Israel Testing Laboratories

ACCREDITED
Cert. No. 1152.01
Electrical (EMC)

DATE: 17 January 2008

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

FCC EMC/Radio Test Report

for

GO Networks Inc.

Equipment under test:

Wireless LAN Access Point

MBW-WLP-1100F-HLS

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

GO Networks Inc.

Wireless LAN Access Point

MBW-WLP-1100F-HLS

FCC ID: T3G-WLP-1100F-HLS

04 February 2008

This report concerns: Original Grant _x_ Class II change

Class B verification ___ Class A verification_____Class I change

Equipment type: Radio 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:
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ITL (Product Testing) Ltd.
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Applicant for this device:
(different from "prepared by")
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1. General Information

1.1 Administrative Information

Manufacturer:	GO Networks Inc.
Manufacturer's Address:	1943 Landings Drive Mountain View, California 94043 USA Tel: 650-962-2000 Fax: 650-962-2010
Manufacturer's Representative:	Roi Ziv Ronen Akerman
Equipment Under Test (E.U.T):	Wireless LAN Access Point
Equipment Model No.:	MBW-WLP-1100F-HLS
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	05.12.07
Start of Test:	05.12.07
End of Test:	09.12.07
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	See Section 2

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

GO Networks Metro Broadband Wireless System

WLP 1100 Pico Cellular Mesh Wi-Fi Base Station

The WLP pico cell BST is the most cost-effective Base Station on GO Metro Broadband Wireless (MBW), delivering unmatched coverage and capacity extensions to metro Cellular Mesh Wi-Fi networks, while supporting a variety of deployment modes

THE GO MBW SYSTEM

With its Metro Broadband Wireless solution, GO Networks introduces the Cellular Wi-Fi architecture, a novel topology for metro Wi-Fi networks that builds on the strengths of existing cellular architectures, while addressing the coverage, capacity, and scalability limitations of existing metro Mesh Wi-Fi solutions.

The GO MBW solution comprises the WLS 2100 Micro Cellular Wi-Fi Sector Base Station, the WLP 1100 Pico Cellular Wi-Fi Base Station, the WMG 500 Wireless Media Gateway, and the Network Management System.

PICO CELLULAR Mesh Wi-Fi BASE-STATION

The MBW WLP complements the WLS Micro Cellular BST by delivering exceptional street-level coverage and capacity enhancements while retaining the WLS's unique performance characteristics. The WLP features GO's xRF™ smart antenna engine as well as the xCell™ suite of network and RF optimization tools and is the MBW's most cost effective weatherproofed base station.

Cellular Mesh, Wi-Fi on a Pico Scale

The WLP is the MBW's first base station to deliver omni-directional coverage on the access side, and to retain full xRF smart antenna engine functionality, enabling the WLP to overcome irregular interference and contend with challenging topographies. The WLP also fits into the MBW's Multi-Service Delivery System, featuring GO's unique local and system-wide xCell optimizations facilitating the delivery of low latency, high throughput voice, video, data, and mobility applications.

Superior Economics

The WLP Pico cell BST is the MBW's most cost effective base station. It enables carriers to extend coverage or enhance capacity in a given area, circumventing the need for additional micro cells, thus adding to the MBW's economic benefits thanks to Cellular Wi-Fi's scalable nature and GO's xRF and xCell performance enhancements. Combined with the other elements of the MBW system, the WLP enables carriers to benefit from Wi-Fi's economies of scale while reducing the metro Wi-Fi's network footprint by 50%, which results in lower upfront CAPEX and lower recurring OPEX for maintenance.

Flexible, Scalable Access and Backhaul

The WLP's attractive form factor lends itself to a wide variety of mounting options (wall, pole, streetlight), enabling carriers to optimize coverage in dense metro and low-density suburban areas.
It supports 802.11b/g for access, and a high power 802.11a channel for the wireless Mesh, as well as support for WDS and point-to-point bridging.

Other optional features include an additional 4.9GHz interface for Public Safety applications, a second Backhaul interface, several power supplies, including a photocell power tap for streetlight installations.

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 December 12, 2003).
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. Product Labeling

Figure 1. FCC Label

Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 Justification

The EUT was tested and investigated with maximum transmitted power from all antenna connectors, and antenna gain at bore-site (0 degrees steering) was taken into the calculation. Channels 1 (2.412 GHz), 6 (2.437 GHz) and 11 (2.462 GHz) were investigated. All data rates were investigated and worst-case rates were selected and plotted.

The data rates for the modulations tested were:

Modulation	Data Rate
OFDM	6 Mbps
DSSS	1 Mbps
CCK	5.5 Mbps

For the inter-modulation, tests:

All interfaces were made to transmit in maximum power at closest possible frequencies (highest frequency at the 2.4GHz interface and lowest frequency at the 5GHz interface). All possible 3rd order inter-modulattions were investigated.

3.2 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software contained a command line that gave the tester an option to select rates and frequencies he needed for the tests.

The command line controlled the software functions that are part of the original software of the unit.

3.3 Special Accessories

No special accessories were needed to achieve compliance.

3.4 Equipment Modifications

No modifications were needed to achieve compliance.

3.5 Configuration of Tested System

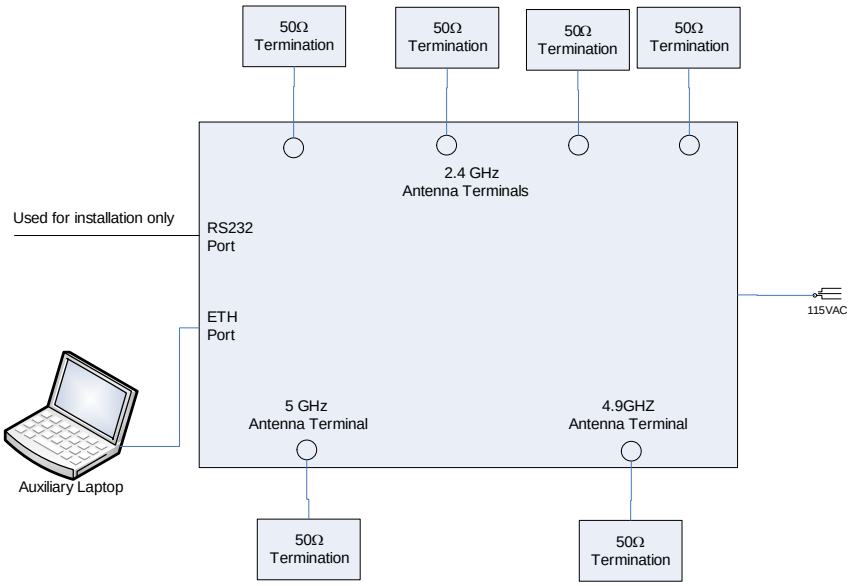

Figure 3. Configuration of Tested System

4. Conducted Emission Test Data Per FCC Sub-parts B; C

4.1 Test Specification

0.15 - 30 MHz, FCC Part 15, Subpart B, CLASS B

4.2 Test Procedure

The E.U.T operation mode and test configuration are as described in Section 4. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room (see Section 3), with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T.’s AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying to CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Data

JUDGEMENT: Passed by 14.0 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.08

Typed/Printed Name: E. Pitt

The margin between the emission levels and the specification limit is, in the worst case, 17.8 dB for the phase line at 0.89 MHz and 14.0 dB at 0.59 MHz for the neutral line.

The E.U.T met the requirements of the FCC Part 15, Subpart B, Class B specification.

The details of the highest emissions are given in Figure 4 to Figure 7.

Conducted Emission

E.U.T Description	Wireless LAN Access Point
Type	MBW-WLP-1100F-HLS
Serial Number:	Not Designated

Specification:	FCC Part 15, Subpart B, Class **B**; Sub-part C
Lead:	Phase
Detectors:	Peak, Quasi-peak, Average

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.296500	33.6	32.9	-27.5	29.5	-20.9	0.0
2	0.593700	29.5	29.0	-27.0	27.5	-18.5	0.0
3	0.890000	30.2	29.5	-26.5	28.2	-17.8	0.0
4	9.880500	40.9	36.7	-23.3	30.7	-19.3	0.0
5	12.221250	28.4	26.6	-33.4	22.4	-27.6	0.0
6	20.008500	31.9	30.2	-29.8	27.4	-22.6	0.0

Figure 4. Detectors: Peak, Quasi-peak, AVERAGE .

Note: QP Delta/Av Delta refer 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.

Conducted Emission

E.U.T Description	Wireless LAN Access Point
Type	MBW-WLP-1100F-HLS
Serial Number:	Not Designated

Specification: FCC Part 15, Subpart B, Class **B**; Sub-part C
Lead: Phase
Detectors: Peak, Quasi-peak, Average

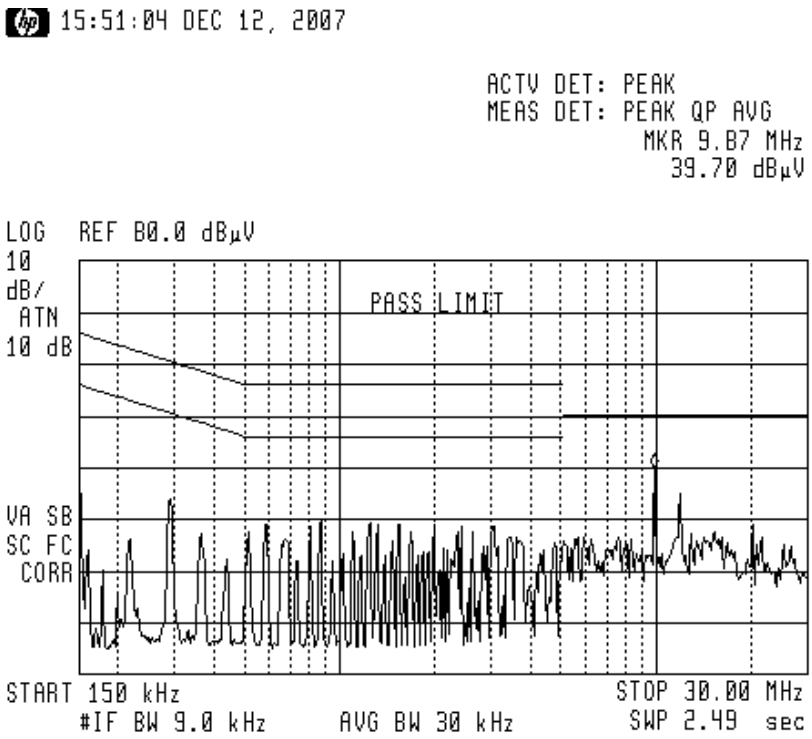

Figure 5. Detectors: Peak, Quasi-peak, Average

Notes:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV).

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.

5. Average detection is designated by the second dash mark (from the top) of each vertical line.

Conducted Emission

E.U.T Description	Wireless LAN Access Point
Type	MBW-WLP-1100F-HLS
Serial Number:	Not Designated

Specification:	FCC Part 15, Subpart B, Class **B**; Sub-part C
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.297000	32.0	31.1	-29.2	29.3	-21.0	0.0
2	0.594625	33.2	32.8	-23.2	32.0	-14.0	0.0
3	0.816025	32.8	32.3	-23.7	31.5	-14.5	0.0
4	3.715650	31.7	31.2	-24.8	29.2	-16.8	0.0
5	9.878000	36.6	32.7	-27.3	25.2	-24.8	0.0
6	20.008250	30.0	28.8	-31.2	27.3	-22.7	0.0

Figure 6. Detectors: Peak, Quasi-peak, AVERAGE

Note: QP Delta/Av Delta refer 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.

Conducted Emission

E.U.T Description	Wireless LAN Access Point
Type	MBW-WLP-1100F-HLS
Serial Number:	Not Designated

Specification: FCC Part 15, Subpart B, Class **B**; Sub-part C
Lead: Neutral
Detectors: Peak, Quasi-peak, Average

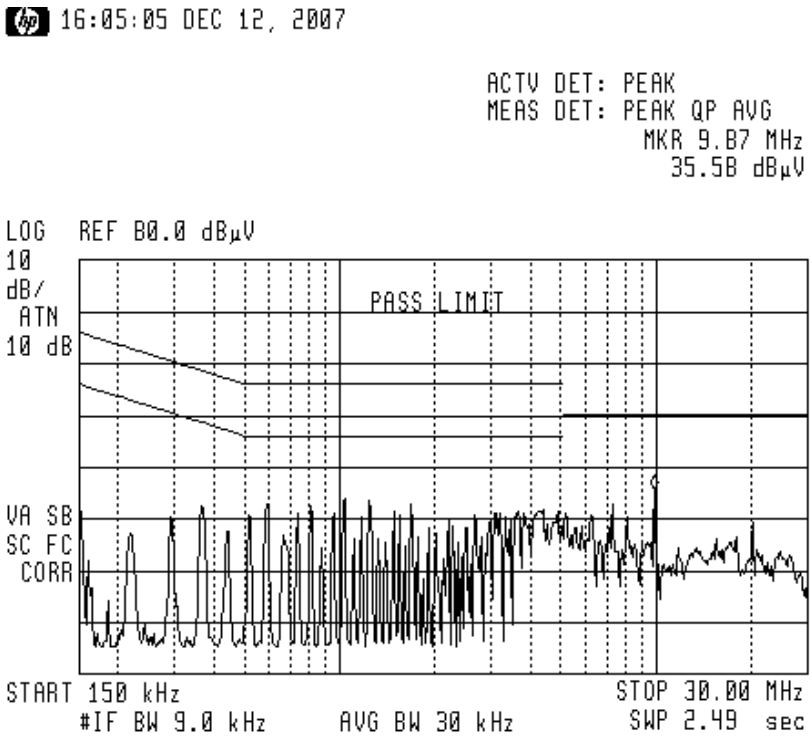

Figure 7 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

4.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
LISN	Fischer	FCC-LISN-2A	127	March 8, 2007	1 Year
LISN	Fischer	FCC-LISN-2A	128	March 8, 2007	1 Year
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1Year
RF Filter Section	HP	85420E	3705A00248	November 12, 2007	1Year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

5. Spurious Radiated Emission Below 1 GHz

5.1 Test Specification

9 kHz-1000 MHz, FCC Part 15, Subpart C; FCC Part 90

5.2 Test Procedure

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

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*.

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 levels of the emissions out of the restricted bands were compared to the limits of FCC Part 90 (-13dBm) using the substitution method.

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-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter.
In the frequency range 30-1000MHz, 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 operated in the frequencies of 2412, 2437, and 2462, 4950, 4965, and 4980, 5745, 7585, and 5825 MHz.

5.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Subpart C. FCC Part 90 specifications.

The results for all three operating frequencies were the same.

The signals in the frequency range 9 kHz – 1000 MHz were at least 20 dB below the specification limit.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.08

Typed/Printed Name: E. Pitt

5.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 year
RF Filter Section	HP	85420E	3705A00248	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

5.5 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.

6. Spurious Radiated Emission Above 1 GHz

6.1 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*.

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 levels of the emissions out of the restricted bands were compared to the limits of FCC Part 90 (-13dBm) using the substitution method.

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 operated in the frequencies of 2412, 2437, and 2462, 4950, 4965, and 4980, 5745, 7585, and 5825 MHz.

6.2 Test Data

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C; FCC Part 90 specifications.

The signals in the frequency range 1.0 – 25 GHz were at least 20 dB below the specification limit.

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.08

Typed/Printed Name: E. Pitt

6.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

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	February 8, 2007	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 Year
Spectrum Analyzer	HP	8546E	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

7. Maximum Transmitted Peak Power Output

7.1 Test procedure

The test was performed for CCK, DSSS, and OFDM modulations

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (0.5 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 operated at 2412, 2437, and 2462 MHz.

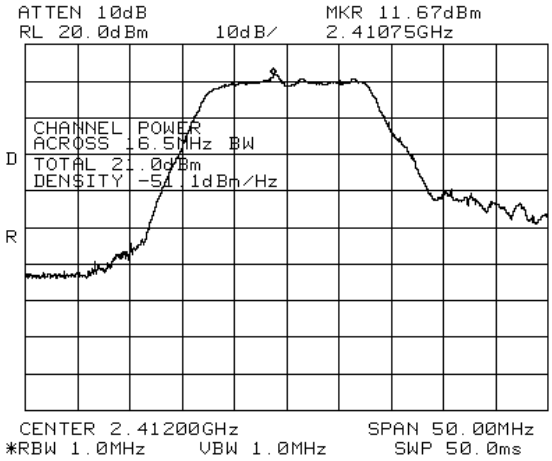

Figure 8 2412 MHz OFDM Modulation

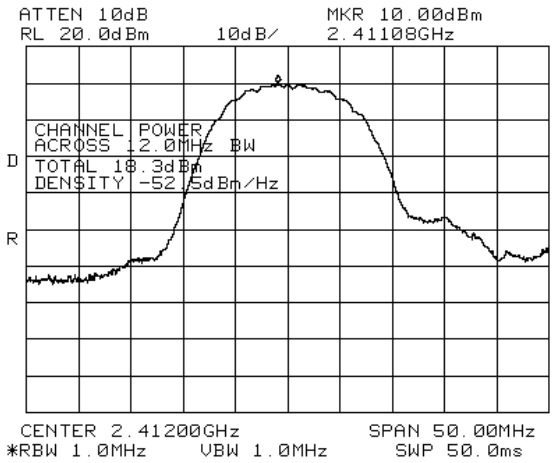

Figure 9 2412 MHz DSSS Modulation

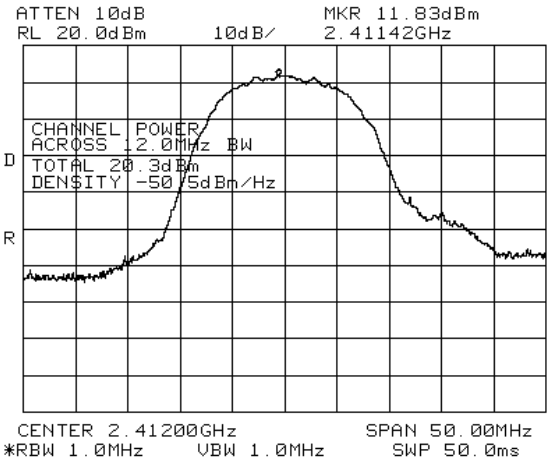

Figure 10 2412 MHz CCK Modulation

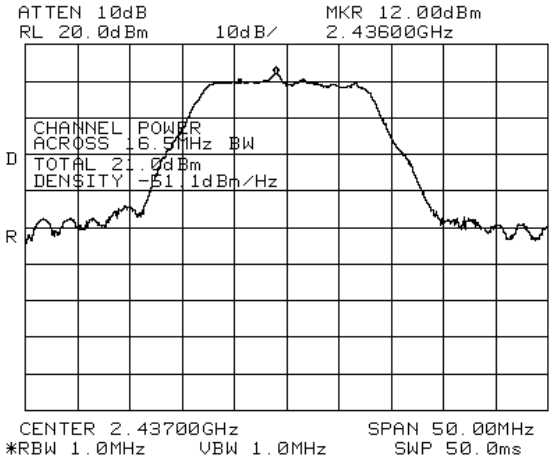

Figure 11 2437 MHz OFDM Modulation

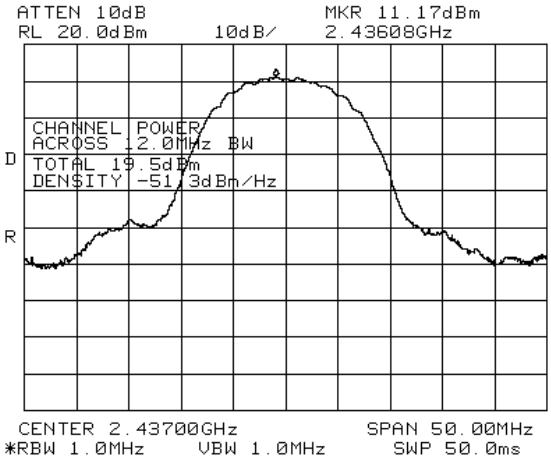

Figure 12 2437 MHz DSSS Modulation

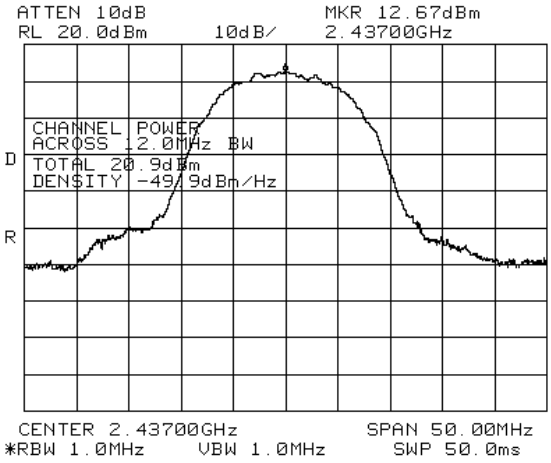

Figure 13 2437 MHz CCK Modulation

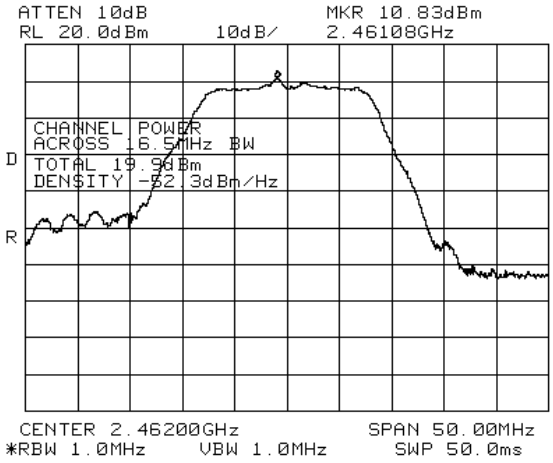

Figure 14 2462 MHz OFDM Modulation

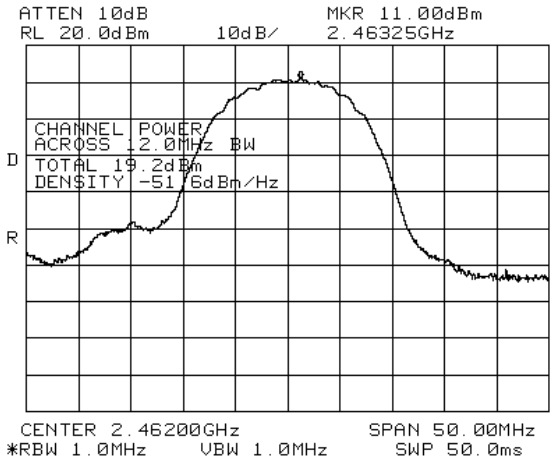

Figure 15 2462 MHz DSS Modulation

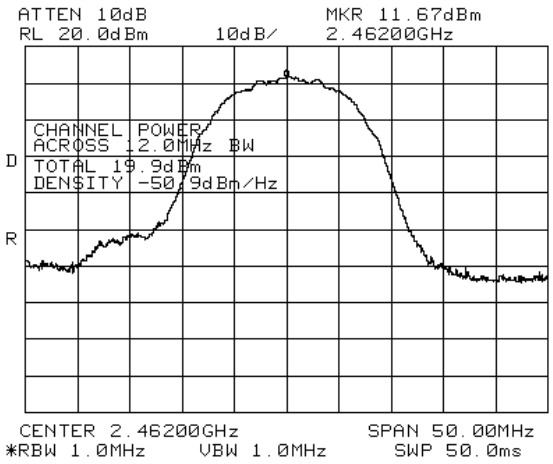

Figure 16 2462 MHz CCK Modulation

7.2 Results table

E.U.T. Description: Wireless LAN Access Point
Model No.: MBW-WLP-1100F-HLS
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Peak Power Type of Modulation CCK (dBm)	DSSS (dBm)	OFDM (dBm)	Specification (dBm)	Margin (dB)
2412.00	20.3	18.3	21.0	21.5	-3.2
2437.00	20.9	19.5	21.0	21.5	-2.0
2462.00	19.9	19.2	19.9	21.5	-2.3

Figure 17 Maximum Peak Power Output

Calculated Power Limit per Each Antenna Connector:

Gain of each antenna is 7.4 dBi.

Gain of antenna array (4 antennas) G_m = 7.4 +10 log 4 = 13.4 dBi

Total output power $P_t = 30 - \frac{13.4 - 6}{3} = 27.5 dBm$

Peak power limit per each antenna connector:

$P = P_t - 10 \log 4 = 27.5 - 6 = 21.5$ dBm

JUDGEMENT: Passed by 2 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.08

Typed/Printed Name: E. Pitt

7.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacturer	Model	Serial 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 18 Test Equipment Used

8. Peak Power Output Out of 2400-2483.5 MHz Band

8.1 Test procedure

The test was performed for OFDM, DSSS, and CCK modulations at the operating frequencies of 2412, 2437, and 2462 MHz..

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (0.5 dB). The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9 kHz-150 kHz, 30 kHz resolution BW for the frequency range 150 kHz-10.0 MHz, 100 kHz resolution BW for the frequency range 10.0 MHz-6.5 GHz, and 300 kHz resolution BW for the frequency range 6.5 – 25.0 GHz. 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.

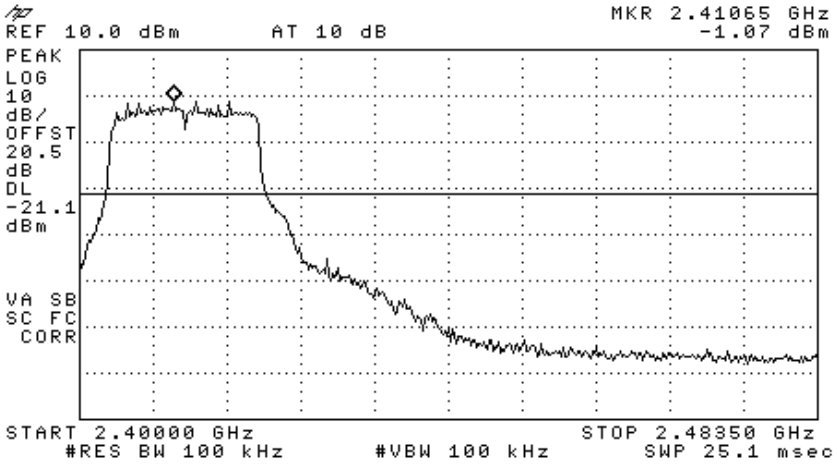

Figure 19 —2412 MHz OFDM

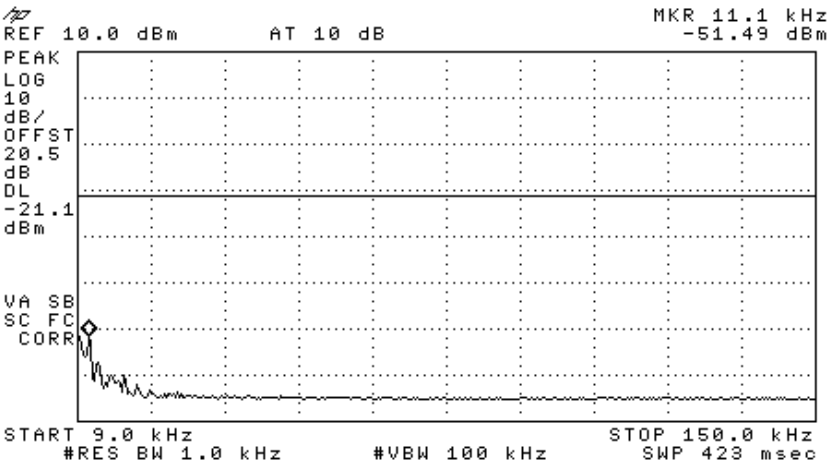

Figure 20 —2412 MHz OFDM

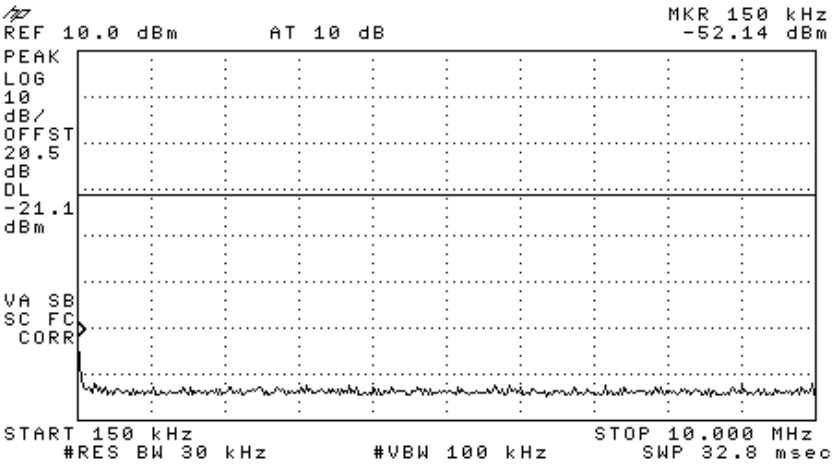

Figure 21 —2412 MHz OFDM

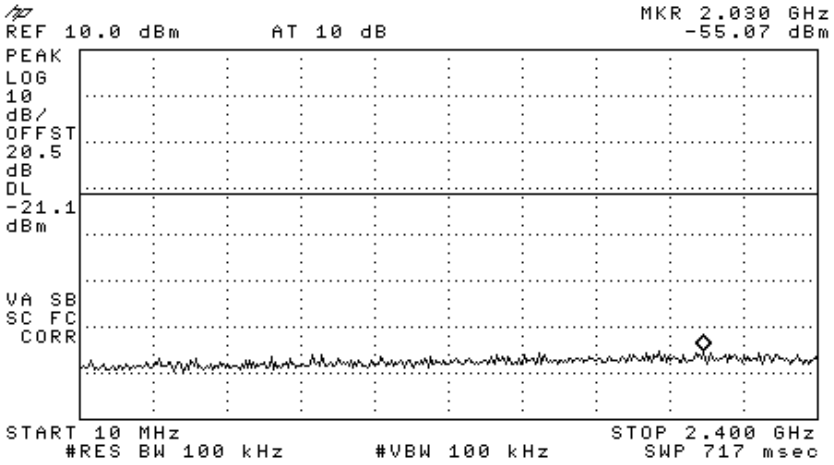

Figure 22 —2412 MHz OFDM

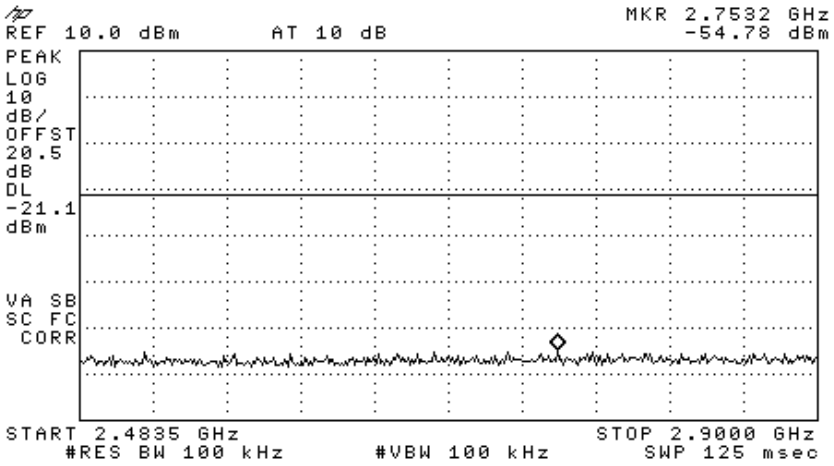

Figure 23 —2412 MHz OFDM

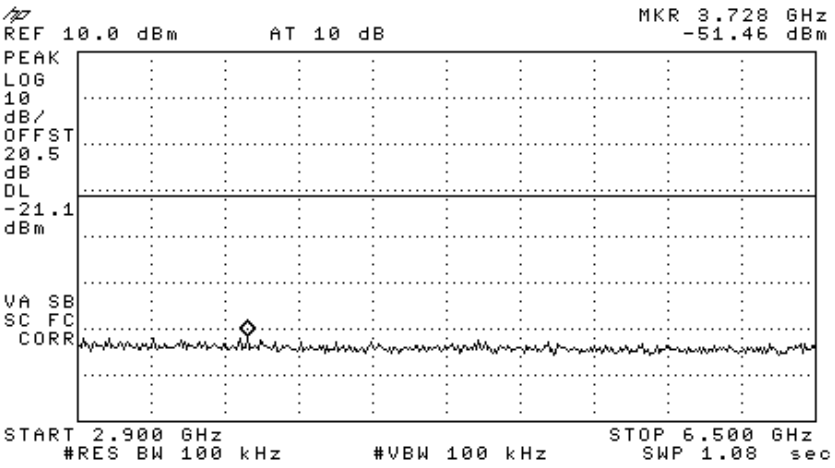

Figure 24 —2412 MHz OFDM

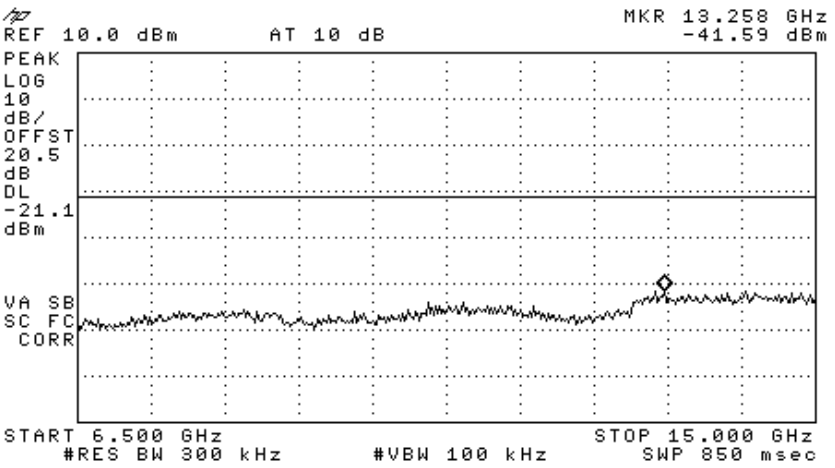

Figure 25 —2412 MHz OFDM

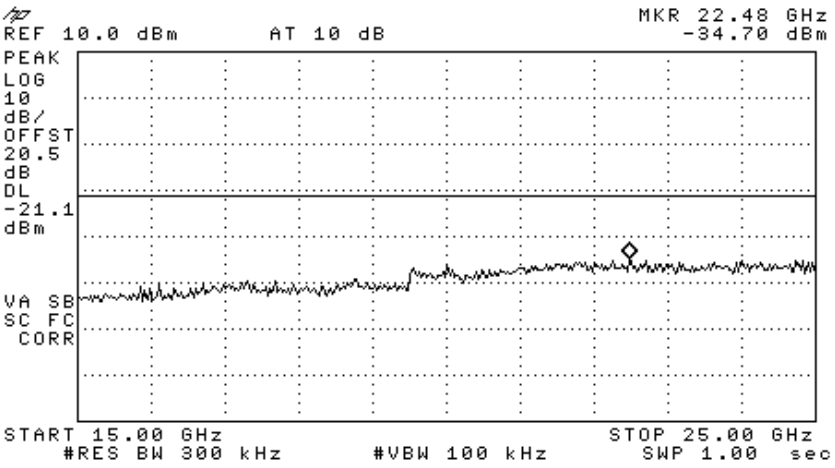

Figure 26 —2412 MHz OFDM

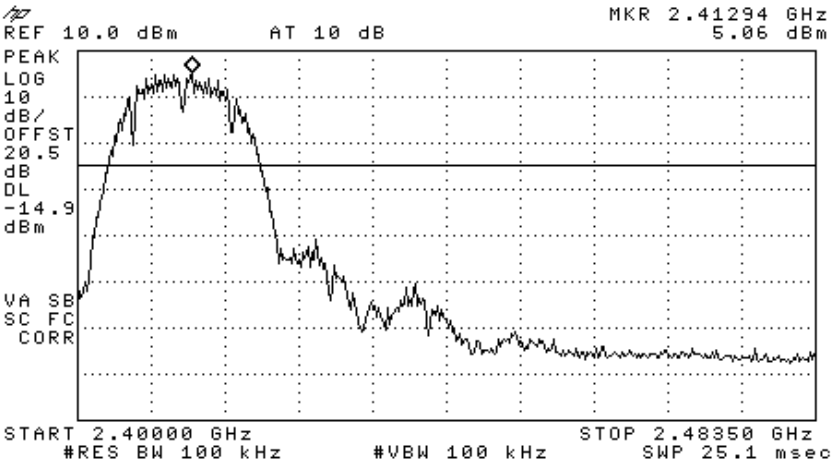

Figure 27 —2412 MHz DSSS

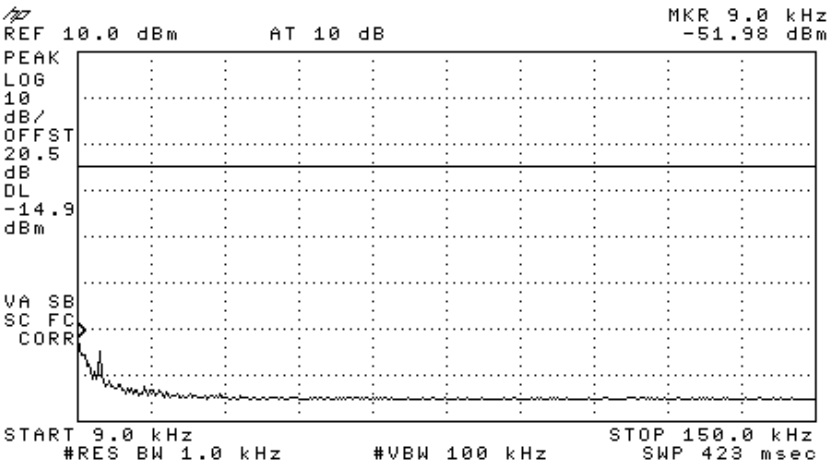

Figure 28 —2412 MHz DSSS

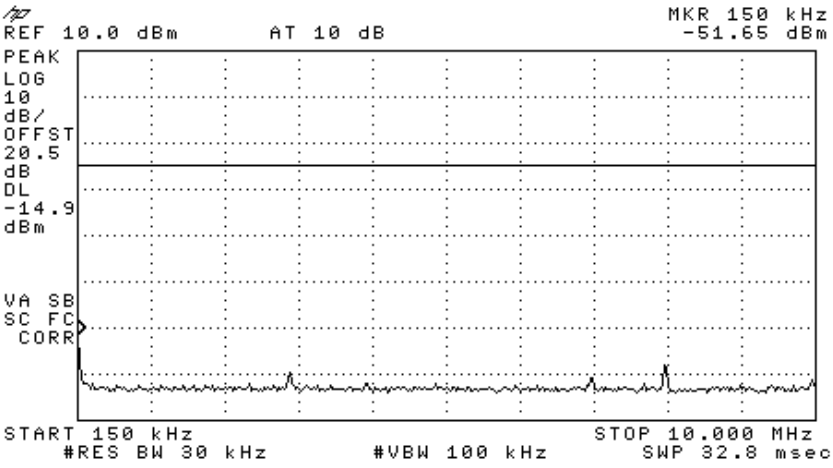

Figure 29 —2412 MHz DSSS

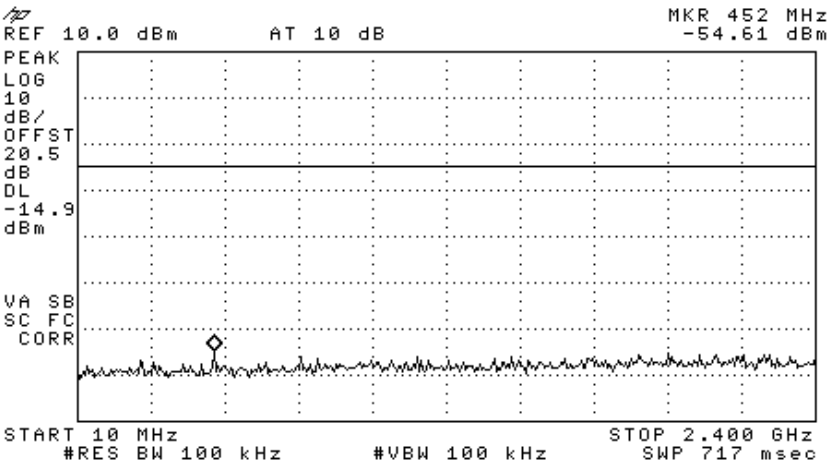

Figure 30 —2412 MHz DSSS

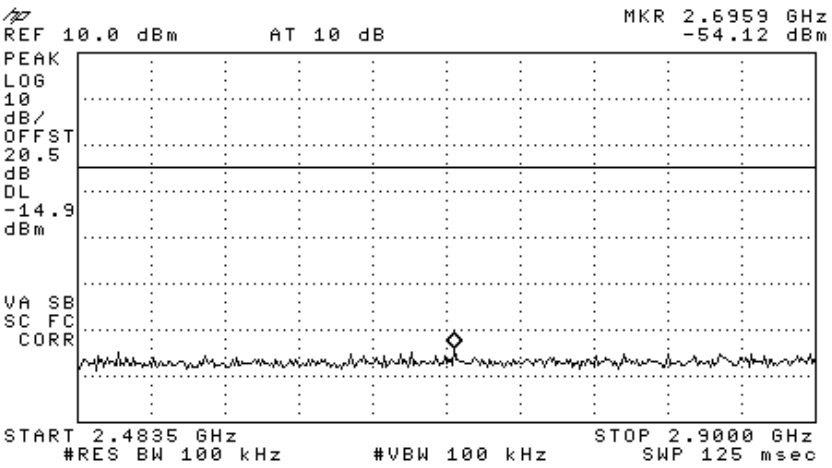

Figure 31 —2412 MHz DSSS

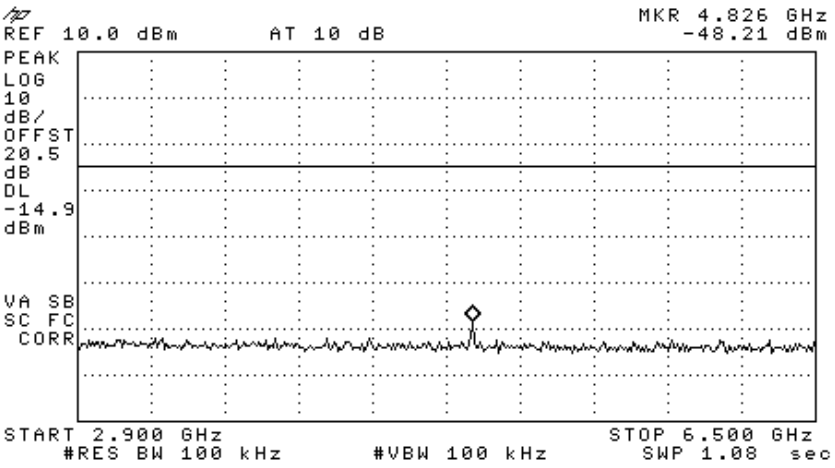

Figure 32 —2412 MHz DSSS

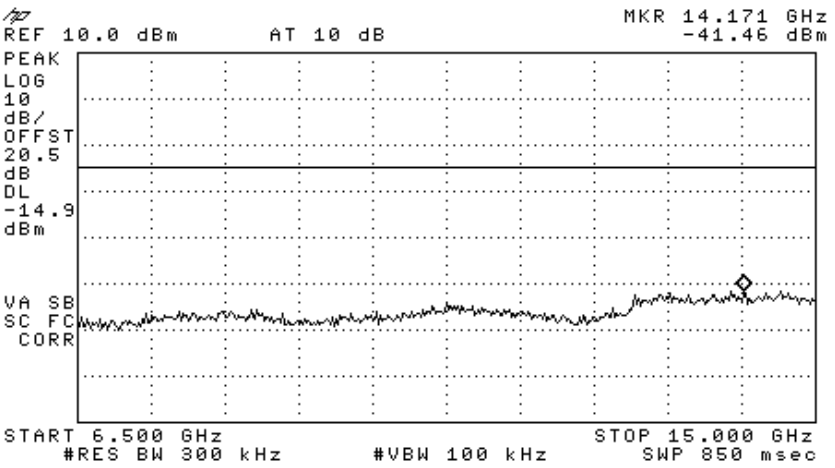

Figure 33 —2412 MHz DSSS

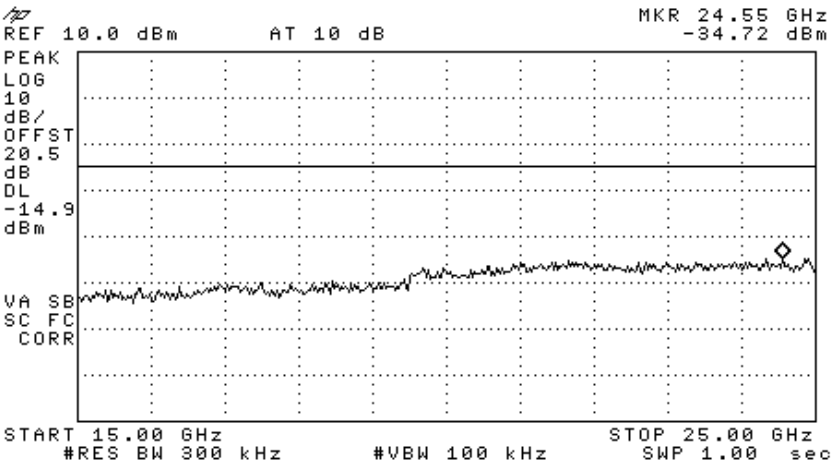

Figure 34 —2412 MHz DSSS

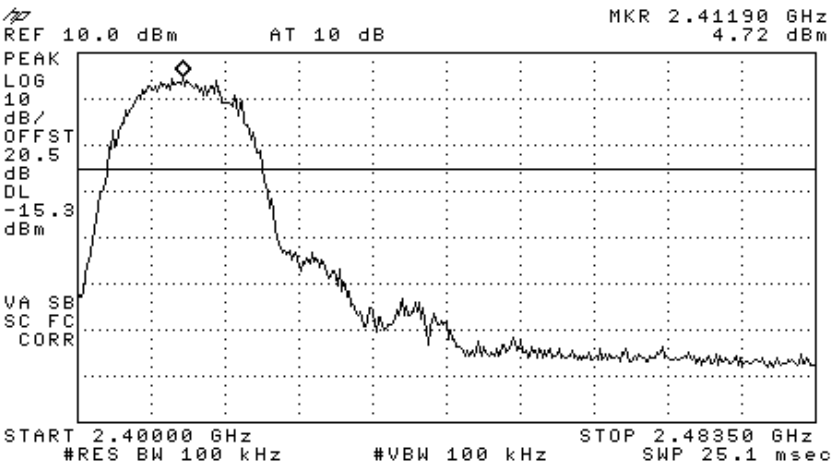

Figure 35 —2412 MHz CCK

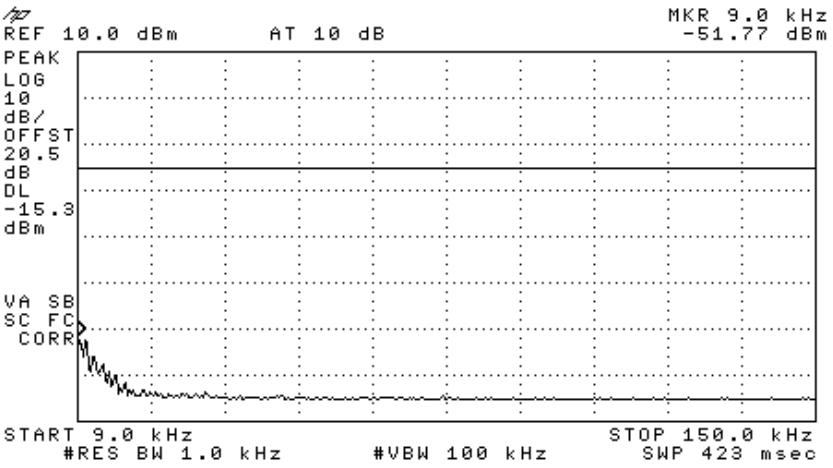

Figure 36 —2412 MHz CCK

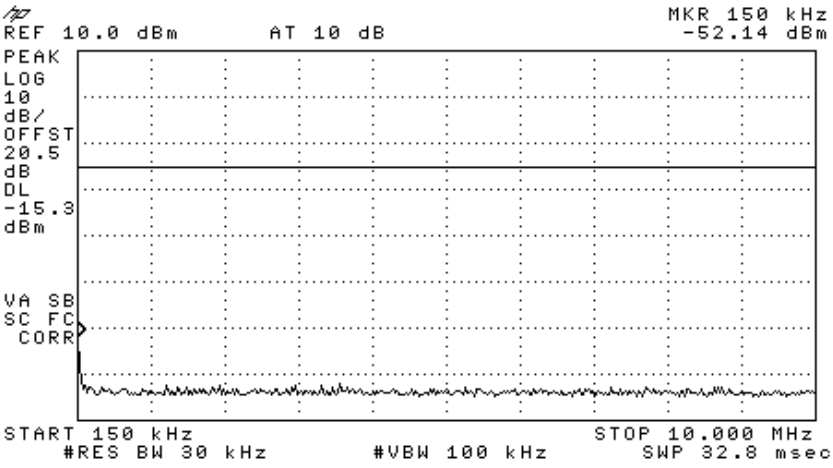

Figure 37 —2412 MHz CCK

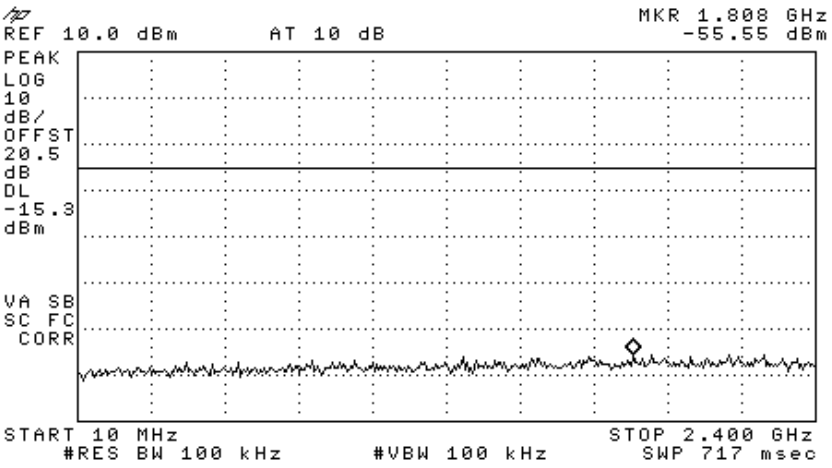

Figure 38 —2412 MHz CCK

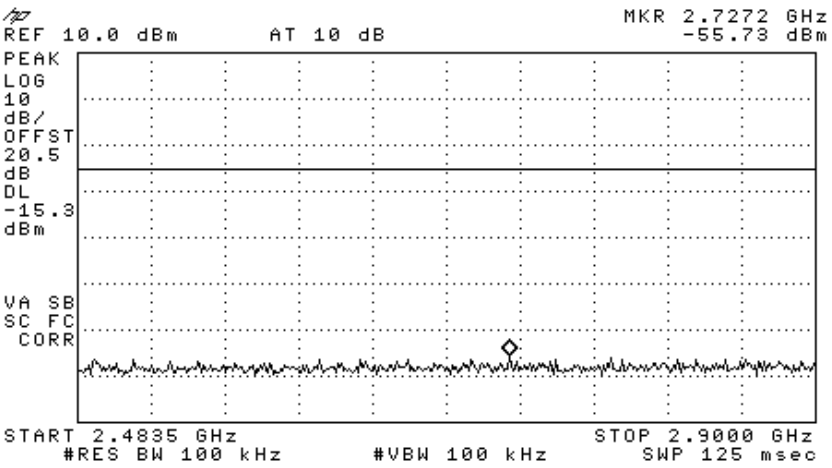

Figure 39 —2412 MHz CCK

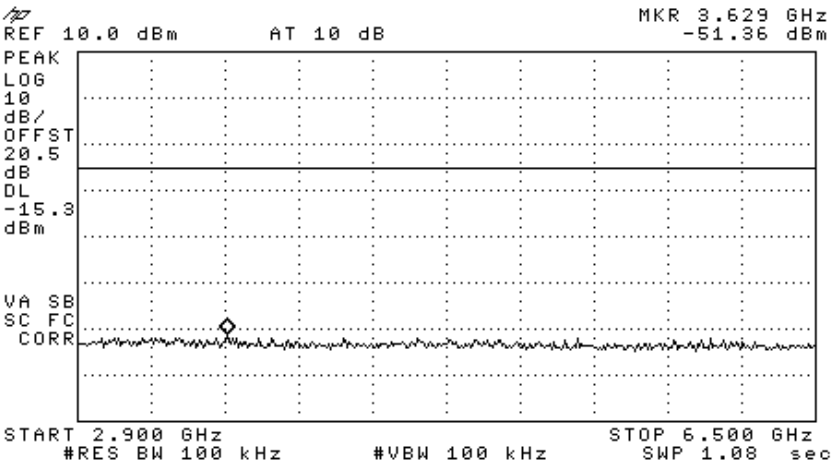

Figure 40 —2412 MHz CCK

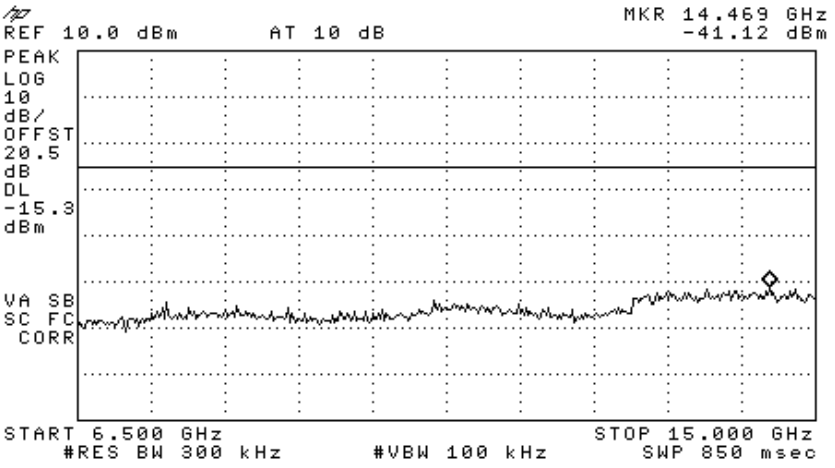

Figure 41 —2412 MHz CCK

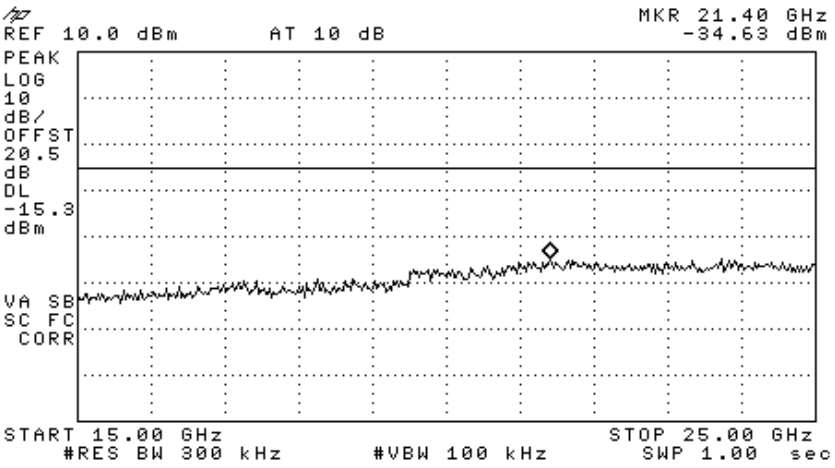

Figure 42 —2412 MHz CCK

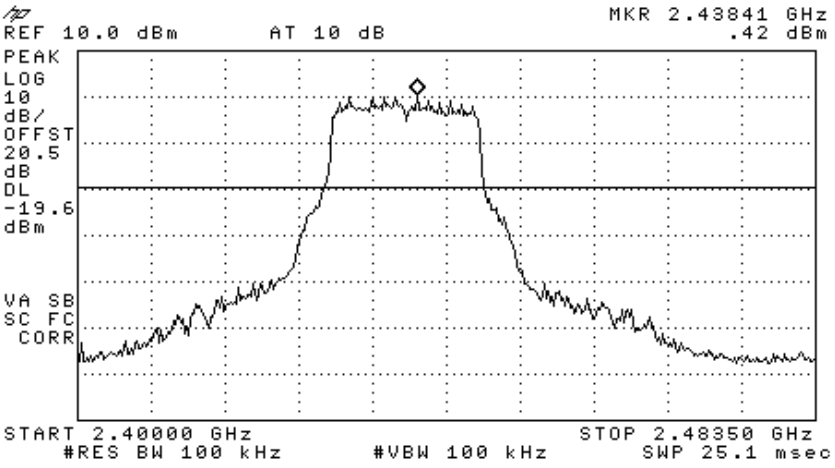

Figure 43 —2437 MHz OFDM

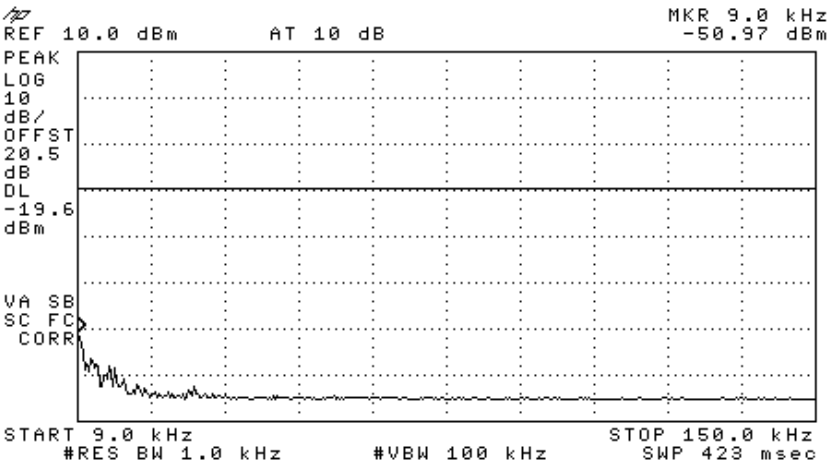

Figure 44 —2437 MHz OFDM

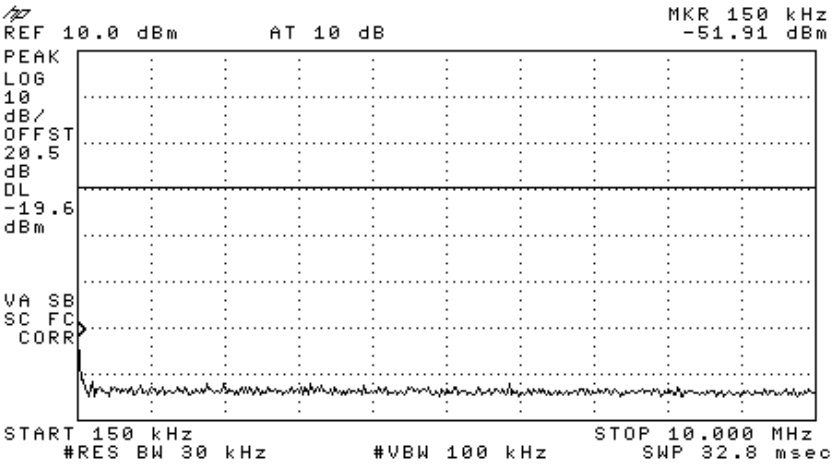

Figure 45 —2437 MHz OFDM

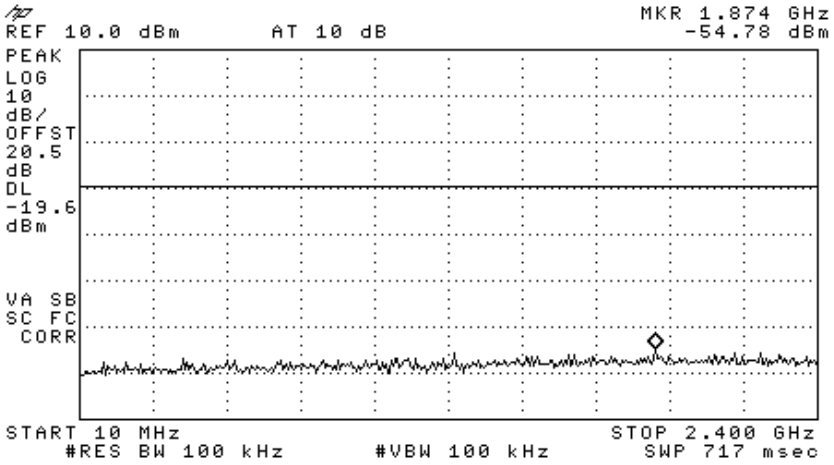

Figure 46 —2437 MHz OFDM

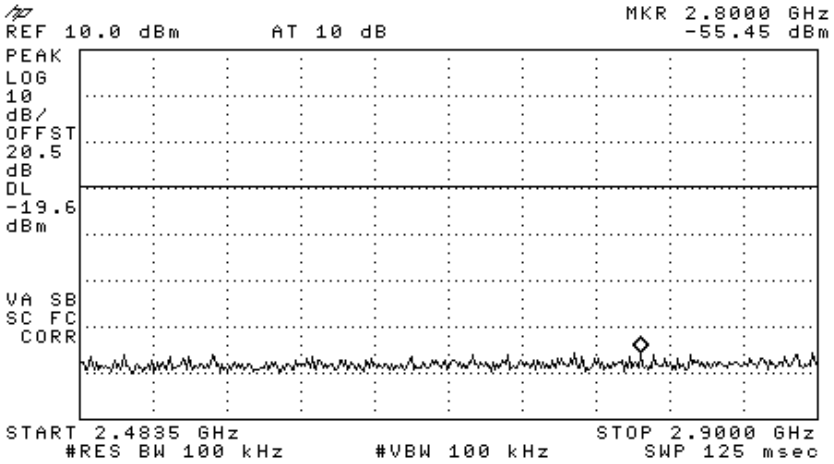

Figure 47 —2437 MHz OFDM

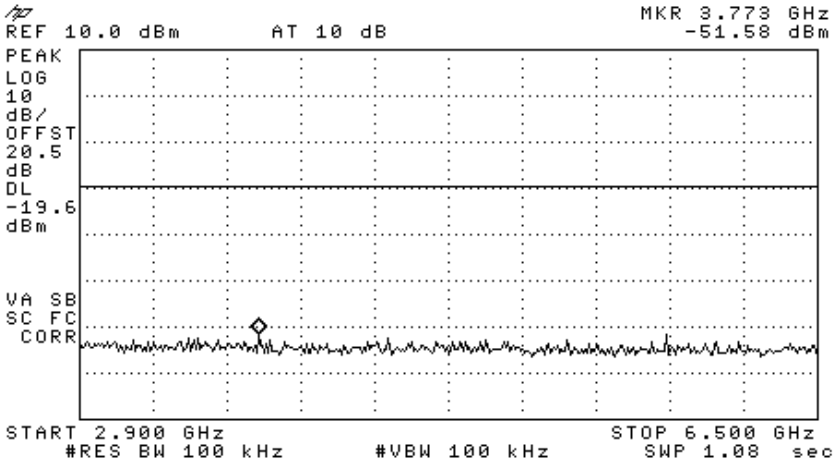

Figure 48 —2437 MHz OFDM

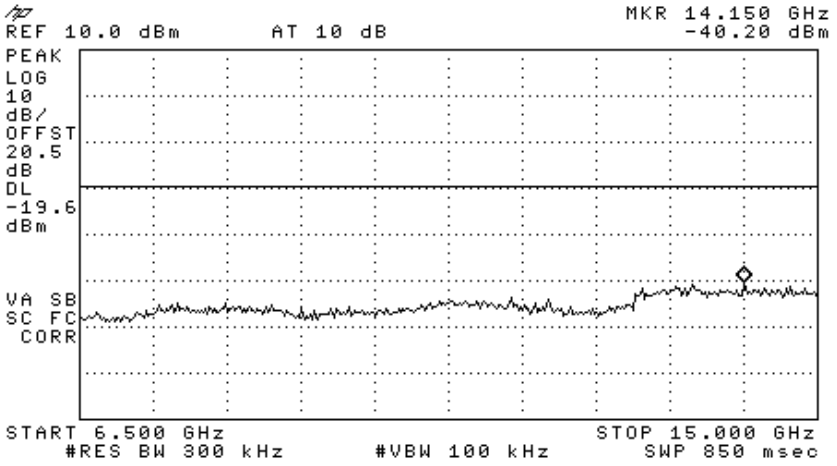

Figure 49 —2437 MHz OFDM

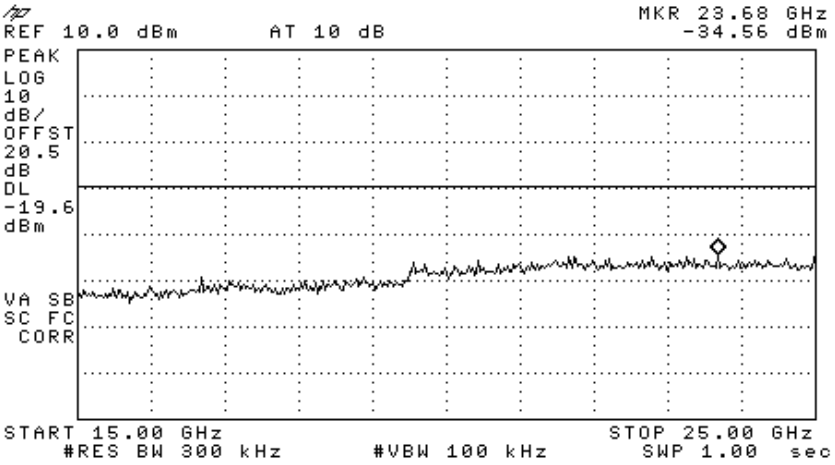

Figure 50 —2437 MHz OFDM

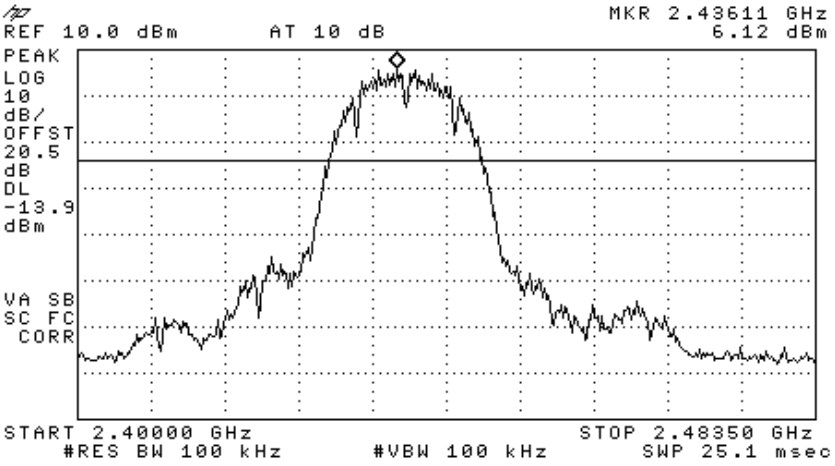

Figure 51 —2437 MHz DSSS

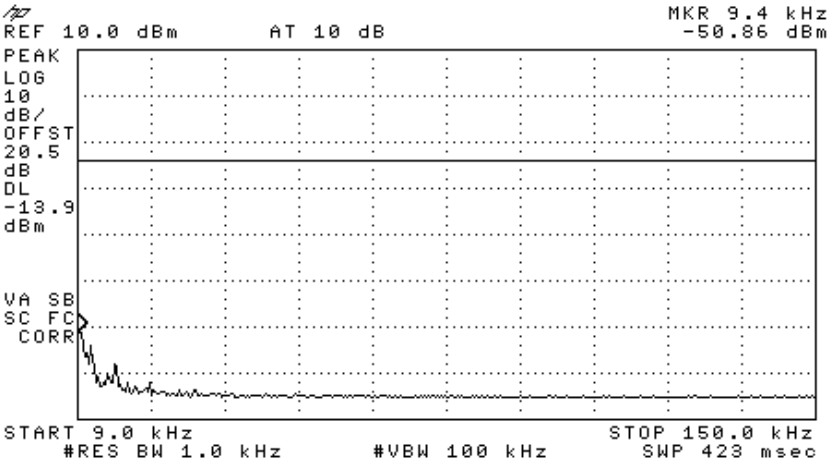

Figure 52 —2437 MHz DSSS

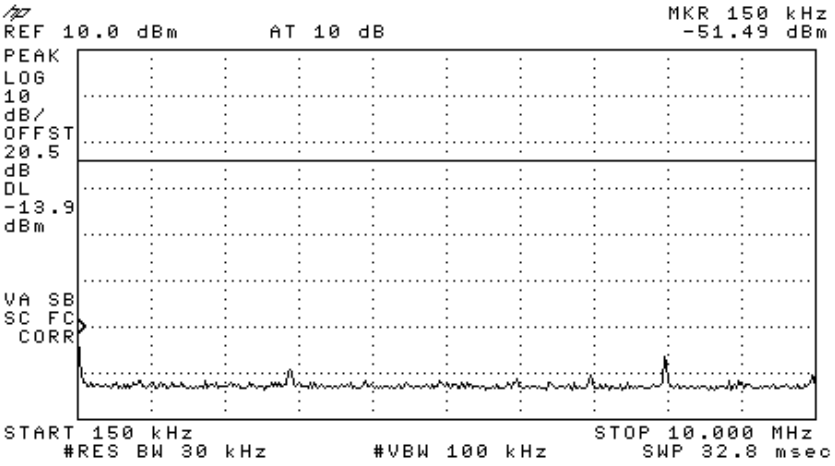

Figure 53 —2437 MHz DSSS

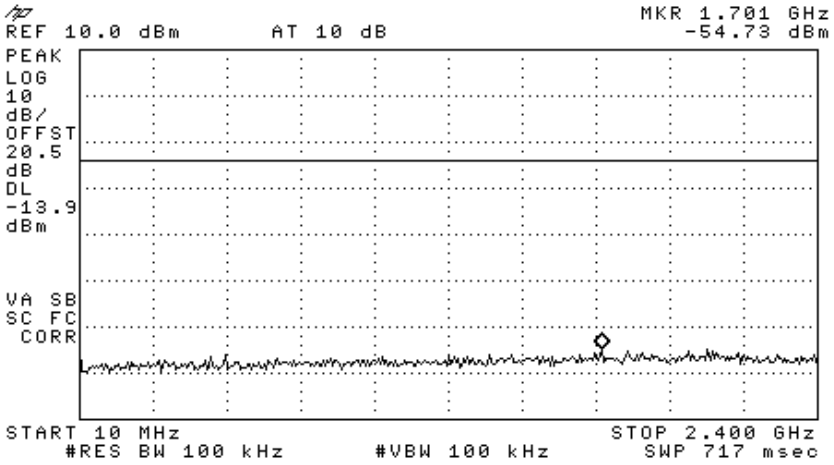

Figure 54 —2437 MHz DSSS

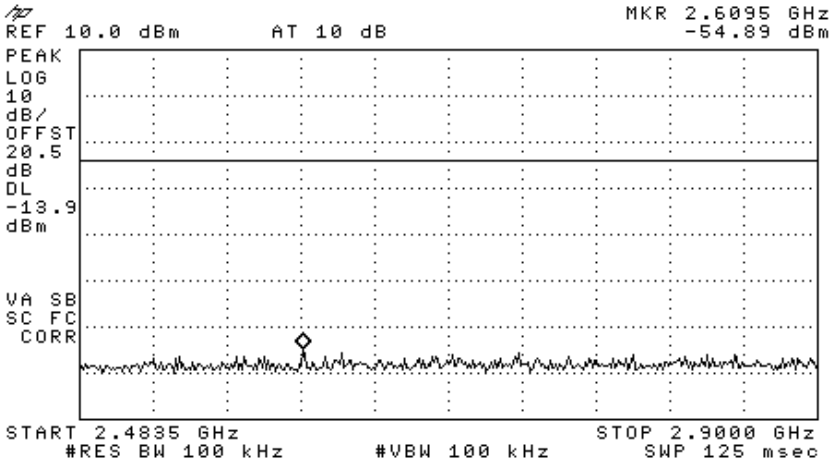

Figure 55 —2437 MHz DSSS

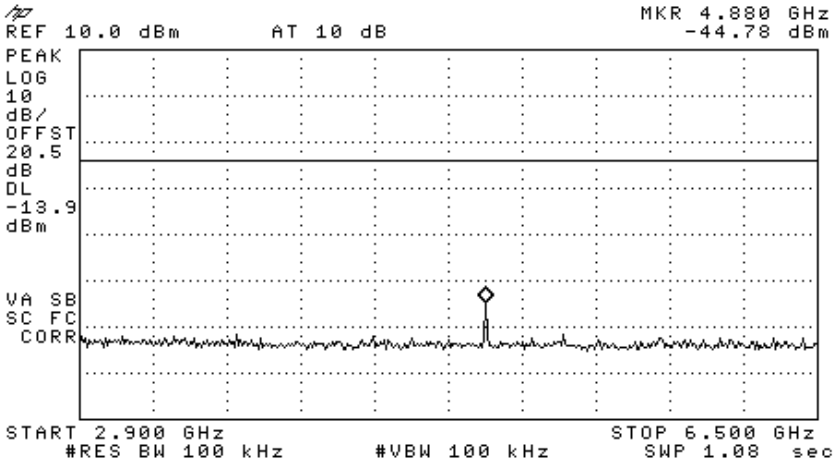

Figure 56 —2437 MHz DSSS

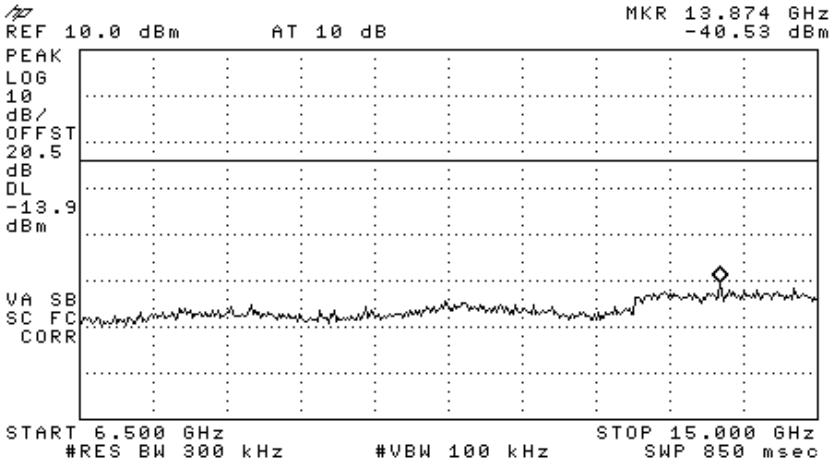

Figure 57 —2437 MHz DSSS

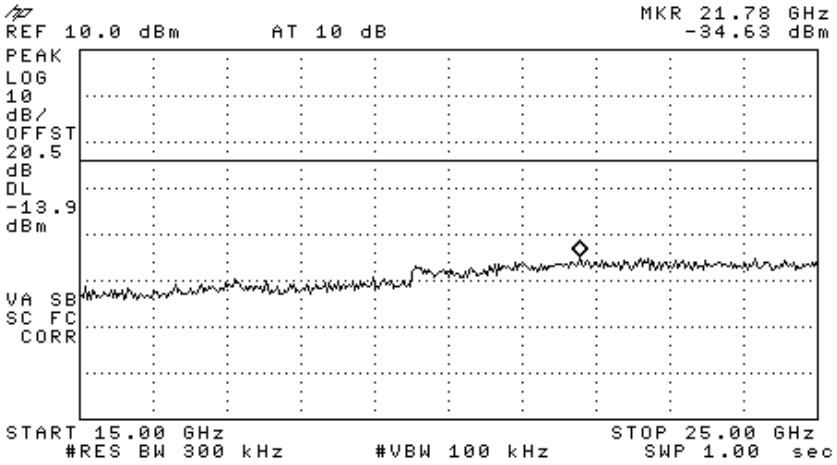

Figure 58 —2437 MHz DSSS

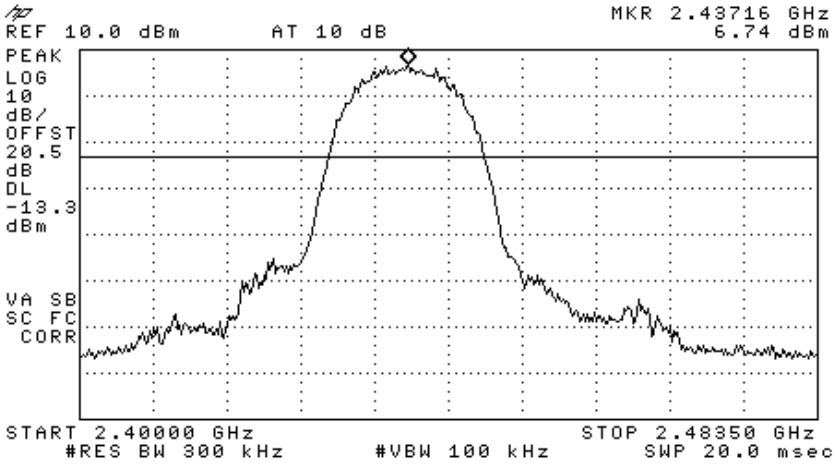

Figure 59 —2437 MHz CCK

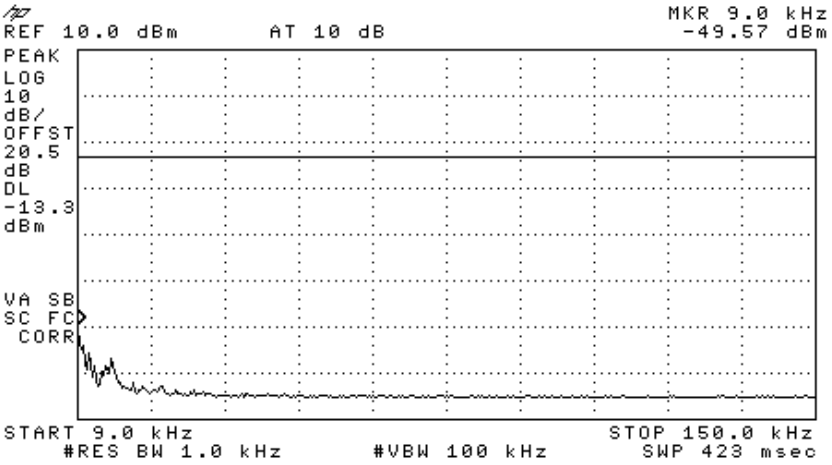

Figure 60 —2437 MHz CCK

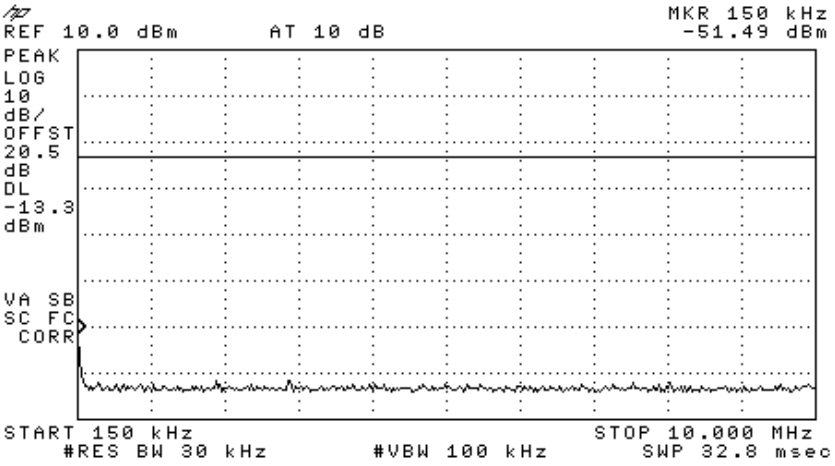

Figure 61 —2437 MHz CCK

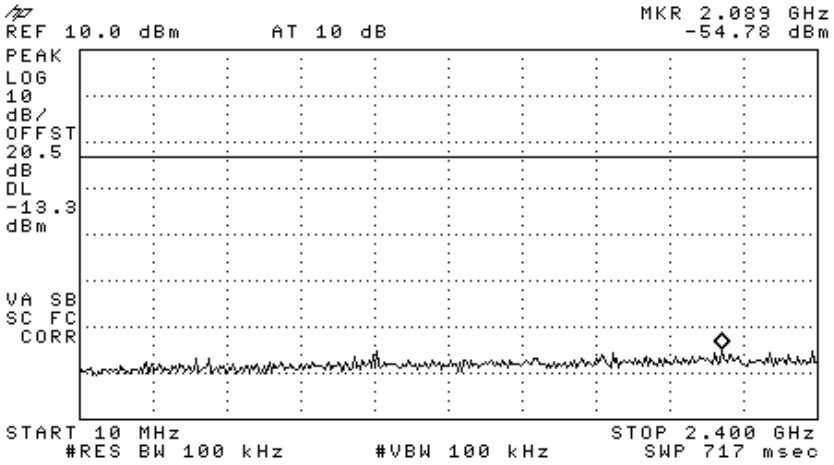

Figure 62 —2437 MHz CCK

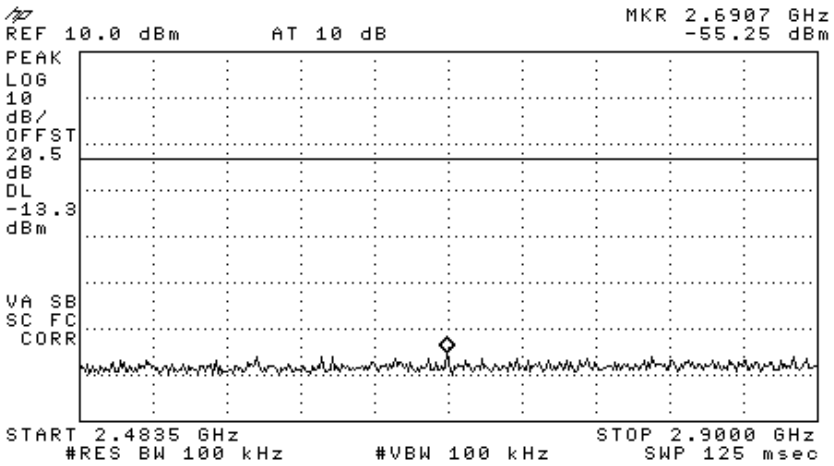

Figure 63 —2437 MHz CCK

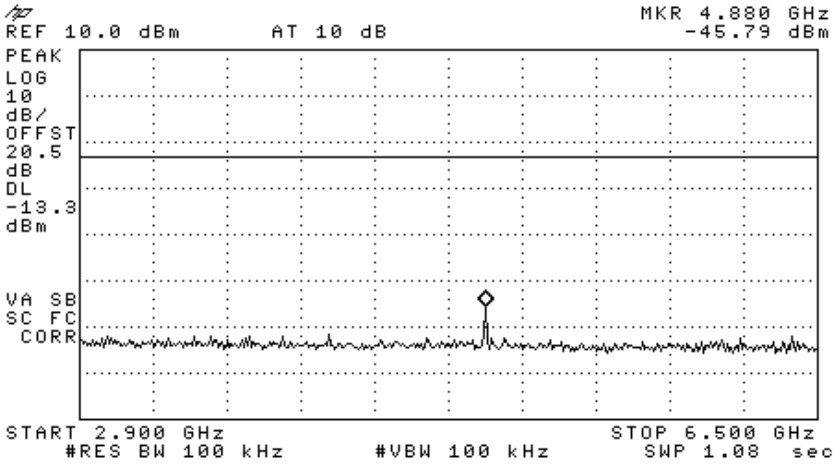

Figure 64 —2437 MHz CCK

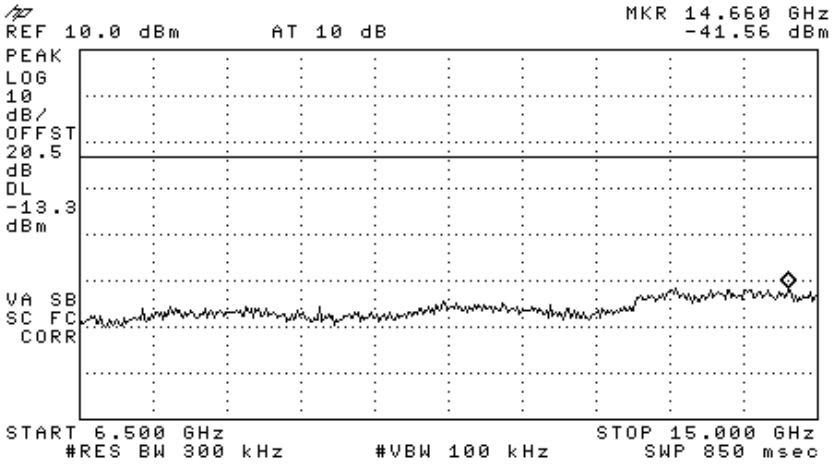

Figure 65 —2437 MHz CCK

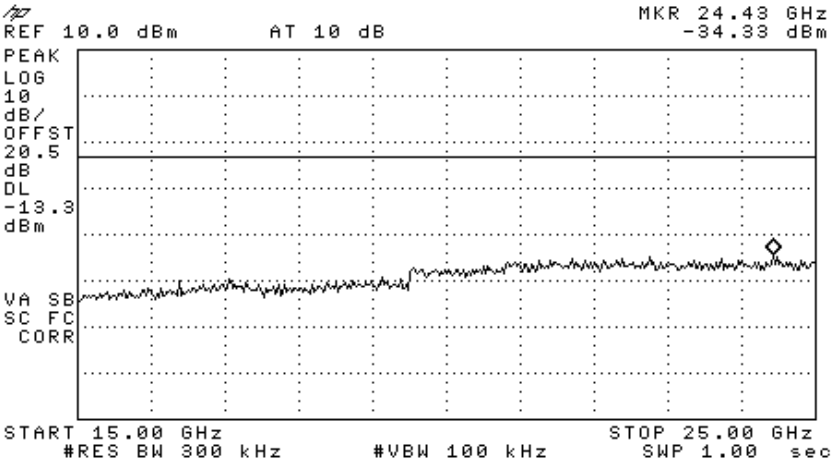

Figure 66 —2437 MHz CCK

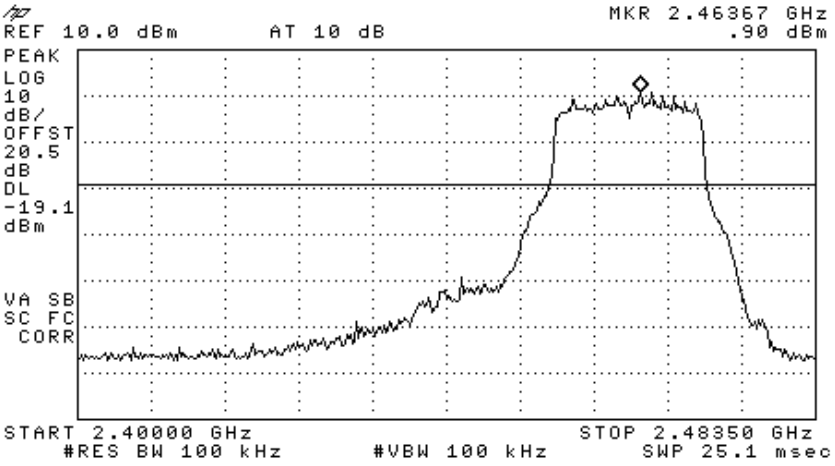

Figure 67 —2462 MHz OFDM

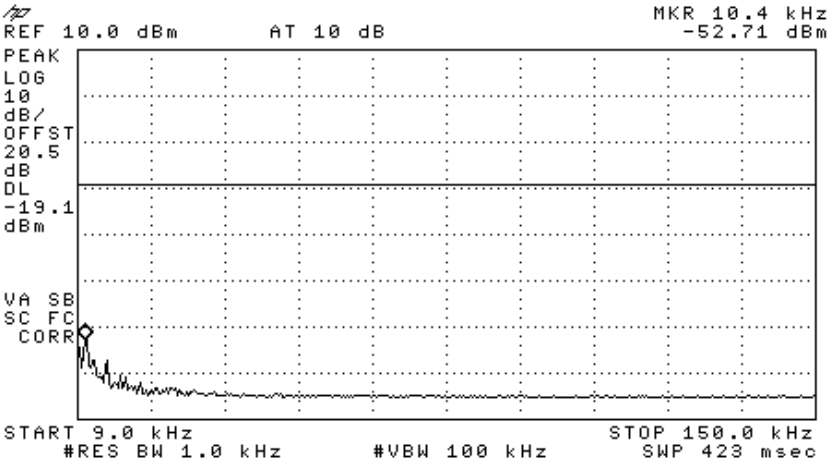

Figure 68 —2462 MHz OFDM

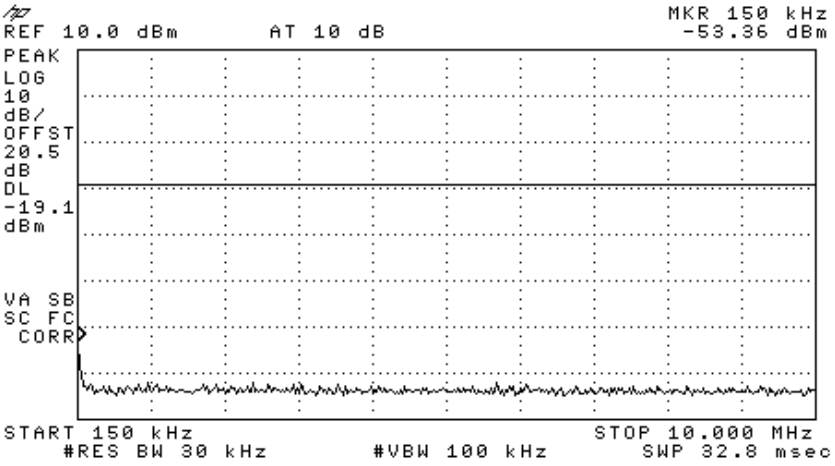

Figure 69 —2462 MHz OFDM

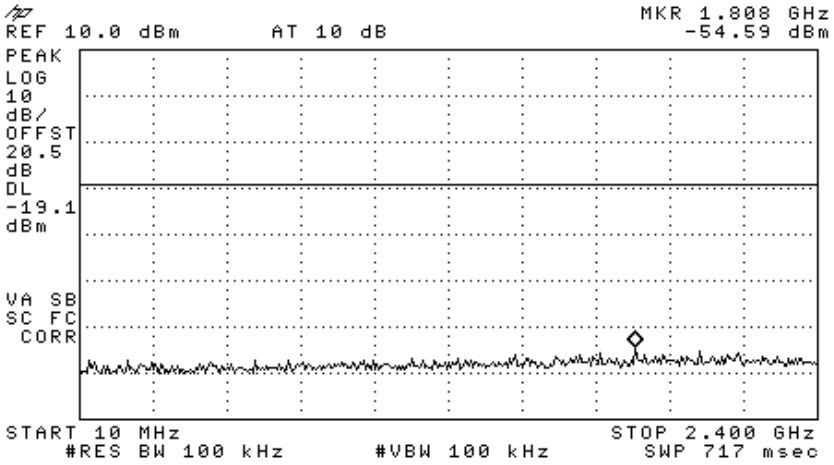

Figure 70 —2462 MHz OFDM

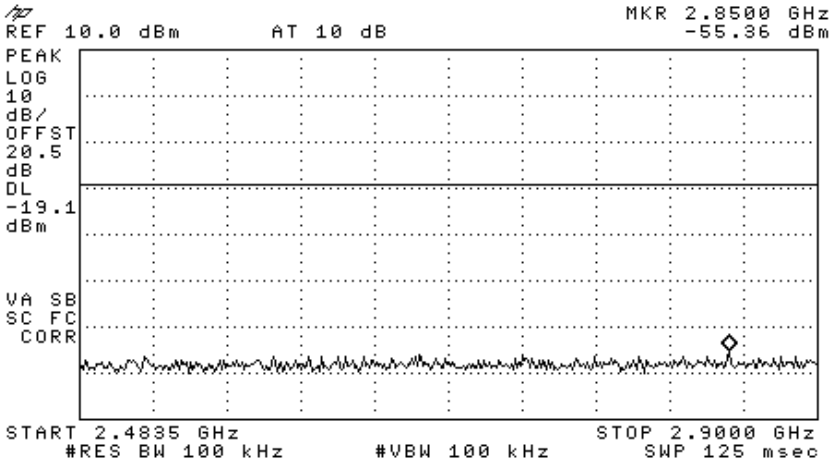

Figure 71 —2462 MHz OFDM

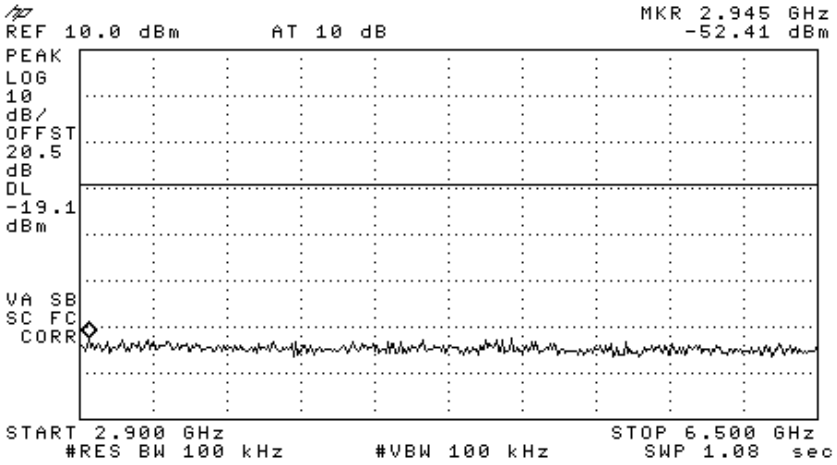

Figure 72 —2462 MHz OFDM

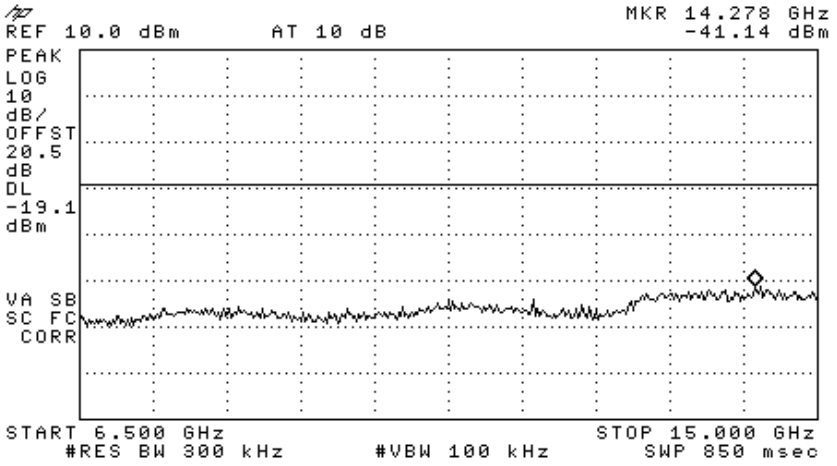

Figure 73 —2462 MHz OFDM

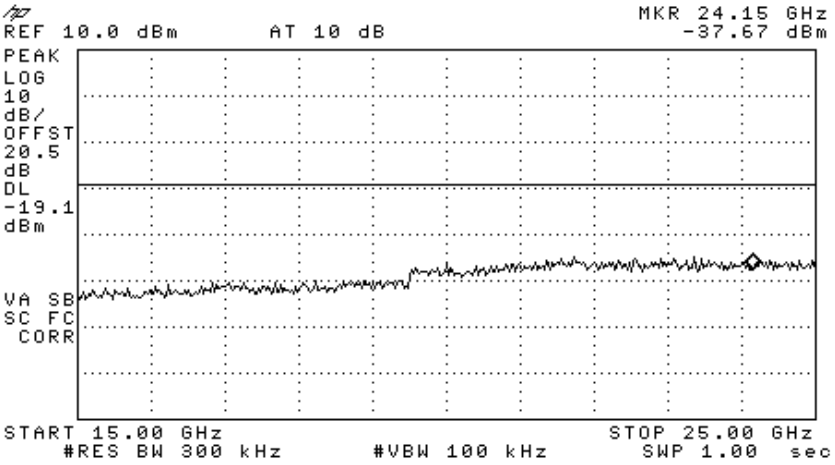

Figure 74 —2462 MHz OFDM

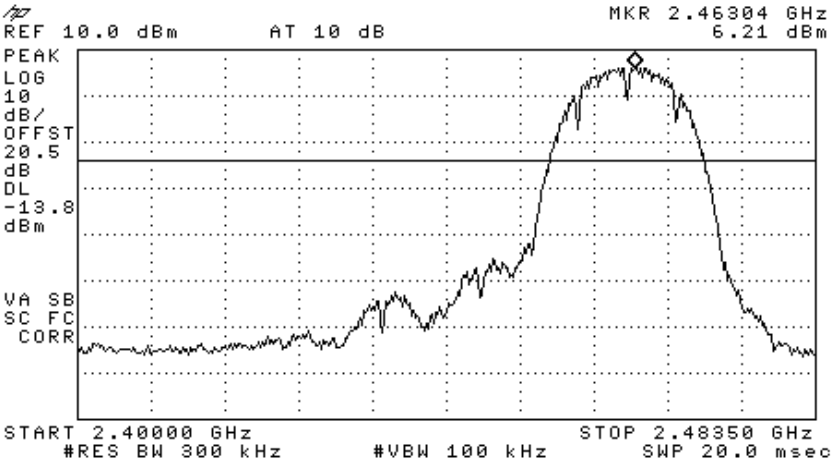

Figure 75 —2462 MHz DSSS

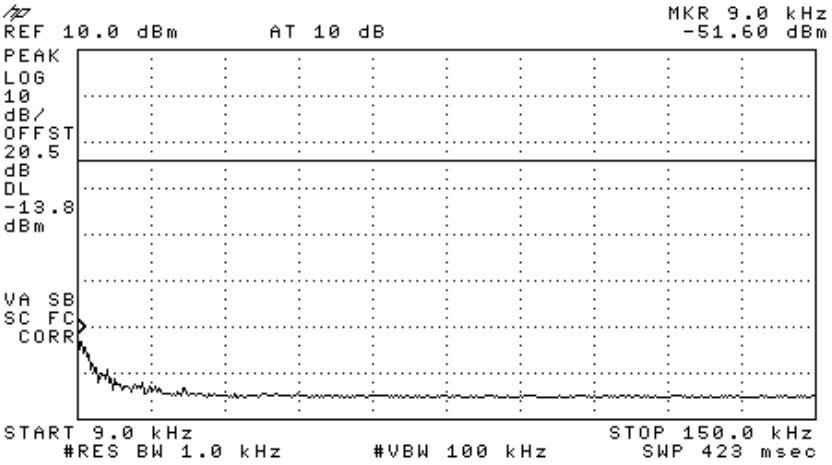

Figure 76 —2462 MHz DSSS

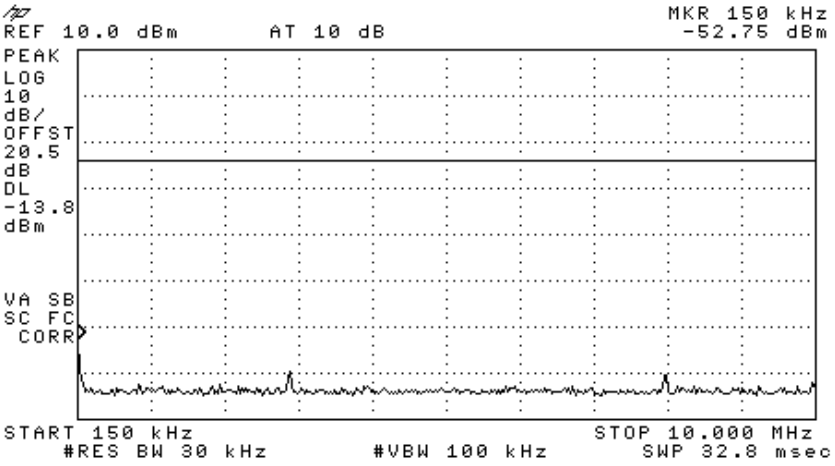

Figure 77 —2462 MHz DSSS

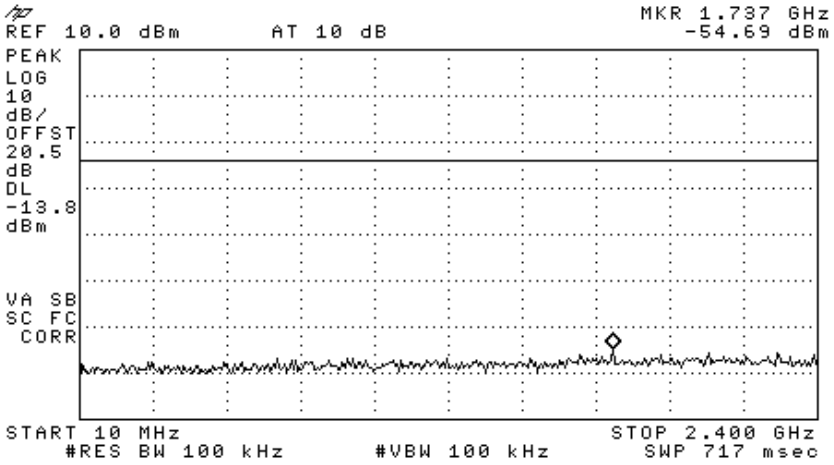

Figure 78 —2462 MHz DSSS

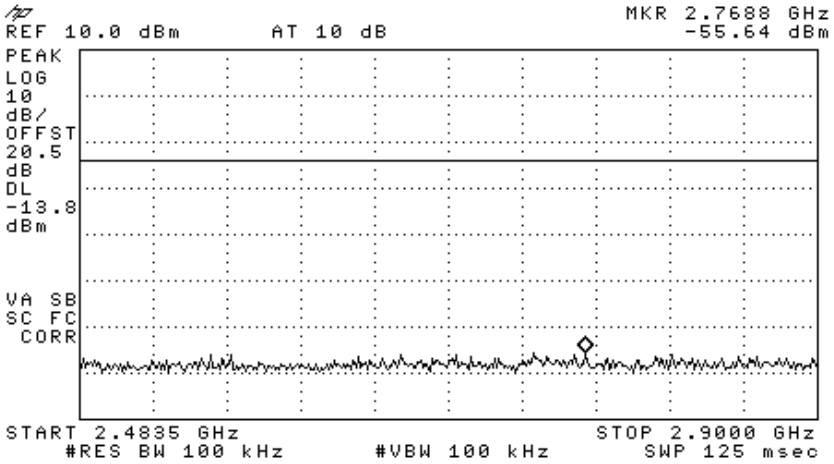

Figure 79 —2462 MHz DSSS

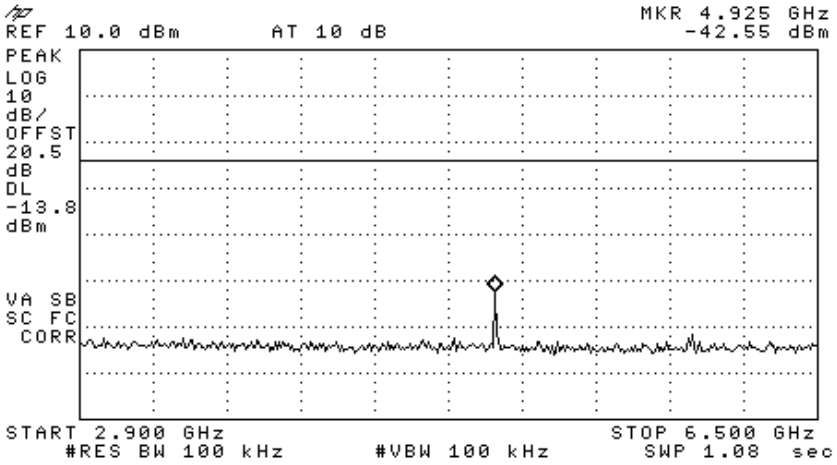

Figure 80 —2462 MHz DSSS

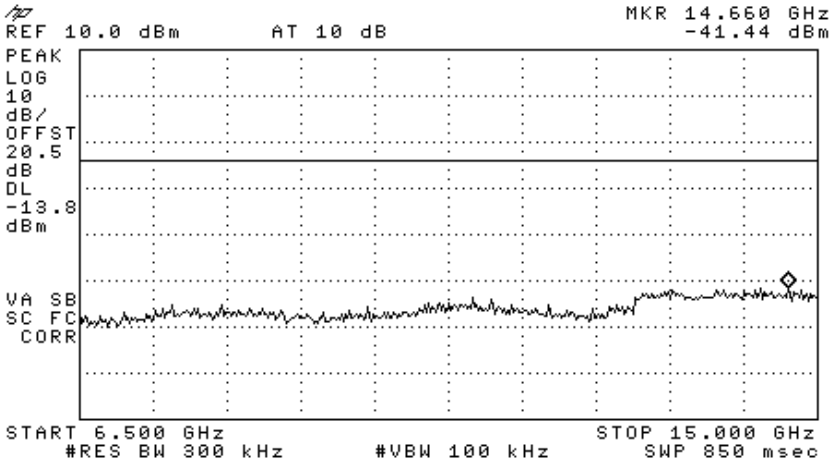

Figure 81 —2462 MHz DSSS

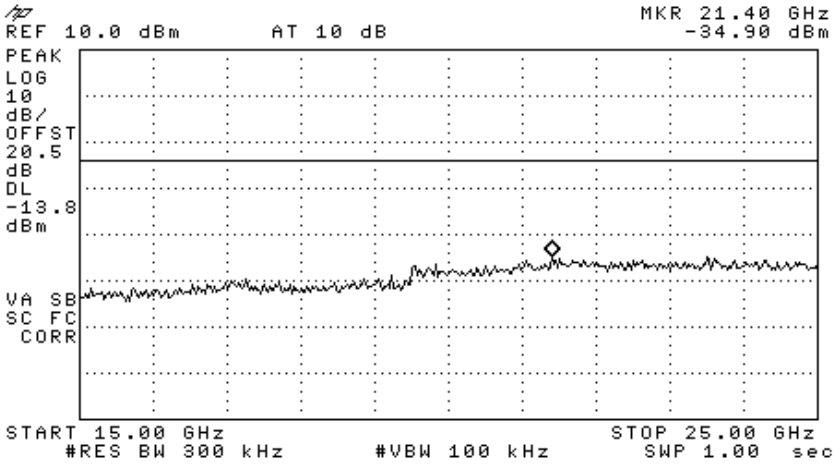

Figure 82 —2462 MHz DSSS

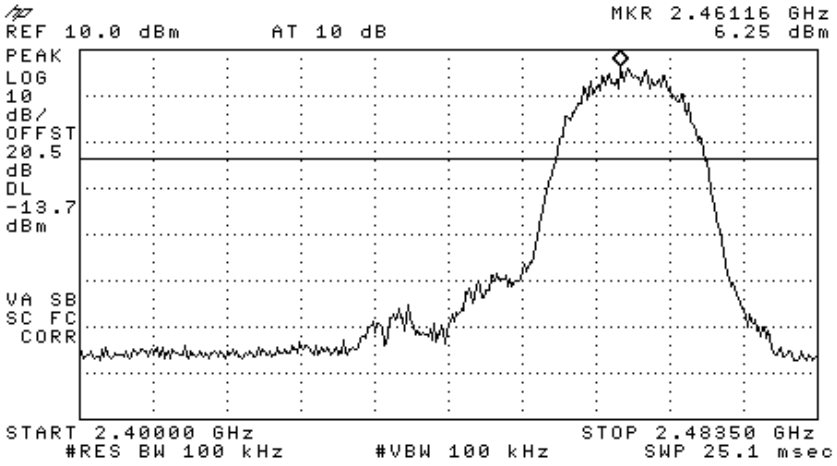

Figure 83 —2462 MHz CCK

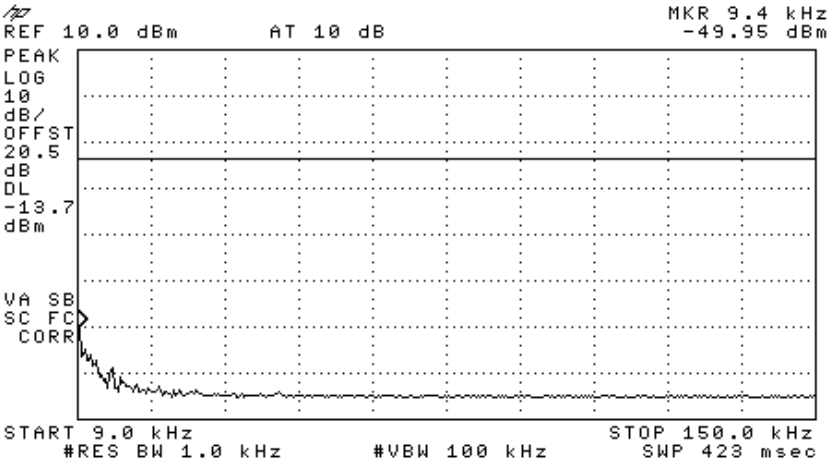

Figure 84 —2462 MHz CCK

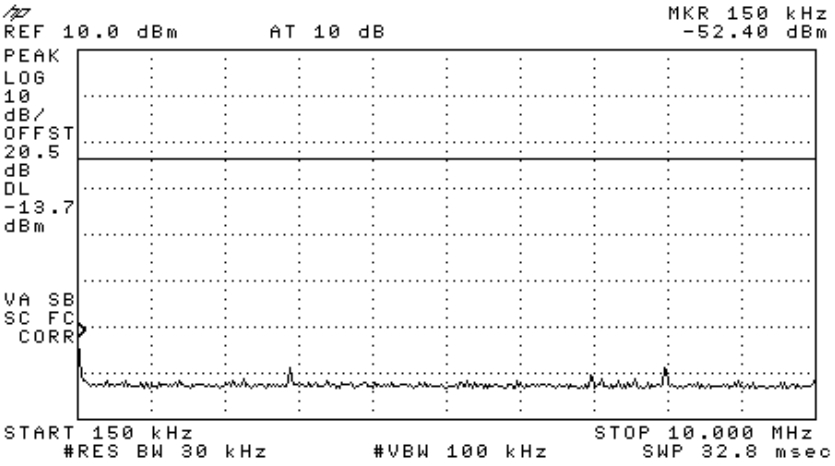

Figure 85 —2462 MHz CCK

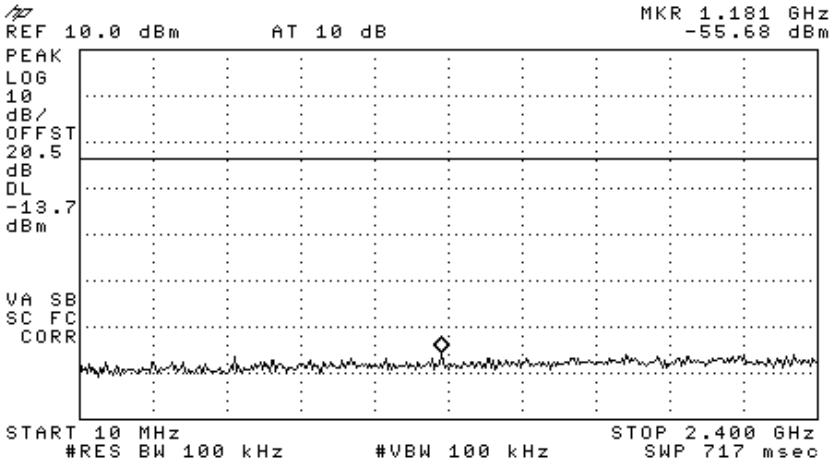

Figure 86 —2462 MHz CCK

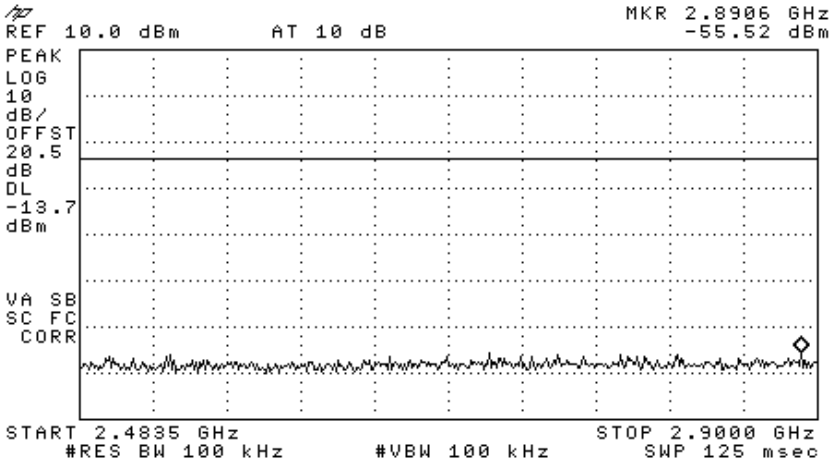

Figure 87 —2462 MHz CCK

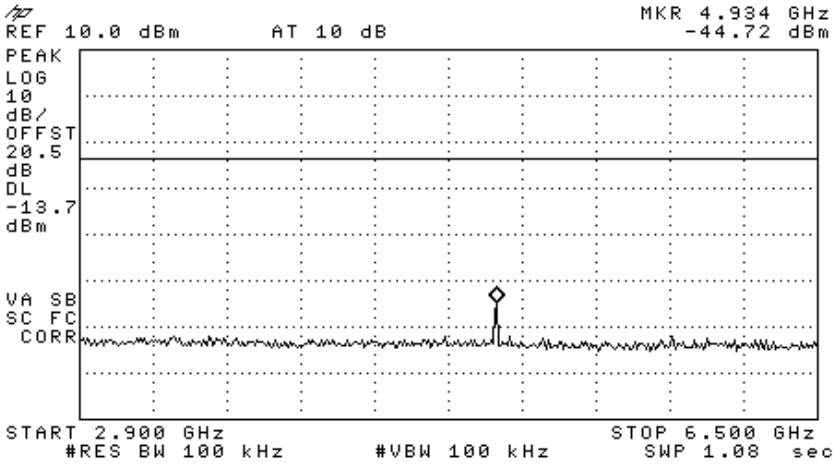

Figure 88 —2462 MHz CCK

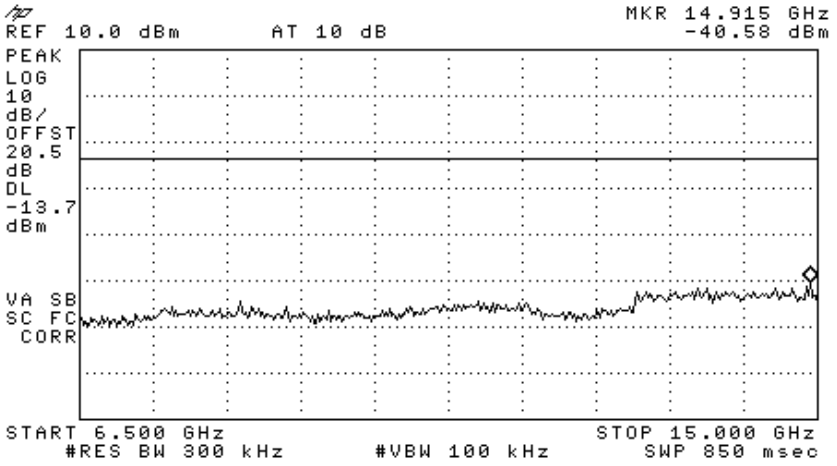

Figure 89 —2462 MHz CCK

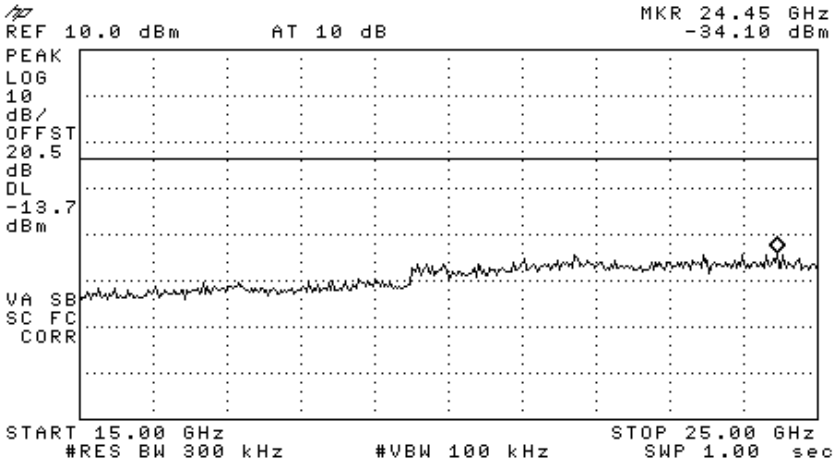

Figure 90 —2462 MHz CCK

8.2 Results table

E.U.T. Description: Wireless LAN Access Point
Model No.: MBW-WLP-1100F-HLS
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading (dBc)	Specification (dBc)	Margin (dB)
2412	OFDM	33.60	20.0	-13.60
	DSSS	39.82	20.0	-19.82
	CCK	39.33	20.0	-19.33
2437	OFDM	34.96	20.0	-14.96
	DSSS	40.73	20.0	-20.73
	CCK	41.03	20.0	-21.03
2462	OFDM	38.57	20.0	-18.57
	DSSS	41.10	20.0	-21.10
	CCK	40.40	20.0	-20.40

Figure 91 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 13.6 dB

TEST PERSONNEL:

Tester Signature:  Date: 04.02.08

Typed/Printed Name: E. Pitt

8.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacturer	Model	Serial 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, 2007	1 year

Figure 92 Test Equipment Used

9. 6 dB Minimum Bandwidth

9.1 Test procedure

The test was performed for CCK, DSSS, and OFDM modulations. The E.U.T. was operated at 2412, 2437, and 2462 MHz.

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=0.5dB. 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.

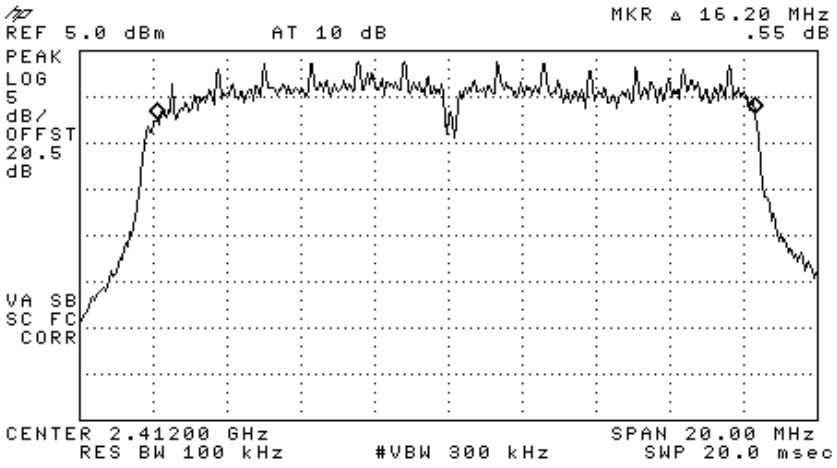

Figure 93 —2412 MHz OFDM Modulation

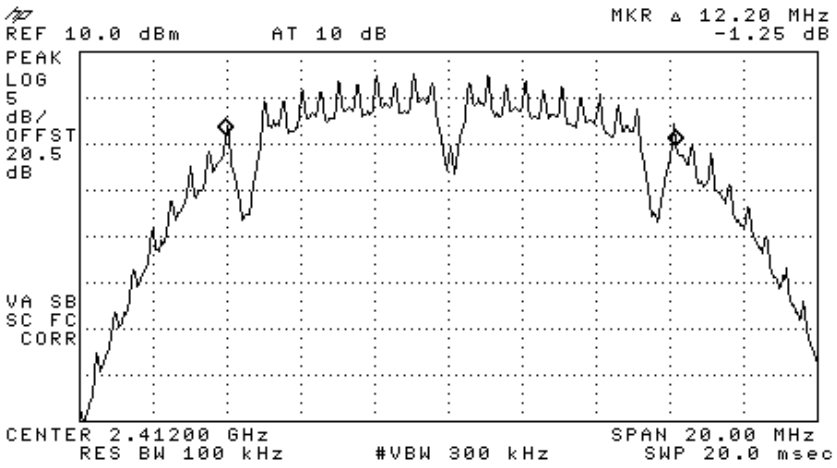

Figure 94 —2412 MHz DSSS Modulation

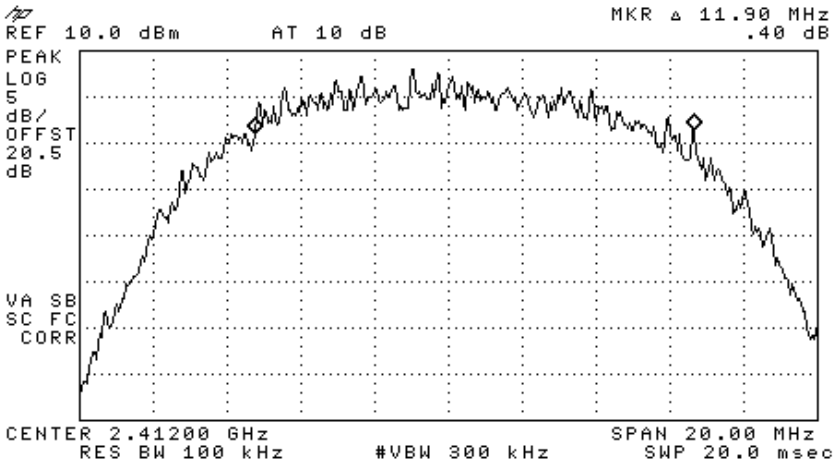

Figure 95 —2412 MHz CCK Modulation

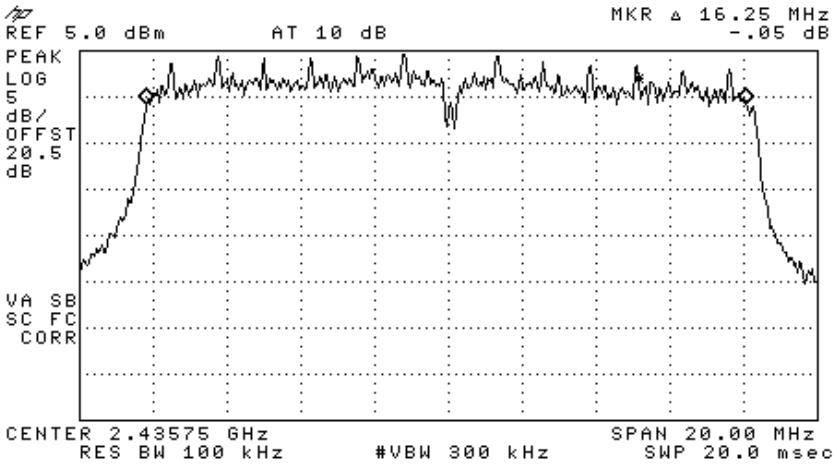

Figure 96 —2437 MHz OFDM Modulation

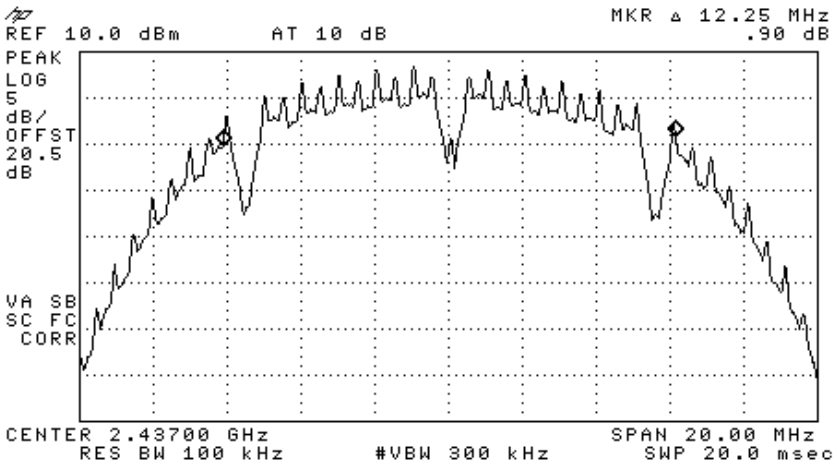

Figure 97 —2437 MHz DSSS Modulation

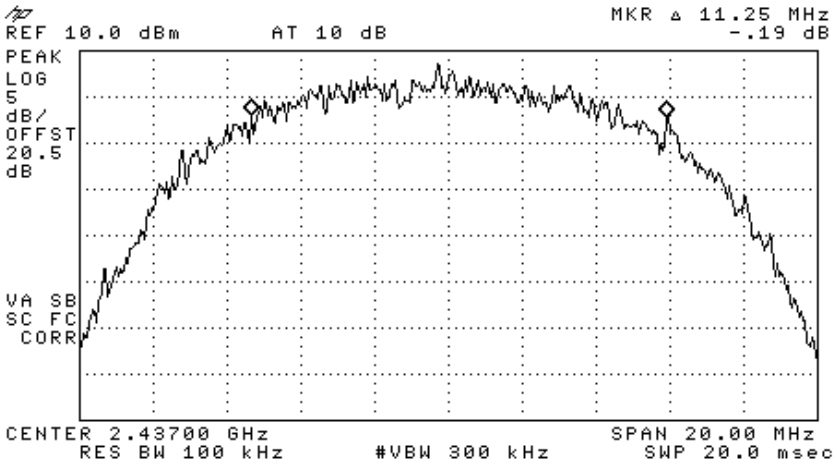

Figure 98 —2437 MHz CCK Modulation

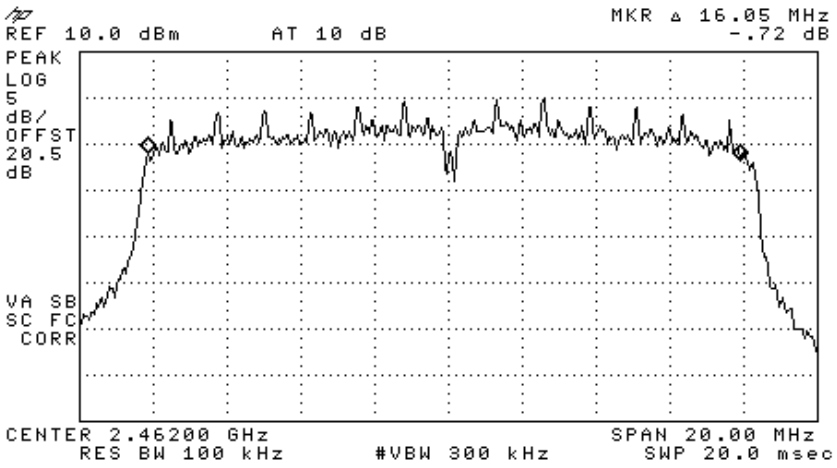

Figure 99 —2462 MHz OFDM Modulation

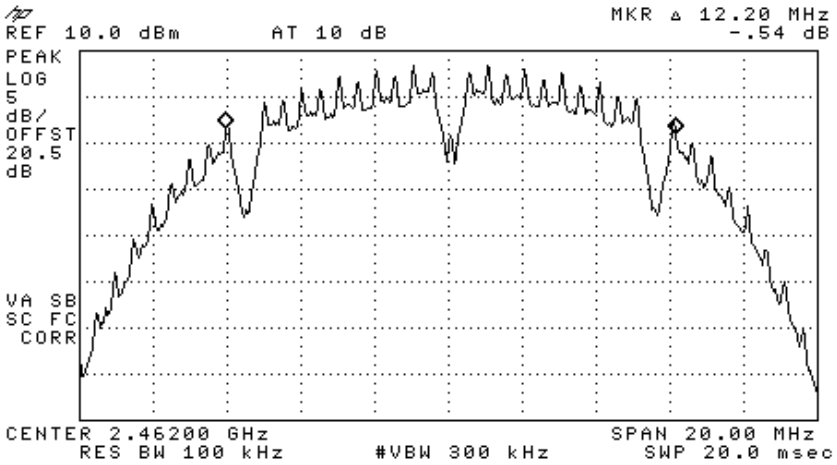

Figure 100 —2462 MHz DSSS Modulation

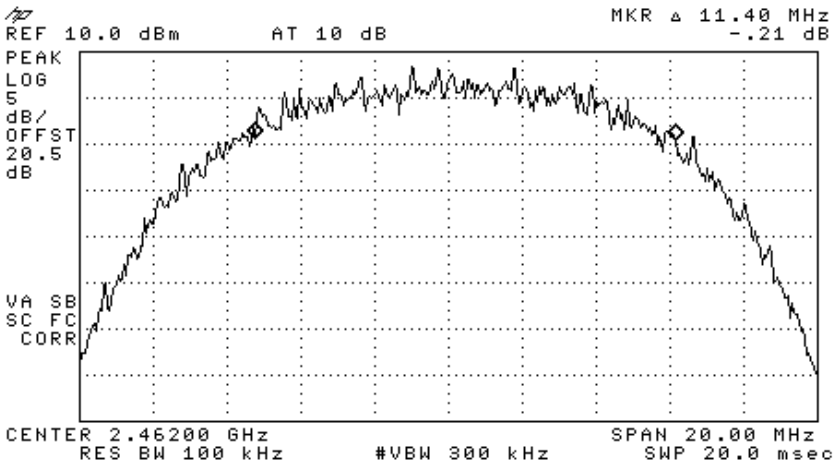

Figure 101 —2462 MHz CCK Modulation

9.2 Results table

E.U.T. Description: Wireless LAN Access Point
Model No.: MBW-WLP-1100F-HLS
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency	6 dB Bandwidth			Specification
	Type of Modulation			
	CCK	DSSS	OFDM	
(MHz)	(MHz)	(MHz)	(MHz)	(MHz)
2412.00	11.90	12.20	16.20	At Least 0.500
2437.00	11.25	12.25	16.25	At Least 0.500
2462.00	11.40	12.20	16.05	At Least 0.500

Figure 102 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.08

Typed/Printed Name: E. Pitt

9.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial 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, 2007	1 year

Figure 103 Test Equipment Used

10. Band Edge Spectrum (2.4 GHz Transmitter)

[In Accordance with section 15.247(c)]

10.1 Test procedure

The test was performed for OFDM, DSSS, and CCK modulations. The E.U.T. was operated at 2412 and 2462 MHz.

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable=0.5dB. The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 2400 MHz and above 2483.5 MHz was measured.

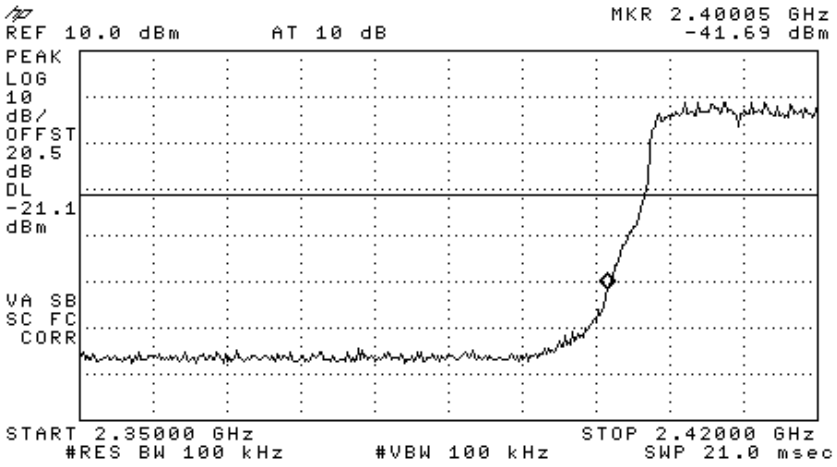

Figure 104 —2412 MHz OFDM Modulation

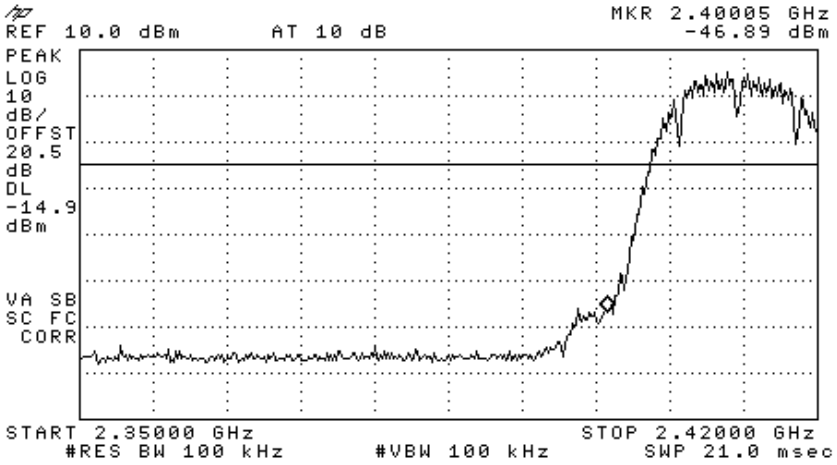

Figure 105 —2412 MHz DSSS Modulation

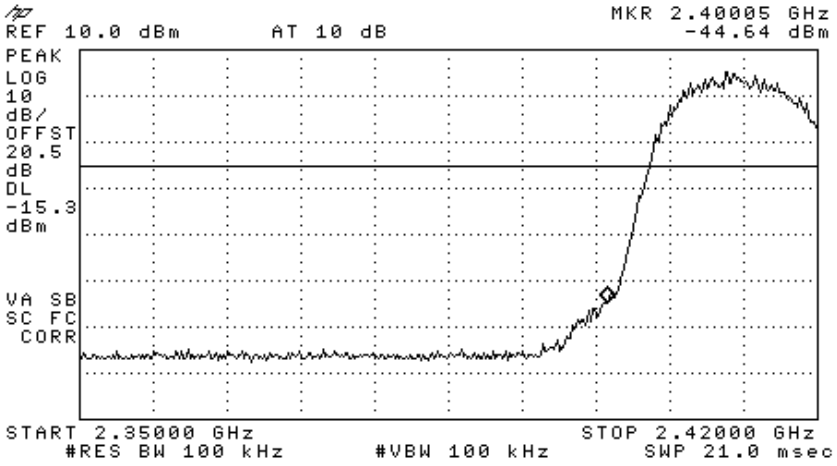

Figure 106 —2412 MHz CCK Modulation

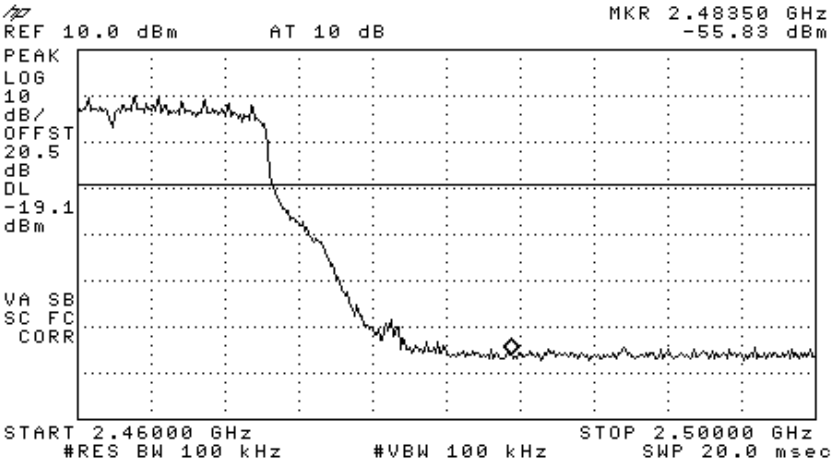

Figure 107 —2462 MHz OFDM Modulation

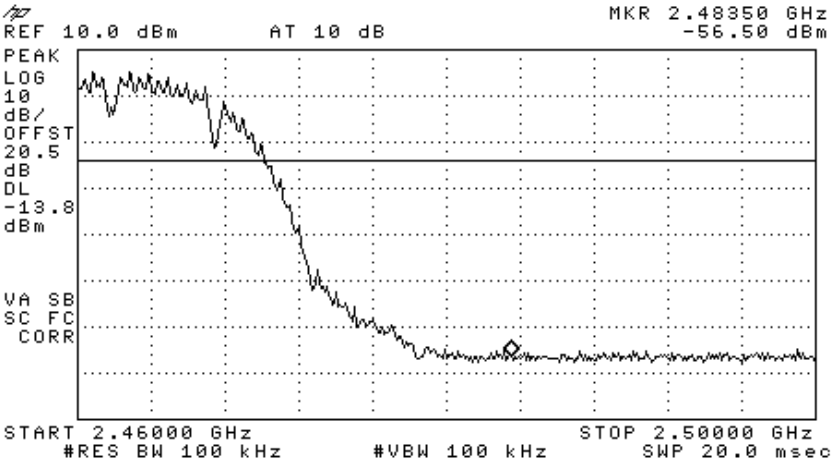

Figure 108 —2462 MHz DSSS Modulation

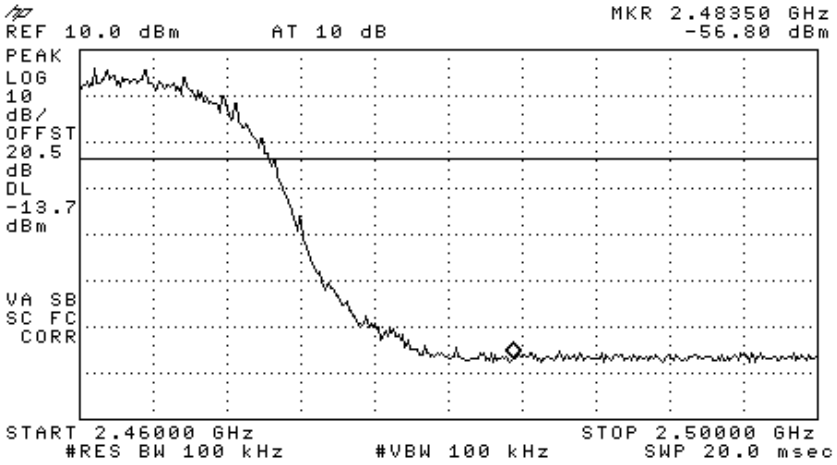

Figure 109 —2462 MHz CCK Modulation

10.2 Results table

E.U.T. Description: Wireless LAN Access Point
Model No.: MBW-WLP-1100F-HLS
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency	Band Edge			Specification	Margin
	Type of Modulation				
	OFDM	DSSS	CCK		
(MHz)	(dBc)	(dBc)	(dBc)	(dBc)	(dBc)
2412.00	41.69	46.89	44.64	-20.0	-21.69
2462.00	50.83	56.50	56.80	-20.0	-30.83

Figure 110 Band Edge Spectrum

JUDGEMENT: Passed by 21.69 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.08

Typed/Printed Name: E. Pitt

10.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacturer	Model	Serial 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, 2007	1 year

Figure 111 Test Equipment Used

11. Transmitted Power Density (2.4 GHz Transmitter)

[In accordance with section 15.247(d)]

11.1 Test procedure

The test was performed for CCK, DSSS, and OFDM modulations

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable=0.5dB. The spectrum analyzer was set to 3 kHz resolution BW. 100 kHz video BW and sweep time of 1 second for each 3 kHz "window". The spectrum peaks were located at each of the 3 operating frequencies.

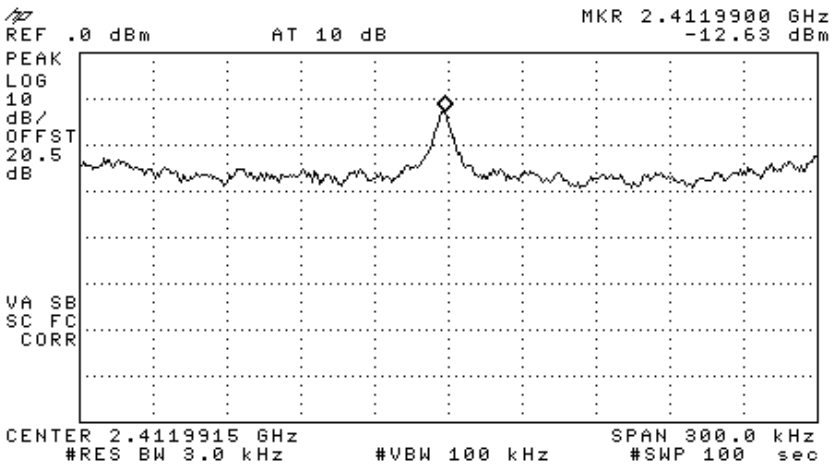

Figure 112 —2412 MHz OFDM Modulation

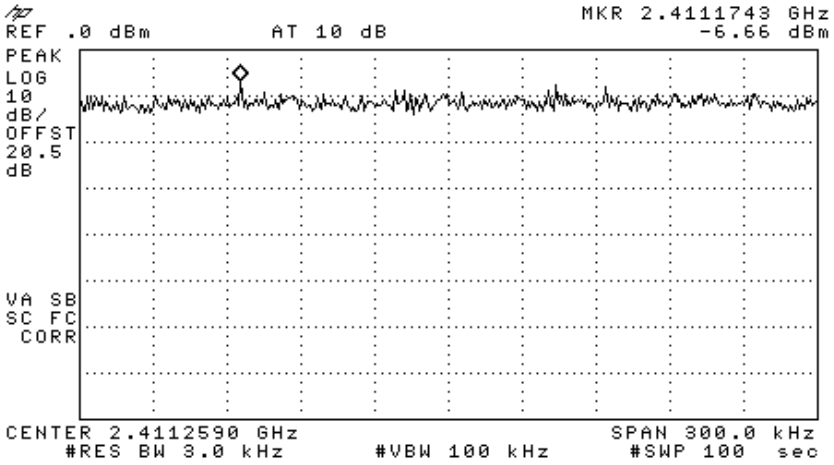

Figure 113 —2412 MHz DSSS Modulation

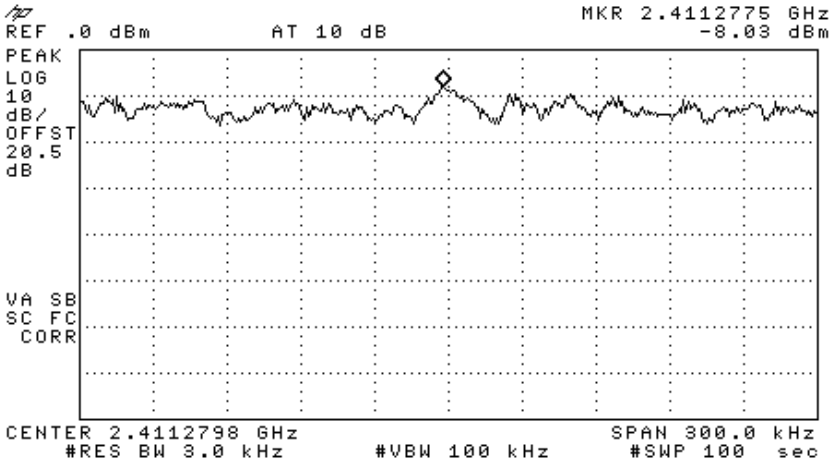

Figure 114 —2412 MHz CCK Modulation

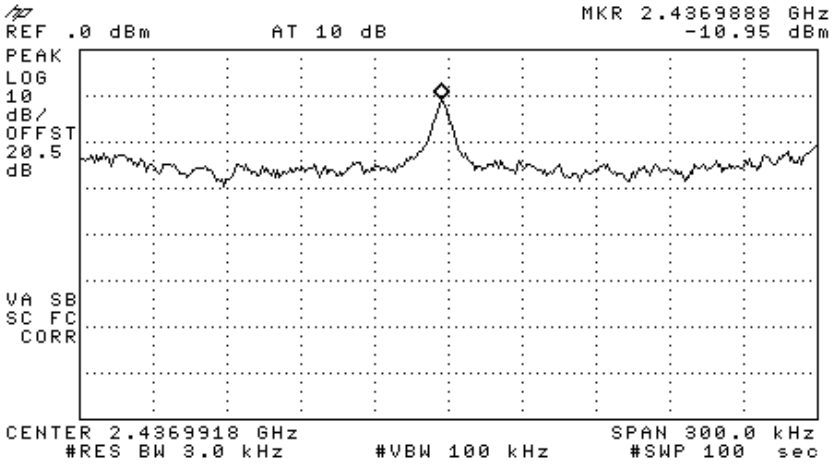

Figure 115 —2437 MHz OFDM Modulation

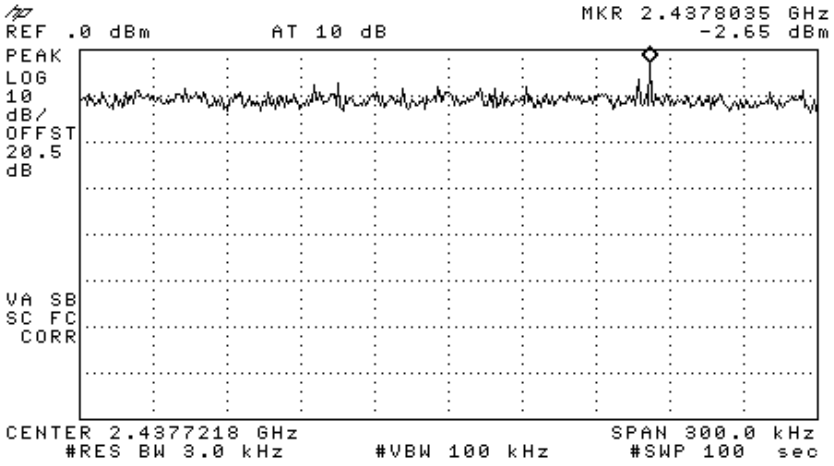

Figure 116 —2437 MHz DSSS Modulation

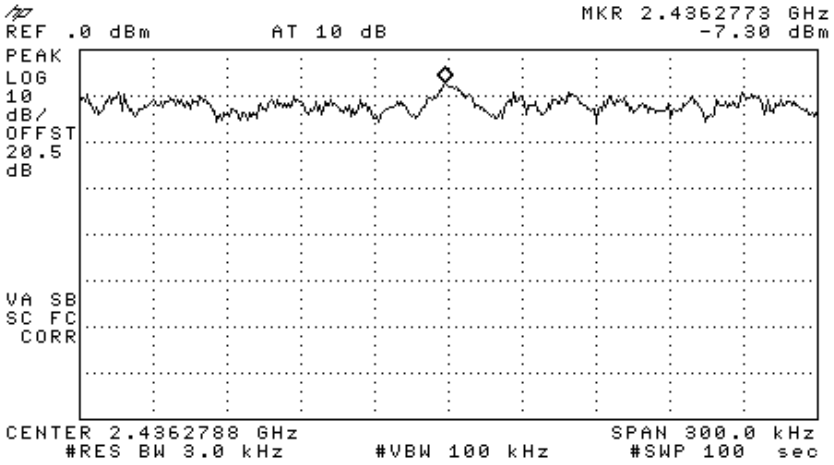

Figure 117 —2437 MHz CCK Modulation

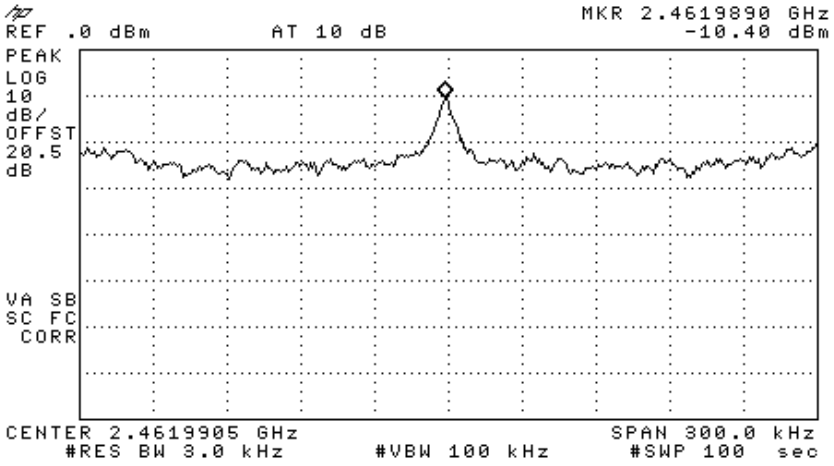

Figure 118 —2462 MHz OFDM Modulation

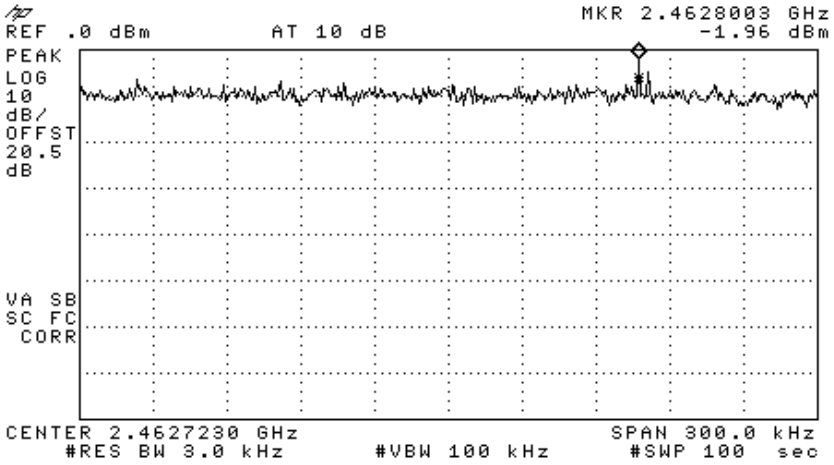

Figure 119 —2462 MHz DSSS Modulation

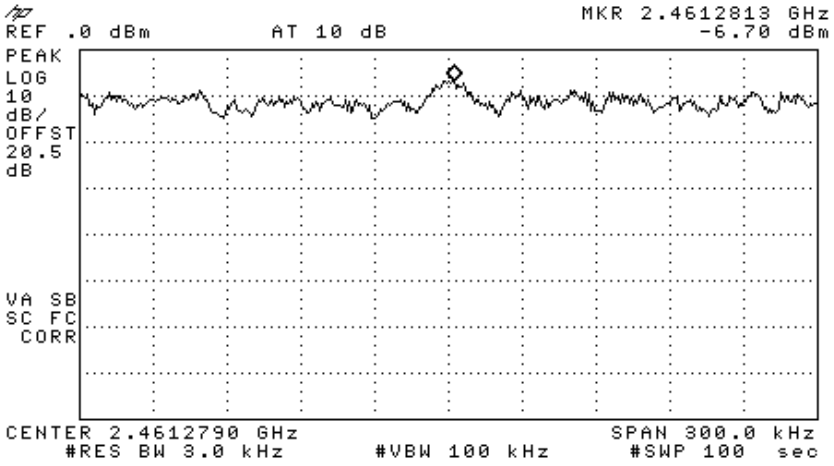

Figure 120 —2462 MHz CCK Modulation

11.2 Results table

E.U.T. Description: Wireless LAN Access Point
Model No.: MBW-WLP-1100F-HLS
Serial Number: Not Designated
Specification: F.C.C. Part 15, Subpart C

Operation Frequency	Band Edge			Specification	Margin
	Type of Modulation				
(MHz)	OFDM (dB/3kHz)	DSSS (dB/3kHz)	CCK (dB/3kHz)	(dB/3kHz)	(dB/3kHz)
2412.00	-12.63	-6.66	-8.03	2.0	-4.66
2437.00	-10.95	-2.65	-7.30	2.0	-0.65
2462.00	-10.40	-1.96	-6.70	2.0	-0.04

Figure 121 Test Results

The peak power spectral density on each antenna connector is
$PD_1 = PD_{total} - 10 \log 4 = 8-6 = 2dBm/3kHz$

JUDGEMENT: Passed by 0.04 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.08

Typed/Printed Name: E. Pitt

11.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacturer	Model	Serial 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 122 Test Equipment Used

12. Antenna Gain (2.4 GHz Transmitter)

The antenna gain is 7.4 dBi.

13. R.F Exposure/Safety (2.4 GHz Transmitter)

The E.U.T. is a fixed installation transmitter. The typical distance between the E.U.T. and the general population is 1.0 meters.

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 125.89mW (Peak) (21.0 dBm)

G_T- Antenna Gain, 21.88 = 13.4 dBi

R- Distance from Transmitter using 20cm worst case

(c) The peak power density is :

$$S_p = \frac{125.89 \times 21.88}{4\pi(20)^2} = 0.56\frac{mW}{cm^2}$$

(d) The E.U.T. transmission in actual worst case is 98.7%.

The average power over 30 minutes is:

$$P_{AV} = \frac{125.89 \times 98.7}{100} = 124.25mW$$

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

$$S_{AV} = \frac{124.25 \times 21.88}{4\pi(20)^2} = 0.54\frac{mW}{cm^2}$$

(f) This is below the FCC limit.

14. Radiated Emission Test Data Per FCC Part 15 Sub-part B

14.1 Test Specification

30-40000 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 configuration tested is shown in *Figure 3*.

The E.U.T. highest frequency source or used frequency is 5.825 GHz.

The frequency range 30-40000 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 2.9-40 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 emissions were measured at a distance of 3 meters.

14.3 Test Data

JUDGEMENT: Passed by 0.8 dB

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

The margin between the emission level and the specification limit is 0.8 dB in the worst case at the frequency of 600.00 MHz, horizontal polarization.

The signals in the band 1.0 – 40.0 GHz were 20 dB below the specification limit.

The details of the highest emissions are given in Figure 123 to Figure 126.

TEST PERSONNEL:

Tester Signature: _____ Date: 04.02.07

Typed/Printed Name: E. Pitt

Radiated Emission

E.U.T Description	Wireless LAN Access Point
Type	MBW-WLP-1100F-HLS
Serial Number:	Not Designated

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance
Frequency range: 30 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	299.996300	44.5	43.3	-2.7			23.4
2	320.000000	38.8	37.5	-8.5			16.7
3	440.000000	41.6	40.2	-5.8			20.3
4	600.000000	46.8	45.2	-0.8			24.5
5	639.995000	44.8	43.7	-2.3			24.8
6	699.990000	41.7	39.5	-6.5			25.3

Figure 123. 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	Wireless LAN Access Point
Type	MBW-WLP-1100F-HLS
Serial Number:	Not Designated

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

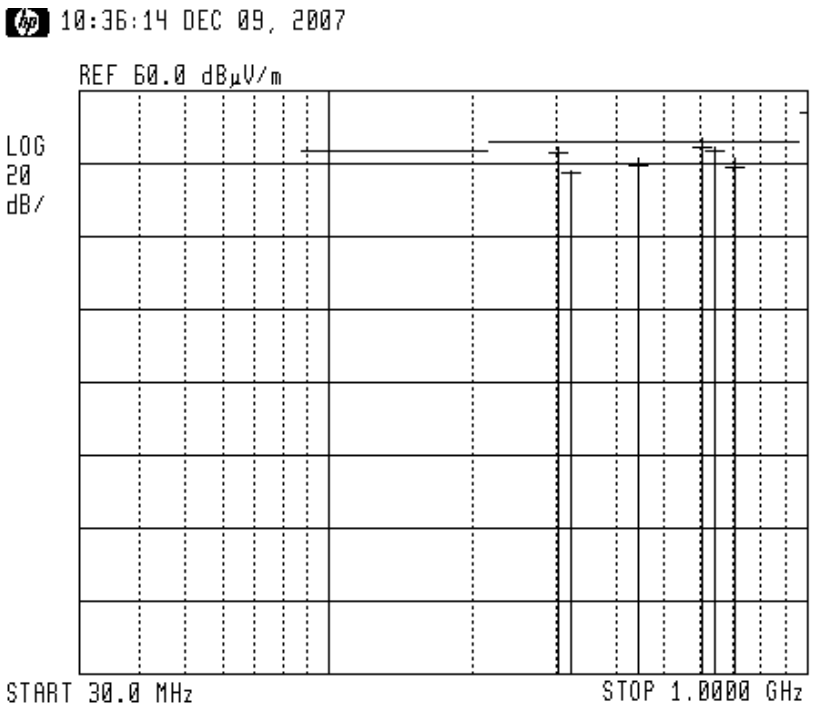

Figure 124. Radiated Emission. Antenna Polarization: HORIZONTAL Detectors: Peak, Quasi-peak

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 Wireless LAN Access Point
Type MBW-WLP-1100F-HLS
Serial Number: Not Designated

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance
Frequency range: 30 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	36.135000	36.2	33.7	-6.3			14.3
2	299.995000	41.3	37.8	-8.2			23.4
3	350.000000	42.4	41.3	-4.7			17.9
4	440.002500	39.0	37.5	-8.5			20.3
5	500.000000	42.3	40.8	-5.2			21.0
6	640.000000	44.4	42.9	-3.1			24.8
7	700.000000	43.4	41.1	-4.9			25.3

Figure 125. 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	Wireless LAN Access Point
Type	MBW-WLP-1100F-HLS
Serial Number:	Not Designated

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

Frequency range: 30 MHz to 1000 MHz
Detectors: Peak, Quasi-peak

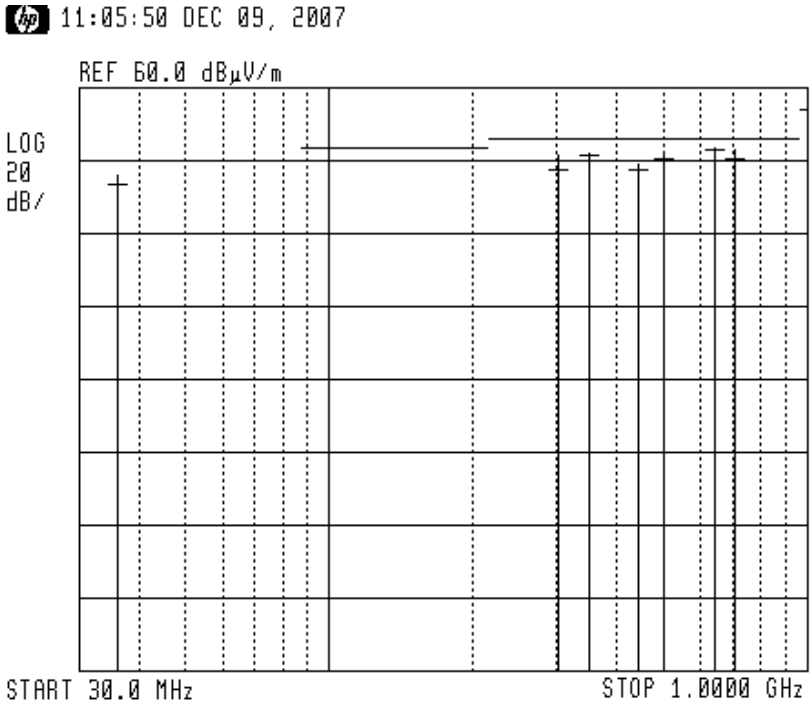

Figure 126. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

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
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	February 8, 2007	1 Year
Low Noise Amplifier	MK Milliwave	MKT6-3000 4000-30-13P	399	February 8, 2007	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 Year
Spectrum Analyzer	HP	8546E	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. Intermodulation

15.1 Test Specification

3rd; 5th Order Product

15.2 Test Procedure

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

The E.U.T was placed in the open site on a non-conductive table, 0.8 meters above the ground. The table azimuth was controlled by a remote positioner.

The emissions below 2.9 GHz 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 above 2.9 GHz, a spectrum analyzer including a low noise amplifier was used. 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 receiver and/or spectrum analyzer center frequency was set to 3rd and 5th order intermodulation products, resulting from the transmitters' operation frequencies below.

The emissions were measured at a distance of 3 meters.

The configurations tested included three transmitters operating in the following frequency ranges (1 transmitter per range):

2412-2462 MHz

4950-4980 MHz

5745-5825 MHz

The E.U.T. was tested in 2 configurations:

Configuration 1:

Transmitter 1 operated at 2462 MHz, antenna gain = 7.4 dBi

Transmitter 2 operated at 4950 MHz, antenna gain = 9 dBi

Transmitter 3 operated at 5745 MHz, antenna gain = 22 dBi

Configuration 2:

Transmitter 1 operated at 2462 MHz, antenna gain = 7.4 dBi

Transmitter 2 operated at 4980 MHz, antenna gain = 9 dBi

Transmitter 3 operated at 5745 MHz, antenna gain = 22 dBi

15.3 Test Data

JUDGEMENT: Passed

The intermodulation signal levels were below the spectrum analyzer noise level, at least 6 dB below the specification limit.

The results for both frequency configurations were the same.

TEST PERSONNEL:

Tester Signature:  Date: 04.02.08

Typed/Printed Name: E. Pitt

15.4 Test Instrumentation Used, Intermodulation 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	February 8, 2007	1 Year
Low Noise Amplifier	MK Milliwave	MKT6-3000 4000-30-13P	399	February 8, 2007	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 Year
Spectrum Analyzer	HP	8546E	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

16. APPENDIX A - CORRECTION FACTORS

16.1 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".

16.2 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.

16.3 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.

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".*

16.4 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".*

16.5 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".

16.6 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".*

16.7 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			

16.8 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

16.9 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

16.10 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