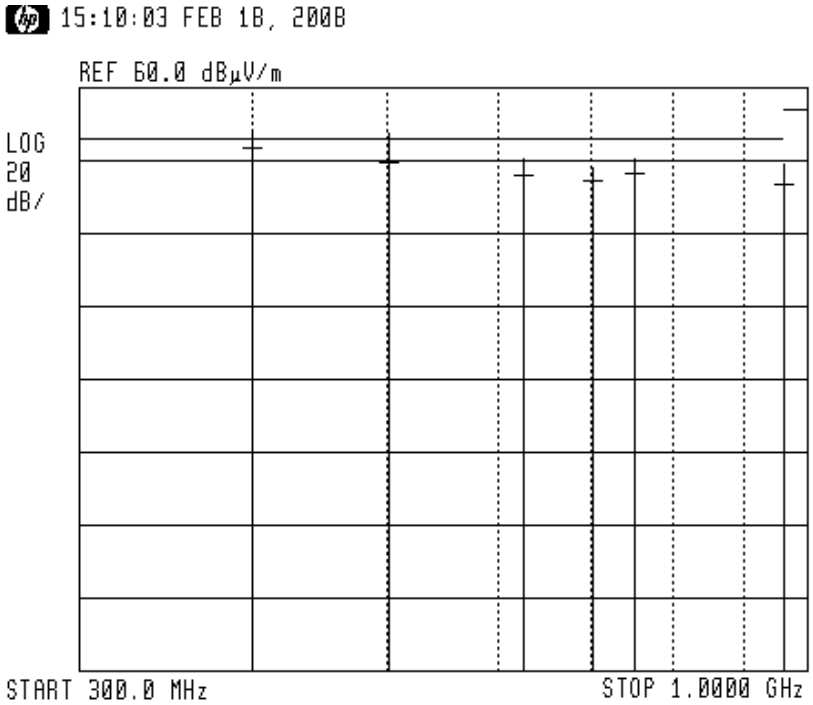


Figure 335. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	47.768400	28.2	21.0	-19.0			12.0
2	66.823250	38.8	36.4	-3.6			10.2
3	175.032600	32.0	25.6	-17.9			15.9
4	250.031550	43.9	40.6	-5.4			20.9
5	267.263050	37.9	34.4	-11.6			21.7

Figure 336. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 300 MHz
Detectors: Peak, Quasi-peak

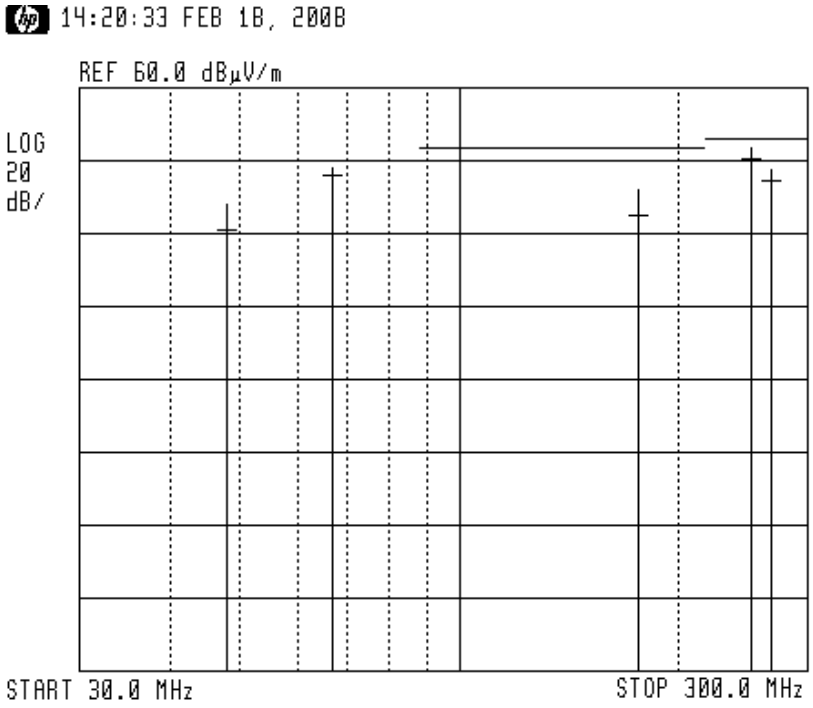


Figure 337. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

Signal Number	Frequency (MHz)	Peak dBuV/m	QP dBuV/m	QP Delta L 1 (dB)	Avg dBuV/m	Av Delta L 2 (dB)	Corr (dB)
1	400.000000	43.0	40.8	-5.2			19.6
2	500.037500	43.6	40.1	-5.9			21.0
3	625.050000	45.3	34.1	-11.9			24.7
4	700.000000	39.7	37.1	-8.9			25.3
5	701.612500	36.1	32.4	-13.6			25.3
6	750.000000	36.5	31.5	-14.5			25.8

Figure 338. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With Four Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 300 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

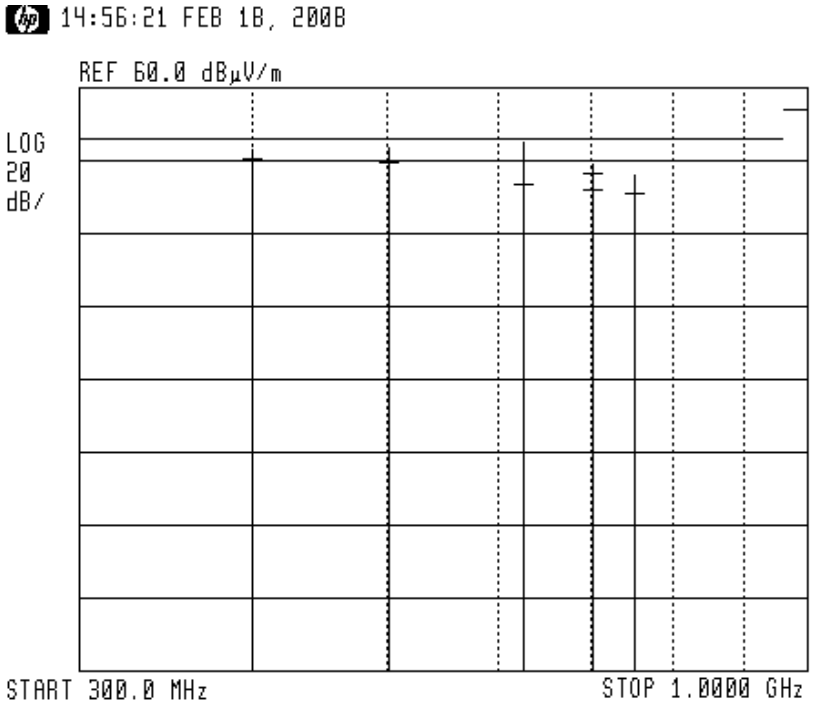


Figure 339. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

Note:

1. *Horizontal axis shows logarithmic frequency scale.*
2. *The vertical axis shows amplitude (in dB µV/m).*
3. *Peak detection is designated by the top of each vertical line.*
4. *Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.*

25.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1Year
RF Filter Section	HP	85420E	3705A00248	November 12, 2007	1Year
Antenna Biconical	ARA	BCD 235/B	1041	March 22, 2007	1Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	February 4, 2007	2 Years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 Years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 Years
Horn Antenna	Narda	V637	0410	December 8, 2006	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2007	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2008	1 Year
Low Noise Amplifier	MK Milliwave	MKT6-3000 4000-30-13P	399	January 9, 2008	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 Year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

25.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

26. Intermodulation Tests

26.1 Test procedure

An access point having maximum RF output power was used for this test.

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable
(cable loss = 3.5 dB). The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9.0-150.0 kHz, 10kHz for the frequency range 10kHz–10.0MHz, 100kHz for the frequency range 10.0MHz-2.4385GHz, and 1MHz for the frequency range 2.4385-25.0GHz.

4 input signals were sent simultaneously to the E.U.T. as follows:

802.11b/g: in the frequency range 2400-2483 MHz, 2412MHz 64QAM

802.11a: in the frequency range 5150-5250 MHz, 5180MHz BPSK

CELL: in the frequency range 869-894 MHz, 890MHz FM dev. 100kHz

PCS: in the frequency range 1930-1990 MHz, 1985MHz CDMA

The frequency range of 9kHz – 40.0GHz was scanned for unwanted signals.

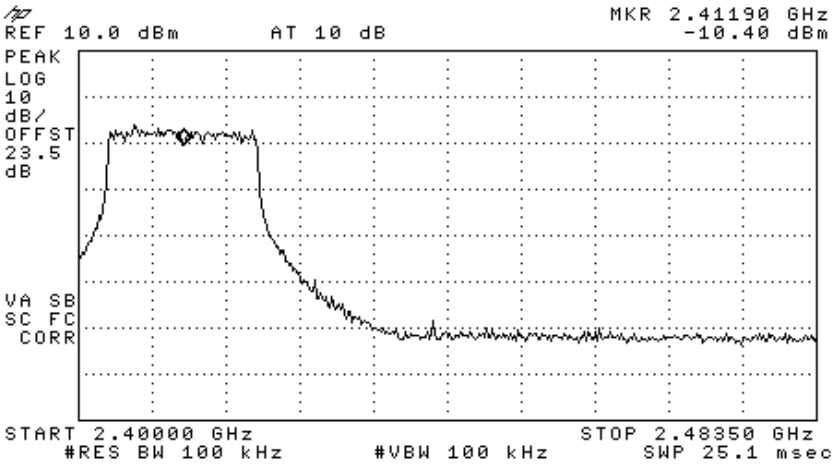


Figure 340 —2412MHz 64QAM

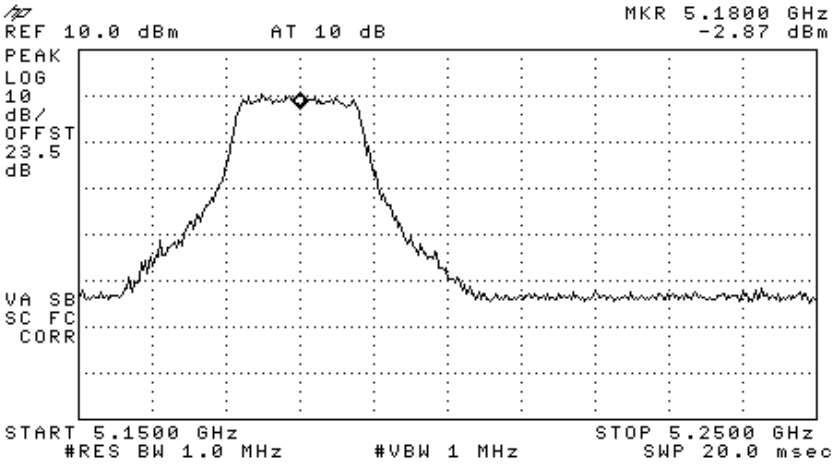


Figure 341 —5180MHz BPSK

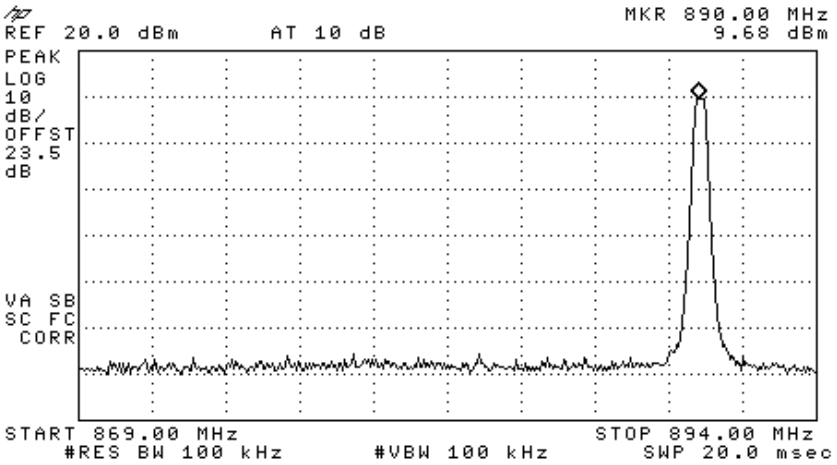


Figure 342 —890MHz FM

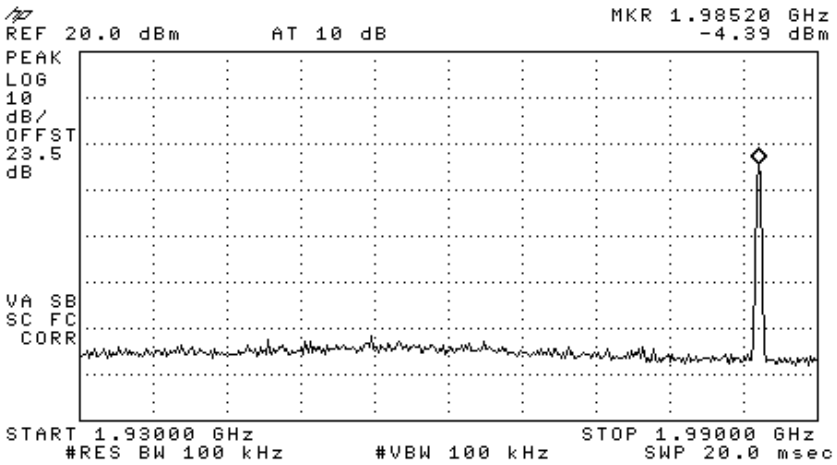


Figure 343 —1985MHz CDMA

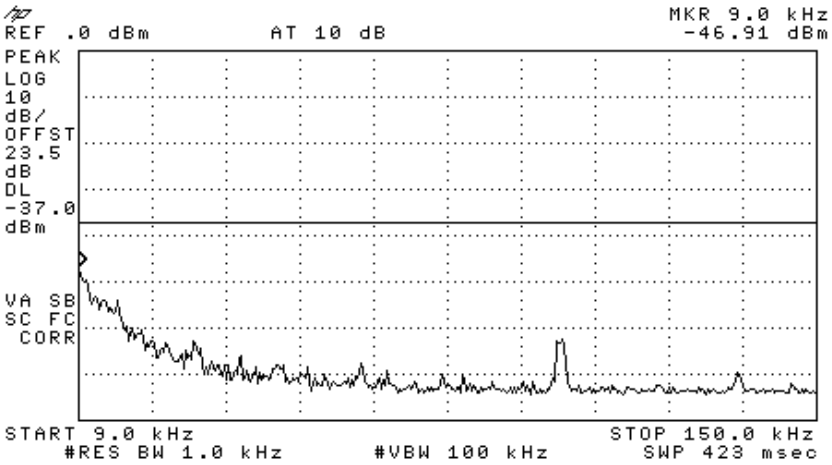


Figure 344

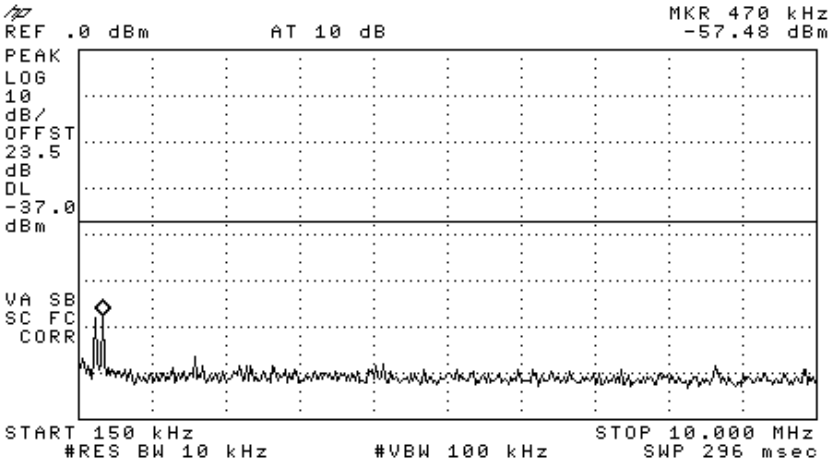


Figure 345

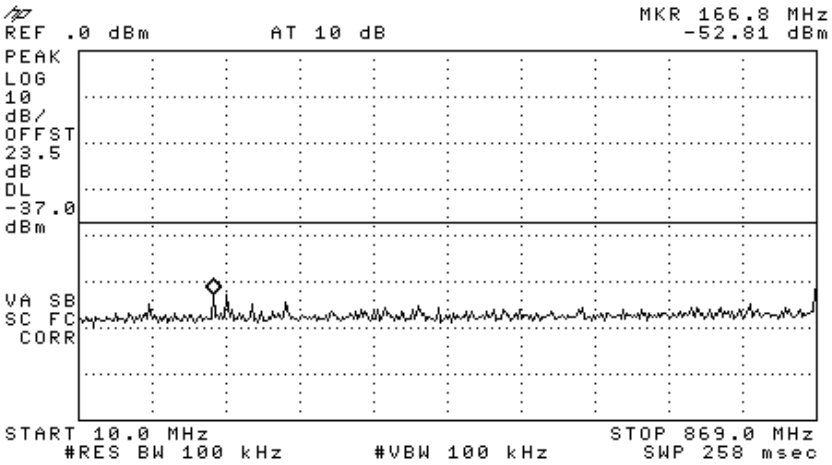


Figure 346

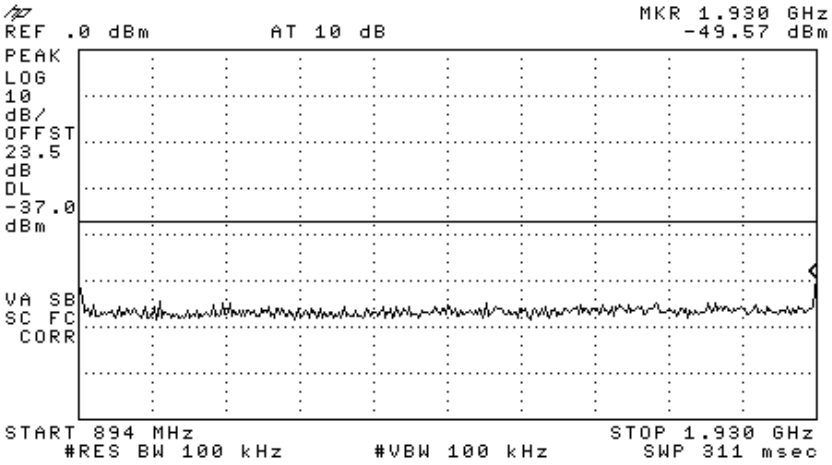


Figure 347

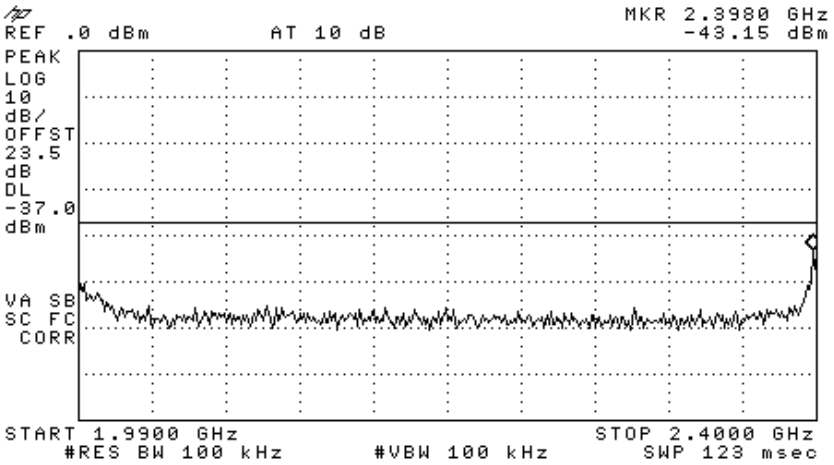


Figure 348

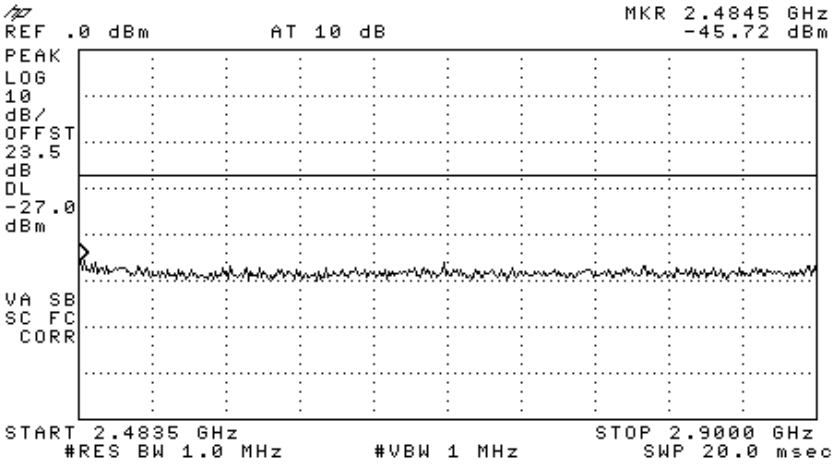


Figure 349

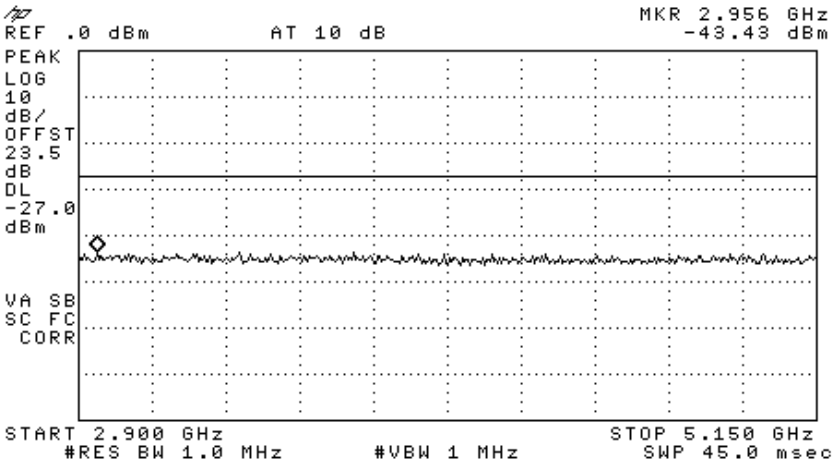


Figure 350

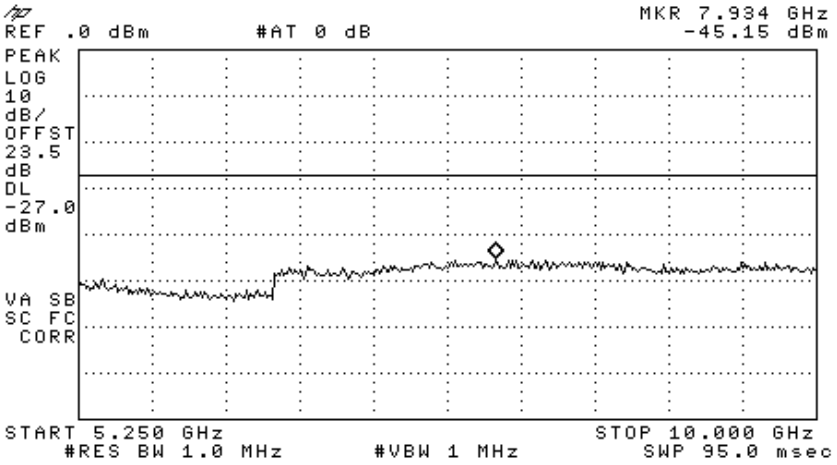


Figure 351

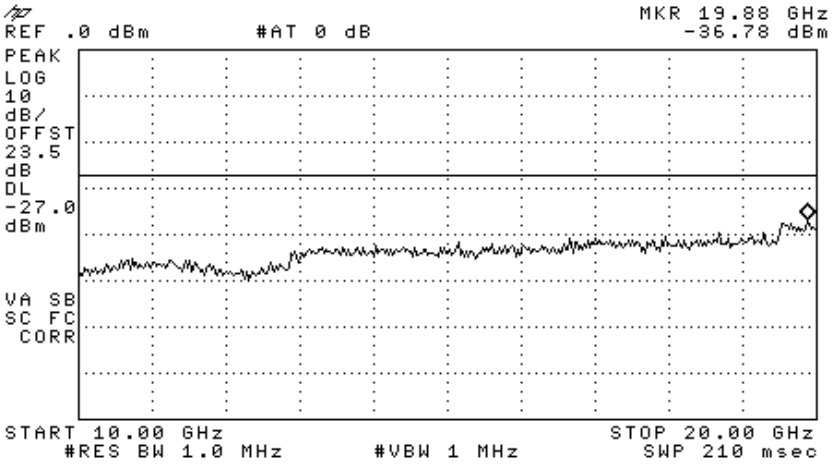


Figure 352

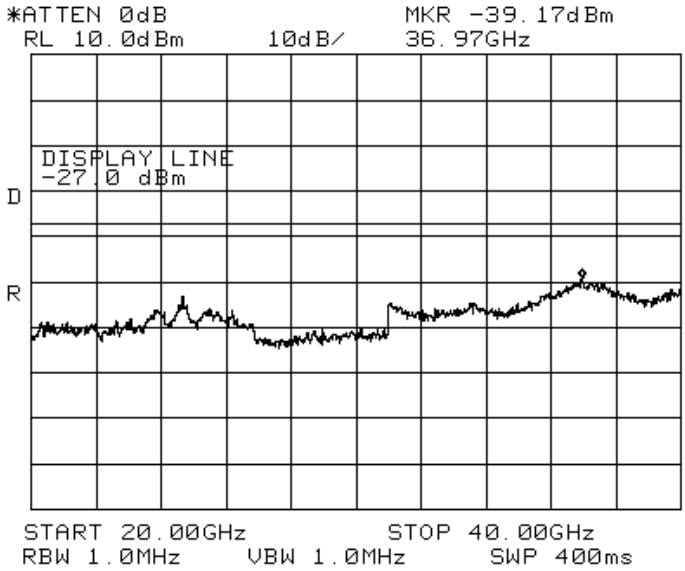


Figure 353

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 21.02.08

Typed/Printed Name: E. Pitt

26.2 Test Equipment Used.

Intermodulation

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Spectrum Analyzer	HP	8564E	3442A00275	November 26, 2006	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-1501-1000	A1675	February 8, 2008	1 year

Figure 354 Test Equipment Used

27. APPENDIX A - CORRECTION FACTORS

27.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.6
30.0	0.8
40.0	0.9
50.0	1.1
60.0	1.2
70.0	1.3
80.0	1.4
90.0	1.6
100.0	1.7
150.0	2.0
200.0	2.3
250.0	2.7
300.0	3.1
350.0	3.4
400.0	3.7
450.0	4.0
500.0	4.3
600.0	4.7
700.0	5.3
800.0	5.9
900.0	6.3
1000.0	6.7

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	7.3
1400.0	7.8
1600.0	8.4
1800.0	9.1
2000.0	9.9
2300.0	11.2
2600.0	12.2
2900.0	13.0

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 27 meters.

3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

27.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

27.3 Correction factors for CABLE

from spectrum analyzer to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

27.4 Correction factors for CABLE

from EMI receiver to test antenna at 10 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.8
30.0	0.9
40.0	1.2
50.0	1.4
60.0	1.6
70.0	1.8
80.0	1.9
90.0	2.0
100.0	2.1
150.0	2.6
200.0	3.2
250.0	3.8
300.0	4.2
350.0	4.6
400.0	5.1
450.0	5.3
500.0	5.6
600.0	6.3
700.0	7.0
800.0	7.6
900.0	8.0
1000.0	8.7

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	9.8
1400.0	10.0
1600.0	11.3
1800.0	12.2
2000.0	13.1
2300.0	14.5
2600.0	15.9
2900.0	16.4

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 34 meters.

3. The above data is located in file 34M10MO.CBL on the disk marked "Radiated Emissions Tests EMI Receiver".

12.6 Correction factors for LOG PERIODIC ANTENNA

Type LPD 2010/A
at 3 and 10 meter ranges.

Distance of 3 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	12.5
400.0	15.4
500.0	16.1
600.0	19.2
700.0	19.4
800.0	19.9
900.0	21.2
1000.0	23.5

Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.8
400.0	15.3
500.0	15.6
600.0	18.7
700.0	19.1
800.0	20.2
900.0	21.1
1000.0	23.2

NOTES:

1. *Antenna serial number is 1038.*
2. *The above lists are located in file number 38M3O.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.*
3. *The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".*

27.5 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

NOTES:

1. *Antenna serial number is 253.*
2. *The above lists are located in file number SAS3M0.ANT for a 3 meter range.*
3. *The files mentioned above are located on the disk marked "Antenna Factors".*

27.6 Correction factors for BICONICAL ANTENNA

Type BCD-235/B, at 3 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	19.4
30.0	14.8
40.0	11.9
50.0	10.2
60.0	9.1
70.0	8.5
80.0	8.9
90.0	9.6
100.0	10.3
110.0	11.0
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13.0
180.0	13.5
190.0	14.0
200.0	14.8
210.0	15.3
220.0	15.8
230.0	16.2
240.0	16.6
250.0	17.6
260.0	18.2
270.0	18.4
280.0	18.7
290.0	19.2
300.0	19.9
310	20.7
320	21.9
330	23.4
340	25.1
350	27.0

NOTES:

1. Antenna serial number is 1041.

2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

27.7 Correction factors for BICONICAL ANTENNA

Type BCD-235/B, 10 meter range

FREQUENCY (MHz)	AFE (dB/m)
30.0	12.1
40.0	10.6
50.0	10.6
60.0	8.9
70.0	8.5
80.0	9.6
90.0	9.4
100.0	9.6
110.0	10.3
120.0	10.7
130.0	12.6
140.0	12.7
150.0	12.7
160.0	13.8
170.0	13.7
180.0	14.9
190.0	13.4
200.0	13.1
210.0	14.0
220.0	14.5
230.0	15.8
240.0	16.0
250.0	16.6
260.0	16.7
270.0	18.3
280.0	18.5
290.0	19.3
300.0	20.9

NOTES:

1. *Antenna serial number is 1041.*
2. *The above list is located in file 41BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".*

27.8 Correction factors for Double-Ridged Waveguide Horn

Model: 3115, S/N 29845
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

27.9 Correction factors for Horn Antenna

Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

27.10 Correction factors for Horn Antenna

Model: V637

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
26.0	43.6	14.9
27.0	43.7	15.1
28.0	43.8	15.3
29.0	43.9	15.5
30.0	43.9	15.8
31.0	44.0	16.0
32.0	44.1	16.2
33.0	44.1	16.4
34.0	44.1	16.7
35.0	44.2	16.9
36.0	44.2	17.1
37.0	44.2	17.4
38.0	44.2	17.6
39.0	44.2	17.8
40.0	44.2	18.0

27.11 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2