

DATE: 21 September 2006

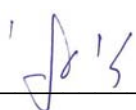
I.T.L. (PRODUCT TESTING) LTD.
FCC EMC/Radio Test Report
for
GO Networks Inc.

Equipment under test:
Outdoor Wireless LAN Access Point

MBW-WLP-1100F

Written by: 
D. Shidlow, Documentation

Approved by: 
E. Pitt, Test Engineer

Approved by: 
I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

Measurement/Technical Report for
GO Networks Inc.
Outdoor Wireless LAN Access Point
MBW-WLP-1100F
FCC ID: T3G-WLP-1100F-000
21 September 2006

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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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:	Sharon Ashkenazi
Equipment Under Test (E.U.T):	Outdoor Wireless LAN Access Point
Equipment Model No.:	MBW-WLP-1100F
Equipment Serial No.:	SCGG1001022
Date of Receipt of E.U.T:	02.08.06
Start of Test:	02.08.06
End of Test:	08.08.06
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	See Section 2

1.2 List of Accreditations

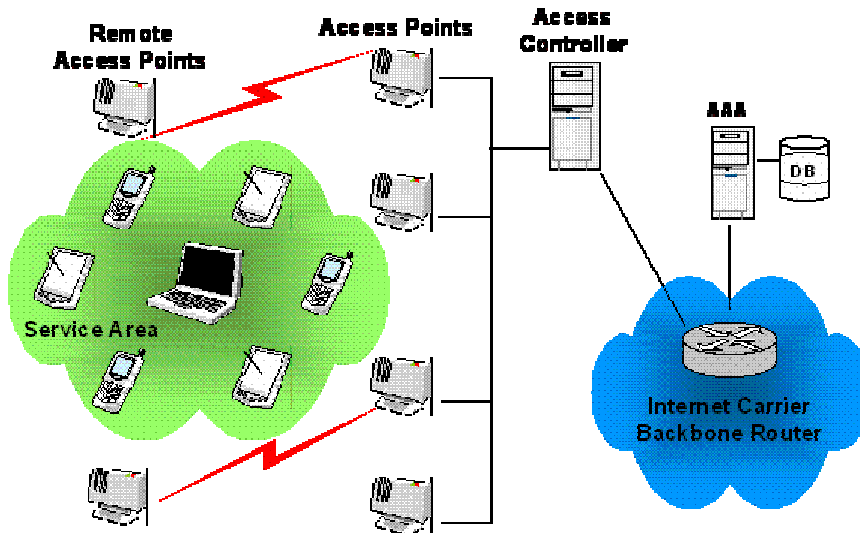
The EMC laboratory of I.T.L. is accredited by the following bodies:

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

The WLP is designed to be an outdoor Wireless LAN Access Point (AP) to be installed in public wireless LAN hot spots / hot zones. A user in the vicinity of the AP, that has a laptop / PDA or cell phone with a wireless LAN NIC (Network Interface Card) can associate with the AP and be connected to the Internet.



In a public WLAN (wireless LAN) installation, the WLPs will be installed by large service providers, or municipalities in areas where there will be a demand for this service, such as train stations, airports and also city – wide deployments.

Typical Installations

The WLP-1100F will typically be installed outdoors to provide outdoor coverage of Campuses or city neighborhoods. Many of the WLP-1100F installations will be on top of light poles. These types of installations are common in municipality installations.

External Interfaces

Interface	Description
Power	100-240VAC power input, sealed connector
GND	Ground Screw
Ethernet	Sealed RJ45 connector
RS232	For maintenance only Sealed RJ45 connector
Access Channel	802.11b/g WLAN channel Frequencies 2.412 – 2.462GHz
Back Haul Channel	802.11a WLAN channel Frequencies 5.745 – 5.825 GHz

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

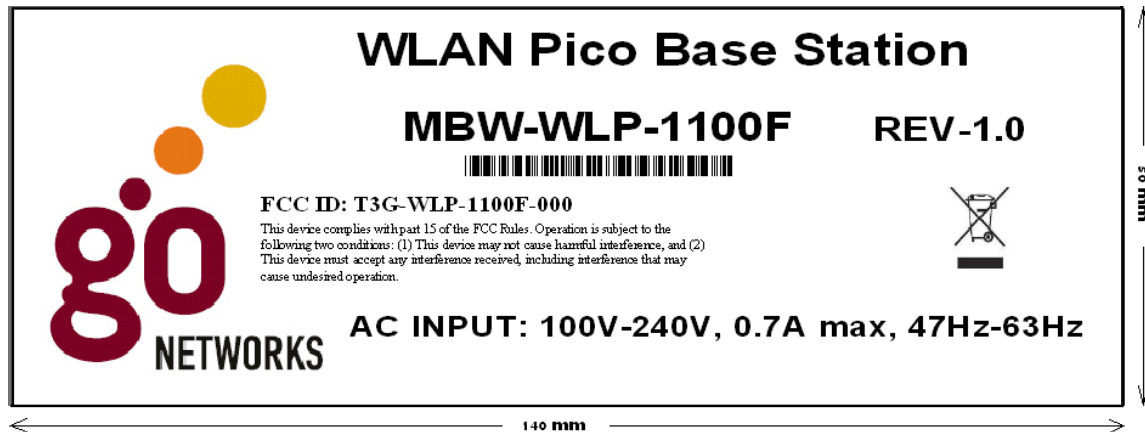


Figure 1. FCC Label

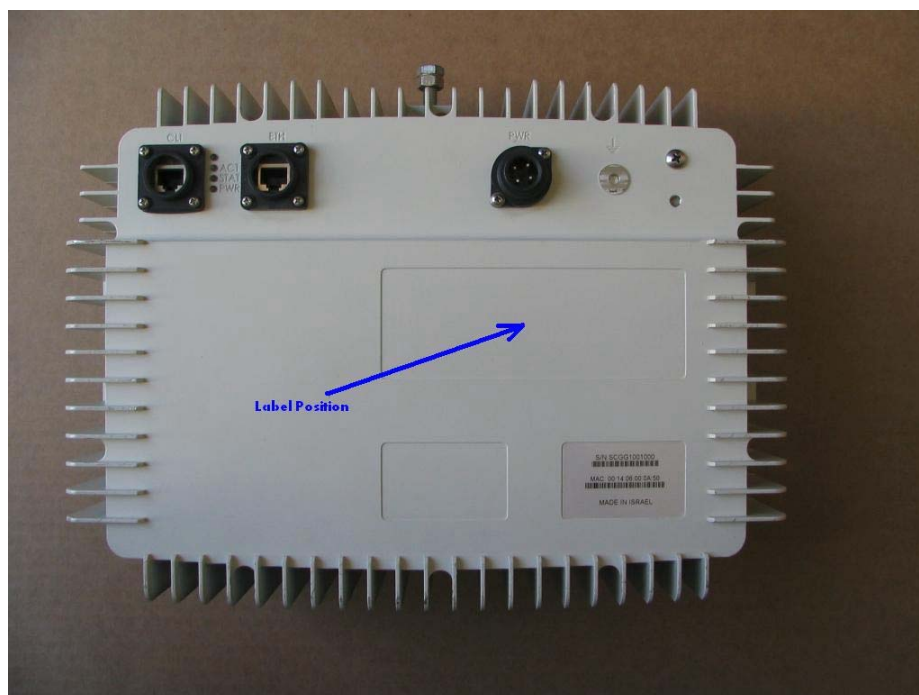


Figure 2. Location of Label on EUT

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

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

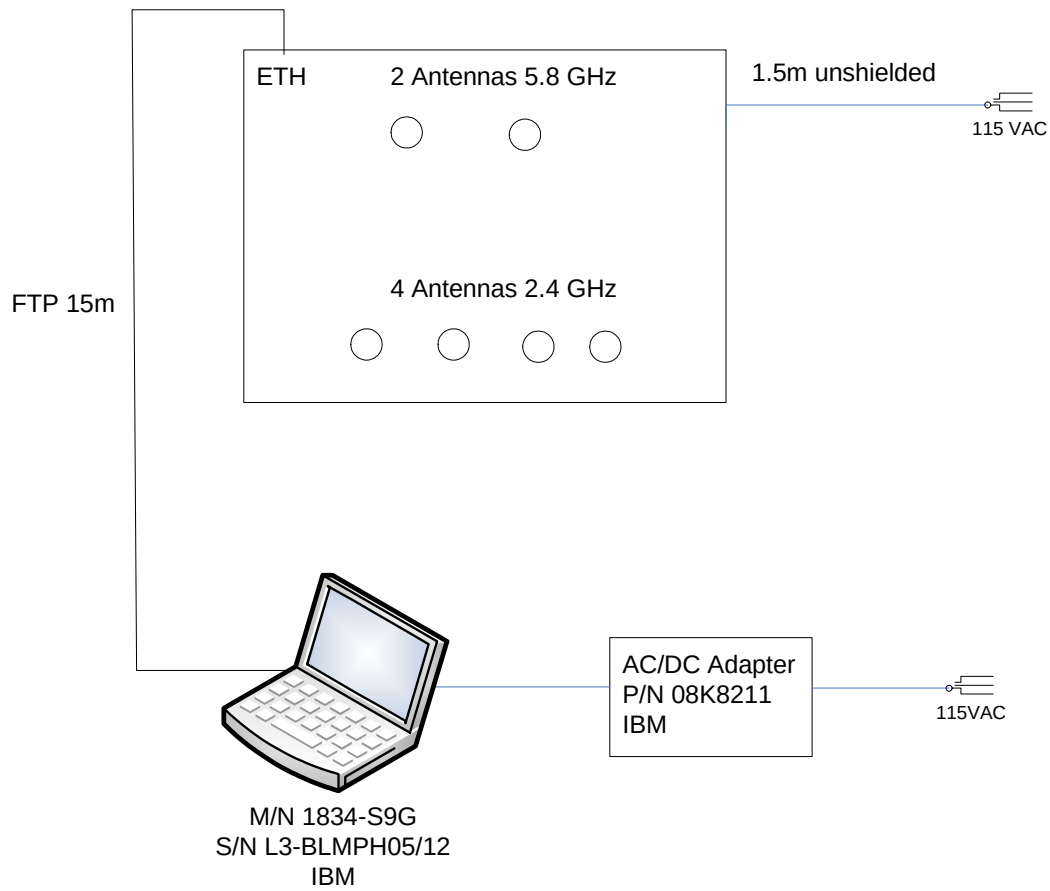


Figure 3. Configuration of Tested System

4. Block Diagram

4.1 Schematic Block/Connection Diagram

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4.2 Theory of Operation

The WL-1100F employs 2 WLAN channels simultaneously and independently. One of these WLAN channels (named the access channel) is used primarily for providing access to WLAN stations. The other channel (named the back haul channel) is used solely for providing a connection between different WLP deployed in the same vicinity.

A WLAN Station (STA) can associate to the access channel and transmit / receive data from it. The WLP's access channel employs a multi element (4) antenna with a beam steering algorithm to steer a directional beam in the direction of the STA from which it is receiving information / to which it is transmitting information.

The beam steering is performed digitally on the Base Band (BB) signal. In transmission the BB signal is duplicated 4 times. Each "copy" of the signals is modified digitally and transmitted to a separate RF chain. Each of the 4 RF chains performs up – conversion and amplification separately and drives one of the 4 antenna elements. A similar performance happens in reception.

The back haul (BH) channel is a non-beam forming channel. It is made up of a single RF chain ending with 2 antennas which are selectable via a RF switch. This provides the BH channel with selection diversity of about 3dB.

5. Spurious Radiated Emission in the Restricted Bands Below 1 GHz (2.4 GHz Transmitter)

5.1 Test Specification

9 kHz-1000 MHz, FCC Part 15, Subpart B, CLASS B

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 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 MHz.

5.3 Test Results

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

The results for all three operating frequencies were the same.

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

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: E. Pitt

Date: 06.09.06

Typed/Printed Name: E. Pitt

5.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	March 22, 2006	1 year
RF Section	HP	85420E	3427A00103	March 22, 2006	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 19, 2006	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 17, 2005	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 17, 2005	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	ThinkJet 2225	2738508357.0	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:

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

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

No external pre-amplifiers are used.

6. Spurious Radiated Emission in the Restricted Band, Above 1 GHz (2.4 GHz Transmitter)

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.

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 at the frequencies of 2412, 2437, and 2462 MHz.

6.2 Test Data

JUDGEMENT: Passed by 5.7 dB

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

The margin between the emission level and the specification limit is 5.7 dB in the worst case at the frequency of 2483.50 MHz, horizontal and vertical polarizations.

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

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Peak

Freq.	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
2390.00	62.8**	74.0	-11.2
2483.50	63.0**	74.0	-11.0
4824.00	42.5*	74.0	-31.5
4874.00	43.8*	74.0	-30.2
4924.00	43.2*	74.0	-30.8

**Figure 4. Radiated Emission. Antenna Polarization: HORIZONTAL.
 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- Preamplifier Gain

** “Correction Factor” = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Average

Freq.	Average Amp	Average Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
2390.00	47.9**	54.0	-6.1
2483.50	48.3**	54.0	-5.7
4824.00	32.3*	54.0	-21.7
4874.00	34.0*	54.0	-20.0
4924.00	33.8*	54.0	-20.2

**Figure 5. Radiated Emission. Antenna Polarization: HORIZONTAL.
 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- Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Peak

Freq.	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
2390.00	62.8**	74.0	-11.2
2483.50	63.0**	74.0	-11.0
4824.00	42.5*	74.0	-31.5
4874.00	43.8*	74.0	-30.2
4924.00	43.2*	74.0	-30.8

**Figure 6. Radiated Emission. Antenna Polarization: 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- Preamplifier Gain

** “Correction Factor” = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
 Detector: Average

Freq.	Average Amp	Average Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
2390.00	47.9**	54.0	-6.1
2483.50	48.3**	54.0	-5.7
4824.00	32.3*	54.0	-21.7
4874.00	34.0*	54.0	-20.0
4924.00	33.8*	54.0	-20.2

**Figure 7. Radiated Emission. Antenna Polarization: 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- Preamplifier Gain

** Correction Factor = Antenna Factor + Cable Loss

6.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Receiver	HP	85422E	3411A00102	March 22, 2006	1 year
RF Section	HP	85420E	3427A00103	March 22, 2006	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	ThinkJet2225	2738508357	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 24,2005	2 year
Horn Antenna	EMCO	3115	29845	March 15, 2006	2 year
Horn Antenna	ARA	SWH-28	1007	October 28, 2005	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	October 16, 2005	1 year
Low Noise Amplifier	Sophia Wireless	LNA28-B	232	February 8, 2006	1 year
Spectrum Analyzer	HP	8592L	3926A01204	February 6, 2006	1 year
Spectrum Analyzer	HP	8564E	3442A00275	February 1, 2006	1 year

7. Maximum Transmitted Peak Power Output (2.4 GHz Transmitter)

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 EXT ATT=24 dB (3×8 dB) and an appropriate coaxial cable (0.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 1 MHz RBW. The power was measured over the channel bandwidth of 12 MHz (See Plots in Figure 8 to Figure 16). Peak power level was measured at selected operation frequencies.

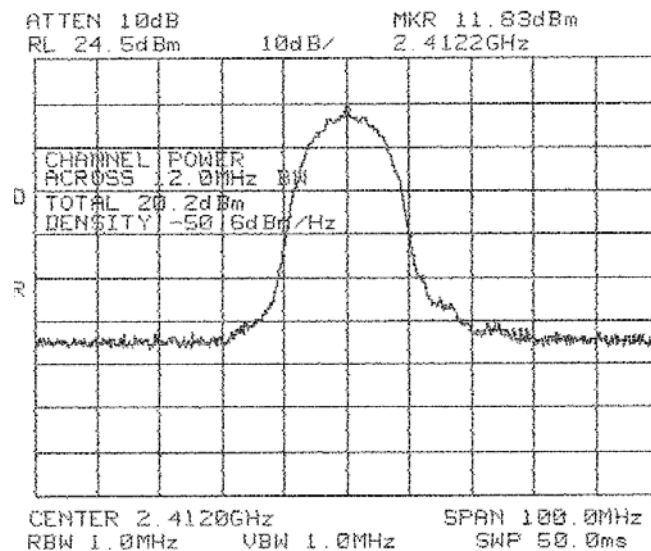


Figure 8 2412 MHz CCK Modulation

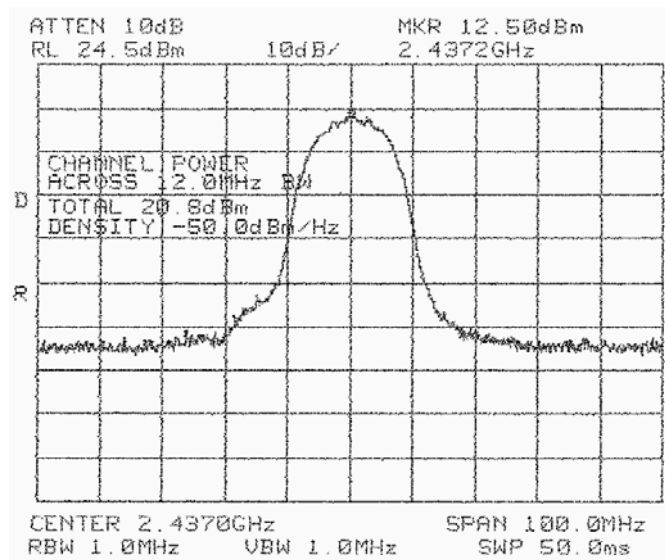


Figure 9 24370 MHz CCK Modulation

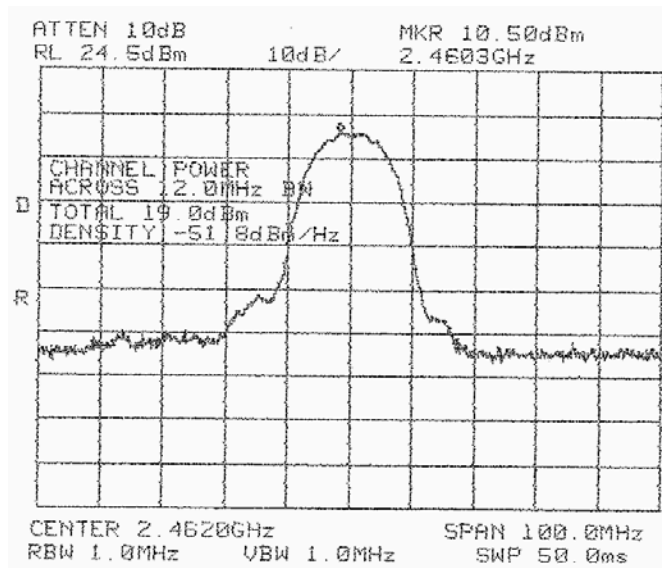


Figure 10 24620 MHz CCK Modulation

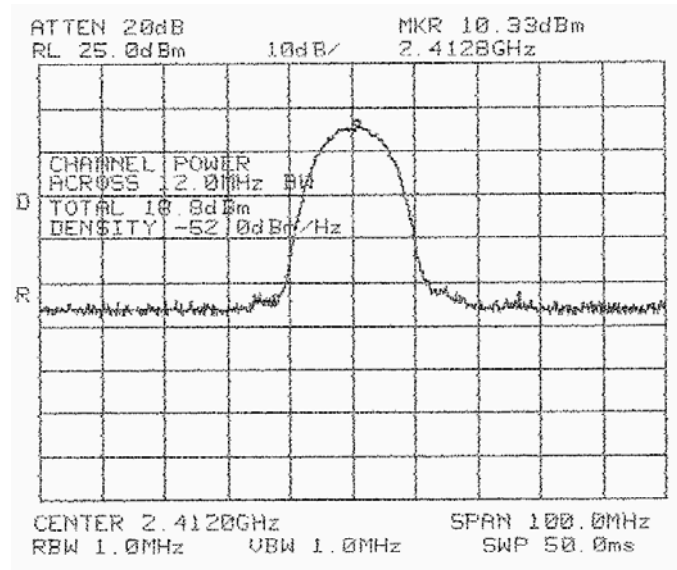


Figure 11 24120 MHz DSSS Modulation

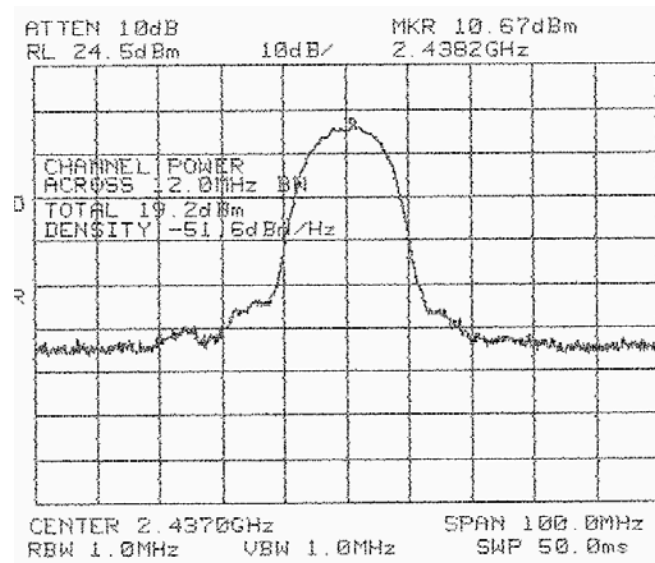


Figure 12 24370 MHz DSSS Modulation

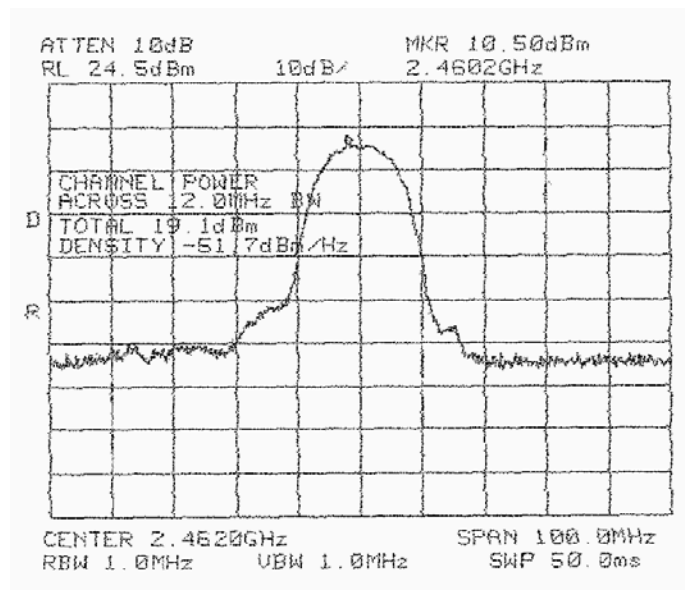


Figure 13 24620 MHz DSSS Modulation

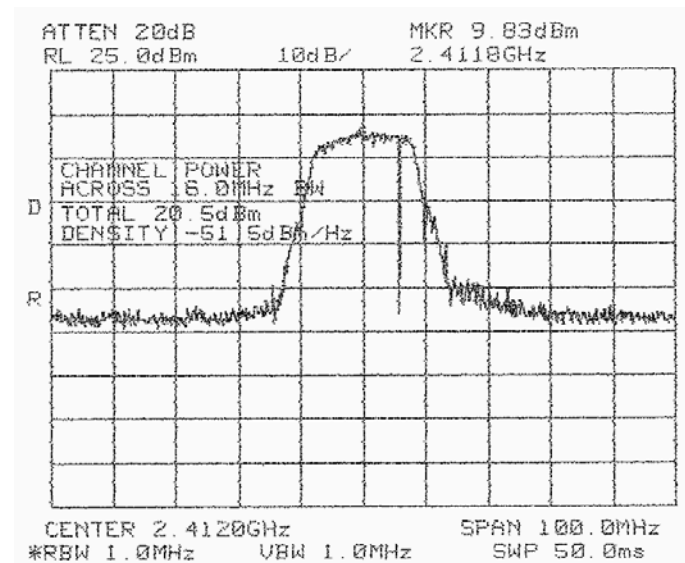


Figure 14 24120 MHz OFDM Modulation

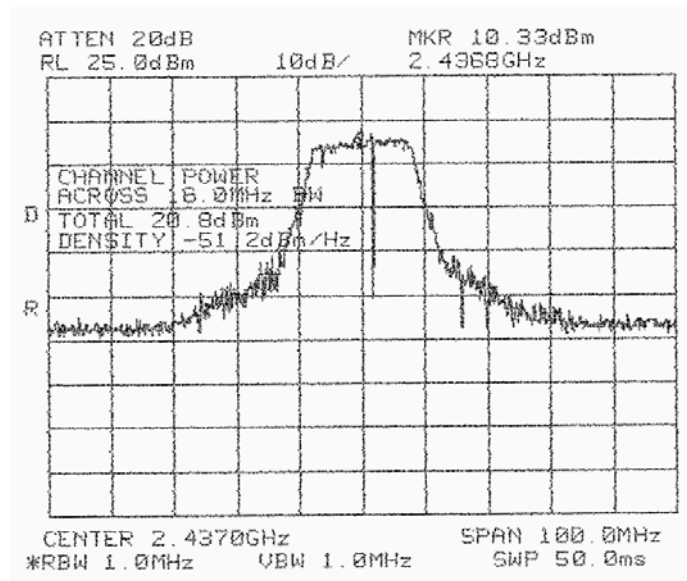


Figure 15 24370 MHz OFDM Modulation

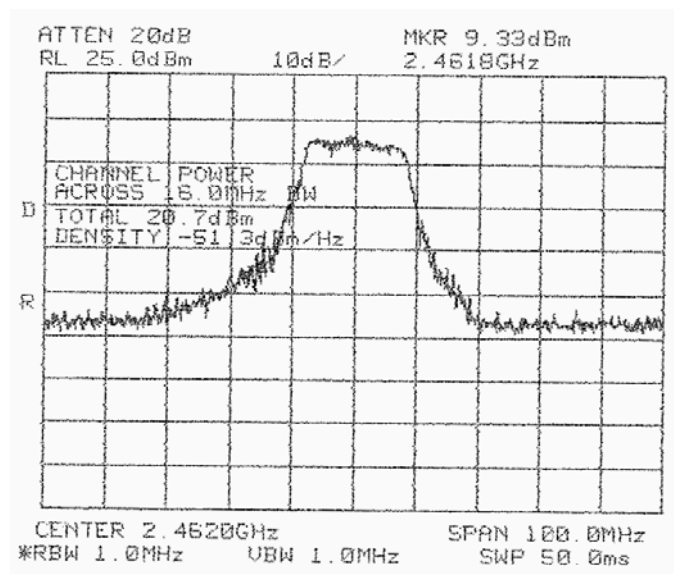


Figure 16 24620 MHz OFDM Modulation

7.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Peak Power			Specification (dBm)	Margin (dB)
	Type of Modulation				
	CCK (dBm)	DSSS (dBm)	OFDM (dBm)		
2412.00	20.2	18.8	20.5	21.5	-1.0
2437.00	20.8	19.2	20.8	21.5	-0.7
2462.00	19.0	19.1	20.7	21.5	-0.8

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:

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

JUDGEMENT: Passed by 0.7 dB

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

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	8592L	3826A01204	February 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 18 Test Equipment Used

8. Peak Power Output Out of 2400-2483.5 MHz Band (2.4 GHz Transmitter)

8.1 Test procedure

The test was performed for OFDM modulation.

The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=24dB ($3 \times 8\text{dB}$) and an appropriate coaxial cable=0.5dB. 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, and 100 kHz resolution BW for the frequency range 10.0 MHz-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.

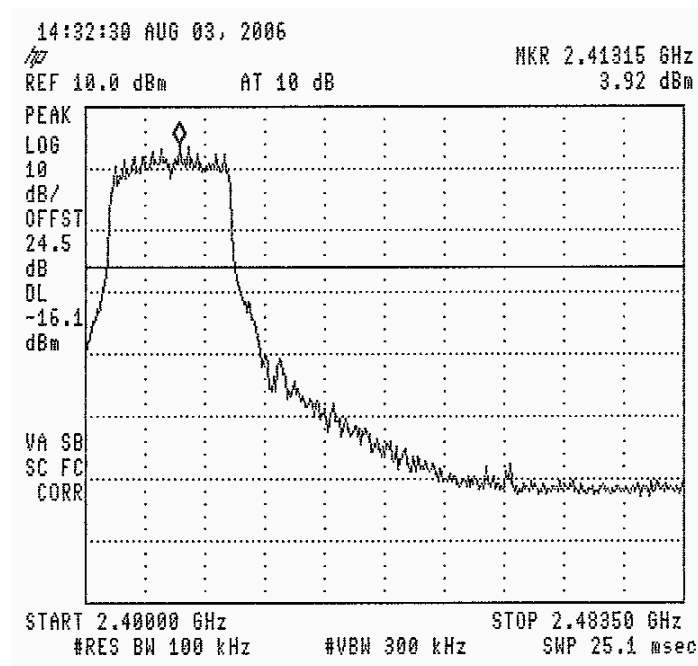


Figure 19 —2412 MHz

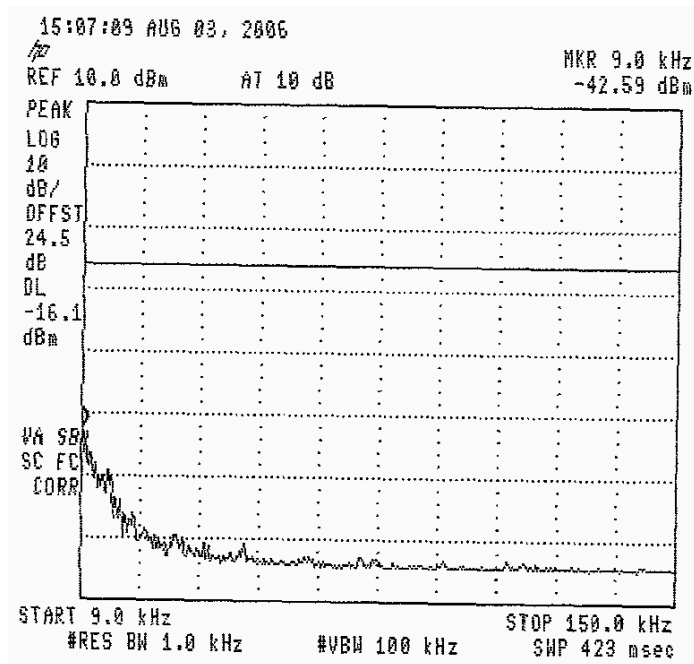


Figure 20 —2412 MHz

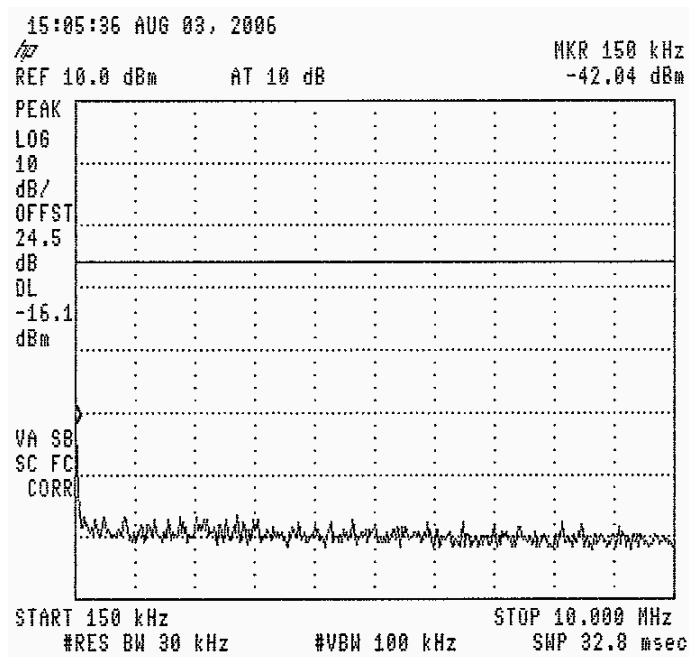


Figure 21 —2412 MHz

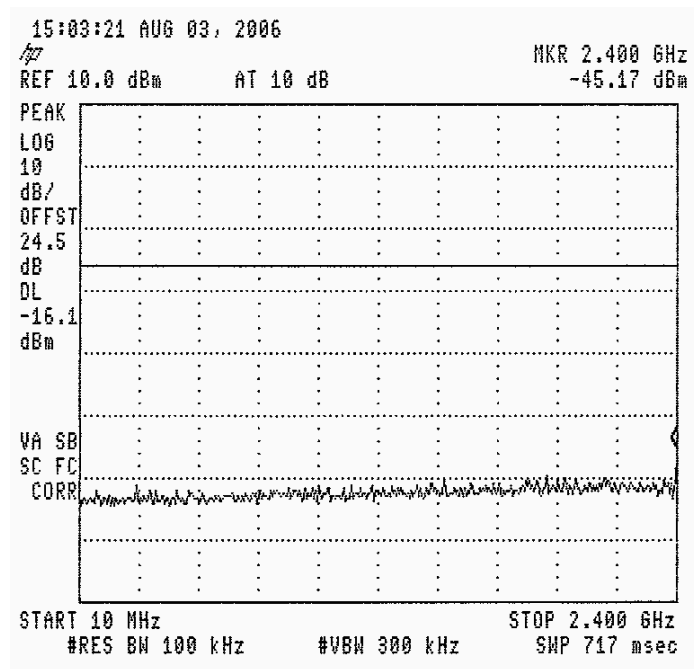


Figure 22 —2412 MHz

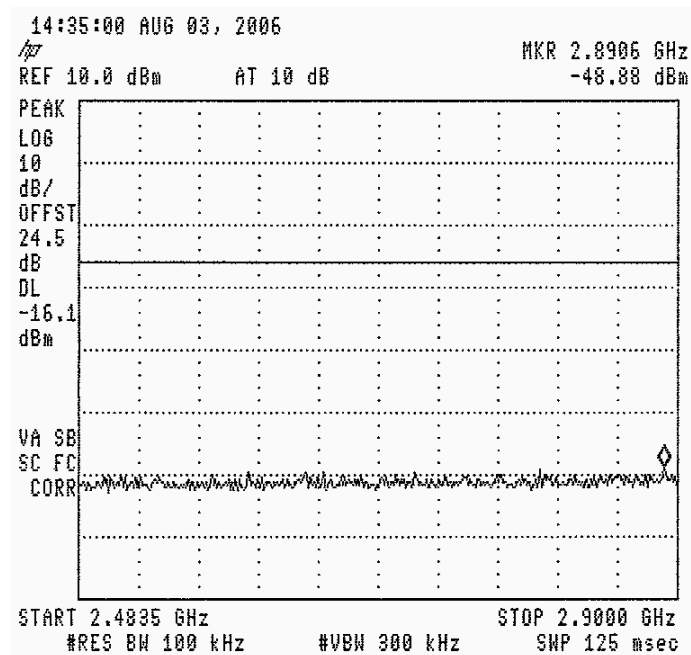


Figure 23 —2412 MHz

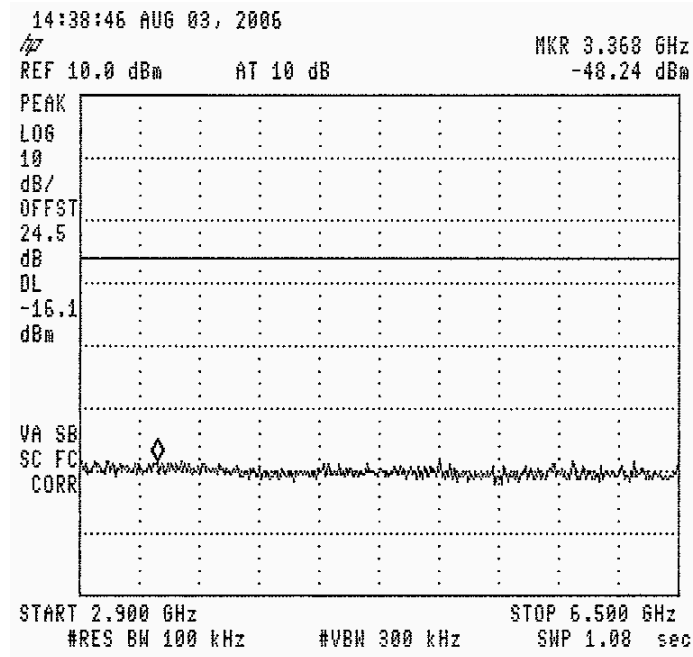


Figure 24 —2412 MHz

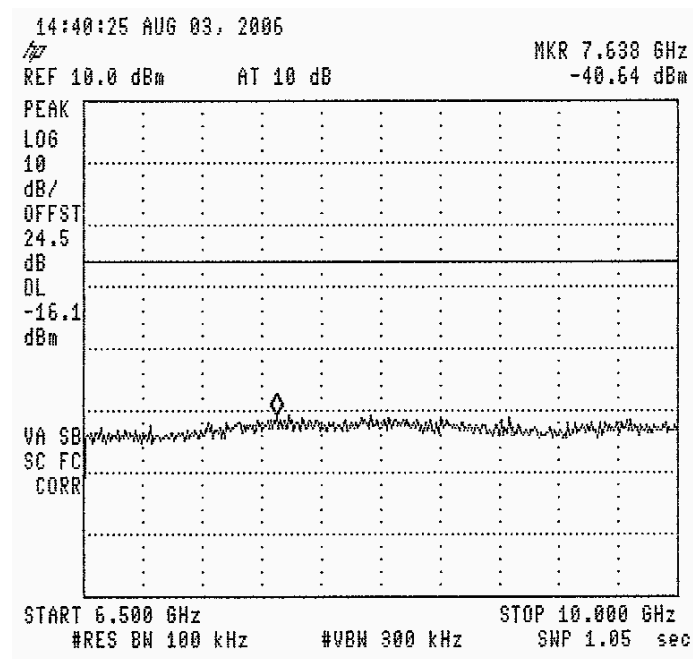


Figure 25 —2412 MHz

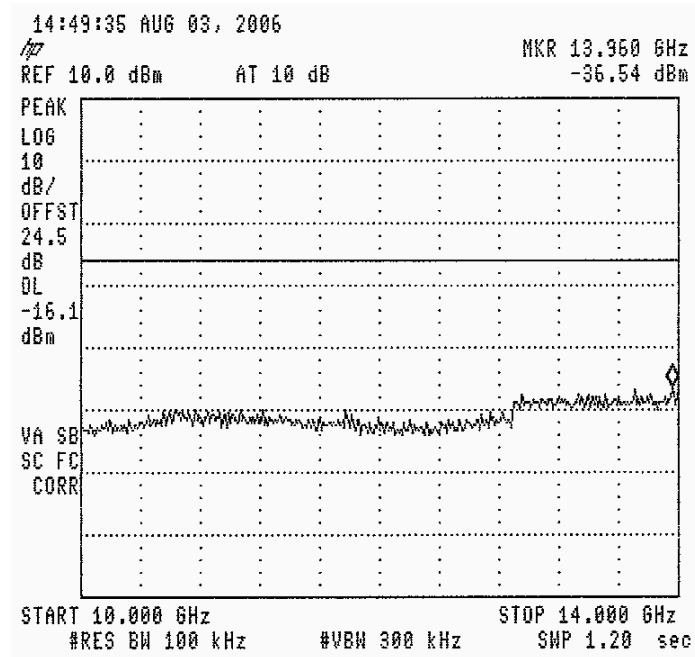


Figure 26 —2412 MHz

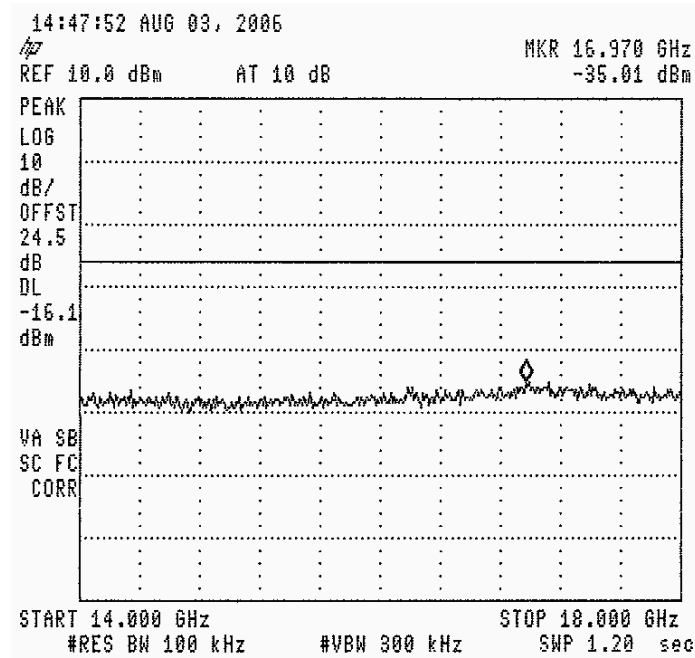


Figure 27 —2412 MHz

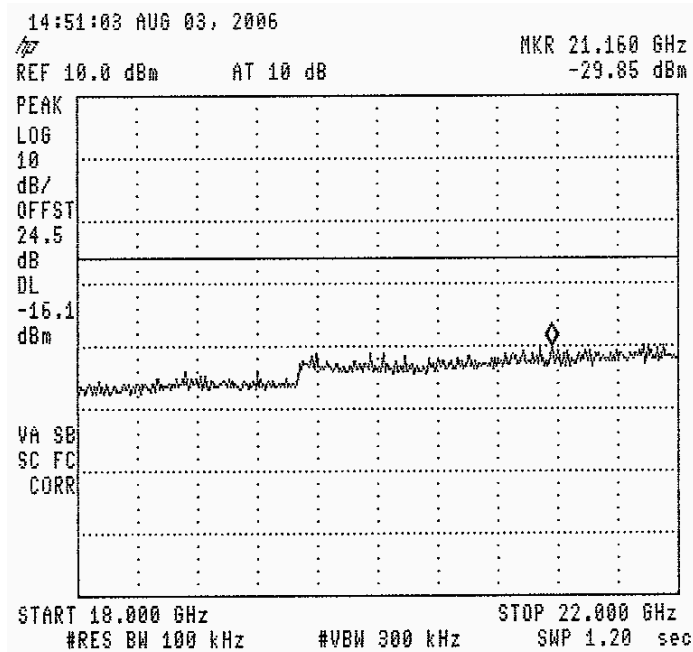


Figure 28 —2412 MHz

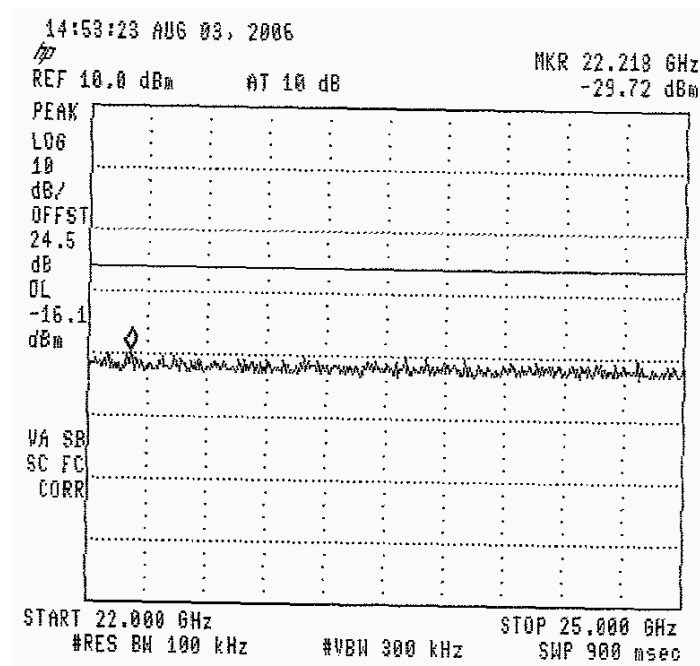


Figure 29 —2412 MHz

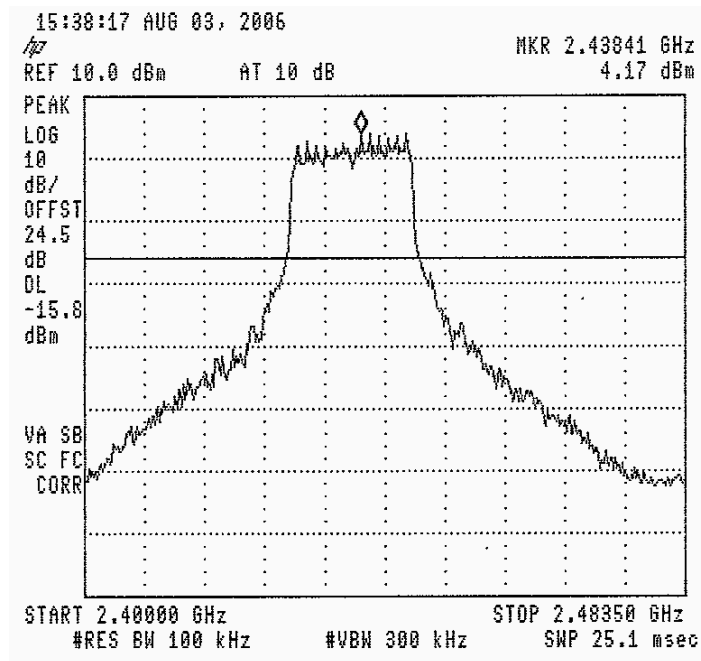


Figure 30 —2437 MHz

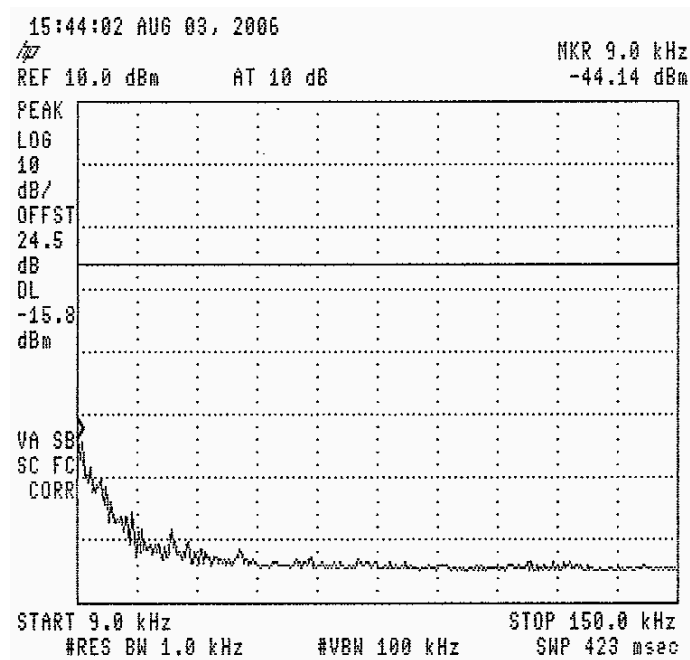


Figure 31 —2437 MHz

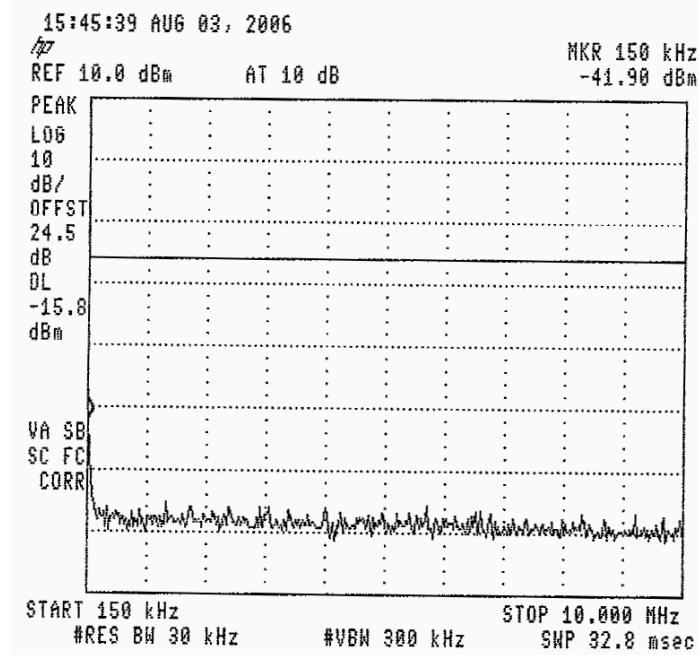


Figure 32 —2437 MHz

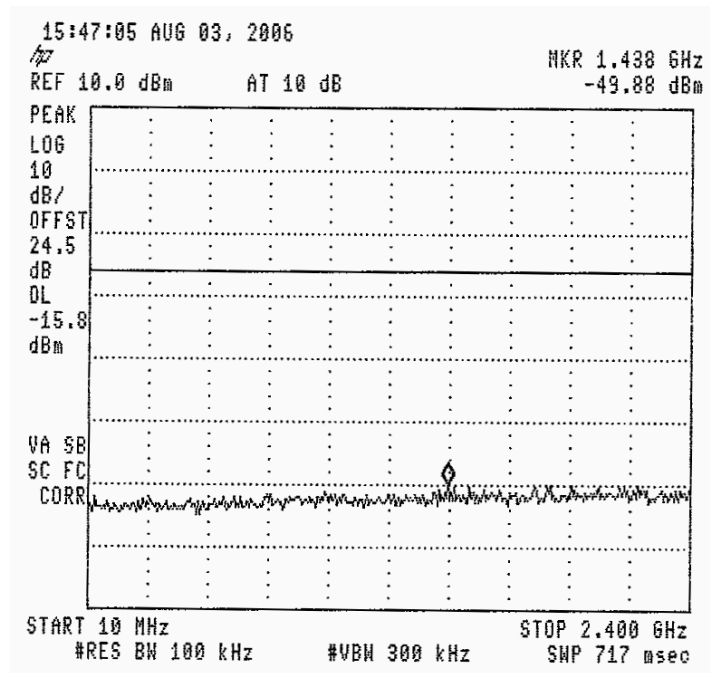


Figure 33 —2437 MHz

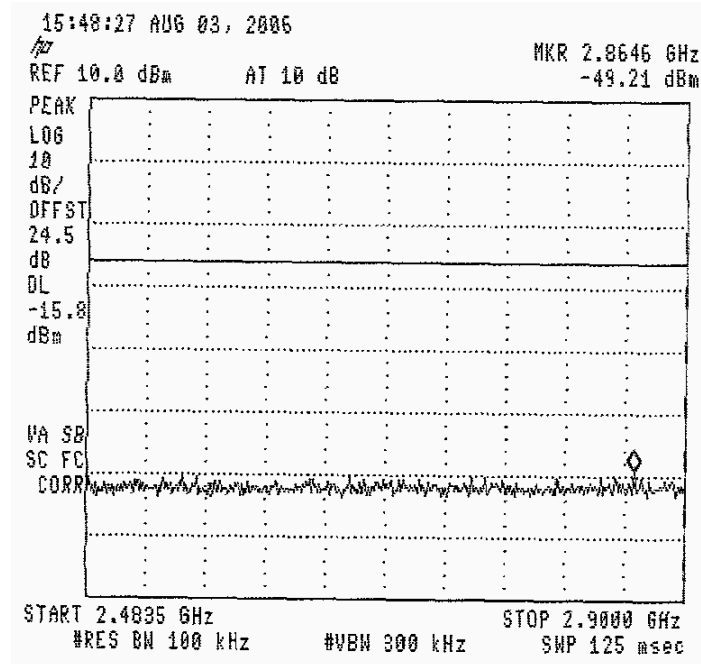


Figure 34 —2437 MHz

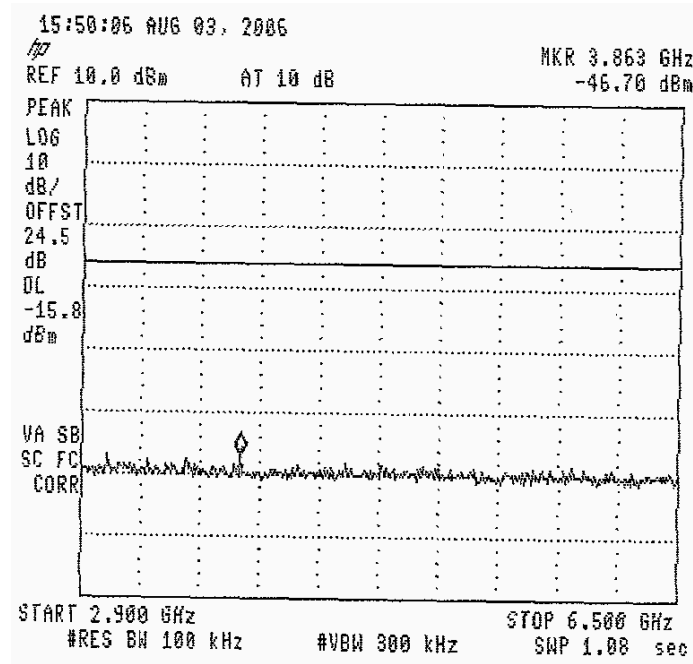


Figure 35 —2437 MHz

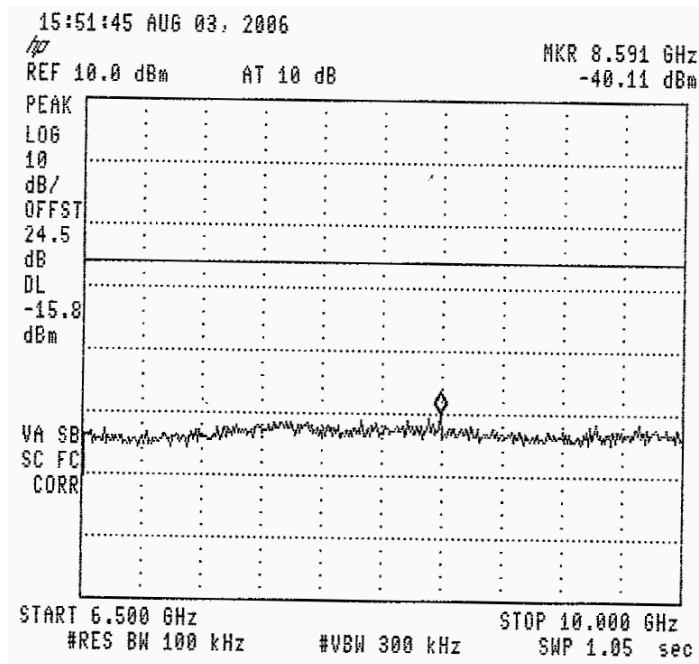


Figure 36 —2437 MHz

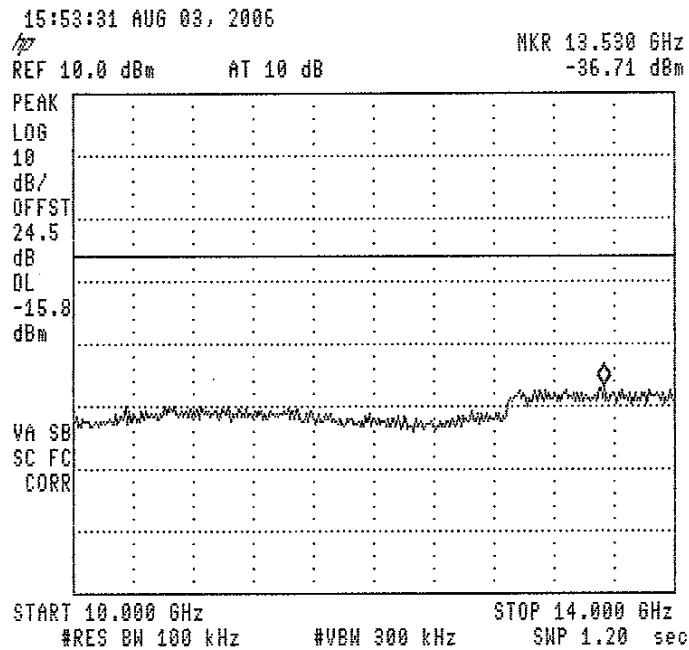


Figure 37 —2437 MHz

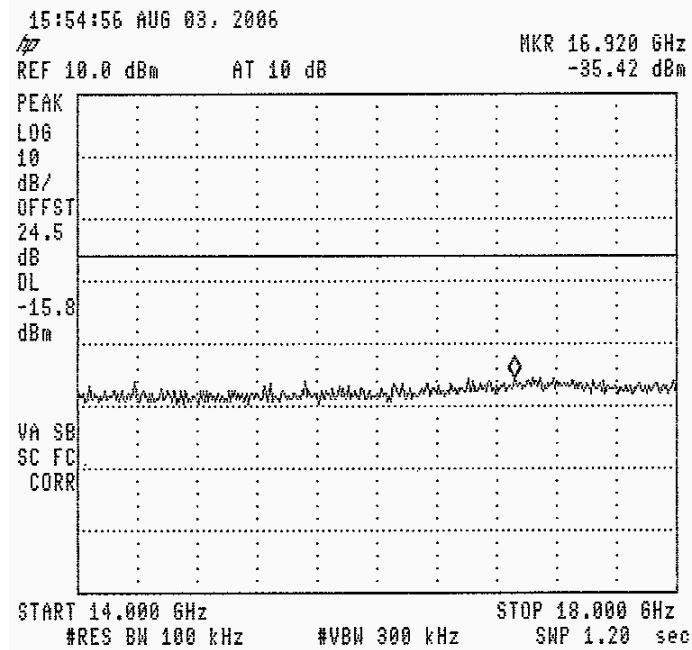


Figure 38 —2437 MHz

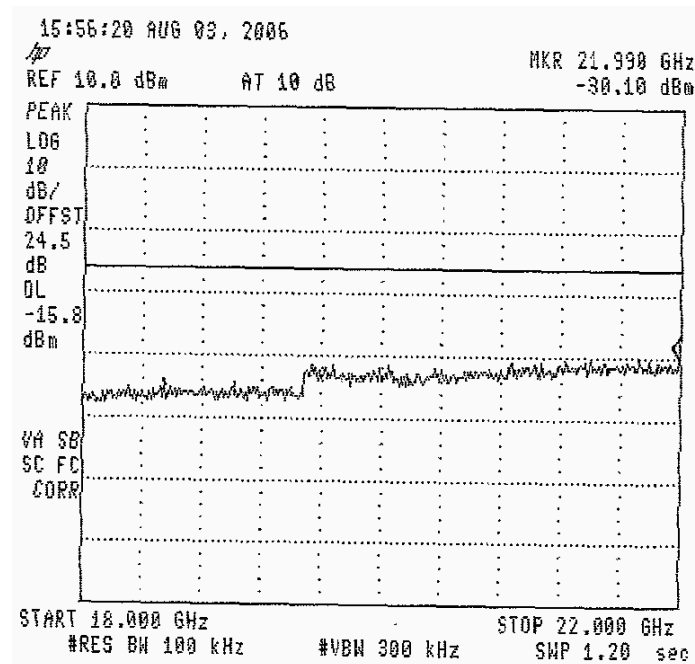


Figure 39 —2437 MHz

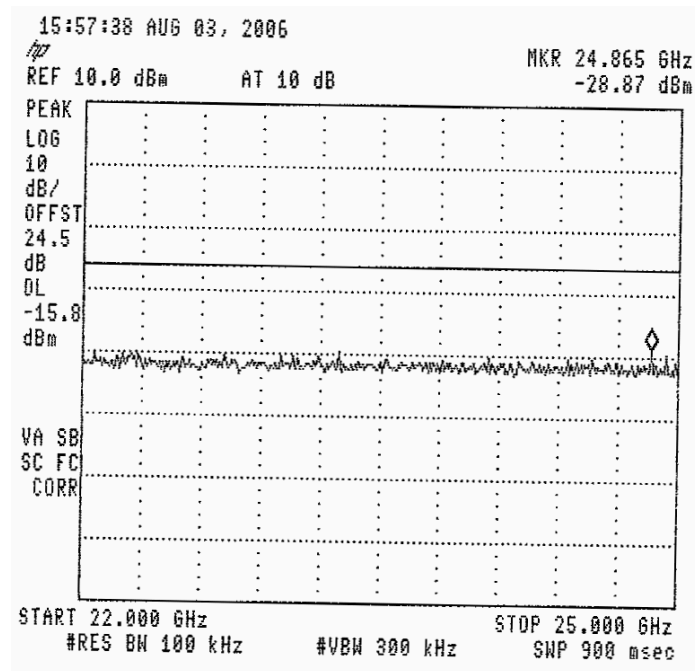


Figure 40 —2437 MHz

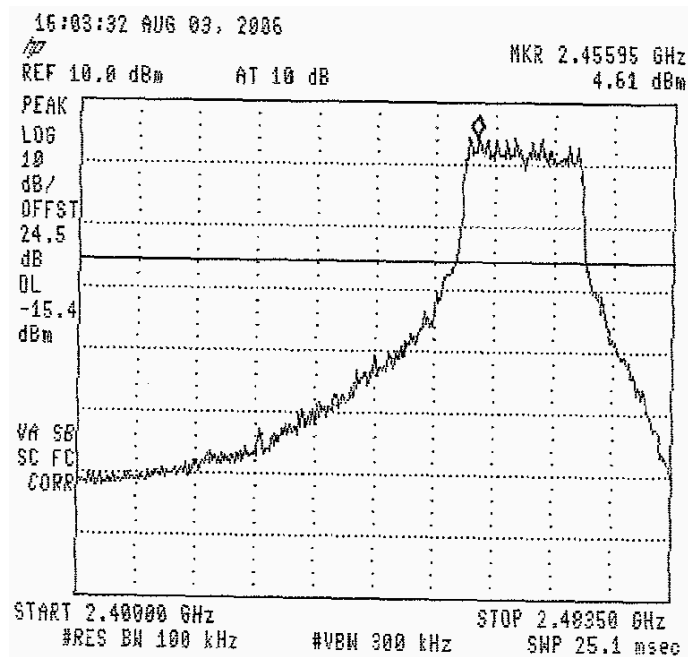


Figure 41 —2462 MHz

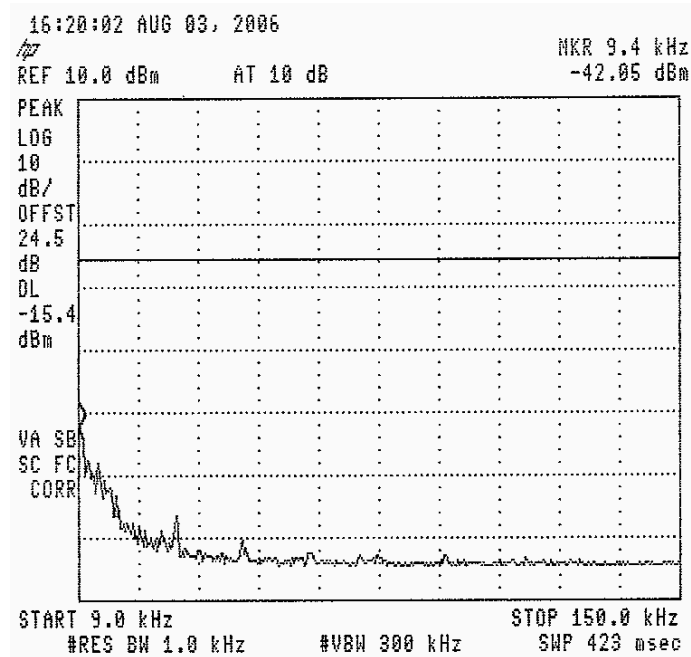


Figure 42 —2462 MHz

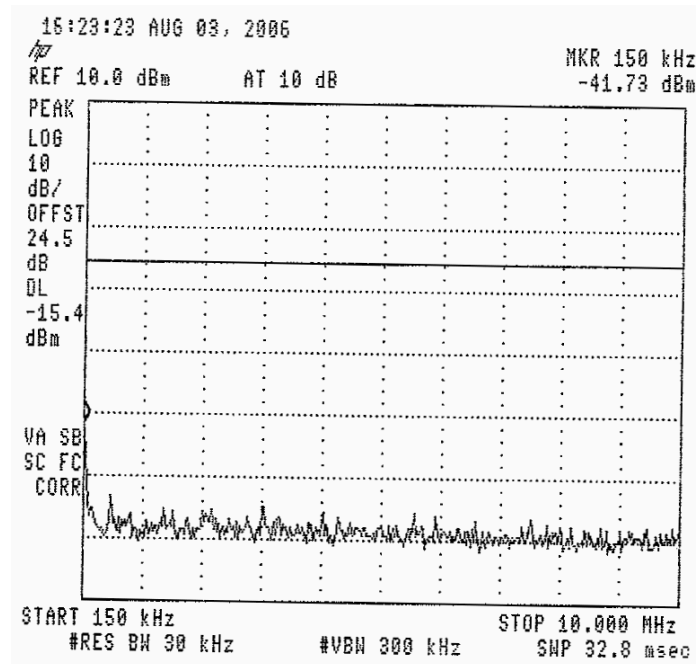


Figure 43 —2462 MHz

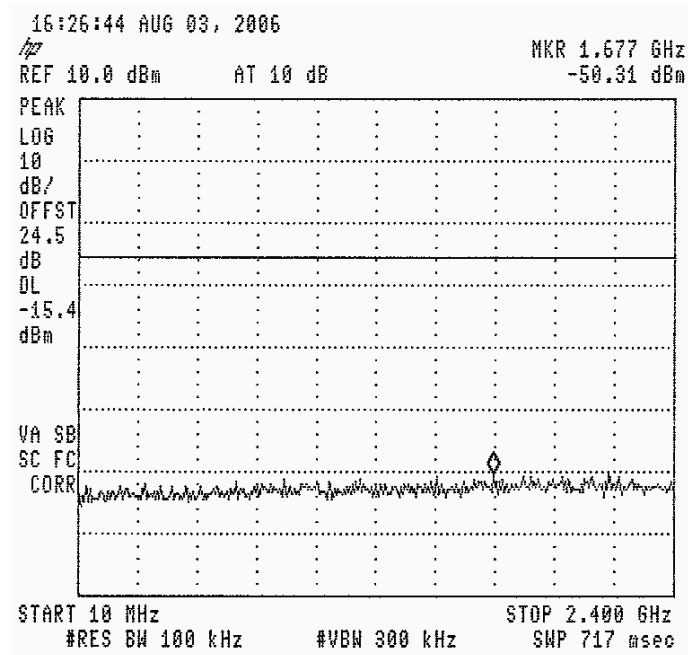


Figure 44 —2462 MHz

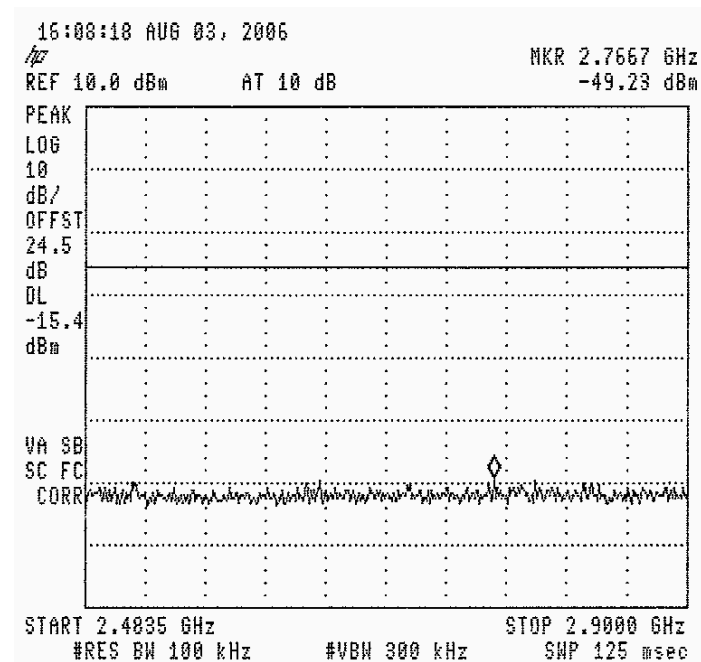


Figure 45 —2462 MHz

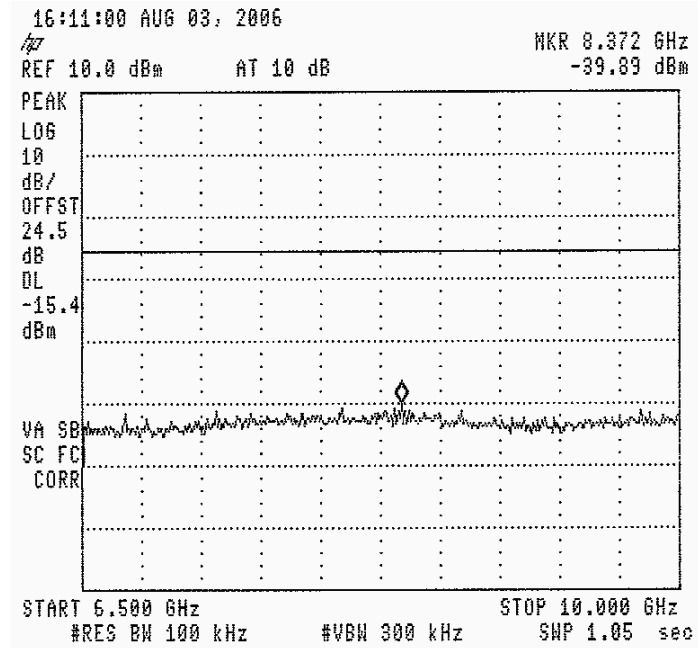


Figure 46 —2462 MHz

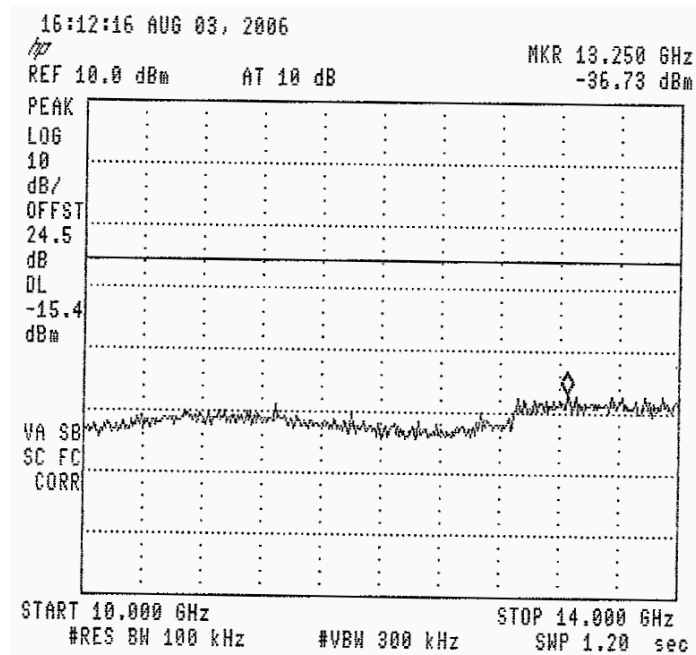


Figure 47 —2462 MHz

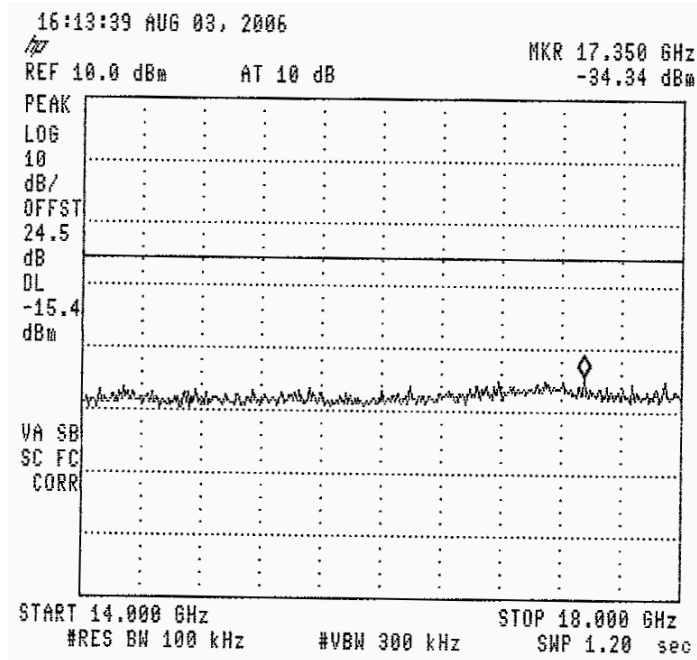


Figure 48 —2462 MHz

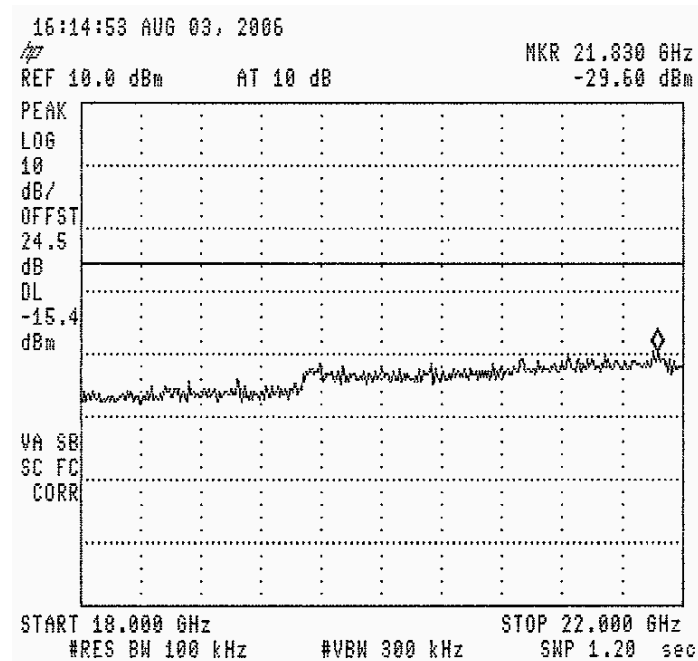


Figure 49 —2462 MHz

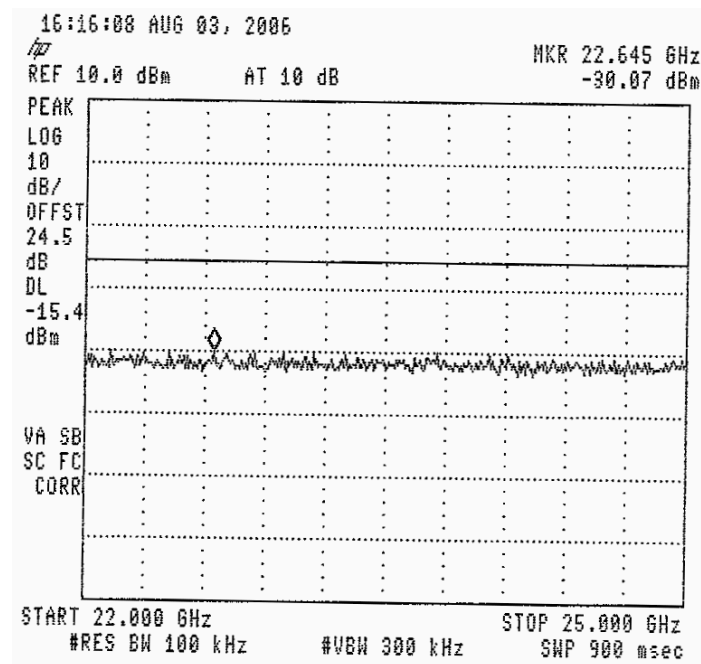


Figure 50 —2462 MHz

8.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBc)	Specification (dBc)	Margin (dB)
2412	33.6	20.0	13.6
2437	33.0	20.0	13.0
2462	34.2	20.0	14.2

Figure 51 Peak Power Output of 2400-2483.5 MHz Band



JUDGEMENT:

Passed by 13.0 dB

TEST PERSONNEL:

Tester Signature: E. Pitt

Date: 11.09.06

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 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 52 Test Equipment Used

9. 6 dB Minimum Bandwidth (2.4 GHz Transmitter)

9.1 Test procedure

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

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=24dB ($3 \times 8\text{dB}$) 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.

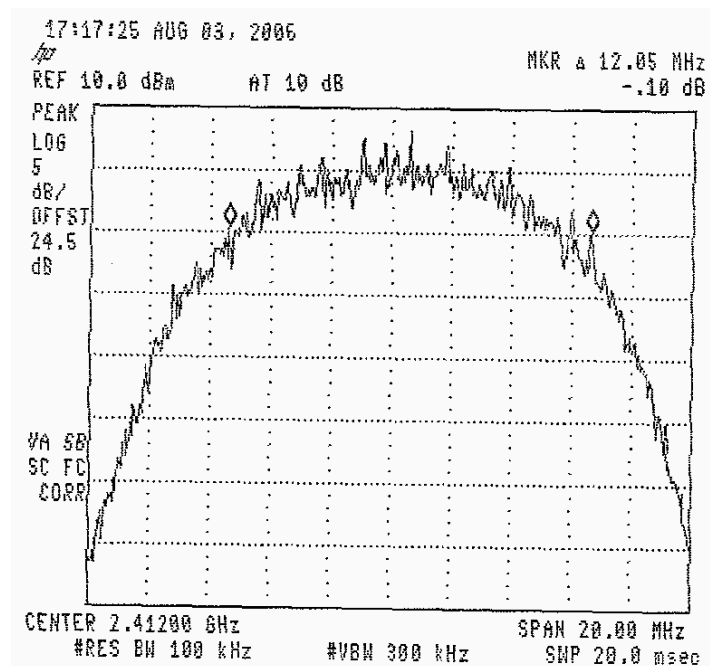


Figure 53 —2412 MHz CCK Modulation

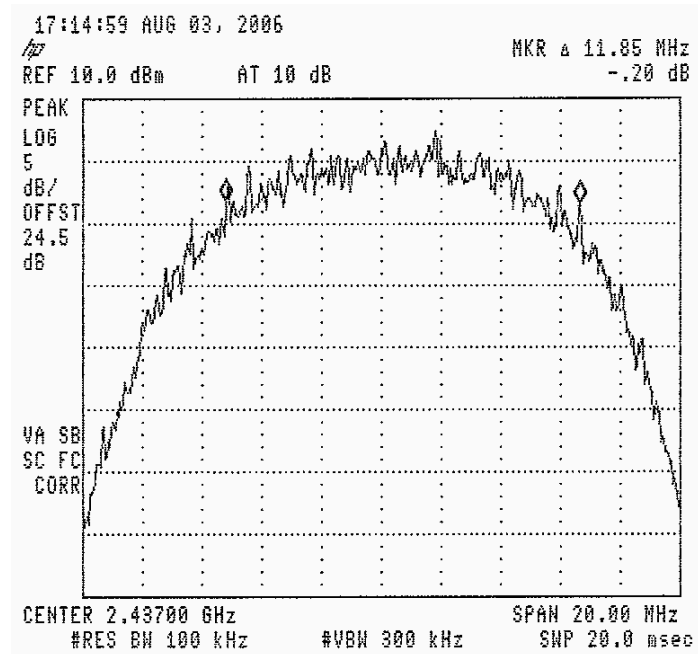


Figure 54 —2437 MHz CCK Modulation

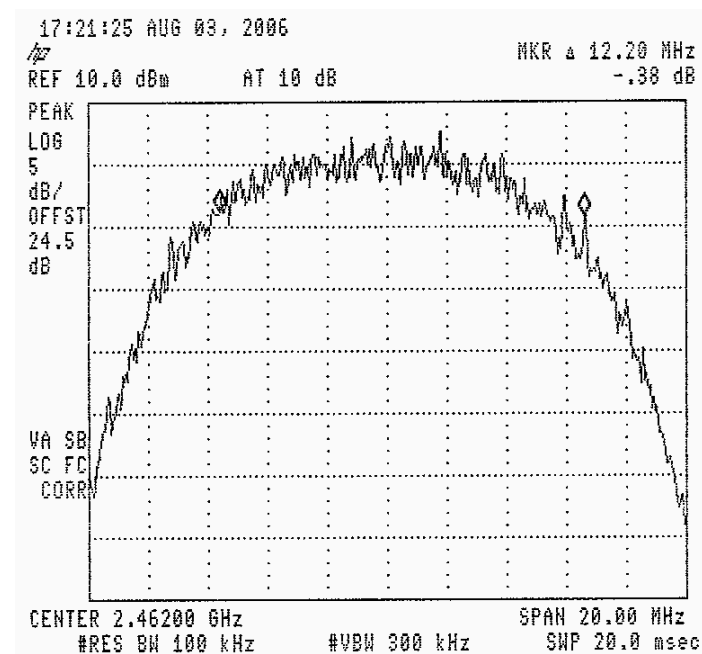


Figure 55 —2462 MHz CCK Modulation

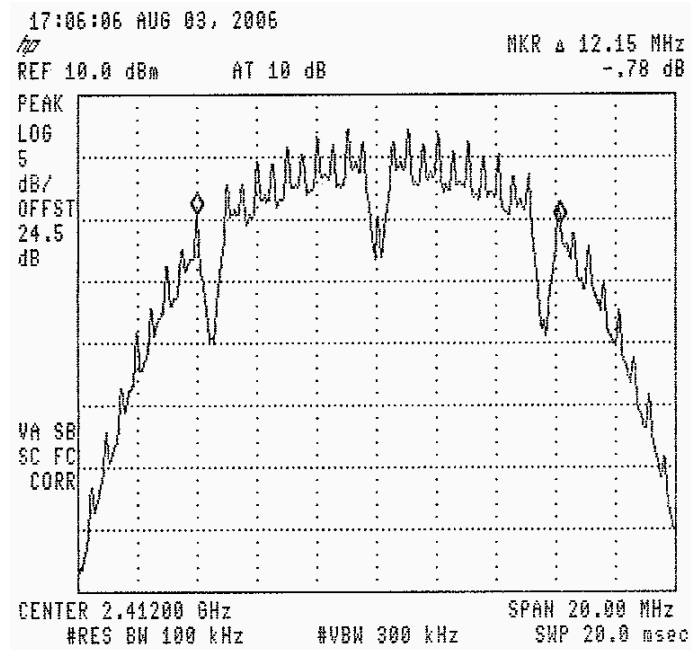


Figure 56 —2412 MHz DSSS Modulation

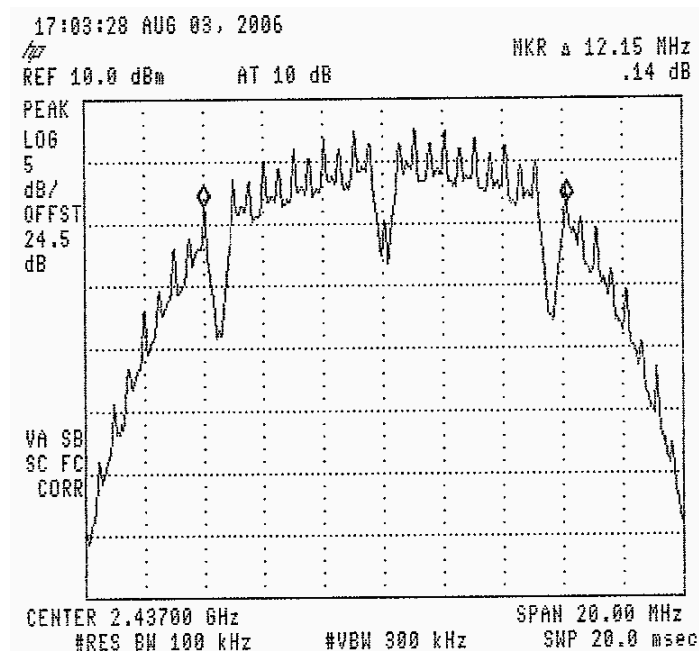


Figure 57 —2437 MHz DSSS Modulation

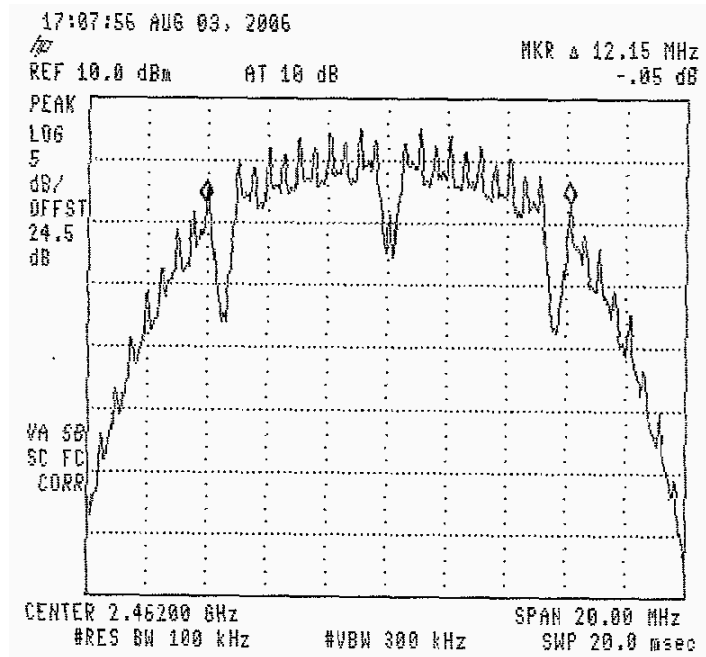


Figure 58 —2462 MHz DSSS Modulation

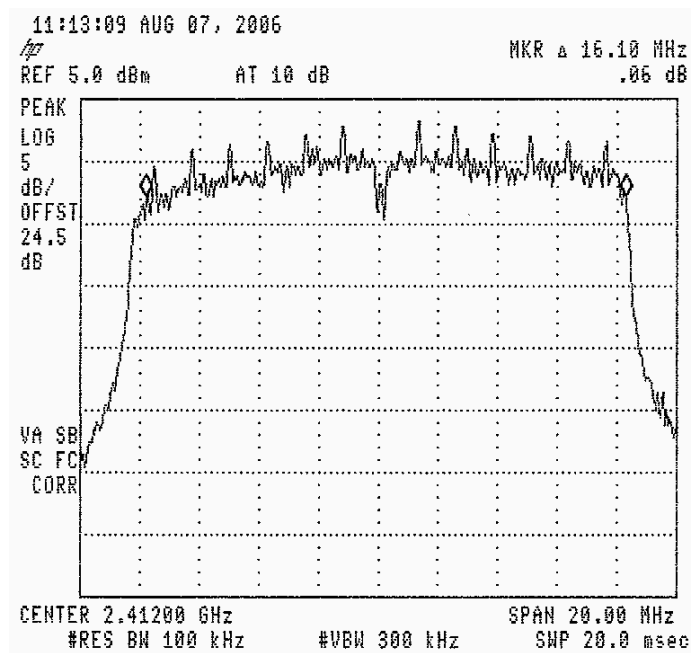


Figure 59 —2412 MHz OFDM Modulation

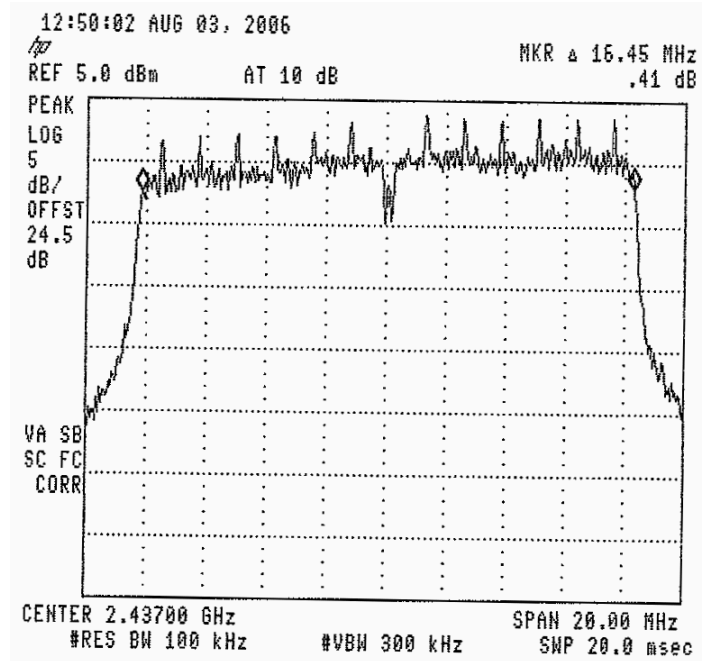


Figure 60 —2437 MHz OFDM Modulation

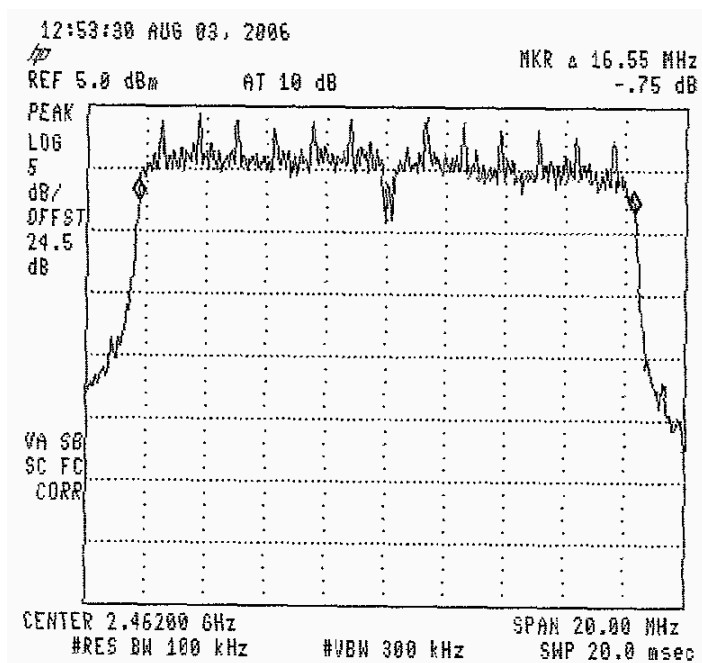


Figure 61 —2462 MHz OFDM Modulation

9.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	6 dB Bandwidth			Specification (MHz)	Margin (MHz)
	Type of Modulation				
	CCK (MHz)	DSSS (MHz)	OFDM (MHz)		
2412.00	12.05	12.15	16.10	At Least 0.500	11.55
2437.00	11.85	12.15	16.45	At Least 0.500	11.35
2462.00	12.20	12.15	16.55	At Least 0.500	11.65

Figure 62 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

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 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 63 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 CCK, DSSS, and OFDM modulations

The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=24dB (3 × 8dB) 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.

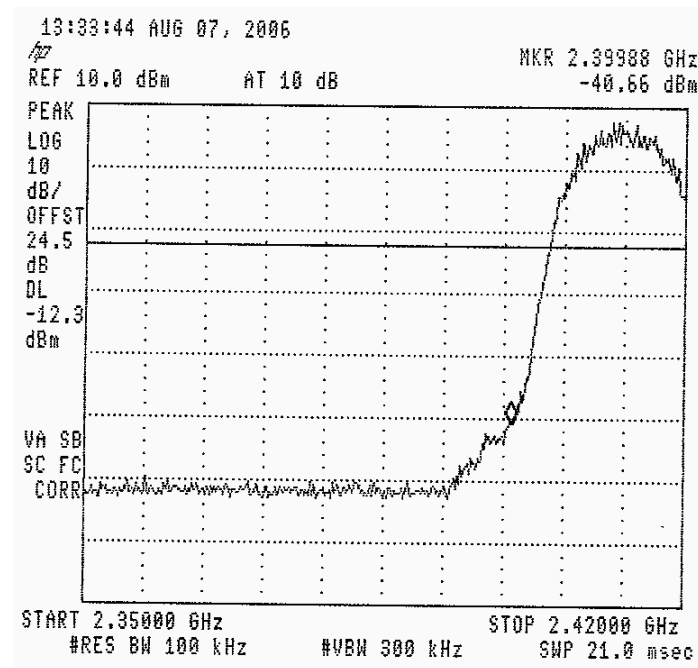


Figure 64 —2412 MHz CCK Modulation

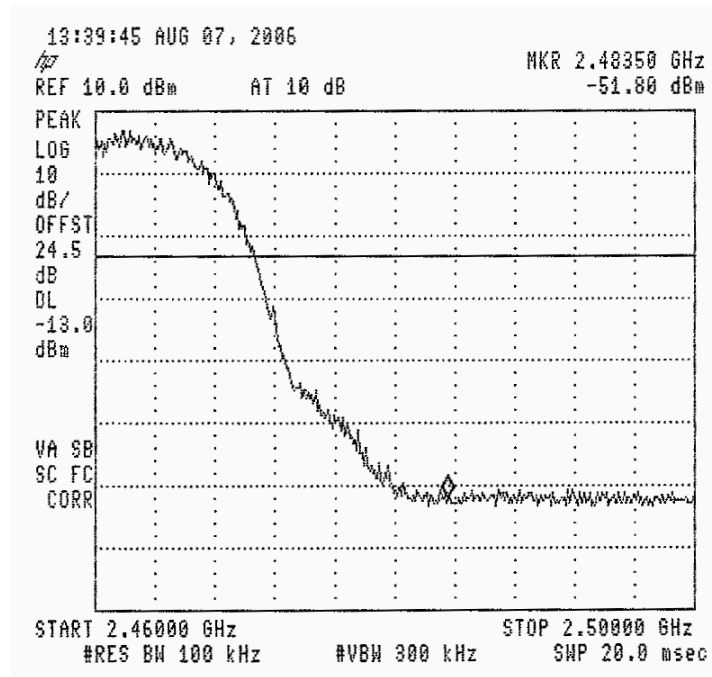


Figure 65 —2462 MHz CCK Modulation

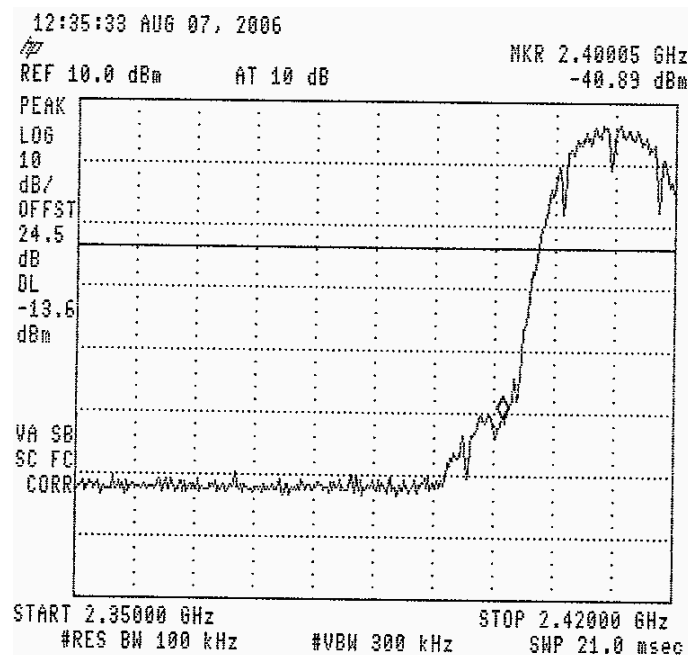


Figure 66 —2412 MHz DSSS Modulation

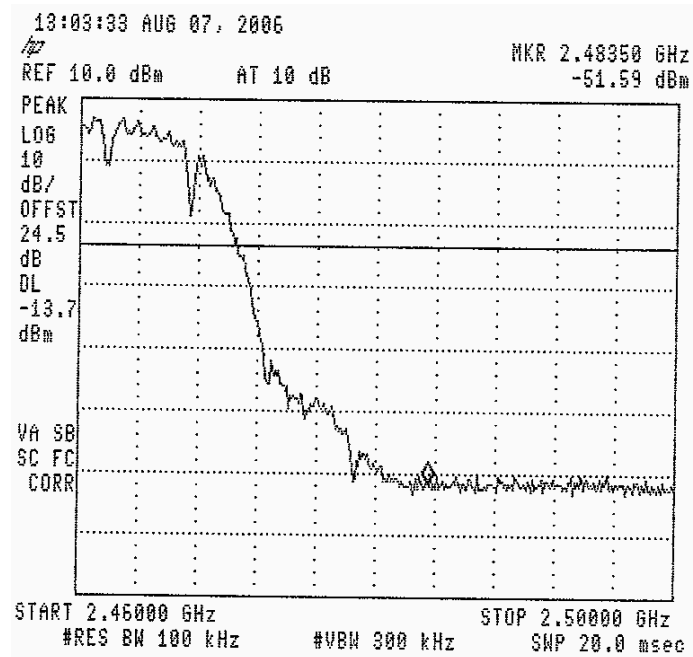


Figure 67 —2462 MHz DSSS Modulation

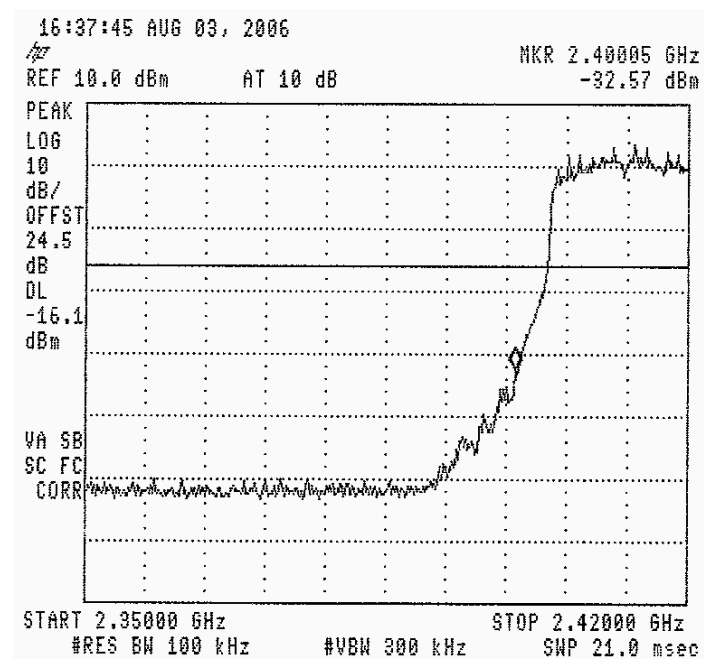


Figure 68 —2412 MHz OFDM Modulation

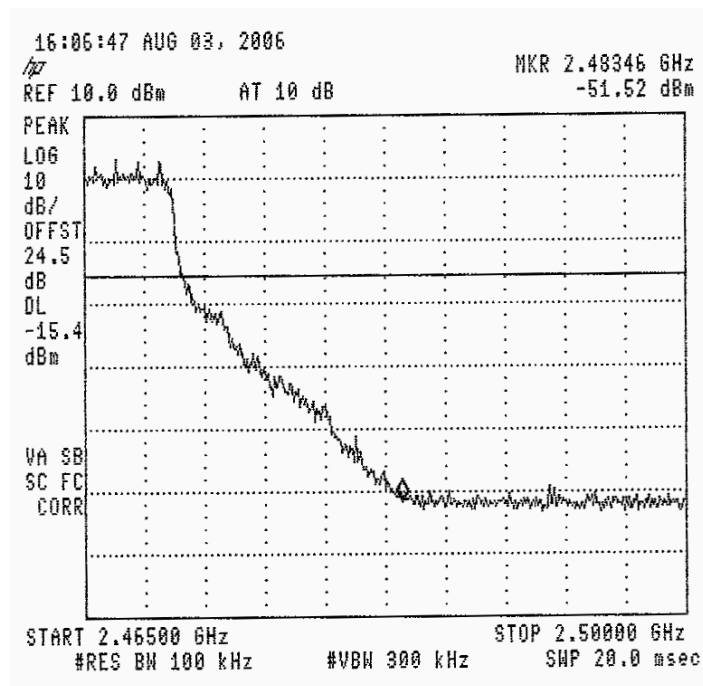


Figure 69 —2462 MHz OFDM Modulation

10.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Band Edge			Specification (dBc)	Margin (dBc)
	Type of Modulation				
	CCK (dBc)	DSSS (dBc)	OFDM (dBc)		
2412.00	-48.36	-47.29	-36.47	-20.0	-16.47
2462.00	-58.80	-57.89	-56.12	-20.0	-36.12

Figure 70 Band Edge Spectrum

JUDGEMENT: Passed by 16.47 dB

TEST PERSONNEL:

Tester Signature: E. Pitt

Date: 11.09.06

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 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 71 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 EXT ATT=24dB ($3 \times 8\text{dB}$) and an appropriate coaxial cable=0.5dB. The spectrum analyzer was set to 3 kHz resolution BW, 10 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.

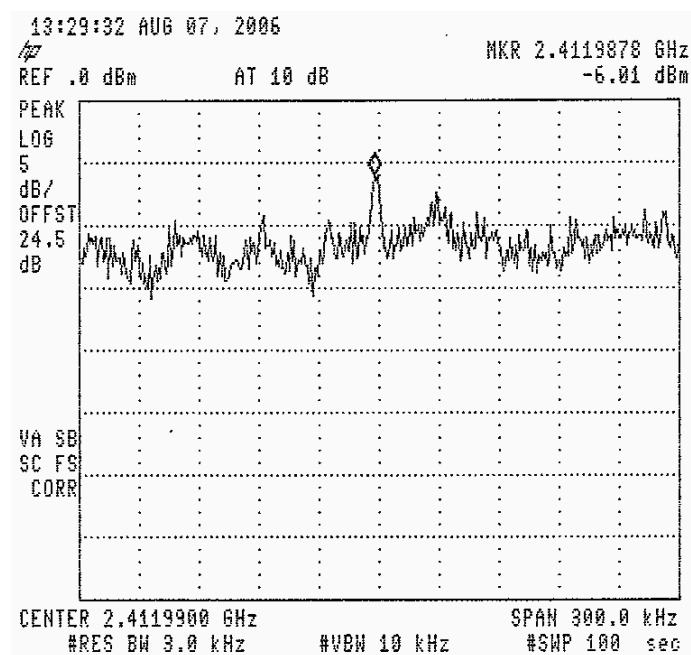


Figure 72 —2412 MHz CCK Modulation

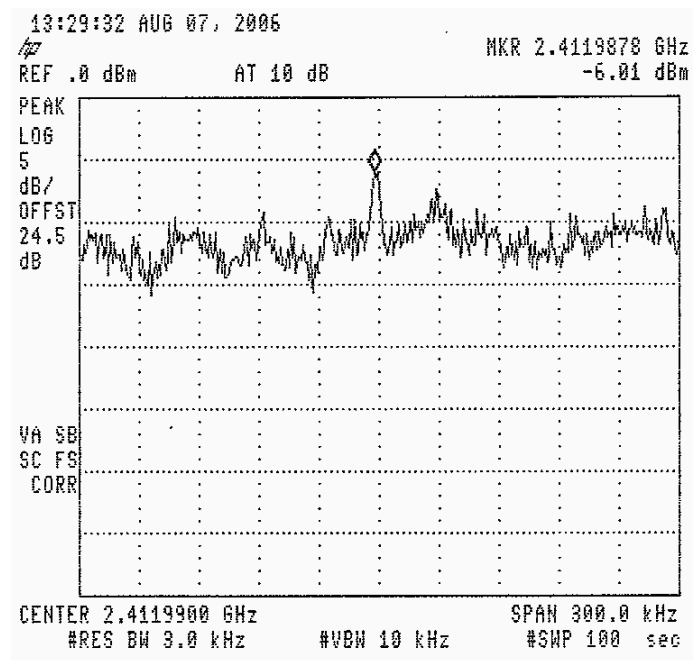


Figure 73 —2437 MHz CCK Modulation

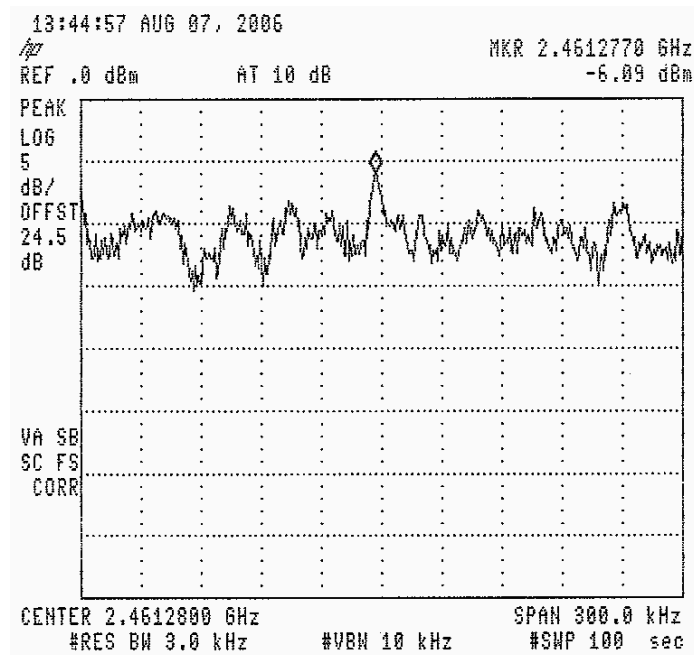


Figure 74 —2462 MHz CCK Modulation

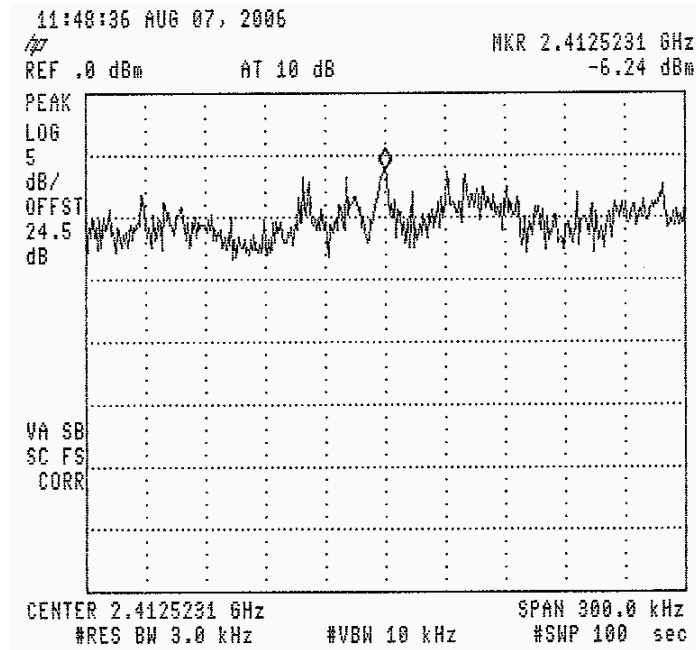


Figure 75 —2412 MHz DSSS Modulation

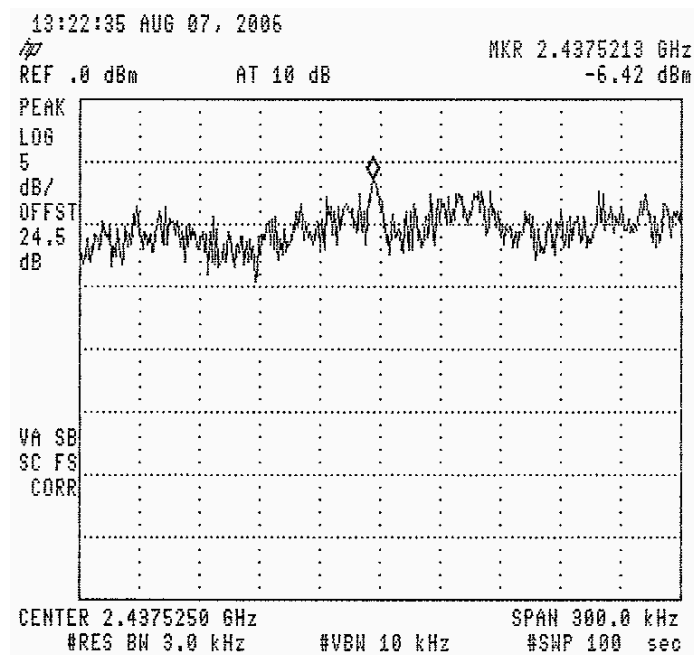


Figure 76 —2437 MHz DSSS Modulation

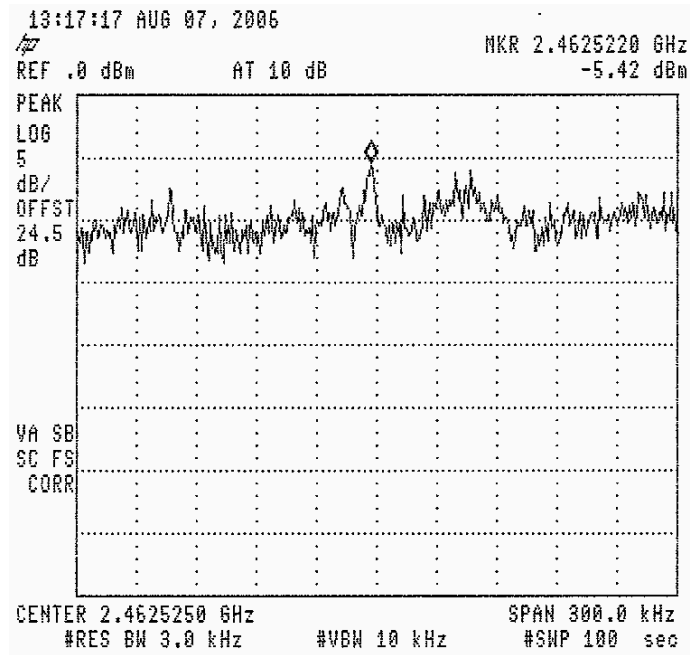


Figure 77 —2462 MHz DSSS Modulation

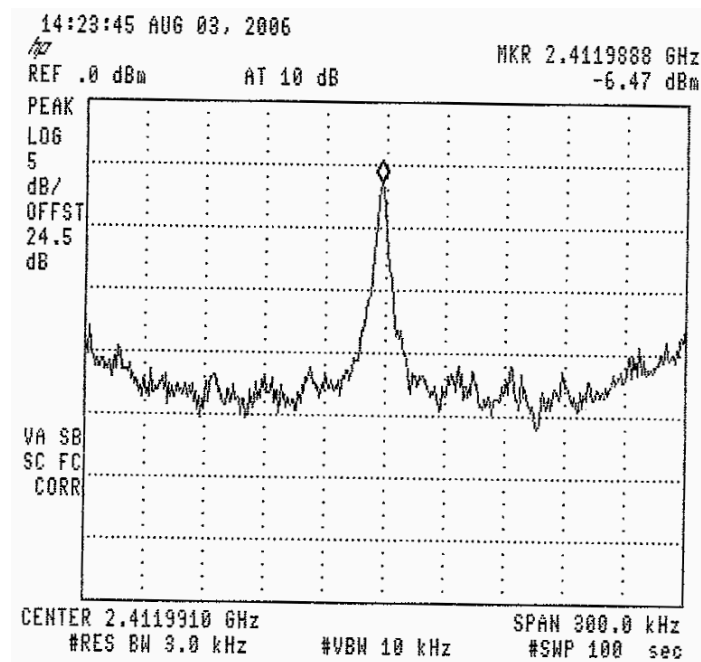


Figure 78 —2412 MHz OFDM Modulation

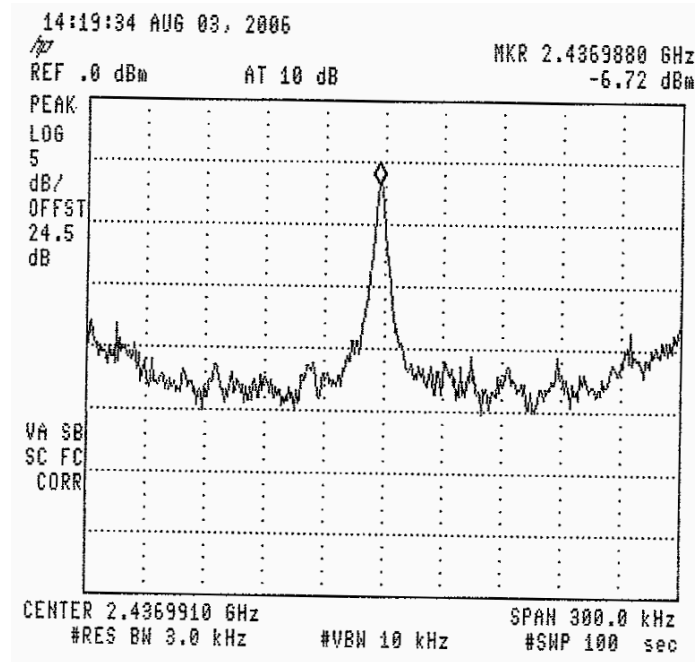


Figure 79 —2437 MHz OFDM Modulation

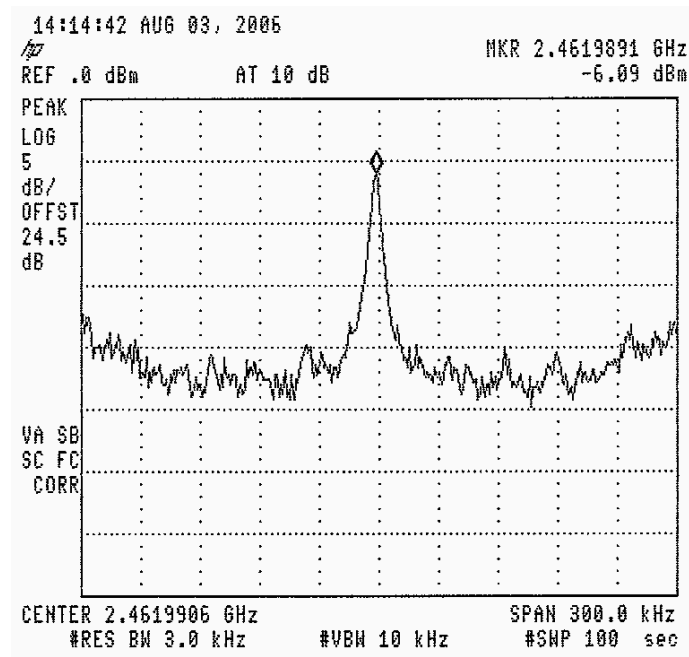


Figure 80 —2462 MHz OFDM Modulation

11.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C

Operation Frequency	Band Edge			Specification	Margin
	Type of Modulation				
(MHz)	CCK (dB/3kHz)	DSSS (dB/3kHz)	OFDM (dB/3kHz)	(dB/3kHz)	(dB/3kHz)
2412.00	-6.01	-6.24	-6.47	2.0	-8.01
2437.00	-6.18	-6.42	-6.72	2.0	-8.18
2462.00	-6.09	-5.42	-6.09	2.0	-7.42

Figure 81 Test Results

The peak power spectral density on each antenna connector is

$$PD_1 = PD_{\text{total}} - 10 \log 4 = 8-6 = 2\text{dBm/3kHz}$$

JUDGEMENT: Passed by 7.42 dB

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

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	8592L	3826A01204	February 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 82 Test Equipment Used

12. Antenna Gain (2.4 GHz Transmitter)

The antenna gain is 7.4 dBi.

SF-245W



2.4GHz Omnidirectional Antenna

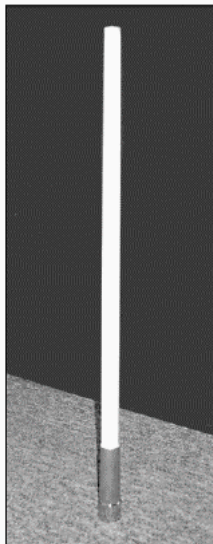
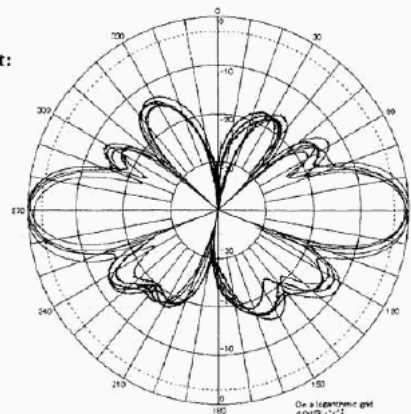
Specifications:

- 2400-2500MHz
- Gain: 7.4dBi
- Length: 17.5 inches
- Weight: 4.7 oz
- -3dB Beam-width: 20 degrees
- Cross Polar Rejection: 15dB +
- Max Power: 50 watts
- Max wind survival: 150MPH +
- Wind Load: 7.1 sq in
- Connector: Integral N-male
- Radome: White UV stabilized fiberglass
- Mast mounting hardware optional
- Mobile lip mount optional
- Mobile permanent mount optional

Vertical radiation pattern

Elevation pattern at:

- 2400MHz
- 2425MHz
- 2450MHz
- 2475MHz
- 2500MHz



NCG Company

1275 N. Grove St.
Anaheim, CA 92806-2114

Phone: 800.962.2611

Fax: 714.630.7024

Email: micks@natcommgroup.com

FEATURES:

- 802.11b and 802.11g compatible
- Designed for use as either a medium gain base antenna or a high gain mobile antenna.
- Male N-connector for easy installation
- Compact gain antenna for point-to-multipoint applications
- Heavy duty fiberglass for durability
- Weather proof for indoor or outdoor installation

MOUNTING OPTIONS:

- **MB-100:** 1"-2.5" mast mount
- **GR-5N:** Mobile lip mount
- **5D4N:** 5/8 inch hole mount



Manufactured by:

COMET Company Ltd.



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 478.6mW (Peak) (26.8 dBm)

G_t - Antenna Gain, 21.88 = 13.4 dBi

R - Distance from Transmitter using 20cm worst case

(c) The peak power density is :

$$S_p = \frac{478.6}{4\pi(20)^2} = 0.10 \frac{mW}{cm^2}$$

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

The average power over 30 minutes is:

$$P_{AV} = \frac{478.6 \times 98.7}{100} = 472.38mW$$

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

$$S_{AV} = \frac{472.38}{4\pi(20)^2} = 0.09 \frac{mW}{cm^2}$$

(f) This is 1 order of magnitude below the FCC limit.

14. Spurious Radiated Emission in the Restricted Bands Below 1 GHz (5.8 GHz Transmitter)

14.1 Test Specification

9 kHz-1000 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 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 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 5745, 5785, and 5825 MHz.

14.3 Test Results

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

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

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

Typed/Printed Name: E. Pitt

14.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	March 22, 2006	1 year
RF Section	HP	85420E	3427A00103	March 22, 2006	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 19, 2006	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 17, 2005	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 17, 2005	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	ThinkJet 2225	2738508357.0	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:

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

FS:	Field Strength [dB μ v/m]
RA:	Receiver Amplitude [dB μ v]
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, Above 1 GHz (5.8 GHz Transmitter)

15.1 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.

In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used.

In the frequency range 2.9-40.0 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 at the frequencies of 5745, 5785, and 5825 MHz.

15.2 Test Data

JUDGEMENT: Passed by dB

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

The results for all three operating frequencies were the same.

The margin between the emission level and the specification limit is 22.8 dB in the worst case at the frequency of 5460.00 MHz, horizontal and vertical polarizations.

The details of the highest emissions are given in *Figure 83* to *Figure 86*.

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 40.0 GHz
 Detector: Peak

Freq.	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
5460.00	44.0*	74.0	-30.

**Figure 83. Radiated Emission. Antenna Polarization: HORIZONTAL.
 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- Preamplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal

Frequency range: 1.0 GHz to 40.0 GHz

Test Distance: 3 meters

Detector: Average

Freq.	Average Amp	Average Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
5460.00	31.2*	54.0	-22.8

**Figure 84. Radiated Emission. Antenna Polarization: HORIZONTAL.
 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- Preamplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical
 Test Distance: 3 meters

Frequency range: 1.0 GHz to 40.0 GHz
 Detector: Peak

Freq.	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
5460.00	44.0*	74.0	-30.0

**Figure 85. Radiated Emission. Antenna Polarization: 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- Preamplifier Gain

Radiated Emission Above 1 GHz

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical

Frequency range: 1.0 GHz to 40.0 GHz

Test Distance: 3 meters

Detector: Average

Freq.	Average Amp	Average Specification	Peak. Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)
5460.00	31.2*	54.0	-22.8

**Figure 86. Radiated Emission. Antenna Polarization: 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- Preamplifier Gain

15.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Receiver	HP	85422E	3411A00102	March 22, 2006	1 year
RF Section	HP	85420E	3427A00103	March 22, 2006	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	ThinkJet2225	2738508357	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 31,2003	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 year
Horn Antenna	ARA	SWH-28	1007	October 28, 2005	2 year
Horn Antenna	Narda	V637	0410	November 19, 2004	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	October 17, 2004	1 year
Low Noise Amplifier	Sophia Wireless	LNA28-B	232	February 8, 2006	1 year
Low Noise Amplifier	MK Milliwave	MKY6-30004000-30-13P	399	February 8, 2006	1 year
Spectrum Analyzer	HP	8592L	3926A01204	February 6, 2006	1 year
Spectrum Analyzer	HP	8564E	3442A00275	February 1, 2006	1 year

16. Maximum Transmitted Peak Power Output (5.8 GHz Transmitter)

16.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through EXT ATT=24dB (3×8 dB) and an appropriate coaxial cable=0.5dB. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 1 MHz RBW. The power was measured over the channel bandwidth of 17 MHz (See Figure 87 to Figure 89). Peak power level was measured at selected operation frequencies.

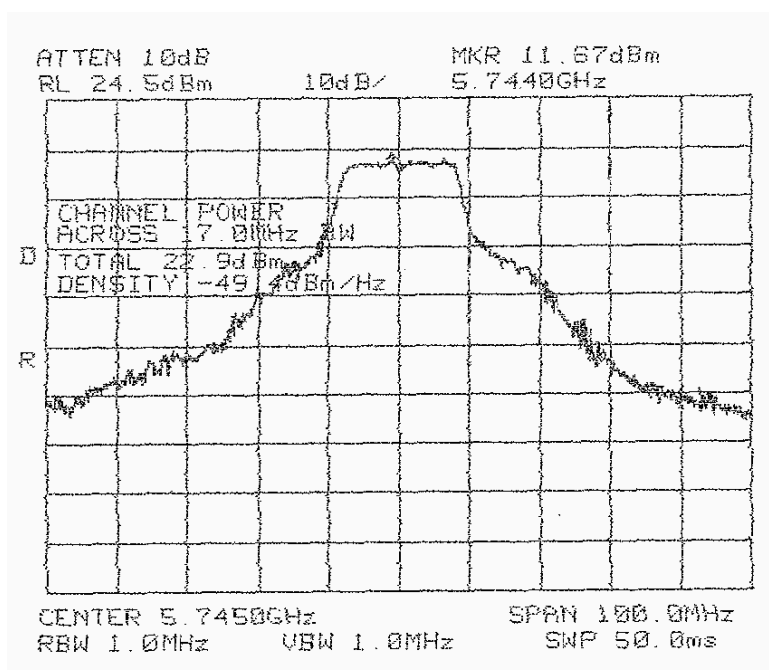


Figure 87 5745 MHz

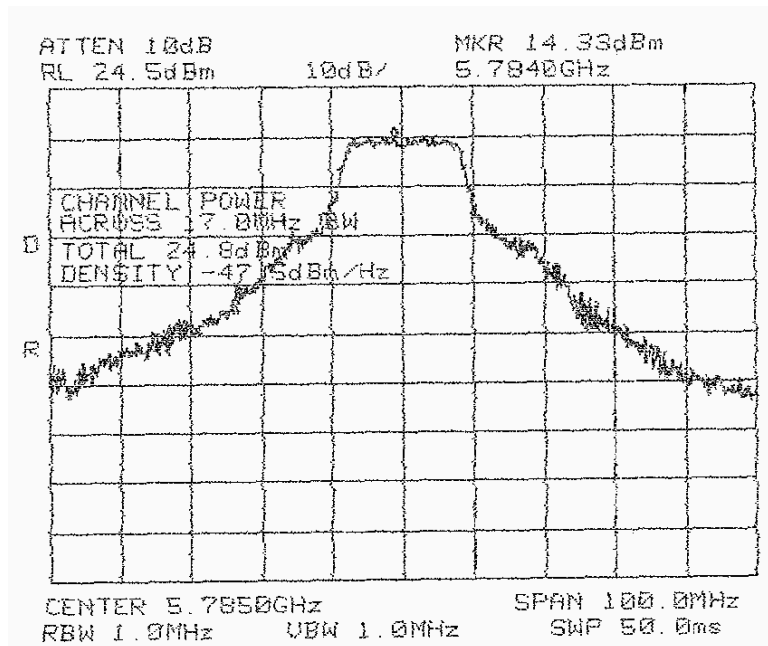


Figure 88 5785 MHz

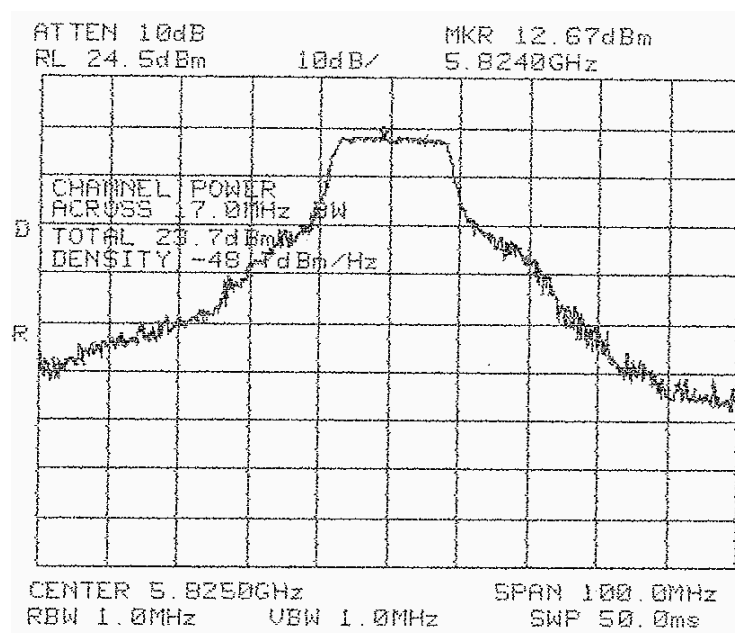


Figure 89 5825 MHz

16.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Peak Power (dBm)	Specification (dBm)	Margin (dB)
5745.00	22.9	25.5	-2.6
5785.00	24.8	25.5	-0.7
5825.00	23.7	25.5	-1.8

Figure 90 Maximum Peak Power Output

Output Power Limit:

$$P - 30 - (G_{\text{ant}} - 6) = 30 - (10.5 - 6) = 25.5 \text{ dBm}$$

Where Antenna Gain = 10.5 dBi

JUDGEMENT: Passed by 0.7 dB

TEST PERSONNEL:

Tester Signature: 

Date: 21.09.06

Typed/Printed Name: E. Pitt

16.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	February 1, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 91 Test Equipment Used

17. Peak Power Output Out of 5700-5825 MHz Band (5.8 GHz Transmitter)

17.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=24dB ($3 \times 8\text{dB}$) and an appropriate coaxial cable=0.5dB. 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, and 100 kHz resolution BW for the frequency range 10.0 MHz-40.0 GHz. The frequency range from 9 kHz to 40 GHz was scanned. Level of spectrum components out of the 5725-5850 MHz was measured at the selected operation frequencies.

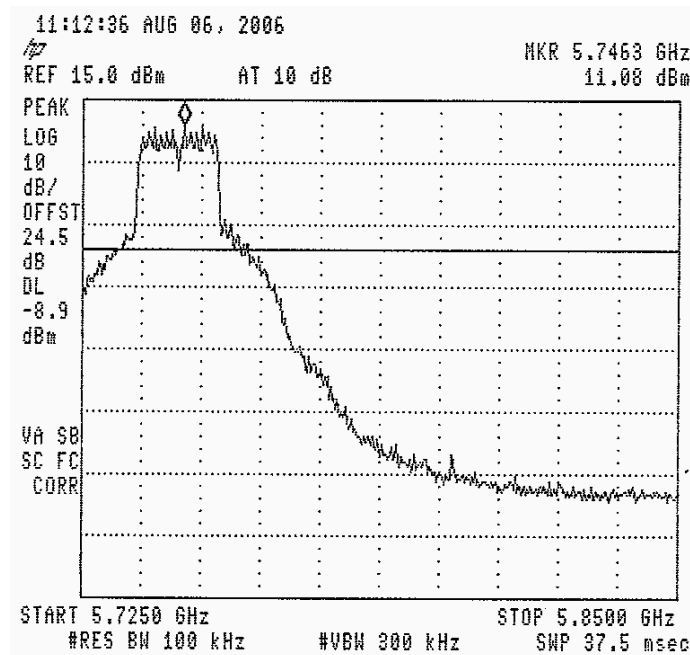


Figure 92 —5745 MHz

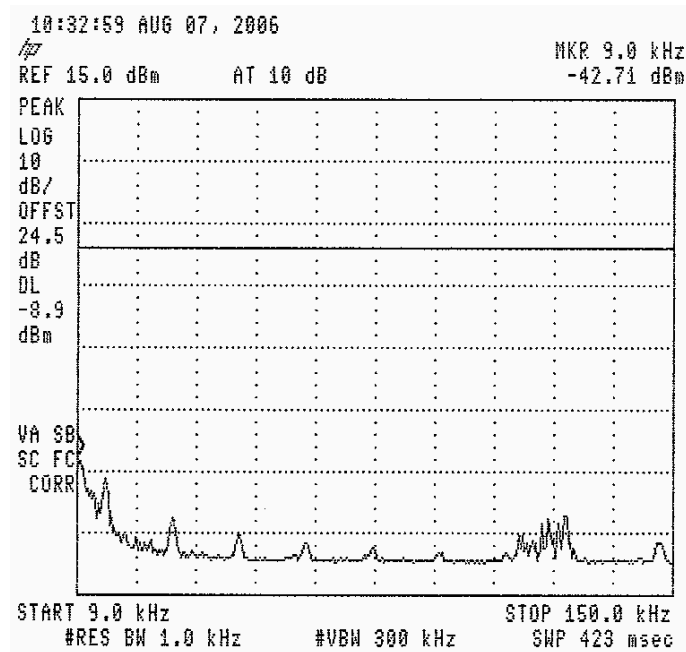


Figure 93 —5745 MHz

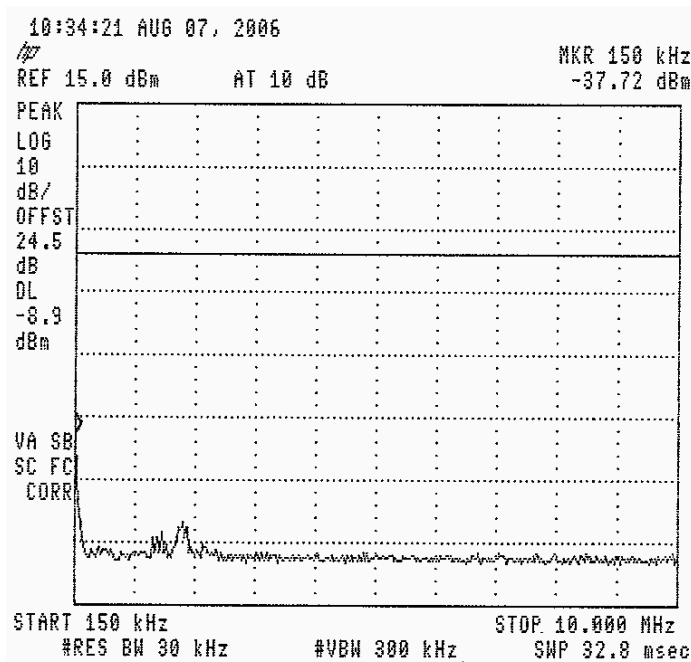


Figure 94 —5745 MHz

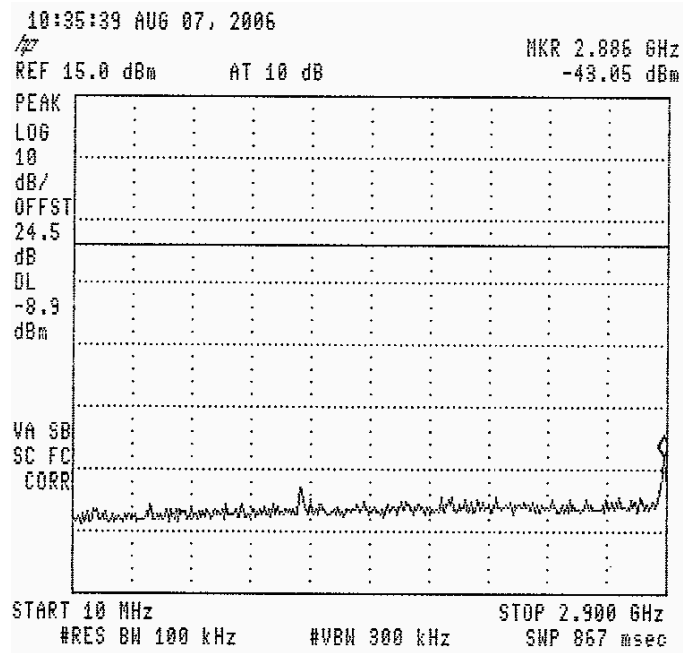


Figure 95 —5745 MHz

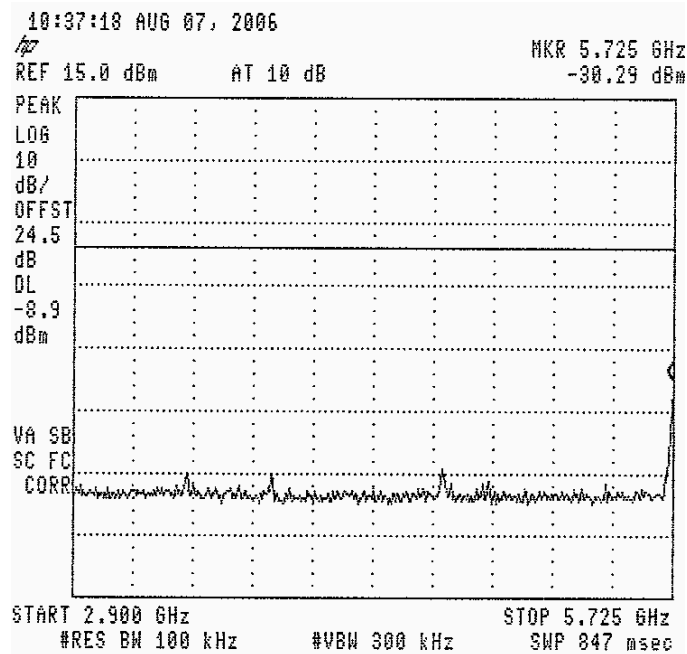


Figure 96 —5745 MHz

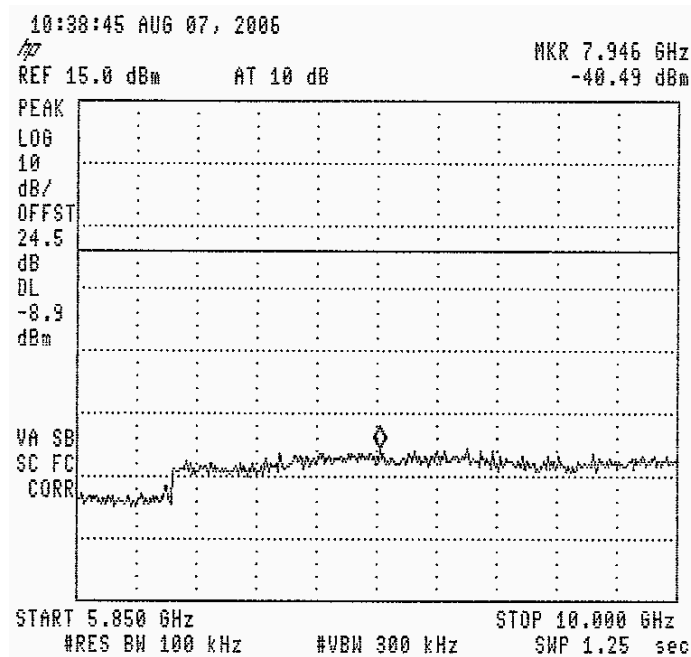


Figure 97 —5745 MHz

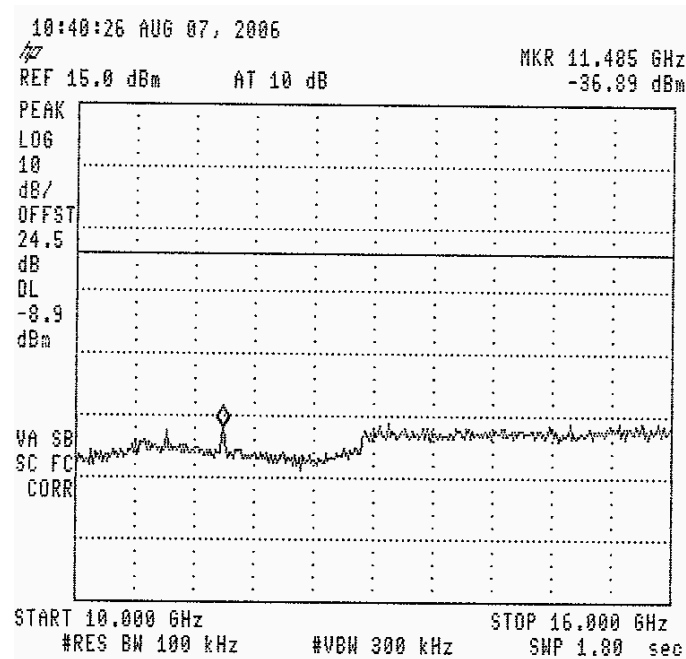


Figure 98 —5745 MHz

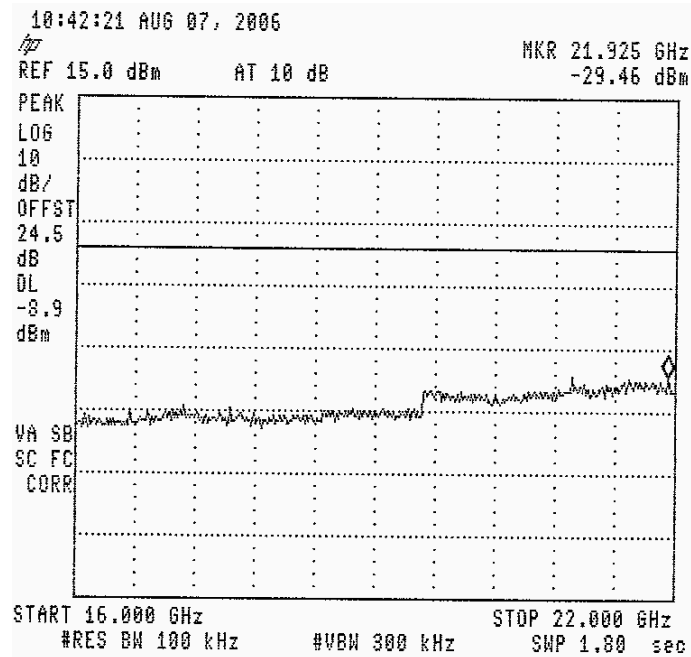


Figure 99 —5745 MHz

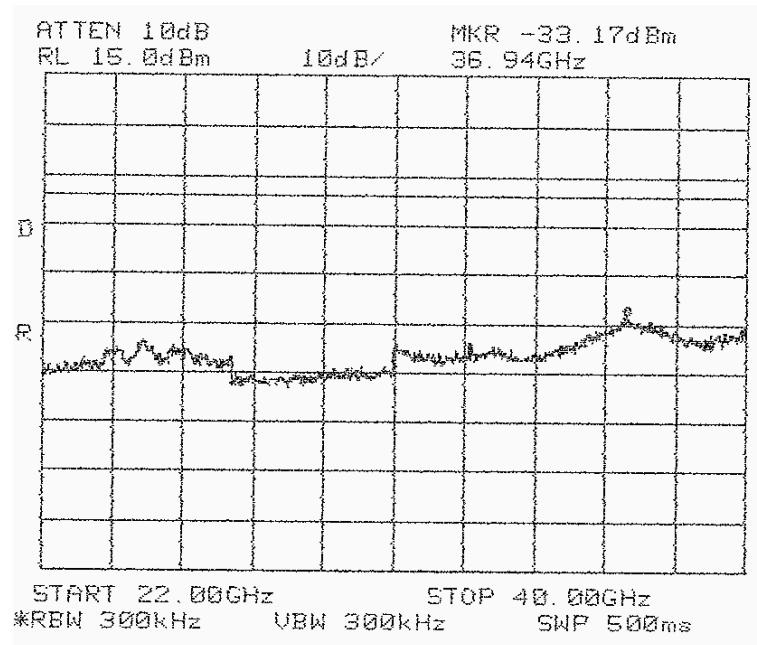


Figure 100 —5745 MHz

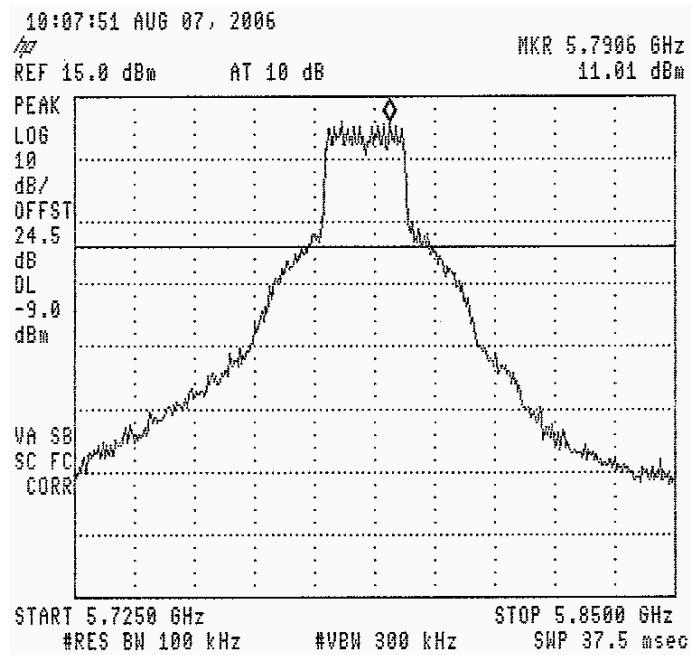


Figure 101 —5785 MHz

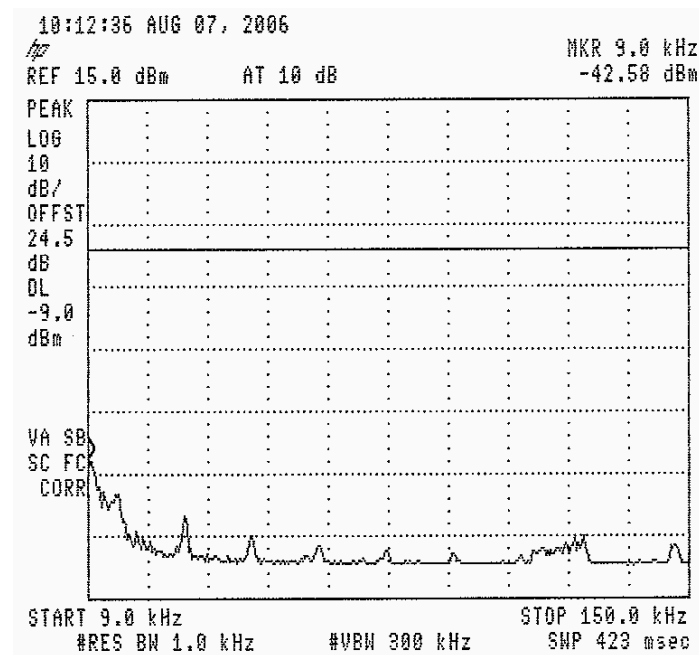


Figure 102 —5785 MHz

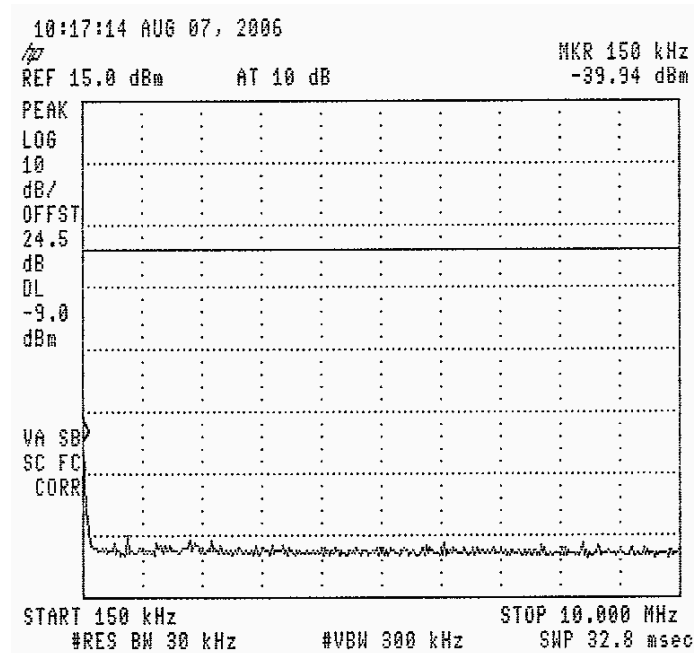


Figure 103 —5785 MHz

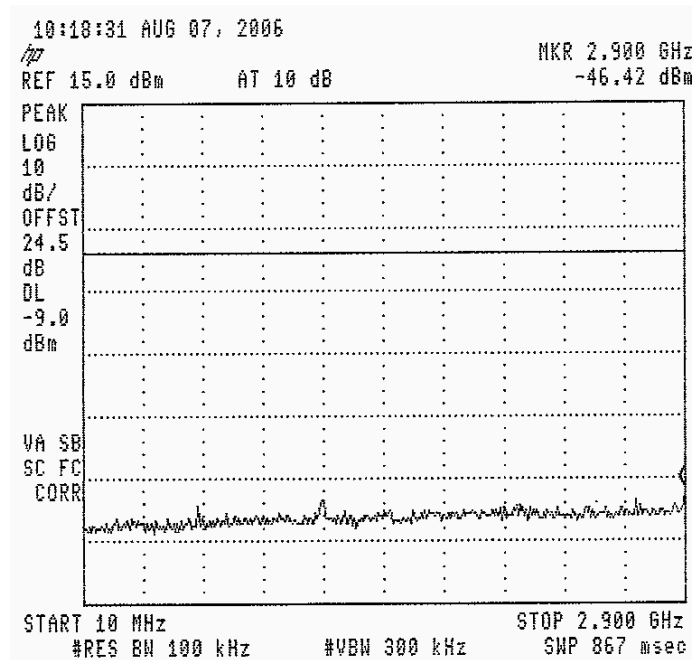


Figure 104 —5785 MHz

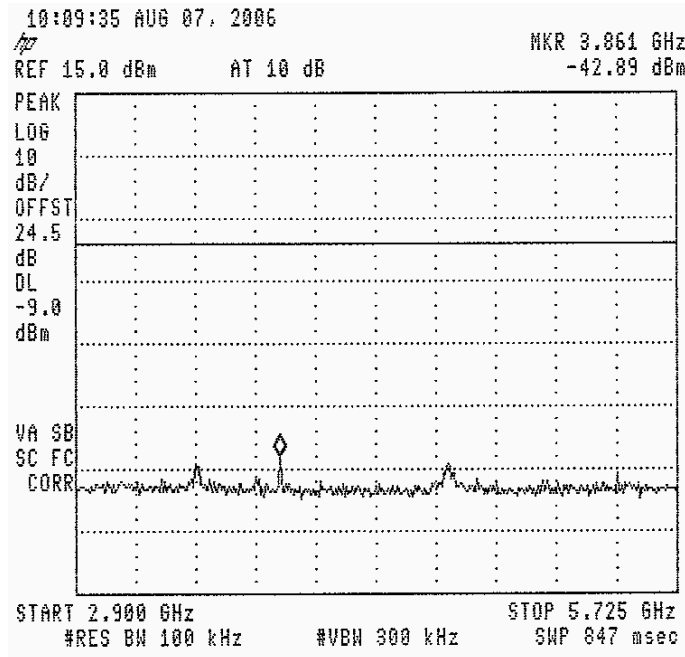


Figure 105 —5785 MHz

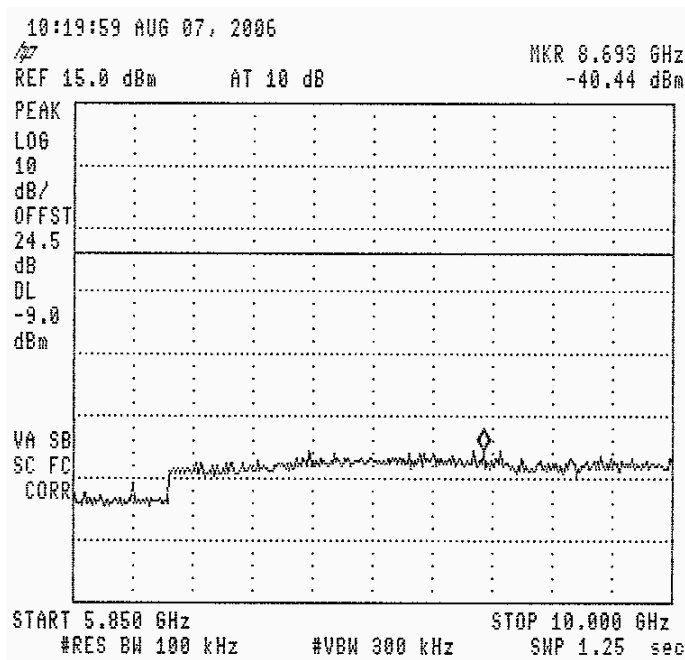


Figure 106 —5785 MHz

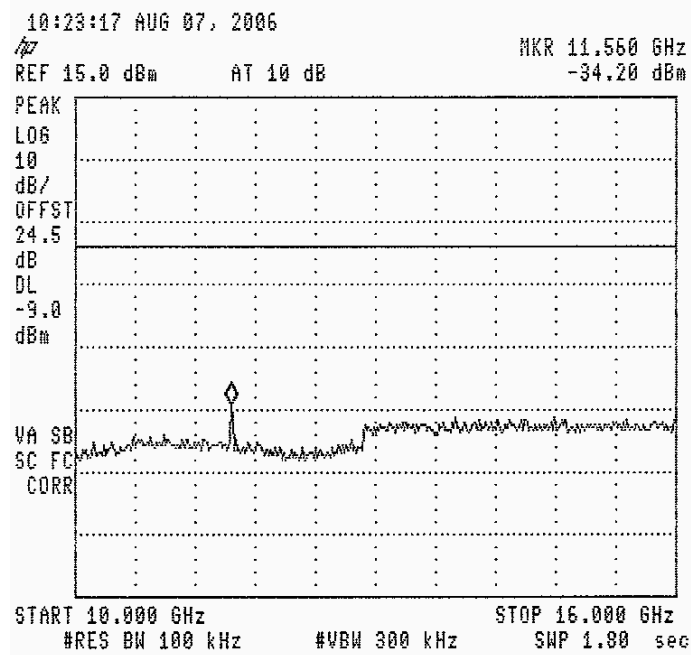


Figure 107 —5785 MHz

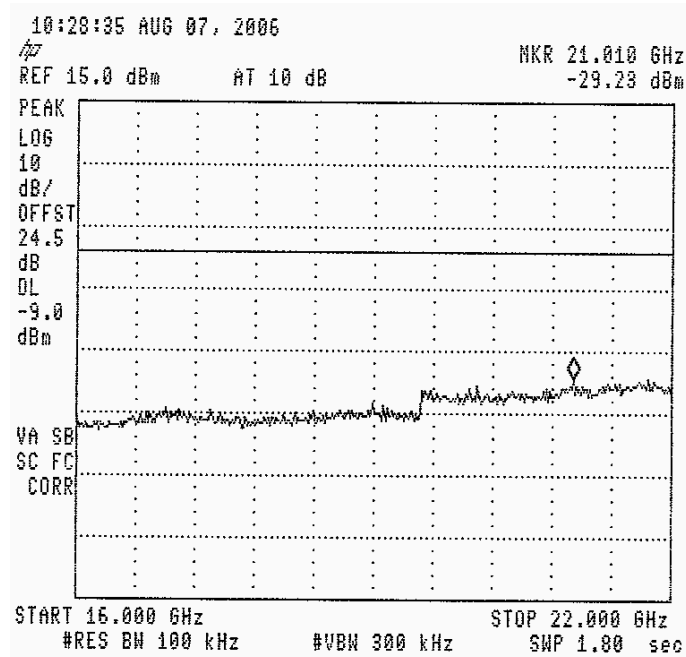


Figure 108 —5785 MHz

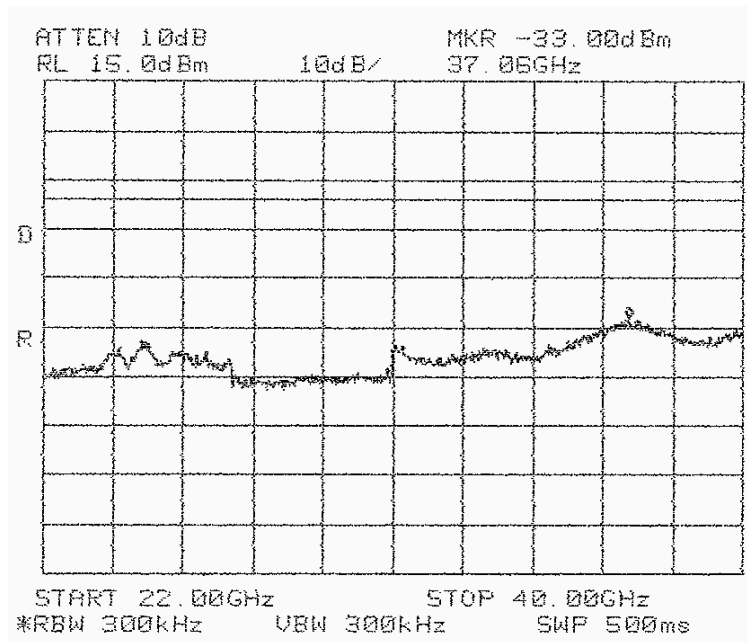


Figure 109 —5785 MHz

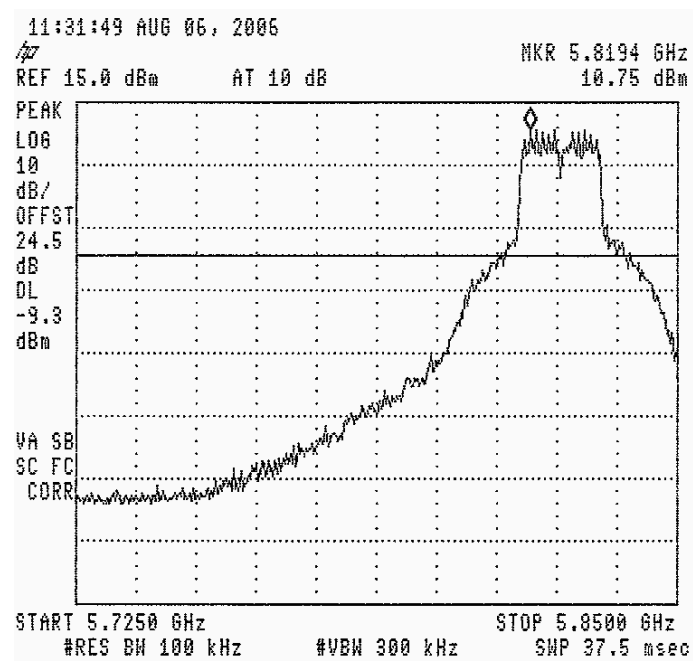


Figure 110 —5825 MHz

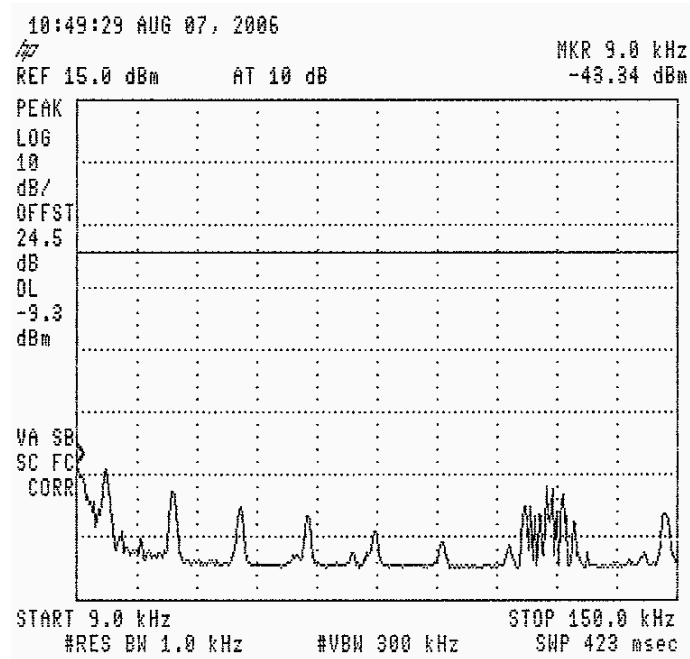


Figure 111 —5825 MHz

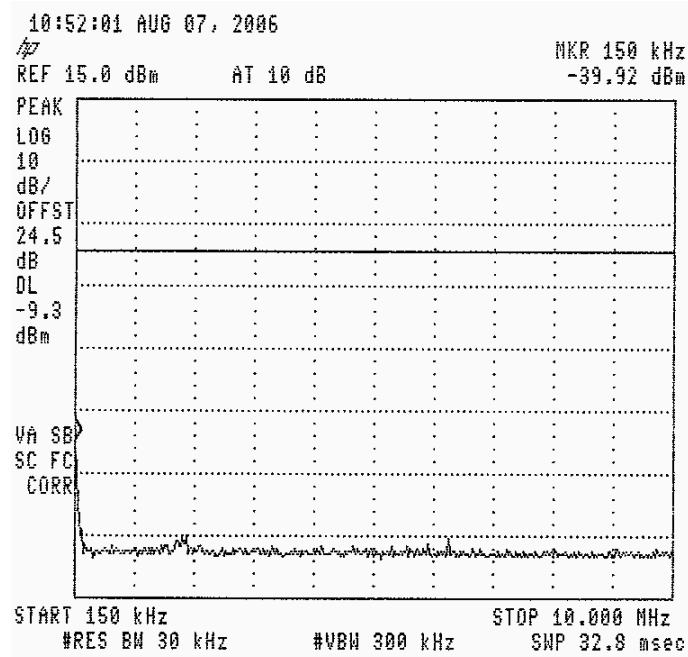


Figure 112 —5825 MHz

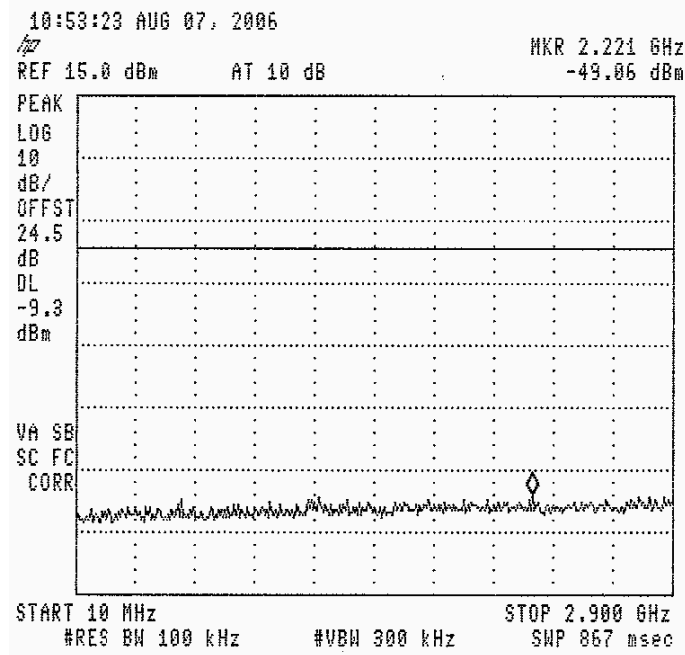


Figure 113 —5825 MHz

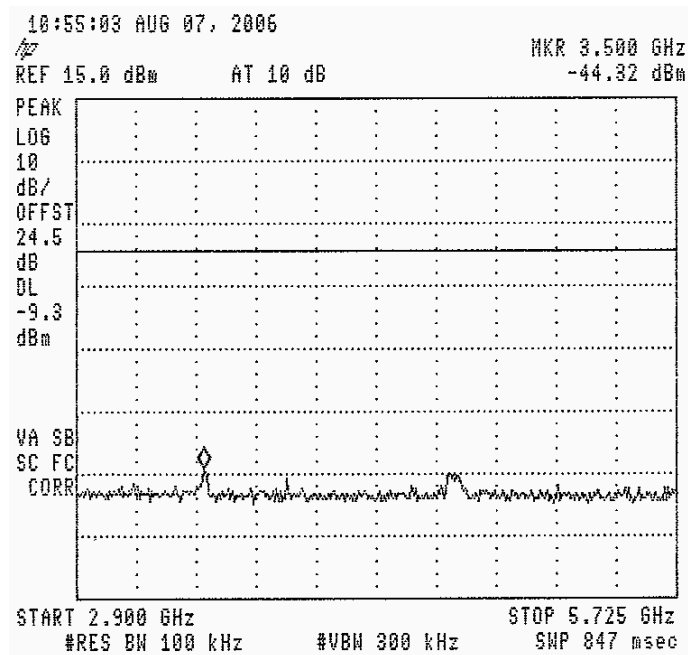


Figure 114 —5825 MHz

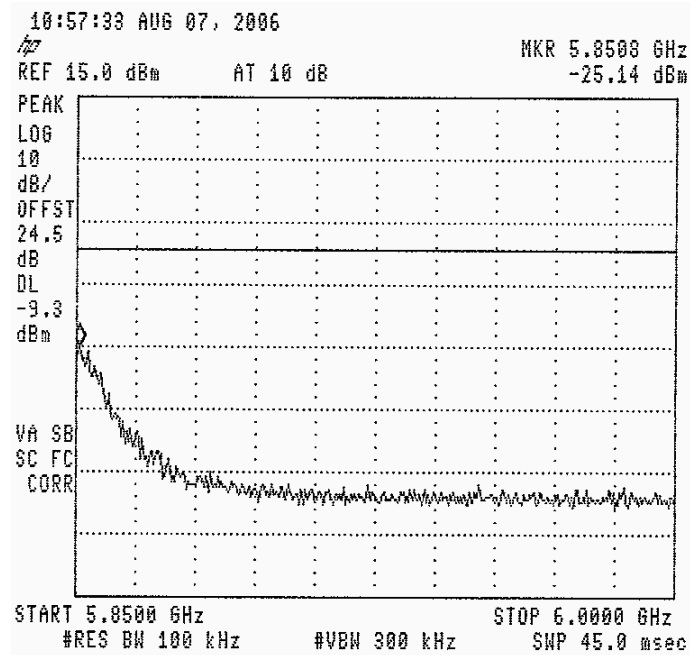


Figure 115 —5825 MHz

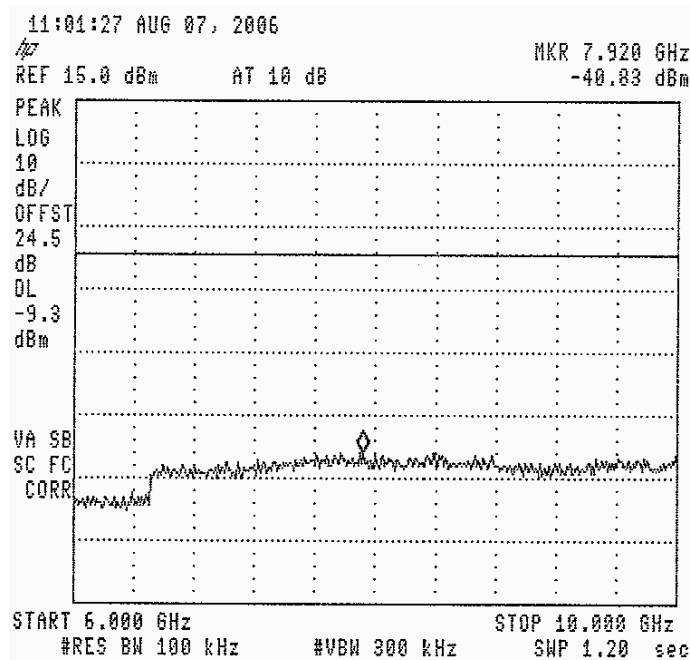


Figure 116 —5825 MHz

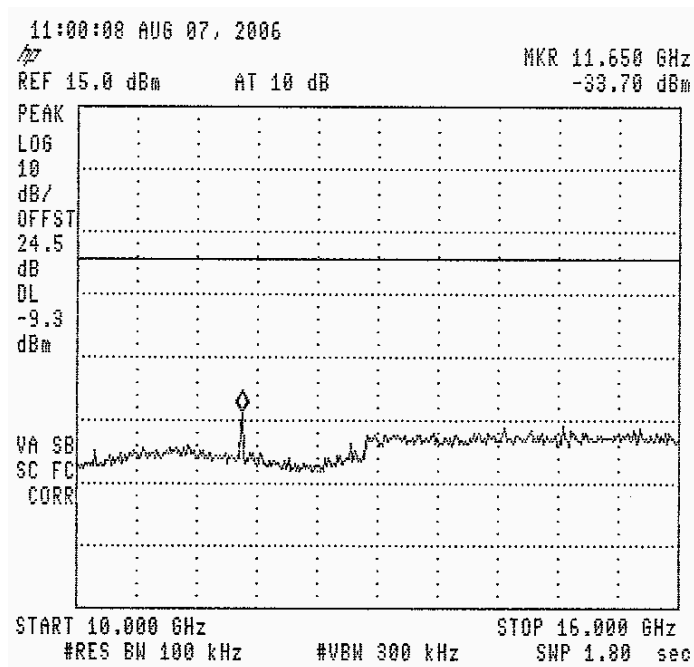


Figure 117 —5825 MHz

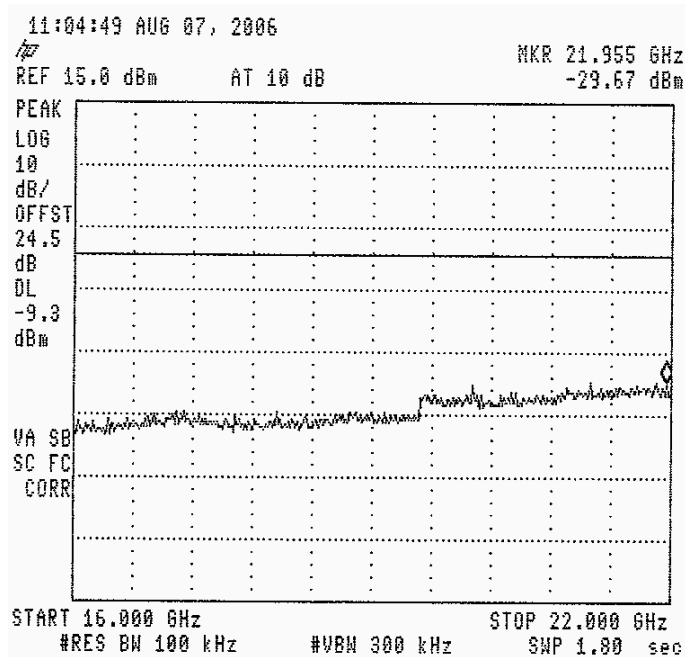


Figure 118 —5825 MHz

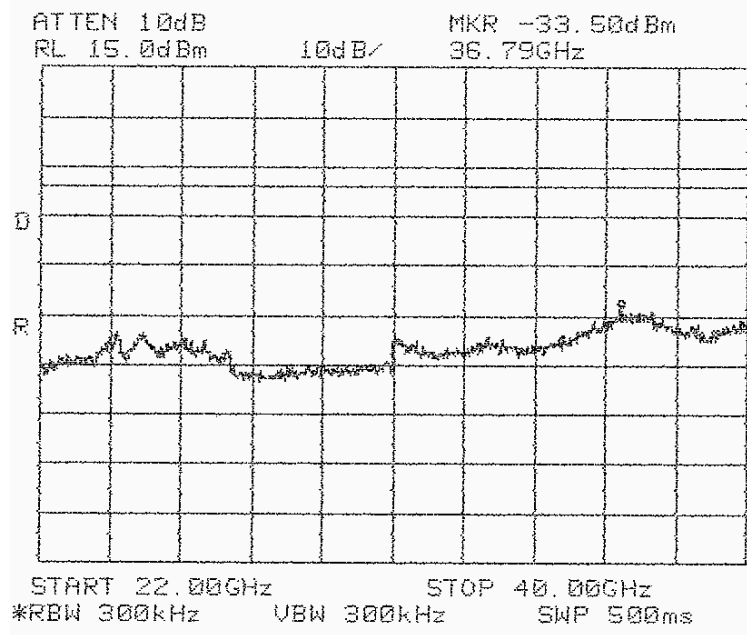


Figure 119 —5825 MHz

17.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point
 Model No.: MBW-WLP-1100F
 Serial Number: SCGG1001022
 Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading (dBc)	Specification (dBc)	Margin (dB)
5745	40.5	20.0	20.5
5785	40.2	20.0	20.2
5825	35.9	20.0	15.9

Figure 120 Peak Power Output of 5700-5825 MHz Band



JUDGEMENT:

Passed by 15.9 dB

TEST PERSONNEL:

Tester Signature: *E. Pitt*

Date: 11.09.06

Typed/Printed Name: E. Pitt

17.3 Test Equipment Used.

Peak Power Output of 5700-5825 MHz Band

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3442A00275	February 1, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 121 Test Equipment Used

18. 6 dB Minimum Bandwidth (5.8 GHz Transmitter)

18.1 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 EXT ATT=24dB ($3 \times 8\text{dB}$) 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.

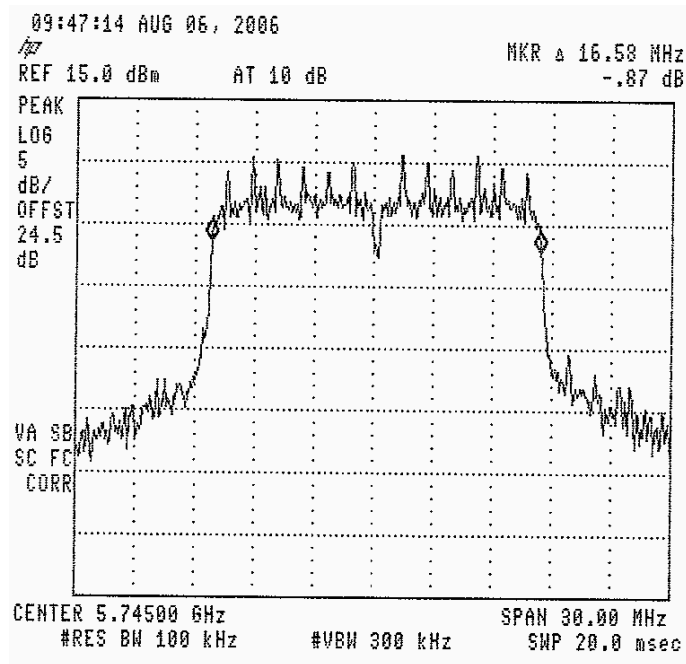


Figure 122 —5745 MHz

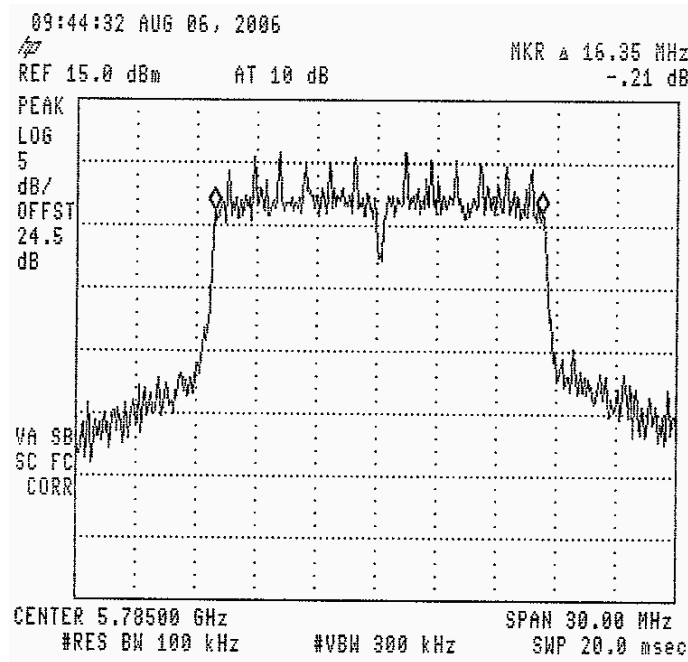


Figure 123 —5785 MHz

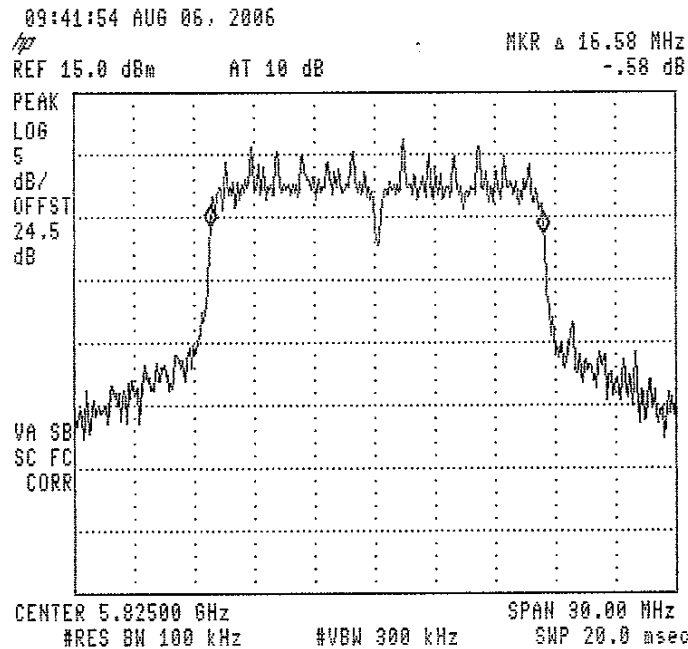


Figure 124 —5825 MHz

18.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Reading (MHz)	Specification (MHz)
5745	16.58	At least 0.5
5785	16.35	At least 0.5
5825	16.58	At least 0.5

Figure 125 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

Typed/Printed Name: E. Pitt

18.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 126 Test Equipment Used

19. Band Edge Spectrum (5.8 GHz Transmitter)

[In Accordance with section 15.247(c)]

19.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=24dB ($3 \times 8\text{dB}$) and an appropriate coaxial cable=0.5dB. The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 5700 MHz and above 5850 MHz was measured relative to power level at 5745 MHz and 5825 MHz correspondingly.

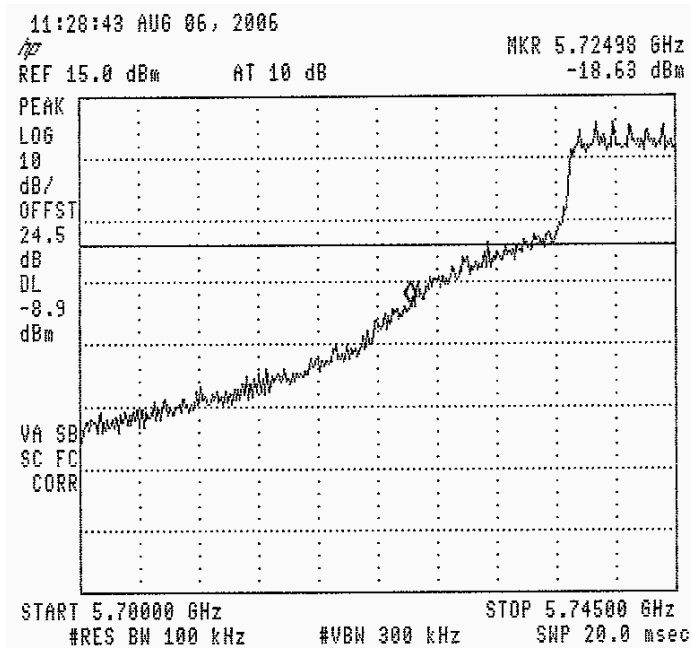


Figure 127 —5745 MHz

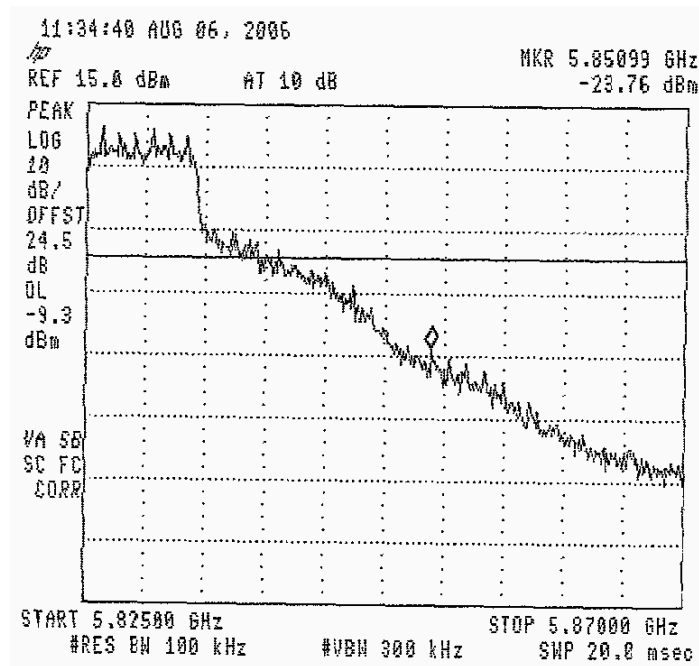


Figure 128 —5825 MHz

19.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point
 Model No.: MBW-WLP-1100F
 Serial Number: SCGG1001022
 Specification: F.C.C. Part 15, Subpart C

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBc)	Specification (dBc)	Margin (dB)
5745	5725	29.7	20.0	9.7
5825	5850	34.5	20.0	14.5

Figure 129 Band Edge Spectrum

JUDGEMENT: Passed by 9.7 dB

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

Typed/Printed Name: E. Pitt

19.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 130 Test Equipment Used

20. Transmitted Power Density (5.8 GHz Transmitter)

[In accordance with section 15.247(d)]

20.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through EXT ATT=24dB (3 × 8dB) and an appropriate coaxial cable=0.5dB. The spectrum analyzer was set to 3 kHz resolution BW, 10 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.

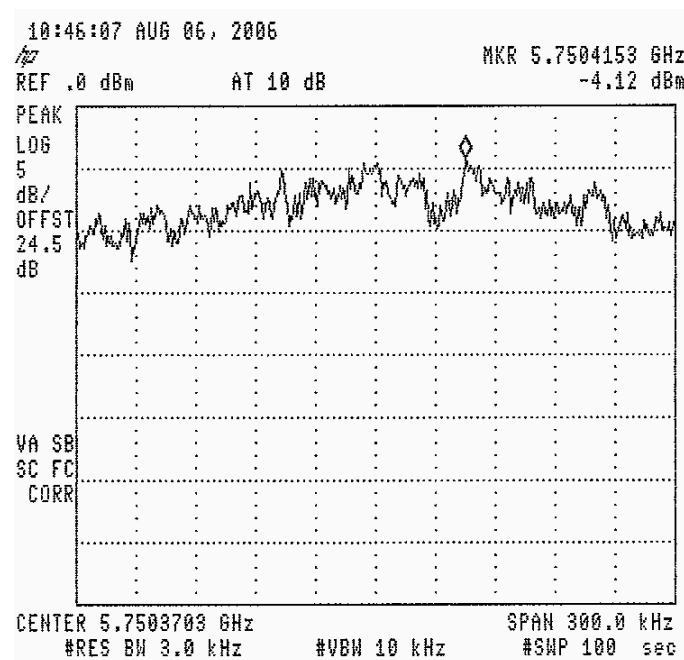


Figure 131 —5745 MHz

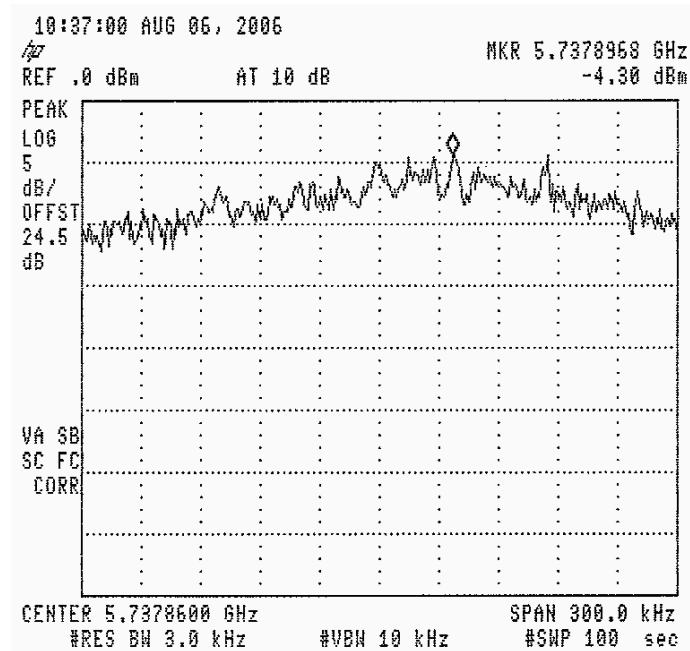


Figure 132 —5745 MHz

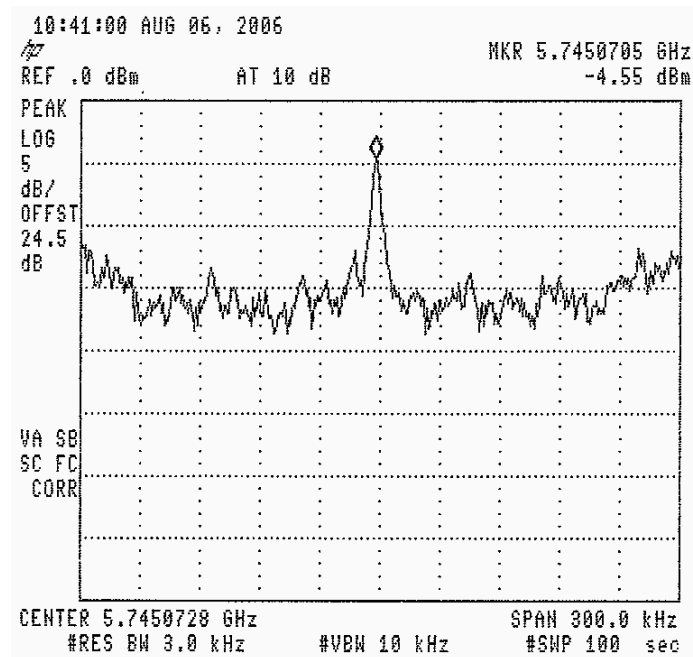


Figure 133 —5745 MHz

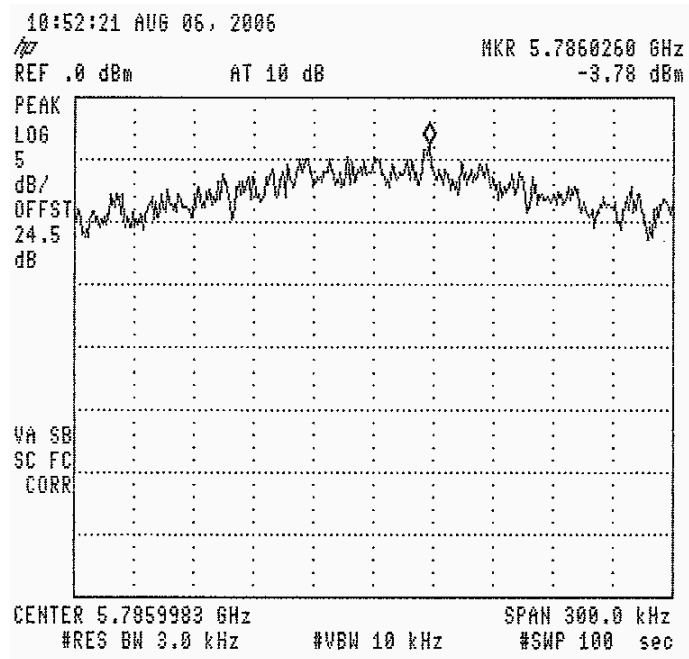


Figure 134 —5785 MHz

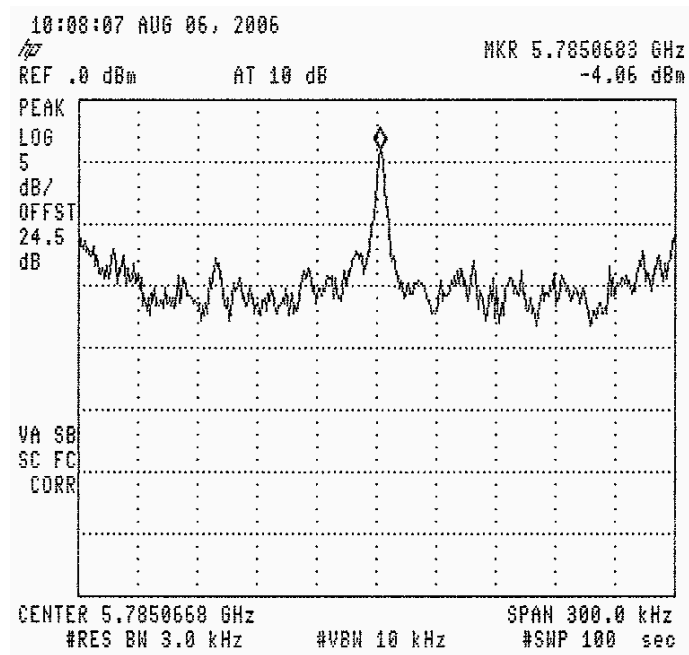


Figure 135 —5785 MHz

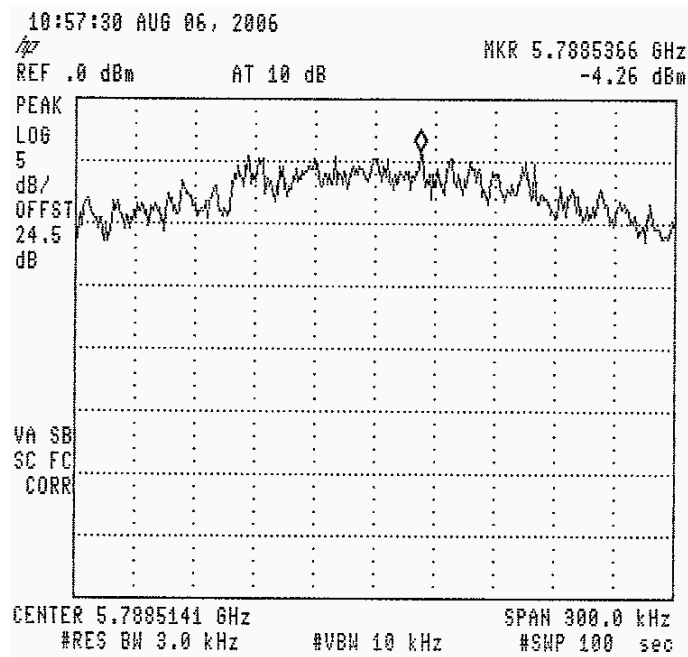


Figure 136 —5785 MHz

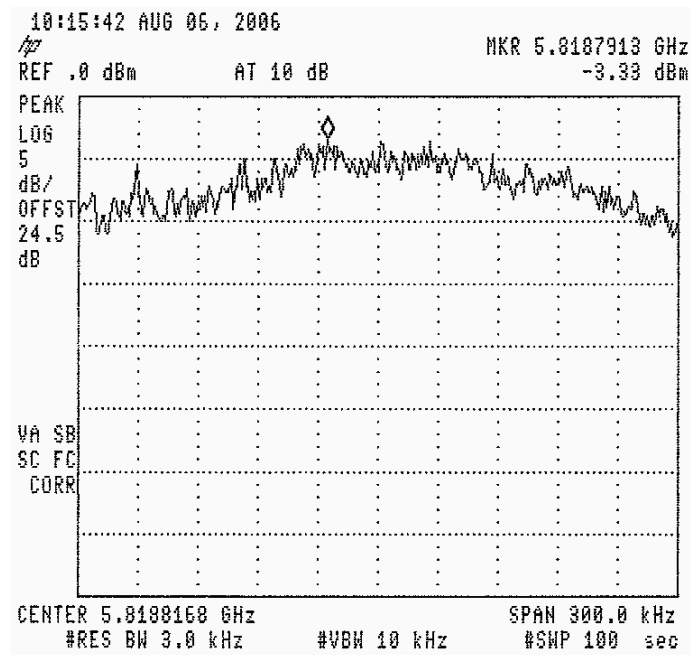


Figure 137 —5825 MHz

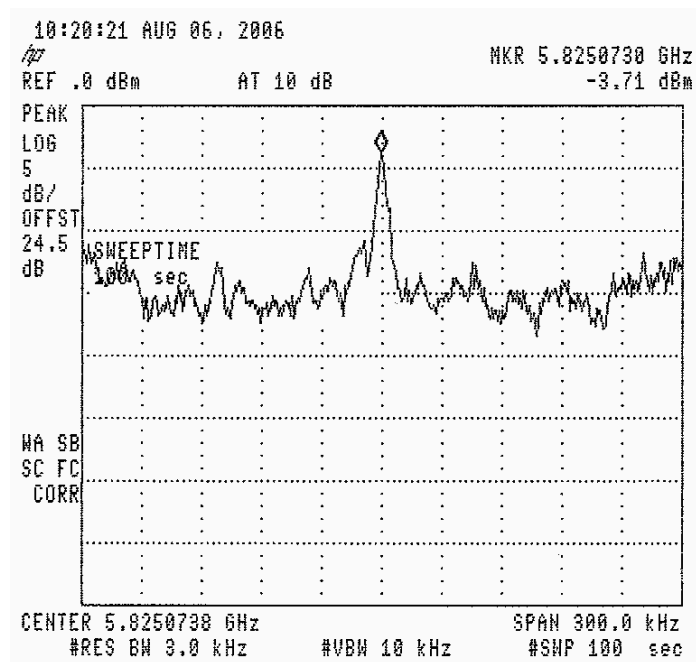


Figure 138 —5825 MHz

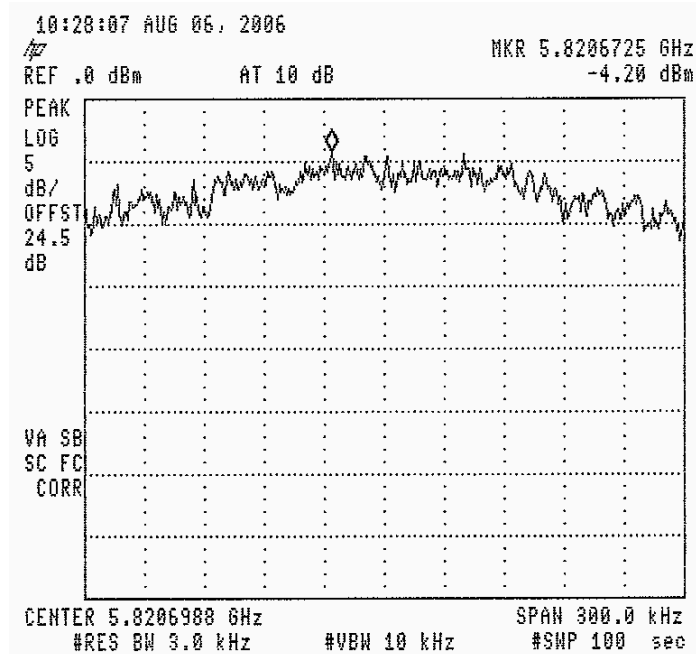


Figure 139 —5825 MHz

20.2 Results table

E.U.T. Description: Outdoor Wireless LAN Access Point

Model No.: MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Reading Signal Analyzer (dBm)	Specification (dBm)	Margin (dB)
5745	4.55	8.0	-3.45
5785	4.26	8.0	-3.74
5825	4.20	8.0	-3.80

Figure 140 Test Results

JUDGEMENT: Passed by 3.8 dB

TEST PERSONNEL:

Tester Signature: E. Pitt

Date: 11.09.06

Typed/Printed Name: E. Pitt

20.3 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 6, 2006	1 year
Cable	Avnet	MTS	N/A	February 8, 2006	1 year
Attenuator	MACOM	M3933/25-74	0056	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0202	October 10, 2005	1 year
Attenuator	MACOM	M3933/25-74	0211	October 10, 2005	1 year

Figure 141 Test Equipment Used

21. Antenna Gain (5.8 GHz Transmitter)

The antenna gain is 10.5 dBi (customer's information).

22. R.F Exposure/Safety (5.8 GHz Transmitter)

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

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(f) FCC limits at 5785MHz 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 537mW (Peak) (27.3 dBm)

G_t - Antenna Gain, 11.2 = 10.5 dBi

R - Distance from Transmitter using 20cm worst case

(h) The peak power density is :

$$S_p = \frac{537}{4\pi(20)^2} = 0.11 \frac{mW}{cm^2}$$

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

The average power over 30 minutes is:

$$P_{AV} = 537 \times 0.987 = 530 mW$$

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

$$S_{AV} = \frac{530}{4\pi(20)^2} = 0.11 \frac{mW}{cm^2}$$

(f) This is 1 order of magnitude below the FCC limit.

23. Conducted Emission From AC Mains Test Data Per FCC Part 15 Sub-part B

23.1 Test Specification

FCC, Part 15, Subpart B: Class B

23.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 4. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 μ Hn 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 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 with 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, and using peak detection.

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

23.3 Test Data

JUDGEMENT: Passed by 7.8 dB

The margin between the emission levels and the specification limit is, in the worst case, 12.0 dB for the phase line at 2.18 MHz and 7.8 dB at 15.50 MHz for the neutral line.

The EUT met the FCC Part 15, Subpart B, Class B specification requirements.

The details of the highest emissions are given in *Figure 142* to *Figure 147*.

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

Typed/Printed Name: E. Pitt

Conducted Emission

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

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

Frequency (MHz)	Peak Amplitude (dBμV)	Quasi-peak Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.34	33.8	33.0	59.3	Pass	-26.3
0.48	35.0	34.7	56.5	Pass	-21.8
0.88	35.0	34.3	56.0	Pass	-21.7
2.18	37.7	37.0	56.0	Pass	-19.0
15.50	43.0	38.2	60.0	Pass	-21.8

Figure 142. Conducted Emission: PHASE. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dBμV)	Average Amplitude (dBμV)	Specification (dB μV)	Pass/Fail	Margin (dB)
0.34	33.8	32.2	49.2	Pass	-17.0
0.48	35.0	34.0	46.4	Pass	-12.4
0.88	35.0	33.5	46.0	Pass	-12.5
2.18	37.7	34.0	46.0	Pass	-12.0
15.50	43.0	35.0	50.0	Pass	-15.0

Figure 143. Detectors: Peak, AVERAGE .

Conducted Emission

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC Part 15, Subpart B, Class B
 Lead: Phase
 Detectors: Peak, Quasi-peak, Average

08:45:41 AUG 03, 2006

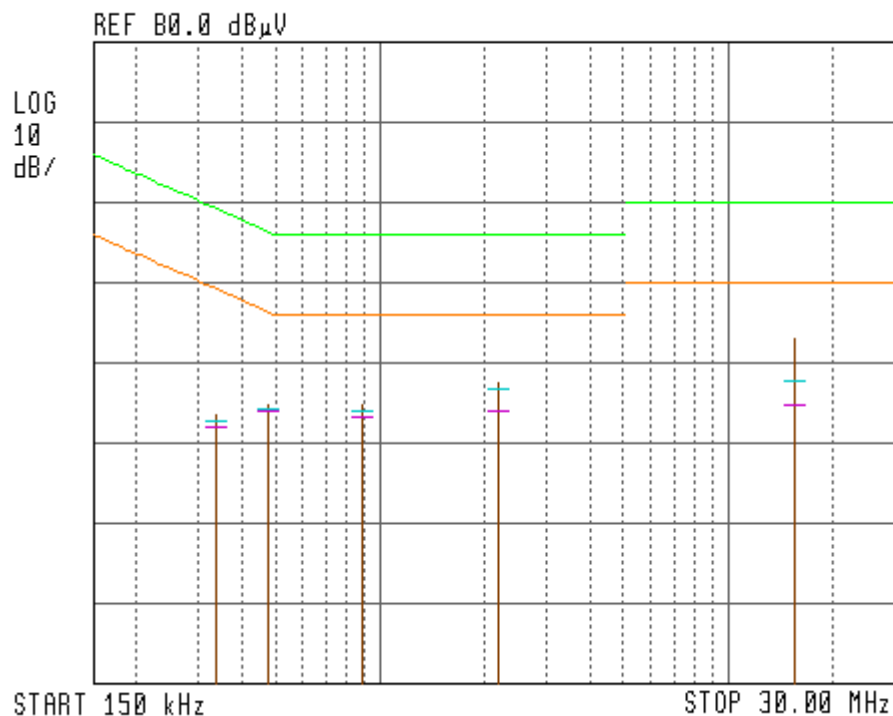


Figure 144. Detectors: Peak, Quasi-peak, Average

Notes:

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB μ V).
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 Outdoor Wireless LAN Access Point

Type MBW-WLP-1100F

Serial Number: SCGG1001022

Specification: FCC Part 15, Subpart B, Class B

Lead: Neutral

Detectors: Peak, Quasi-peak, Average

Frequency (MHz)	Peak Amplitude (dB μ V)	Quasi-peak Amplitude (dB μ V)	Specification (dB μ V)	Pass/Fail	Margin (dB)
0.48	34.0	30.3	56.5	Pass	-26.2
1.98	35.1	34.2	56.0	Pass	-21.8
4.90	31.3	30.4	56.0	Pass	-25.6
11.74	42.3	39.7	60.0	Pass	-20.3
15.15	36.9	32.0	60.0	Pass	-28.0
15.50	47.2	44.8	60.0	Pass	-15.2

Figure 145. Detectors: Peak, QUASI-PEAK

Frequency (MHz)	Peak Amplitude (dB μ V)	Average Amplitude (dB μ V)	Specification (dB μ V)	Pass/Fail	Margin (dB)
0.48	34.0	28.8	46.4	Pass	-17.6
1.98	35.1	31.9	46.0	Pass	-14.1
4.90	31.3	27.3	46.0	Pass	-18.7
11.74	42.3	36.6	50.0	Pass	-13.4
15.15	36.9	27.0	50.0	Pass	-23.0
15.50	47.2	42.2	50.0	Pass	-7.8

Figure 146. Detectors: Peak, AVERAGE

Conducted Emission

E.U.T Description Outdoor Wireless LAN Access Point
Type MBW-WLP-1100F
Serial Number: SCGG1001022

Specification: FCC Part 15, Subpart B, Class B
Lead: Neutral
Detectors: Peak, Quasi-peak, Average

08:57:43 AUG 03, 2006

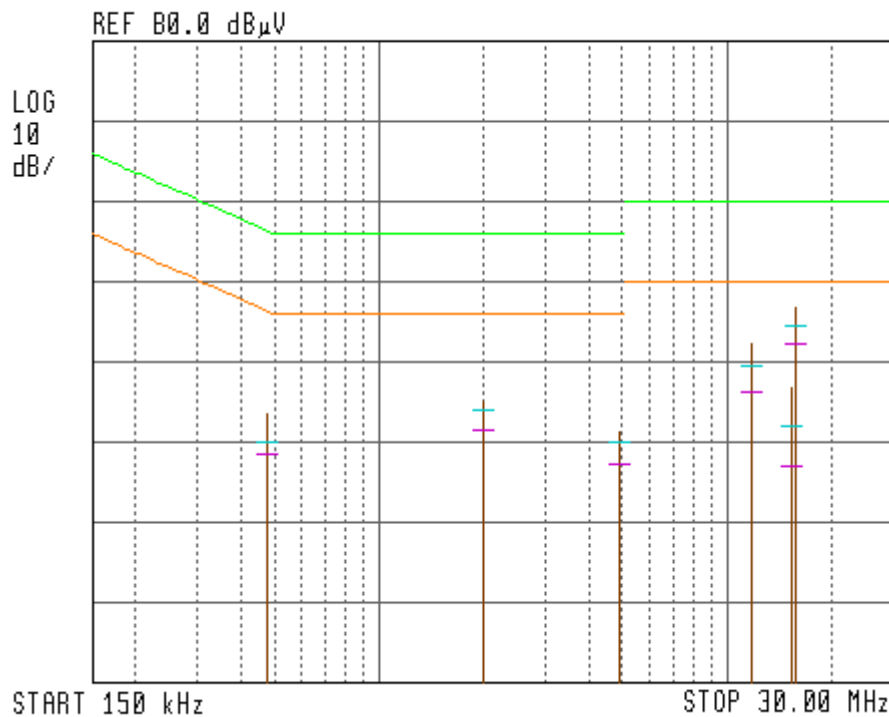


Figure 147 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

Notes:

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB μ V).
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.

23.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration	Period
LISN	Fischer	FCC-LISN-2A	127	March 20, 2006	1 year
LISN	Fischer	FCC-LISN-2A	128	March 20, 2006	1 year
Receiver	HP	85420E/85422E	3427A00103/34	March 22, 2006	1 year
Printer	HP	ThinkJet2225	2738508357	N/A	N/A

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

24.1 Test Specification

30-30000 MHz, FCC Part 15, Subpart B, CLASS B

24.2 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 30-30000 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 2.9-30 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.

24.3 Test Data

JUDGEMENT: Passed by 4.6 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 4.6 dB in the worst case at the frequency of 640.26 MHz, vertical polarization.

The signals in the band 1.0 – 30.0 GHz were below the spectrum analyzer noise level which is at least 6dB below the specification limit.

The details of the highest emissions are given in Figure 148 to Figure 151.

TEST PERSONNEL:

Tester Signature: 

Date: 11.09.06

Typed/Printed Name: E. Pitt

Radiated Emission

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal Frequency range: 30 MHz to 1000 MHz
 Antenna: 3 meters distance Detectors: Peak, Quasi-peak

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB)
240.03	33.6	29.2	19.2	46.0	-16.8
300.73	40.4	36.8	23.0	46.0	-9.2
400.01	35.3	33.0	19.1	46.0	-13.0
599.25	31.7	28.3	23.9	46.0	-17.7
600.01	32.9	29.2	23.9	46.0	-16.8
800.00	36.4	32.9	25.8	46.0	-13.1

**Figure 148. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detectors: Peak, Quasi-peak**

Note: 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.

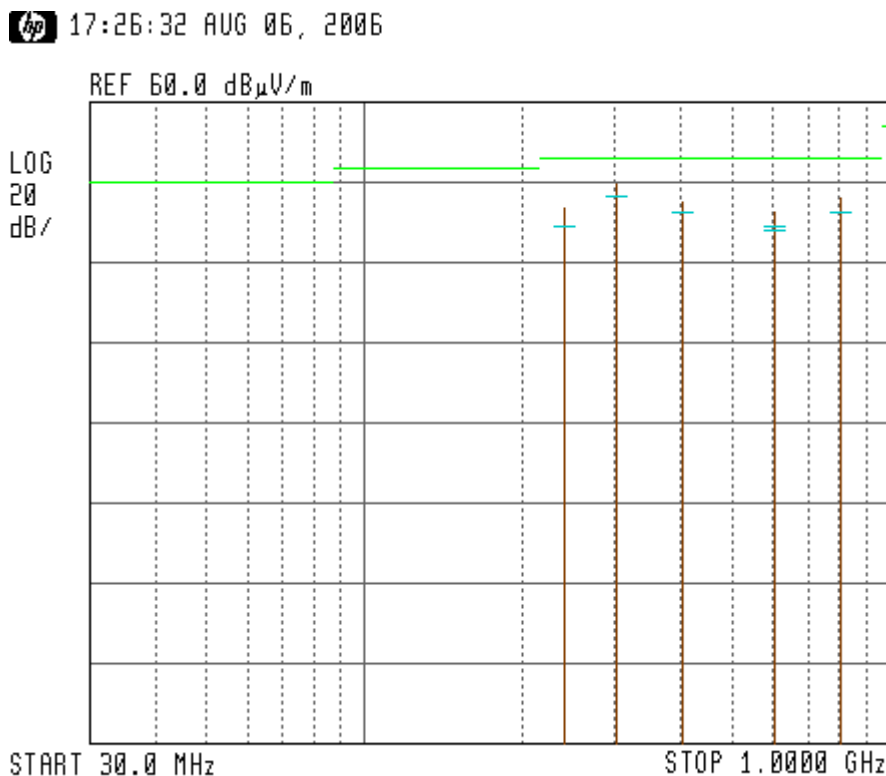
Radiated Emission

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

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 149. 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 μ V/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 Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

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

Frequency	Peak Amp	QP Amp	Correction	Specification	Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB)
240.01	39.6	35.6	19.2	46.0	-10.4
400.01	43.2	40.8	19.1	46.0	-5.2
520.01	37.9	34.9	21.1	46.0	-11.1
560.01	42.8	40.5	22.5	46.0	-5.5
600.02	41.6	38.5	23.9	46.0	-7.5
640.26	44.6	41.4	24.2	46.0	-4.6
800.02	43.1	38.1	25.8	46.0	-7.9

**Figure 150. Radiated Emission. Antenna Polarization: VERTICAL.
 Detectors: Peak, Quasi-peak**

Note: 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.

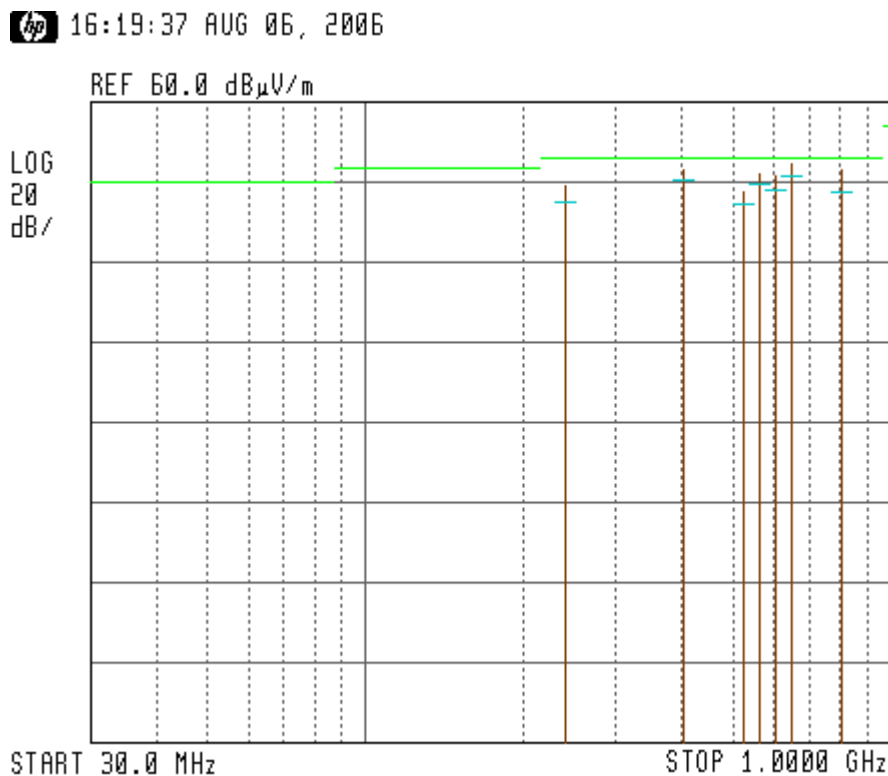
Radiated Emission

E.U.T Description Outdoor Wireless LAN Access Point
 Type MBW-WLP-1100F
 Serial Number: SCGG1001022

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 151. 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 μ V/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.

24.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	March 22, 2006	1 year
RF Section	HP	85420E	3427A00103	March 22, 2006	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	March 19, 2006	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 17, 2005	1 year
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 24, 2005	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 year
Horn Antenna	ARA	SWH-28	1007	October 28, 2005	2 year
Horn Antenna	Narda	V637	0410	November 19, 2004	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	October 16, 2005	1 year
Low Noise Amplifier	Sophia Wireless	LNA28-B	232	February 8, 2006	1 year
Spectrum Analyzer	HP	8592L	3926A01204	February 6, 2006	1 year
Spectrum Analyzer	HP	8564E	3442A00275	February 1, 2006	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	ThinkJet 2225	2738508357.0	N/A	N/A

24.5 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 [dB μ v/m]
RA:	Receiver Amplitude [dB μ v]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

25. APPENDIX A - CORRECTION FACTORS

25.1 Correction factors for CABLE

from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
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		

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".

25.2 Correction factors for

CABLE

from spectrum analyzer
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.

25.3 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 38M30.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".

12.7 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".

**25.8 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".

25.9 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			

25.10 Correction factors for

Horn Antenna
Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	APE (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

25.11 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

25.12 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