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TESTING Cert No.1152.01

DATE: 19 January 2012

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

FCC Radio Test Report

for

GoNet Systems Ltd

Equipment under test:

WiFi Outdoor Access Point

MBW-3100F

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
A. Sharabi, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

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Measurement/Technical Report for

GoNet Systems Ltd

WiFi Outdoor Access Point

MBW-3100F

FCC ID: A7C-3100F-000

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	
Equipment type:	Digital Transmission System	

Limits used:
47CFR15 Section 15.247

Measurement procedure used is ANSI C63.4-2003.

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

Applicant for this device:
(different from "prepared by")
Sharon Ashkenazi
GoNet Systems Ltd.
34 HaBarzel St.
Tel-Aviv, 69710
Israel
Tel: +972-3-633-8634
Fax: +972-3-649-3866
e-mail: SharonA@GoNetworks.com

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1. General Information

1.1 Administrative Information

Manufacturer:	GoNet Systems Ltd
Manufacturer's Address:	34 HaBarzel St., Tel-Aviv, 69710, Israel Tel: +972-3-633-8634 Fax: +972-3-649-3866
Manufacturer's Representative:	Oz Liv
Equipment Under Test (E.U.T):	WiFi Outdoor Access Point
Equipment Model No.:	MBW-3100F
Equipment Serial No.:	MLMU1000802
Date of Receipt of E.U.T:	13.11.2011
Start of Test:	13.11.2011
End of Test:	24.11.2011
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15 Section 15.247

1.2 List of Accreditations

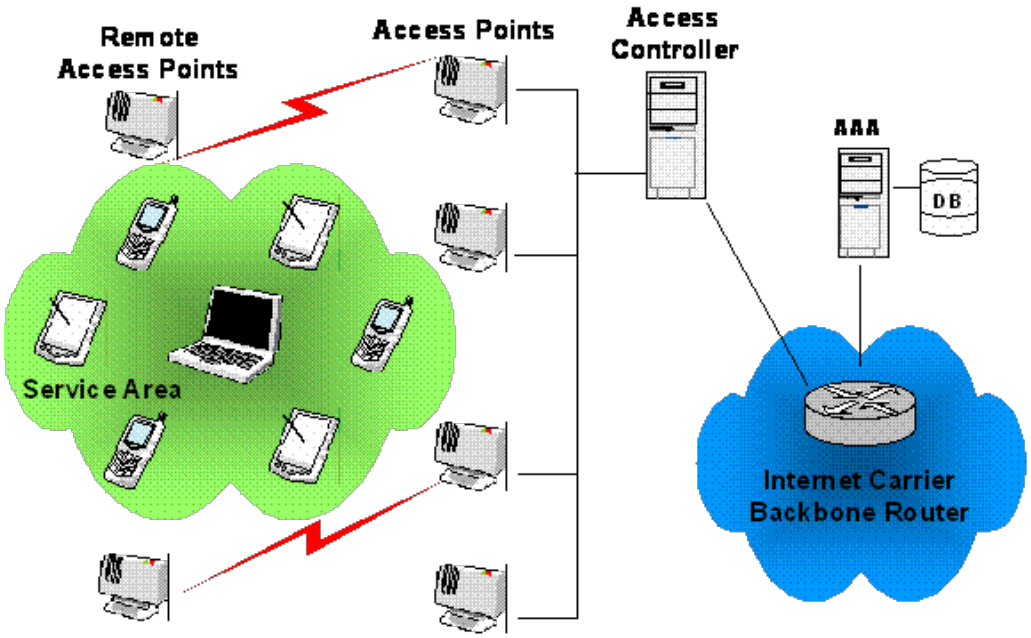
The EMC laboratory of I.T.L. is accredited by the following bodies:

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), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.

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 MBW-3100 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 MBW-3100s will be installed by large service providers or cellular operators in areas where there will be a demand for this service, such as train stations, airports, convention centers and business areas. Another option is that the MBW-3100 will be installed in a campus (such as a university or hospital) by the "owner" of the campus.

The MBW-3100 will typically be installed either outdoors to provide outdoor coverage of Campuses or city neighborhoods, or in large indoor locations such as train stations, airports etc. In outdoor installations the MBW-3100 will typically be mounted either on a pole or on an outside wall of a building. In indoor installation, the MBW-3100 will typically be mounted on wall.

The 5GHz interface allows some of the MBW-3100's to be installed without cable connection to the Internet. The units that are installed in vicinity form link between each other c\and can transfer data to the nearest Internet connection.

1.4 Test Methodology

Conducted and radiated testing was 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 September 03, 2009).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) 0.15 – 30 MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000 MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 4.96 dB

2. System Test Configuration

2.1 Justification

The unit was configured to transmit at maximum power and 100% of the time. During the tests the unit was checked in three different frequencies at the bottom of the range, at the upper limit of the range and in the middle of the range. At all the ranges the unit was tested on four different rates 1Mbit/sec, 11Mbit/sec, 6Mbit/sec and 54 Mbit/sec.

Radiated tests for the Unit was in a typical installation position and with the internal antenna connected.

2.2 EUT Exercise Software

The original software was used in order to operate the system.

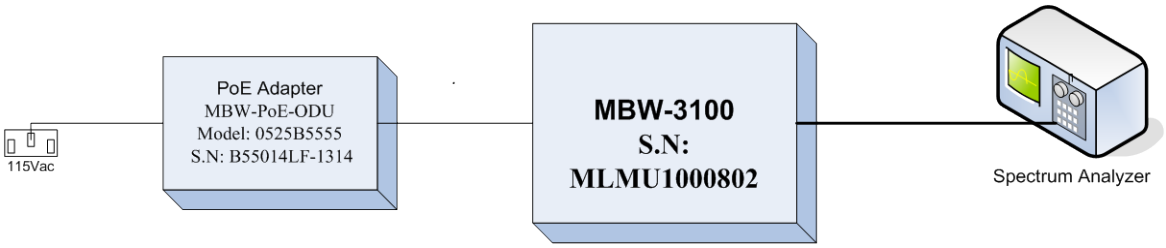
2.3 Special Accessories

No special accessories were needed to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order o achieve compliance.

2.5 Configuration of Tested System



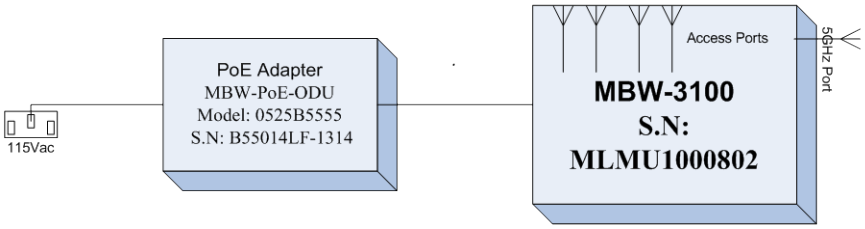
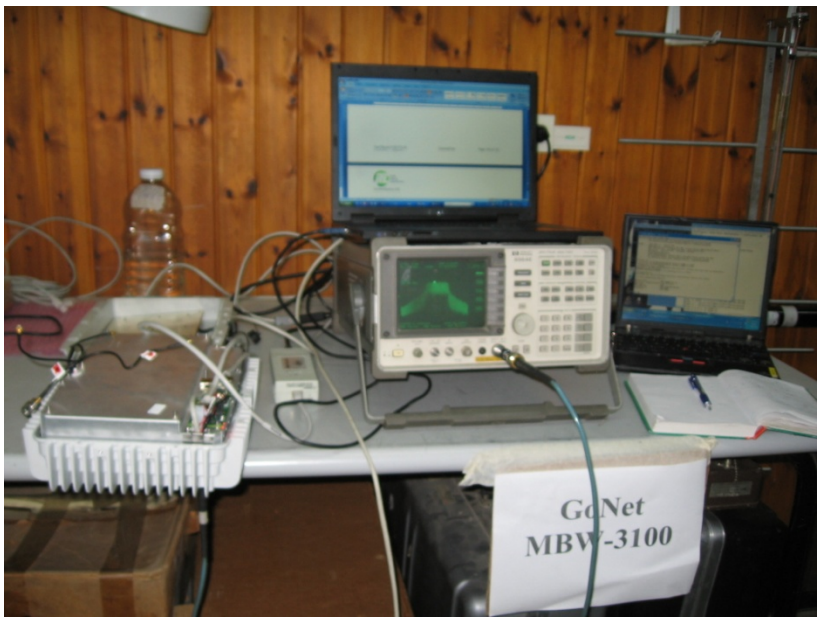


Figure 1. Configuration of Tested System – Conducted

Figure 2. Configuration of Tested System – Radiated

3. Conducted and Radiated Measurement



Test Set-up Photos

Figure 3. Conducted Emission From Antenna Port Test

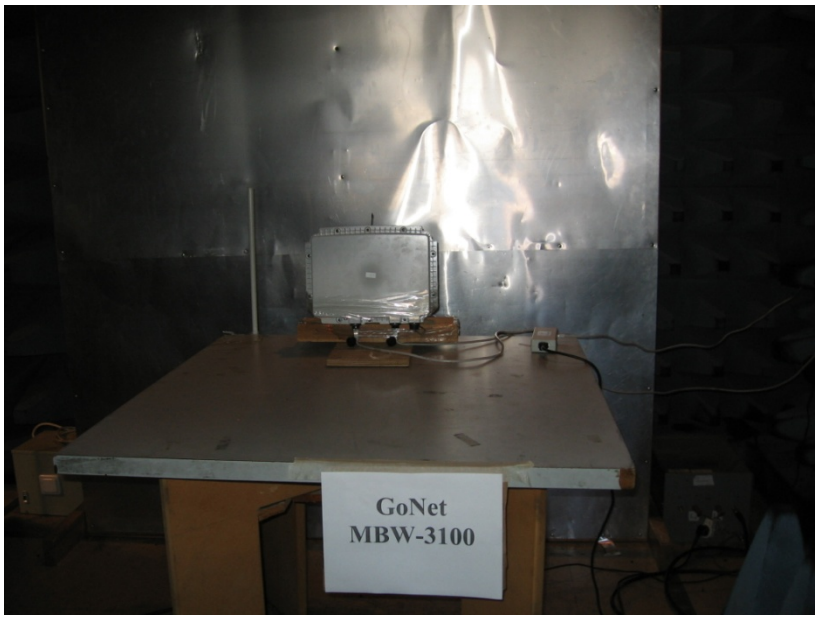


Figure 4. Conducted Emission From AC Power line

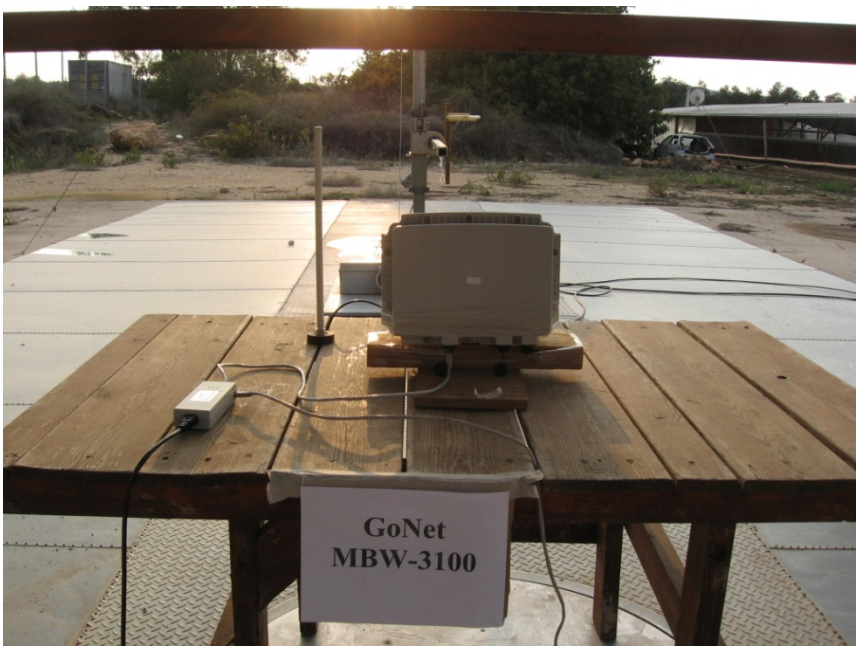


Figure 5. Radiated Emission Test

4. Conducted Emission Data

4.1 Test Specification

F.C.C., Part 15, Subpart C

4.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. 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 a 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 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 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.

4.3 Measured Data

JUDGEMENT: Passed by 7.2 dB

The margin between the emission levels and the specification limit was, in the worst case, 7.2 dB for the phase line at 20.86 MHz and 10.3 dB for the neutral line at 8.88 MHz.

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

The details of the highest emissions are given in *Figure 6* to *Figure 9*.
TEST PERSONNEL:

Tester Signature:  Date: 19.01.12

Typed/Printed Name: A. Sharabi

Conducted Emission

E.U.T Description	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

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

Signal Number	Frequency (MHz)	Pk Delta L 1 (dB)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.182933	-13.7	49.4	-15.0	43.2	-11.2	0.0
2	0.371555	-17.6	39.6	-19.0	37.5	-11.1	0.0
3	5.148736	-18.5	38.3	-21.6	26.6	-23.4	0.0
4	8.869133	-11.0	44.5	-15.5	38.3	-11.7	0.0
5	18.066035	-16.0	39.6	-20.4	33.0	-17.0	0.0
6	20.867215	-7.3	48.8	-11.2	42.8	-7.2	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	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

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

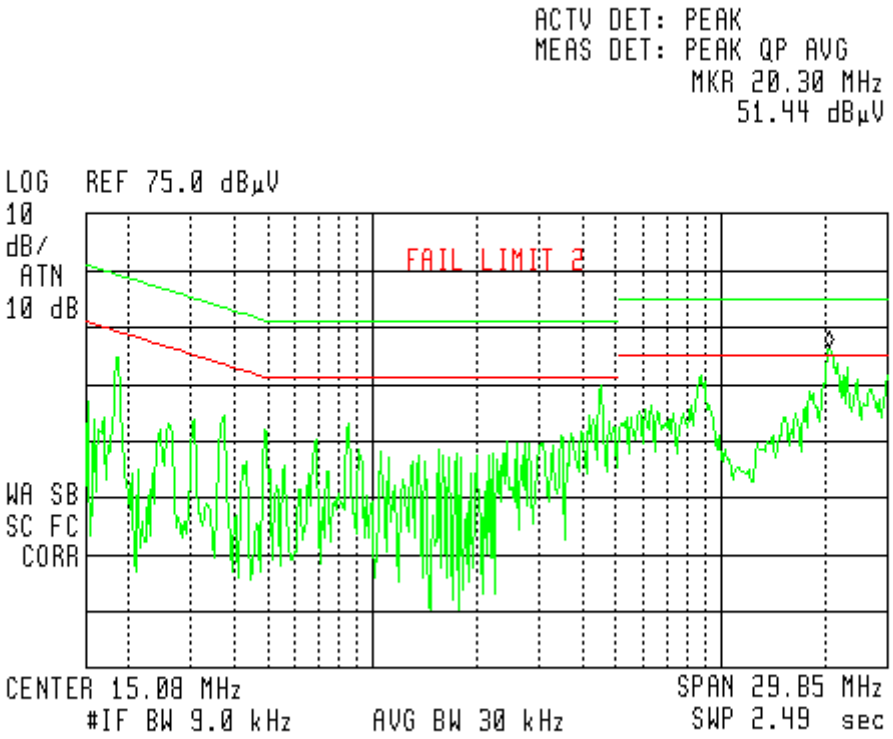


Figure 7. Detectors: Peak, Quasi-peak, Average

Note: Fail indication on the spectral plot results from peak detector level reading above the limit. This indication is for information only and it should not be interpreted as a test failure.

Conducted Emission

E.U.T Description	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

Specification:	FCC Part 15, Subpart 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	0.186721	49.7	48.8	-15.4	42.6	-11.6	0.0
2	0.376545	38.4	37.4	-21.0	35.7	-12.7	0.0
3	0.936136	34.3	33.3	-22.7	29.9	-16.1	0.0
4	4.653419	42.5	39.4	-16.6	28.7	-17.3	0.0
5	8.865163	49.4	45.6	-14.4	39.7	-10.3	0.0
6	20.443430	50.7	45.1	-14.9	38.8	-11.2	0.0

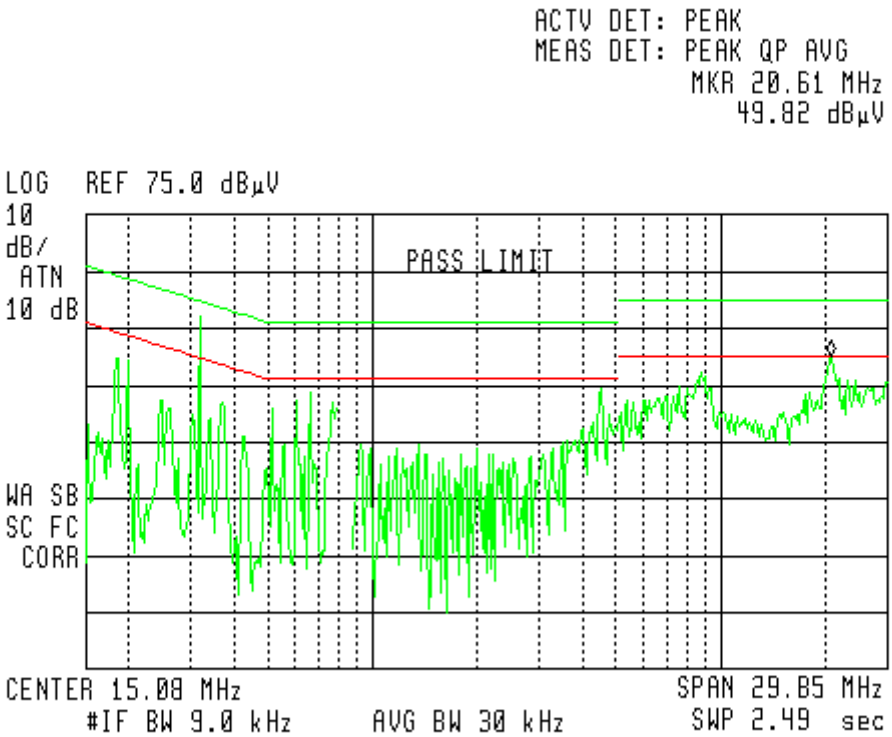
Figure 8. Detectors: Peak, Quasi-peak, AVERAGE

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	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

Specification: FCC Part 15, Subpart C
Lead: Neutral



Detectors: Peak, Quasi-peak, Average

Figure 9 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

4.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 3, 2011	1 Year
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1Year
RF Filter Section	HP	85420E	3705A00248	November 24, 2010	1Year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

5. 6 dB Minimum Bandwidth

5.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 2412, 2437 , and 2462 MHz with the following modulations: 1, 11, 6 and 54 Mbps.

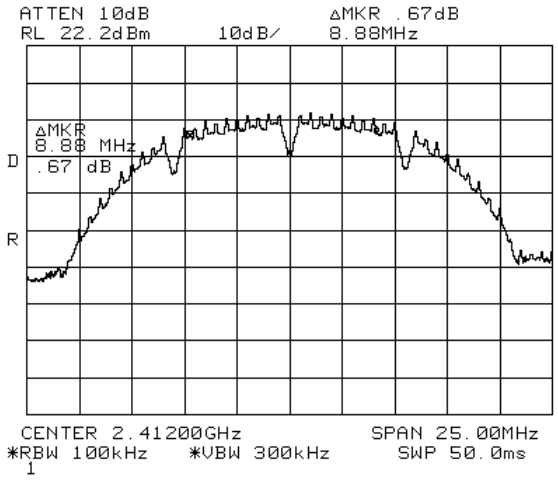


Figure 10 —Channel 1, 1Mbps

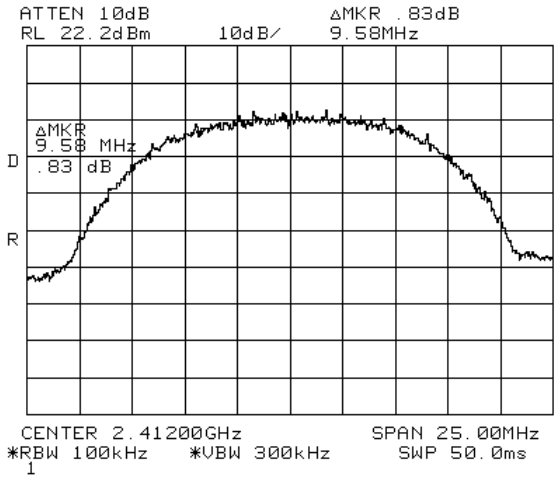


Figure 11 ——Channel 1, 11Mbps

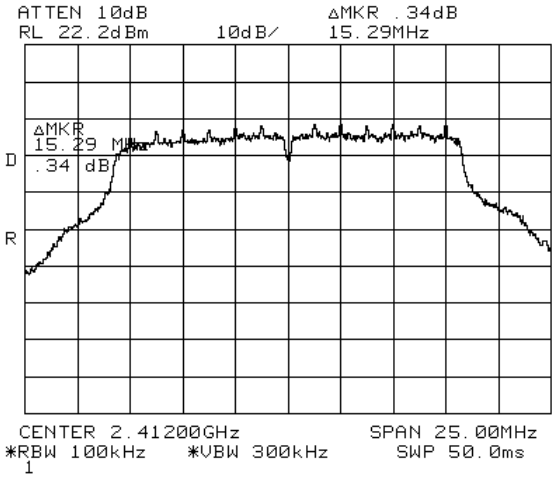


Figure 12 — Channel 1, 6Mbps

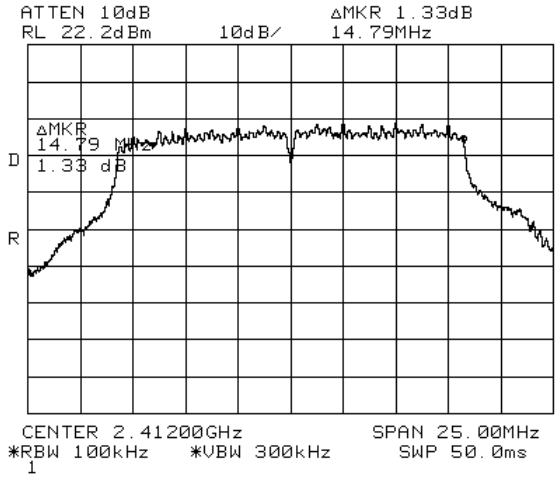


Figure 13 — Channel 1, 54Mbps

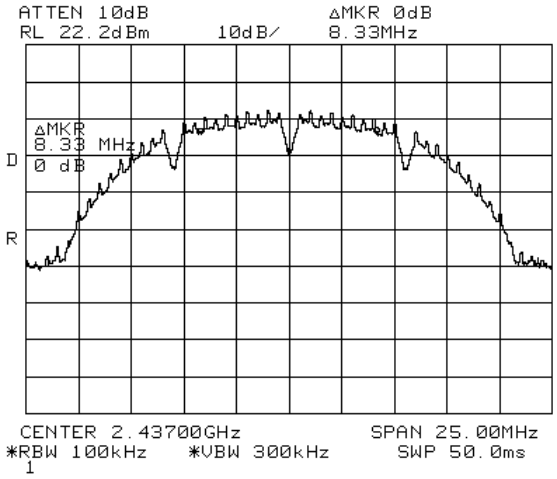


Figure 14 — Channel 6, 1Mbps

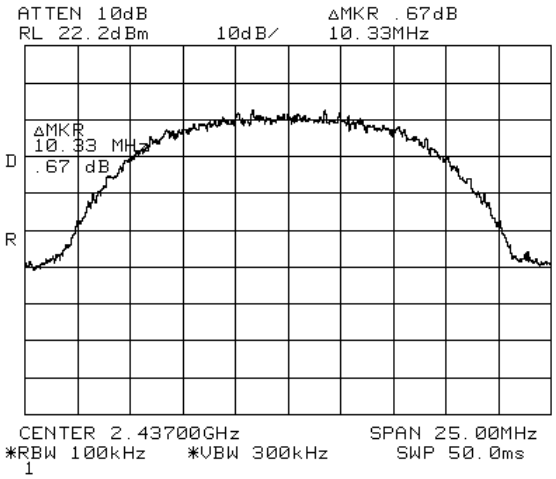


Figure 15 — Channel 6, 11Mbps

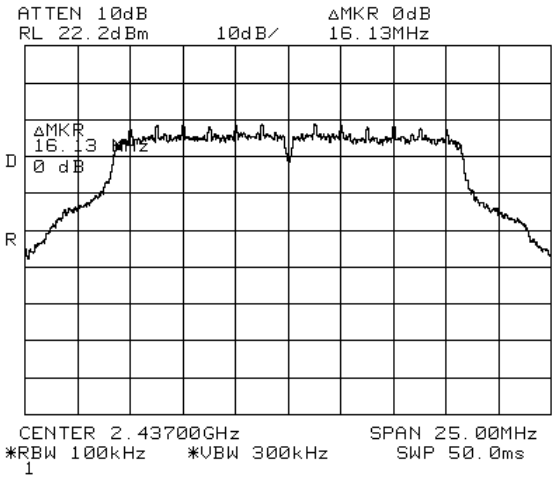


Figure 16 — Channel 6, 6Mbps

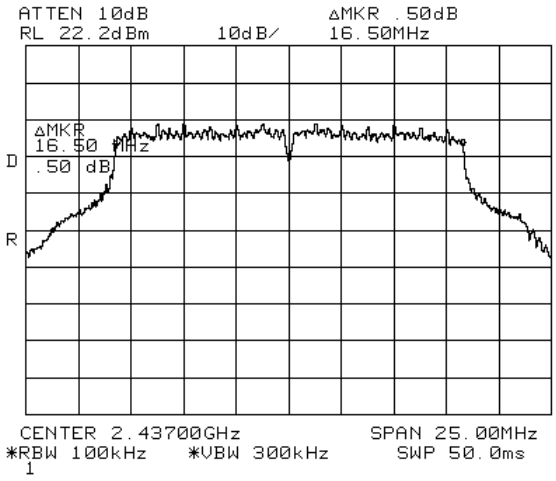


Figure 17 — Channel 6, 54Mbps

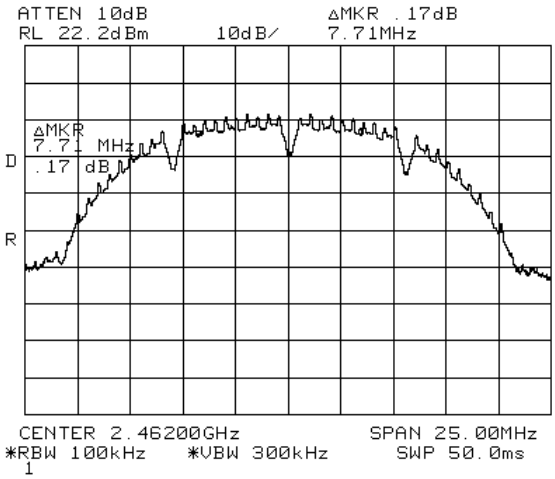


Figure 18 — Channel 11, 1Mbps

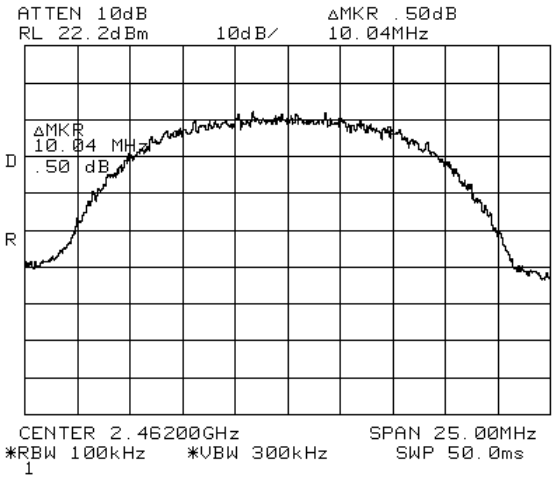


Figure 19 — Channel 11, 11Mbps

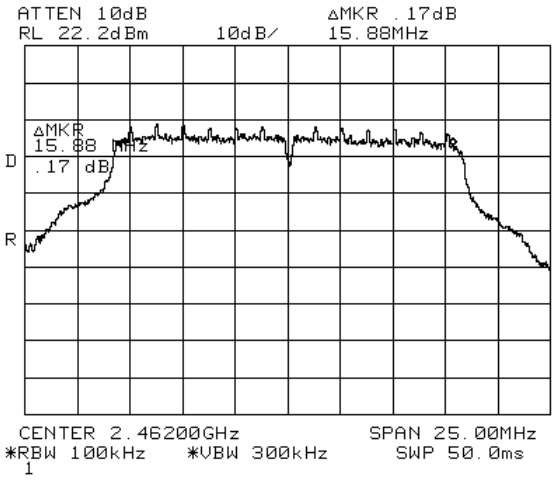


Figure 20 — Channel 11, 6Mbps

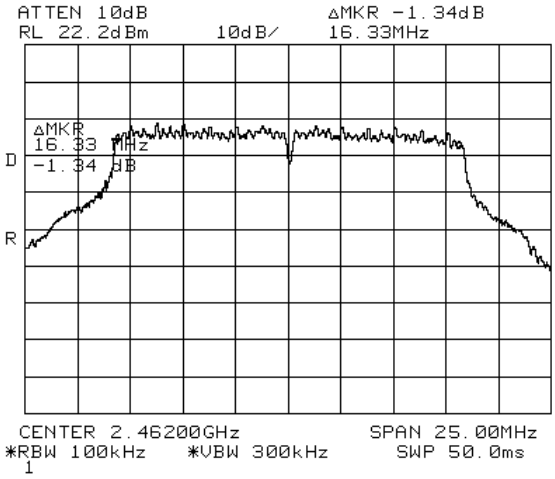


Figure 21 — Channel 11, 54Mbps

5.2 Results table

E.U.T Description: WiFi Outdoor Access Point
Model No.: MBW-3100F
Serial Number: MLMU1000802
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Modulation (Mbps)	Reading (MHz)	Specification (MHz)
2412	1	8.88	0.5
	11	9.58	0.5
	6	15.29	0.5
	54	14.79	0.5
2437	1	8.33	0.5
	11	10.33	0.5
	6	16.13	0.5
	54	16.50	0.5
2462	1	7.71	0.5
	11	10.04	0.5
	6	15.88	0.5
	54	16.33	0.5

Figure 22 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

5.3 Test Equipment Used.

6 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3414U01226	January 23, 2011	1 year
Attenuator	-	30dB	-	10 November,2011	1 year
Cable	TestLINE	18	11556	10 November,2011	1 year

Figure 23 Test Equipment Used

6. 26 dB Minimum Bandwidth

6.1 Test procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 26 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 2412, 2437 , and 2462 MHz with the following modulations: 1, 11, 6 and 54 Mbps.

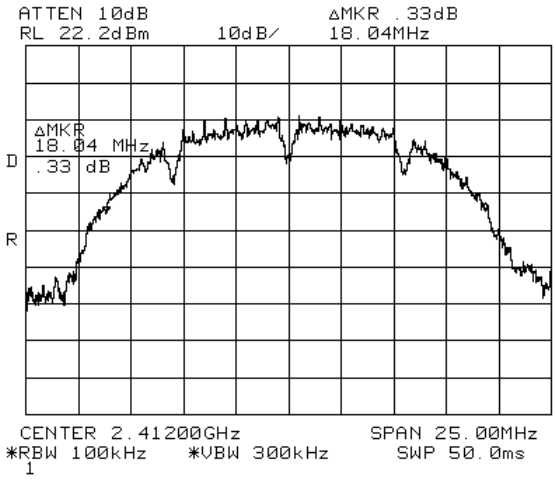


Figure 24 —Channel 1 , 1Mbps

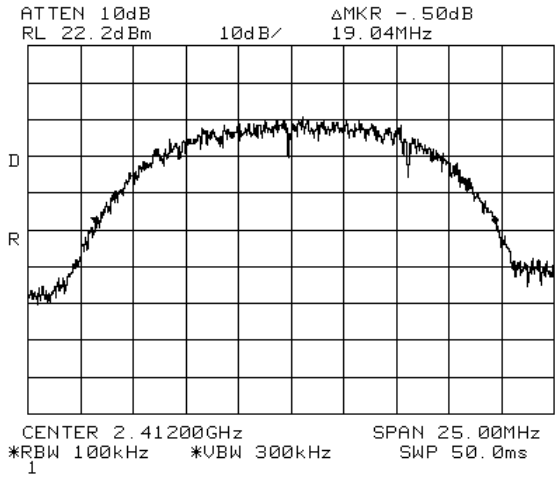


Figure 25 —Channel 1, 11Mbps

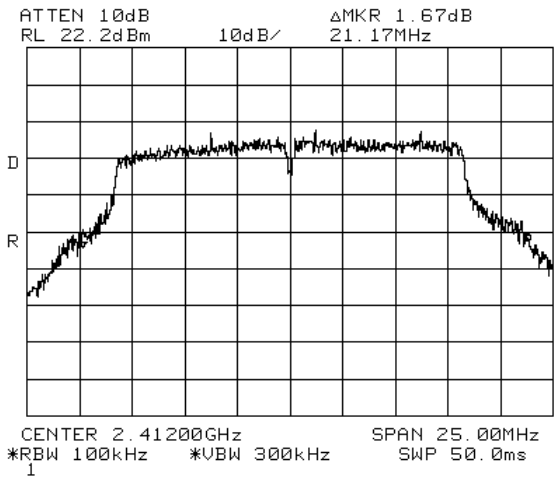


Figure 26 — Channel 1, 6Mbps

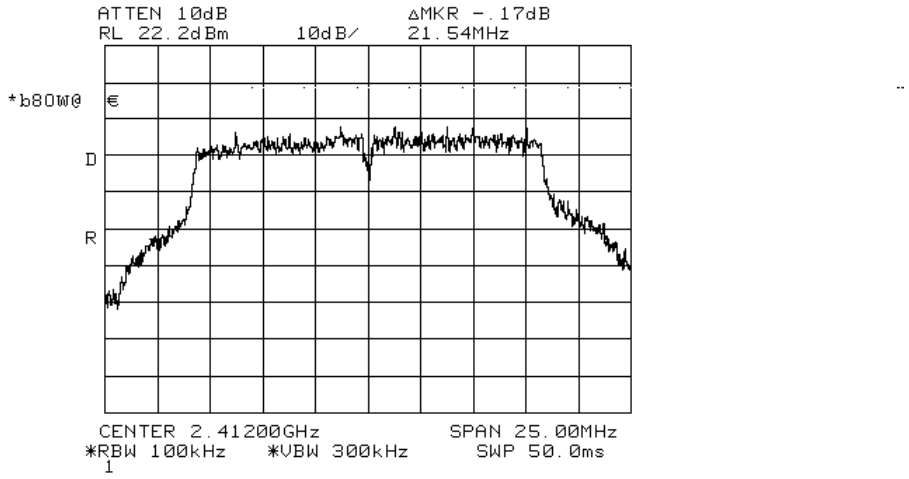


Figure 27 — Channel 1, 54Mbps

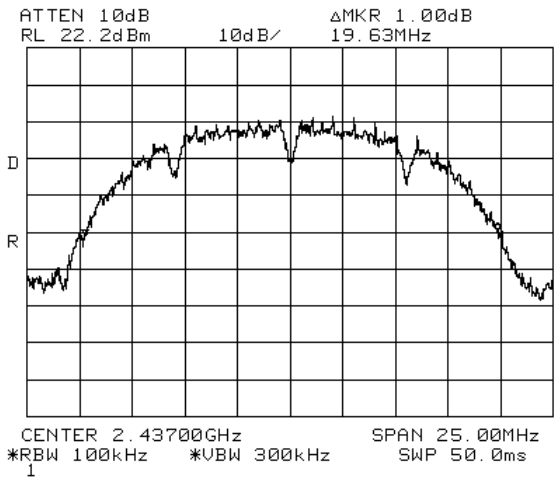


Figure 28 — Channel 6, 1Mbps

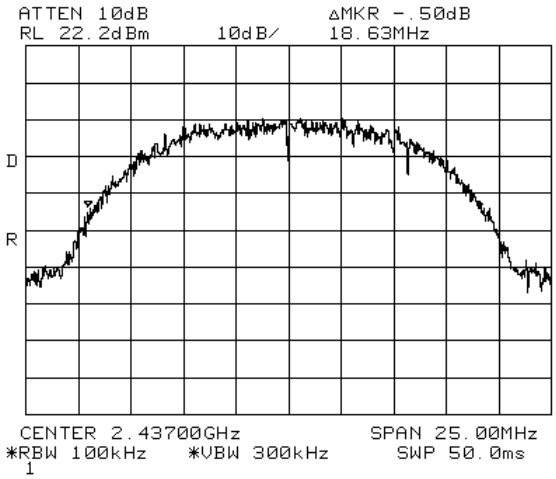


Figure 29 — Channel 6, 11Mbps

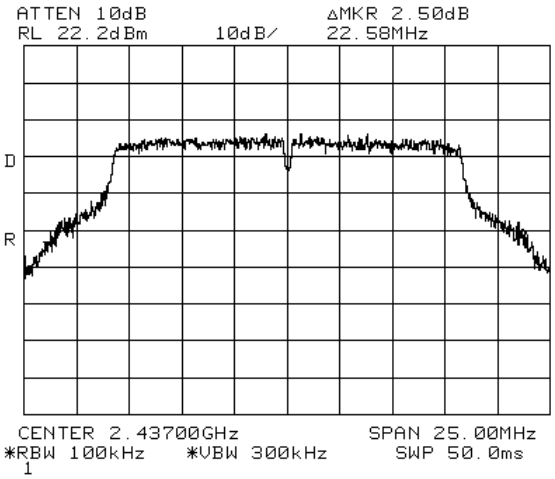


Figure 30 — Channel 6, 6Mbps

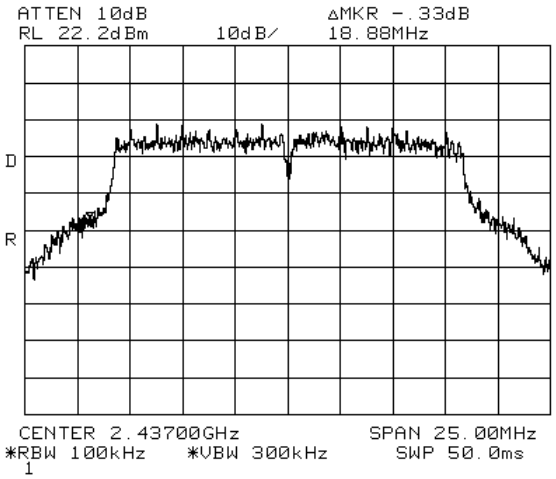


Figure 31 — Channel 6, 54Mbps

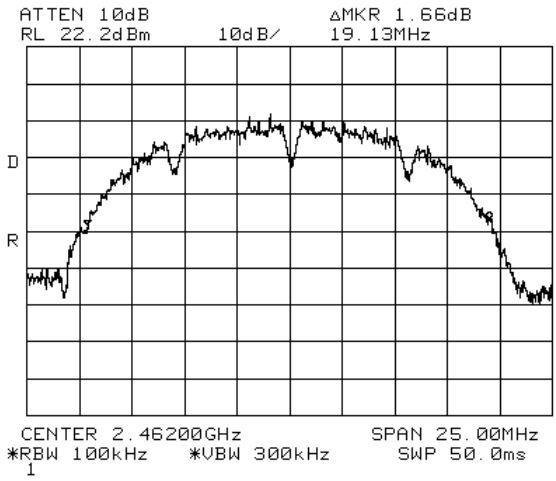


Figure 32 — Channel 11, 1Mbps

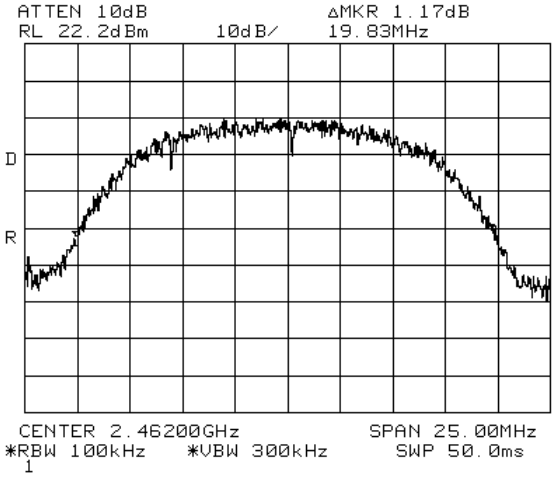


Figure 33 — Channel 11, 11Mbps

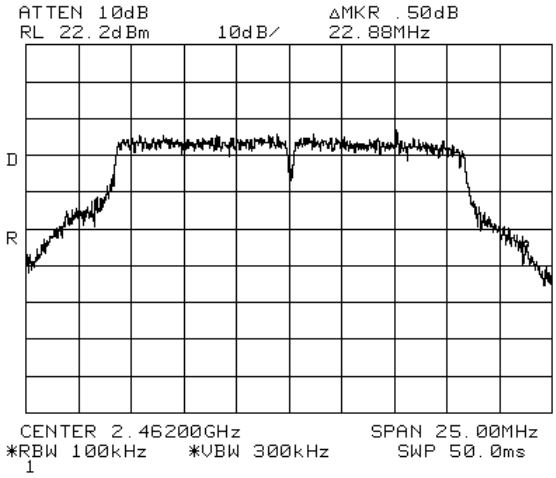


Figure 34 — Channel 11, 6Mbps

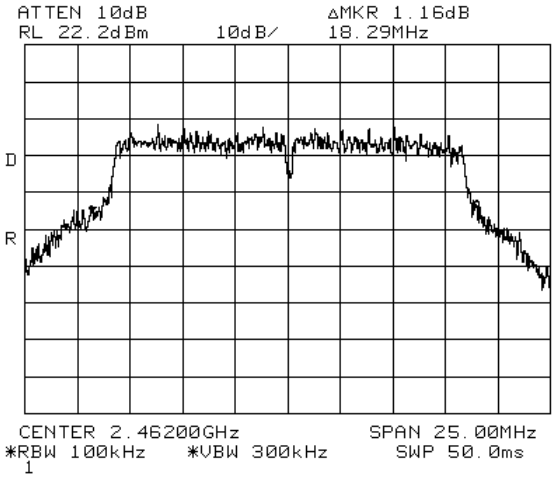


Figure 35 — Channel 11, 54Mbps

6.2 Results table

E.U.T Description: WiFi Outdoor Access Point
Model No.: MBW-3100F
Serial Number: MLMU1000802
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Modulation (Mbps)	Reading (MHz)	Specification (MHz)
2412	1	18.04	0.5
	11	19.04	0.5
	6	21.17	0.5
	54	21.54	0.5
2437	1	19.63	0.5
	11	18.63	0.5
	6	22.58	0.5
	54	18.88	0.5
2462	1	19.13	0.5
	11	19.83	0.5
	6	22.88	0.5
	54	18.29	0.5

Figure 36 26 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

6.3 Test Equipment Used.

26 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3414U01226	23 January,2011	1 year
Attenuator	-	30dB	-	10 November,2011	1 year
Cable	TestLINE	18	11556	10 November,2011	1 year

Figure 37 Test Equipment Used

7. Maximum Transmitted Peak Power Output

7.1 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 1 dB). The Spectrum Analyzer was set to 1.0 MHz resolution BW. Peak power level was measured at selected operation frequencies.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: 1, 11, 6 and 54 Mbps.

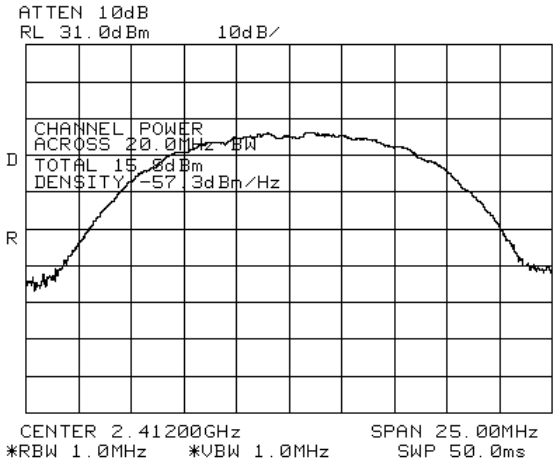


Figure 38 – Channel 1 , 1Mbps

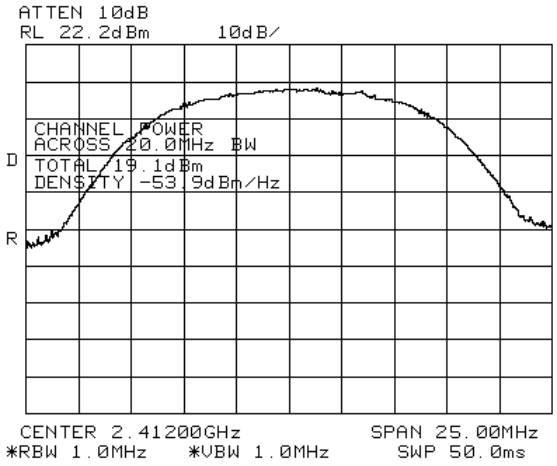


Figure 39- Channel 1 , 11Mbps

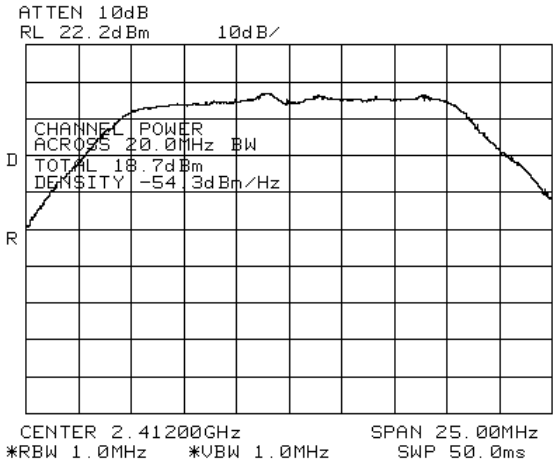


Figure 40 - Channel 1 , 6Mbps

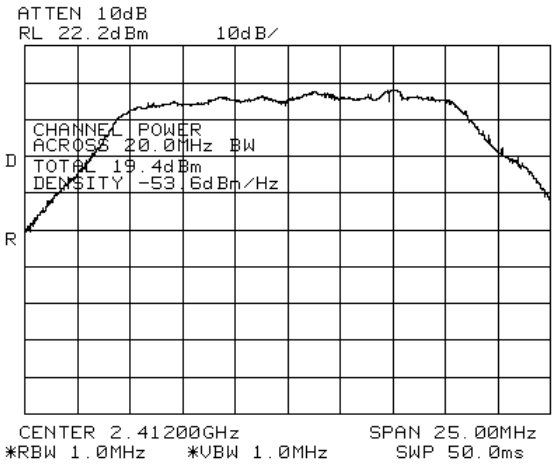


Figure 41 - Channel 1 , 54Mbps

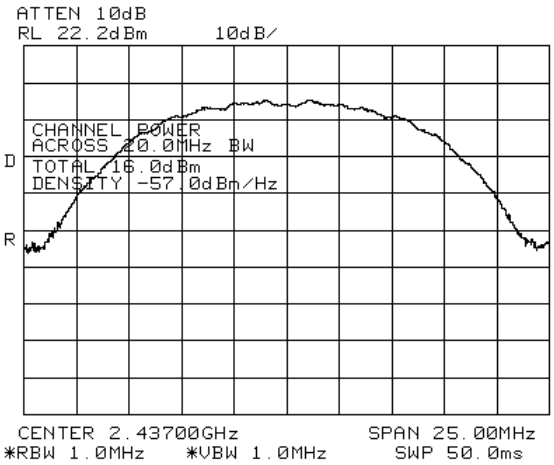


Figure 42 - Channel 6 , 1Mbps

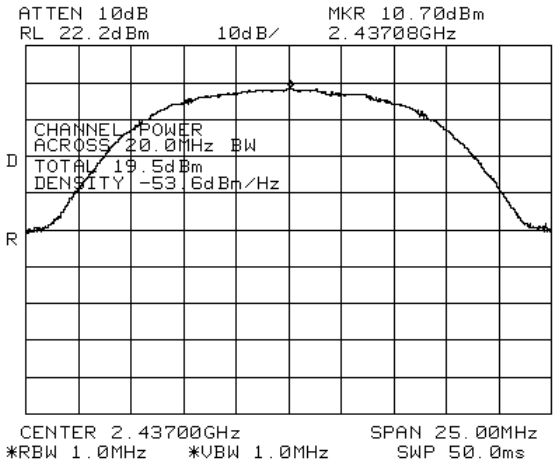


Figure 43 - Channel 6 , 11Mbps

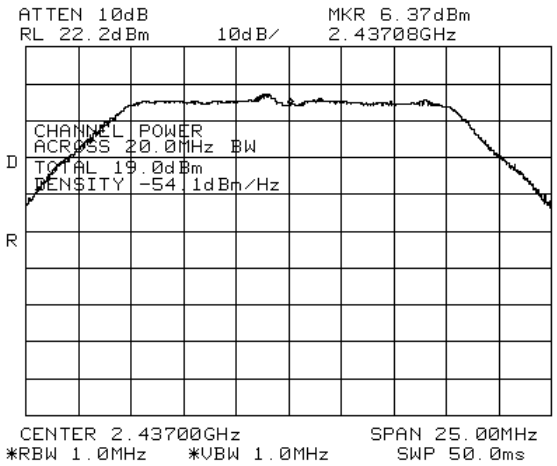


Figure 44 - Channel 6 , 6Mbps

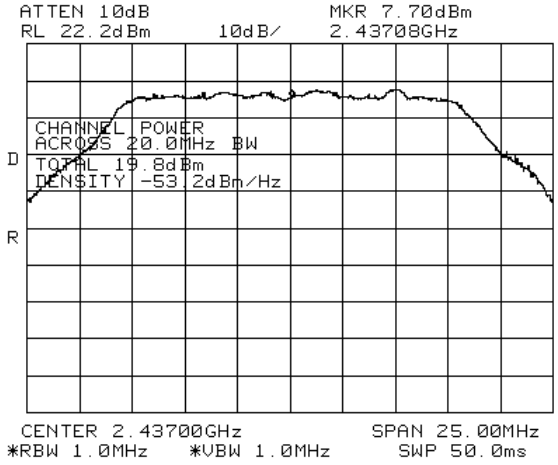


Figure 45 - Channel 6 , 54Mbps

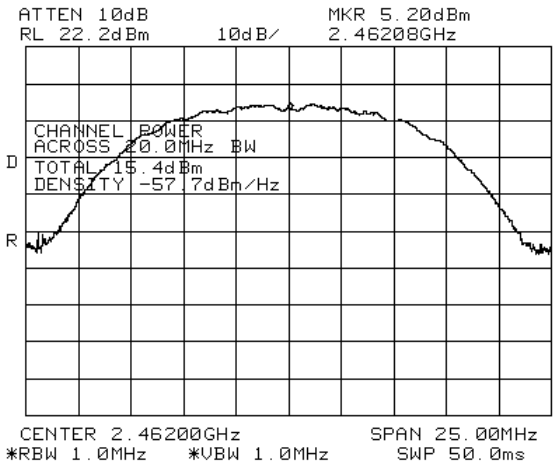


Figure 46 - Channel 11 , 1Mbps

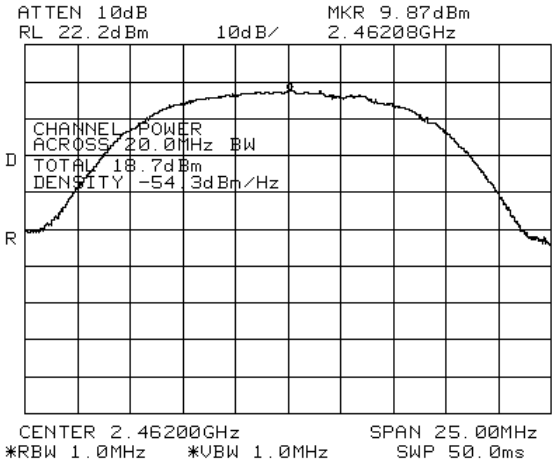


Figure 47 - Channel 11 , 11Mbps

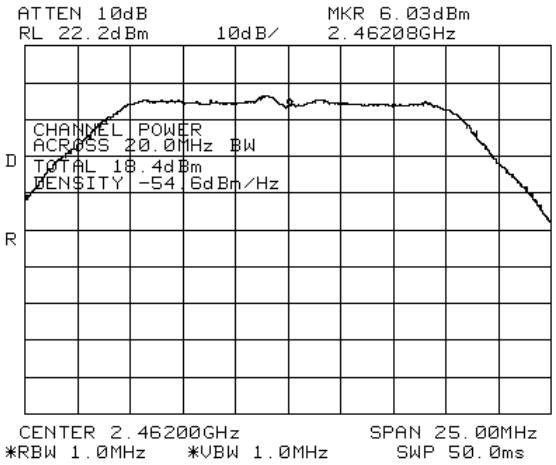


Figure 48 - Channel 11 , 6Mbps

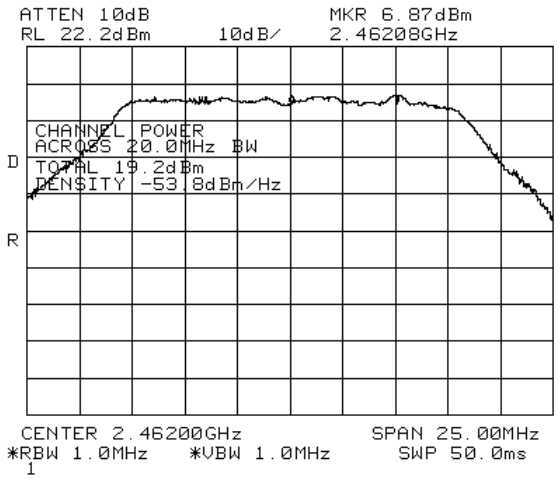


Figure 49 - Channel 11 , 54Mbps

7.2 Results table

E.U.T. Description: WiFi Outdoor Access Point
Model No.: MBW-3100F
Serial Number: MLMU1000802
Specification: F.C.C. Part 15, Subpart C Section 15.247(b)

Operation Frequency (MHz)	Modulation (Mbps)	Reading (dBm)	Specification (dBm)	Margin (dB)
2412	1	15.8	21.5	-5.7
	11	19.1	21.5	-2.4
	6	18.7	21.5	-2.8
	54	19.4	21.5	-2.1
2437	1	16.0	21.5	-5.5
	11	19.5	21.5	-2.0
	6	19.0	21.5	-2.5
	54	19.8	21.5	-1.7
2462	1	15.4	21.5	-6.1
	11	18.7	21.5	-2.8
	6	18.4	21.5	-3.1
	54	19.2	21.5	-2.3

Figure 50 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 1.7 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

7.3 Test Equipment Used.

Peak Power Output

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3414U01226	23 January,2011	1 year
Attenuator	-	30dB	-	10 November,2011	1 year
Cable	TestLINE	18	11556	10 November,2011	1 year

Figure 51 Test Equipment Used

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

8.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9 kHz - 150 kHz, 10 kHz resolution BW for the frequency range 150 kHz - 1 MHz, 30 kHz resolution BW for the frequency range 1 - 30 MHz, 100 kHz resolution BW for the frequency range 30 MHz - 1 GHz and 2.4 – 2.4835 GHz, and 1 MHz resolution BW for the frequency range 1 - 25 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.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: 1, 11, 6 and 54 Mbps.

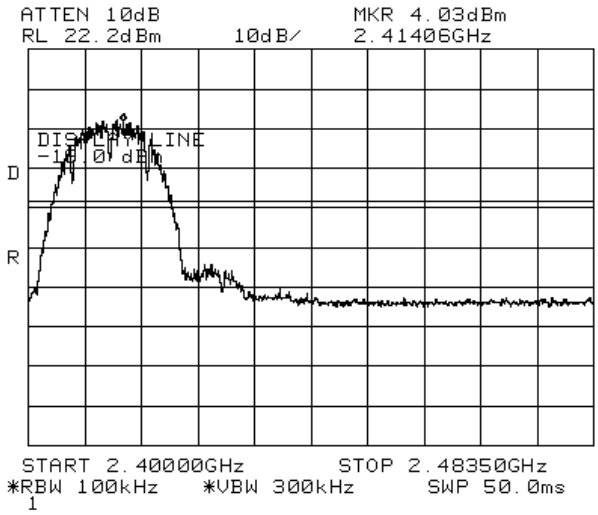


Figure 52 – Channel 1 , 1Mbps

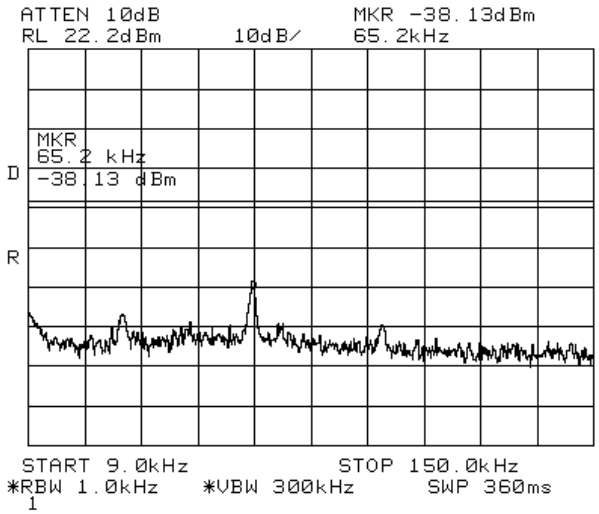


Figure 53 – Channel 1 , 1Mbps

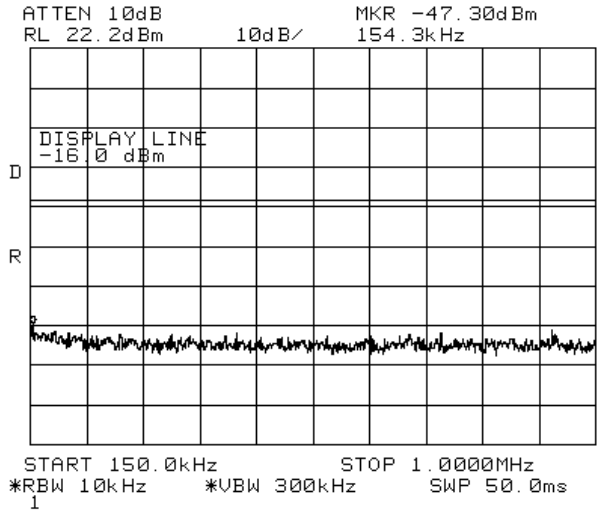


Figure 54 – Channel 1 , 1Mbps

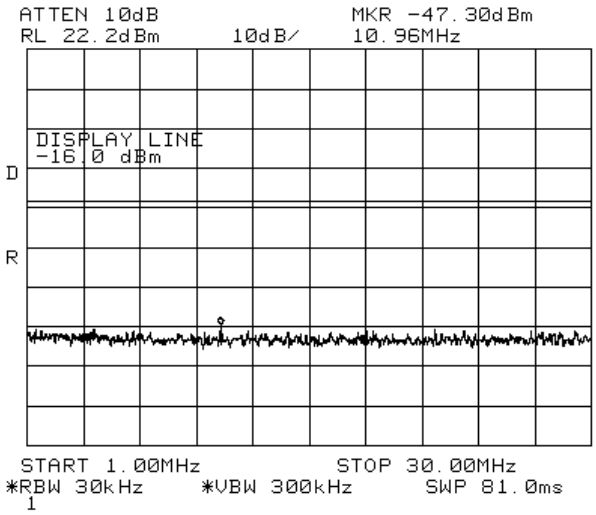


Figure 55 – Channel 1 , 1Mbps

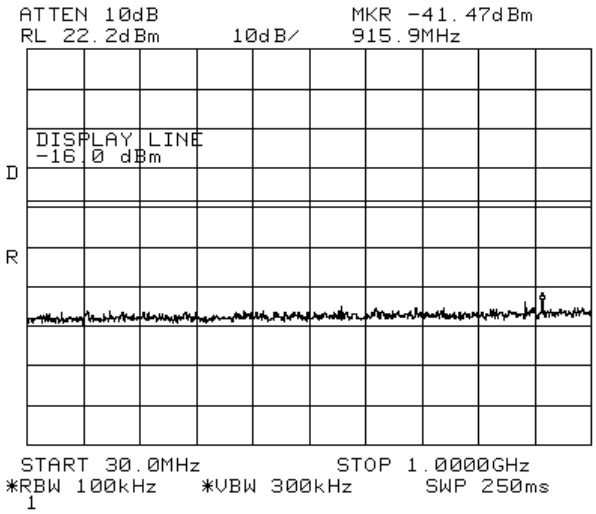


Figure 56 – Channel 1 , 1Mbps

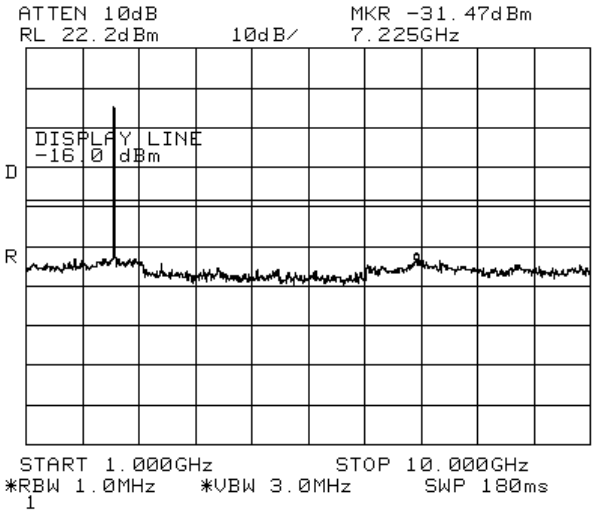


Figure 57 – Channel 1 , 1Mbps

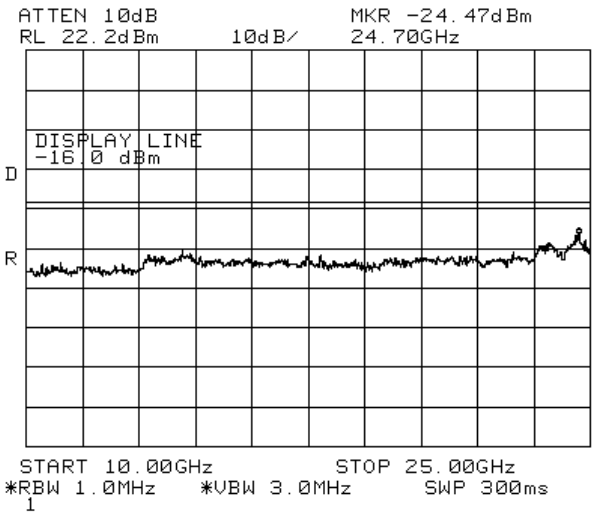


Figure 58- Channel 1 , 1Mbps

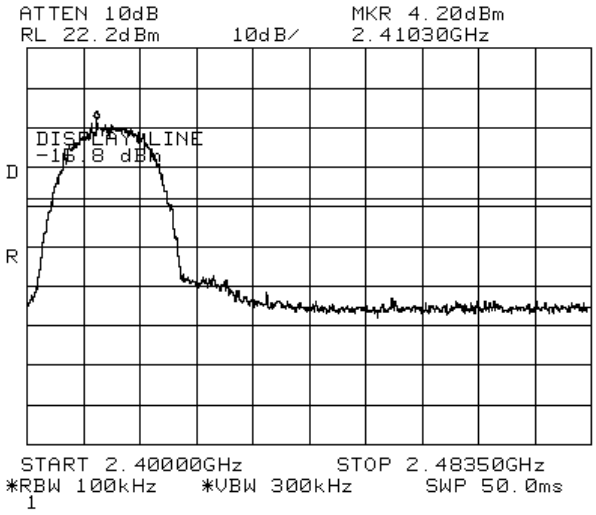


Figure 59- Channel 1 , 11Mbps

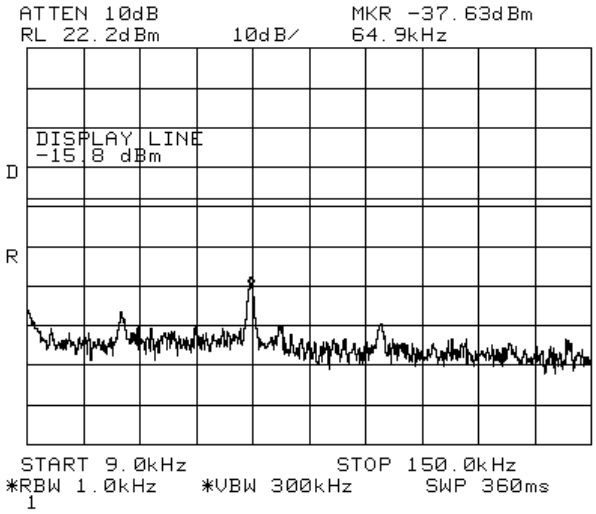


Figure 60- Channel 1 , 11Mbps

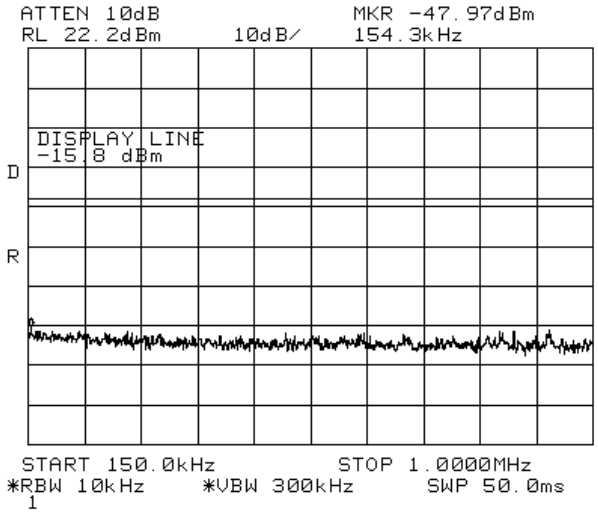


Figure 61- Channel 1 , 11Mbps

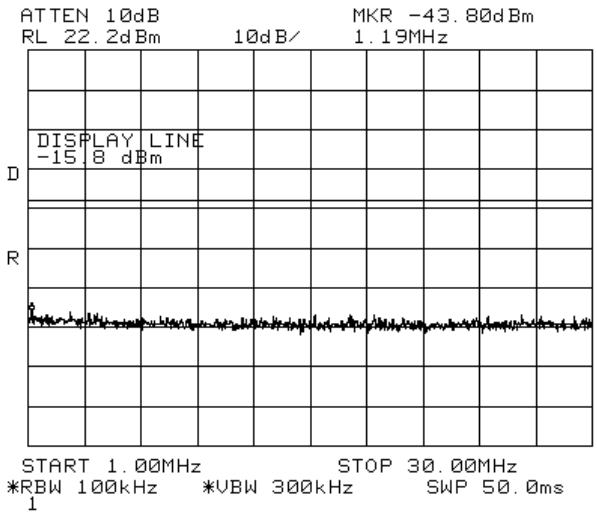


Figure 62- Channel 1 , 11Mbps

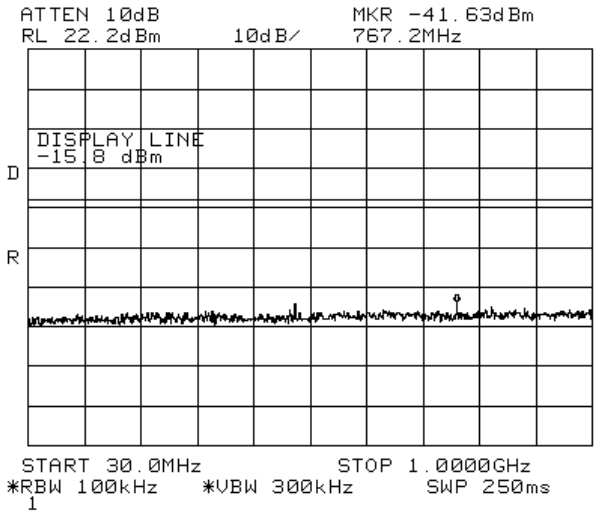


Figure 63- Channel 1 , 11Mbps

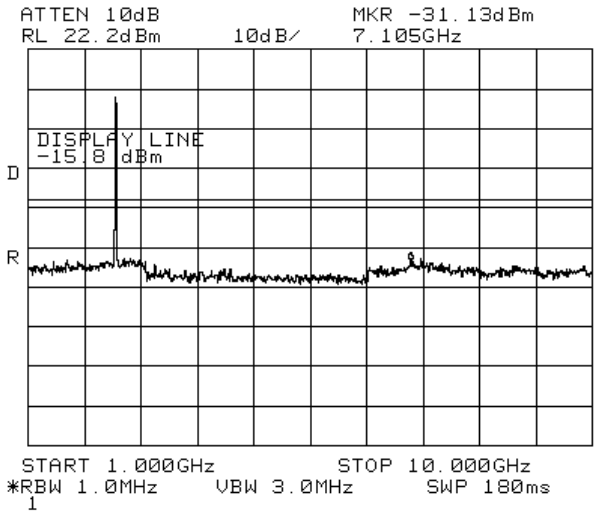


Figure 64- Channel 1 , 11Mbps

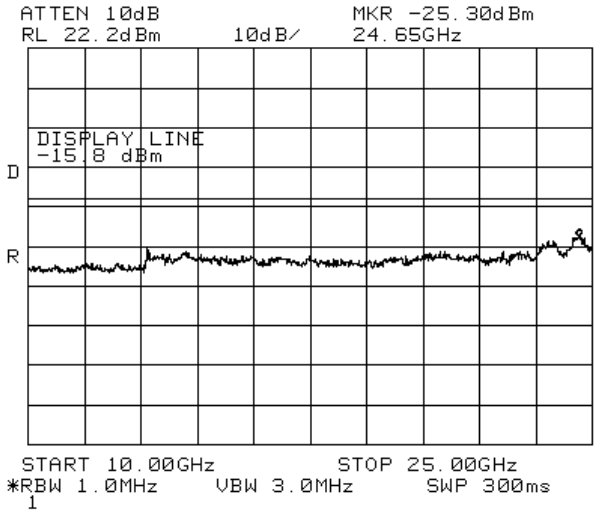


Figure 65 - Channel 1 , 11Mbps

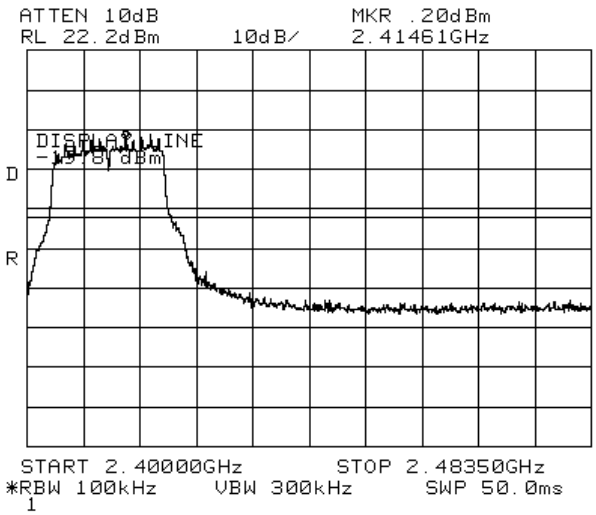


Figure 66 - Channel 1 , 6Mbps

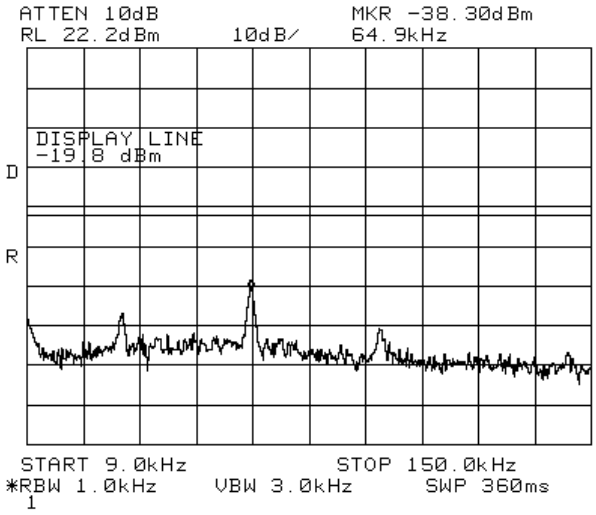


Figure 67 - Channel 1 , 6Mbps

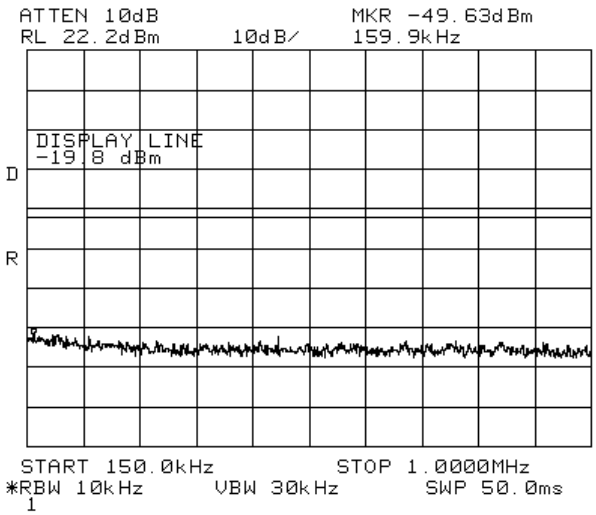


Figure 68 - Channel 1 , 6Mbps

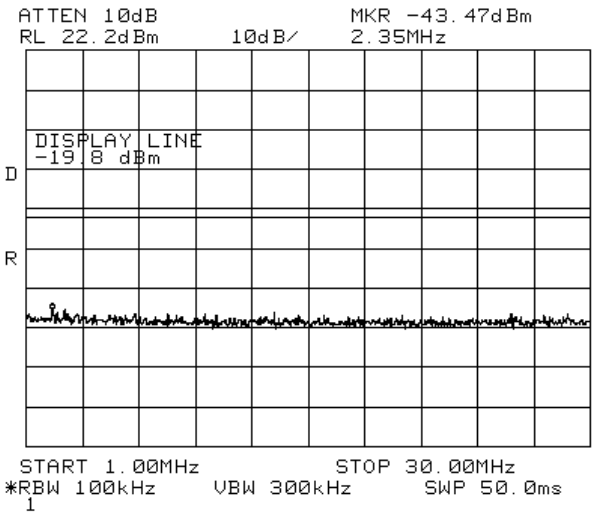


Figure 69 - Channel 1 , 6Mbps

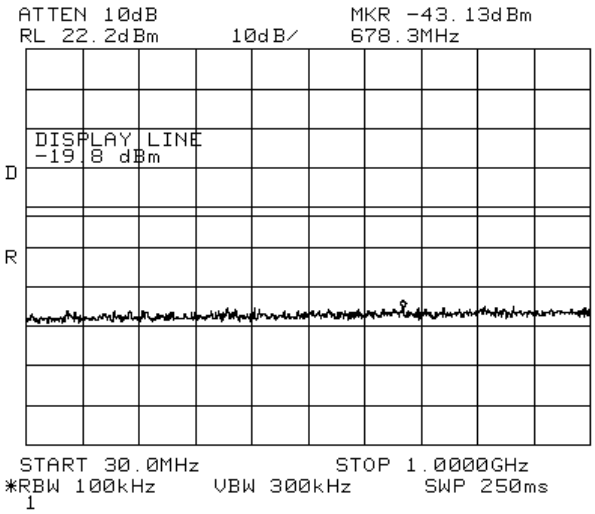


Figure 70 - Channel 1 , 6Mbps

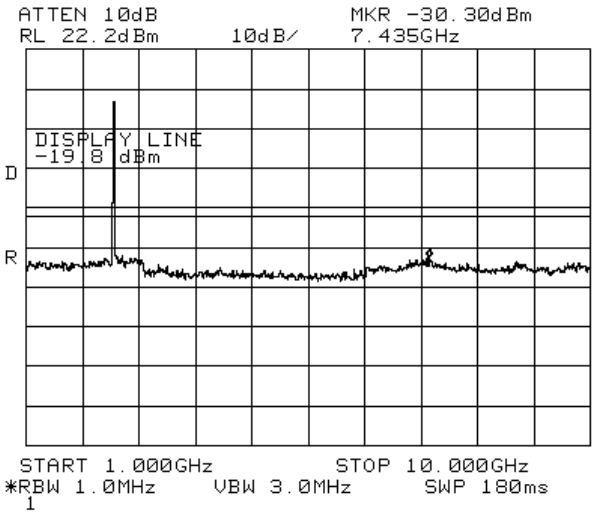


Figure 71 - Channel 1 , 6Mbps

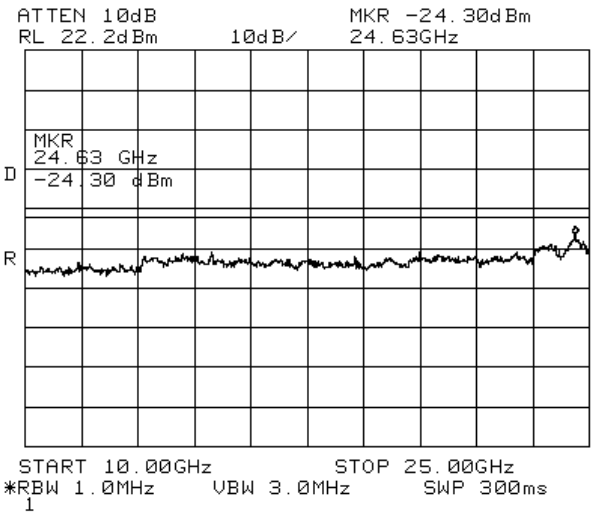


Figure 72 - Channel 1 , 6Mbps

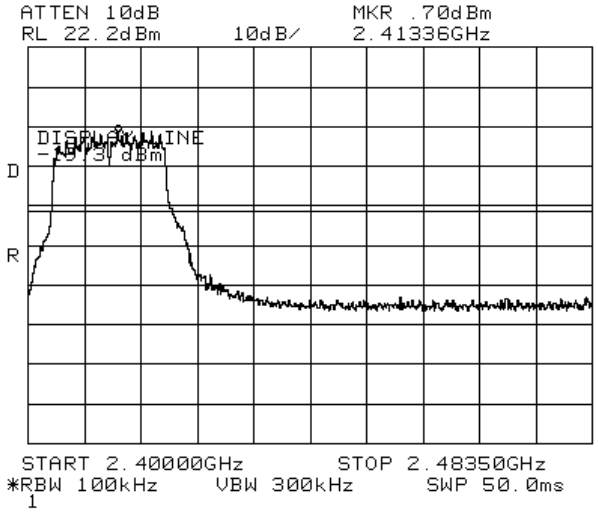


Figure 73 - Channel 1 , 54Mbps

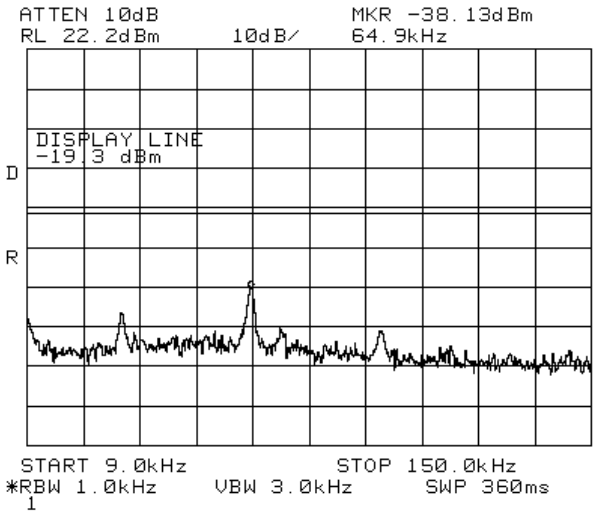


Figure 74 - Channel 1 , 54Mbps

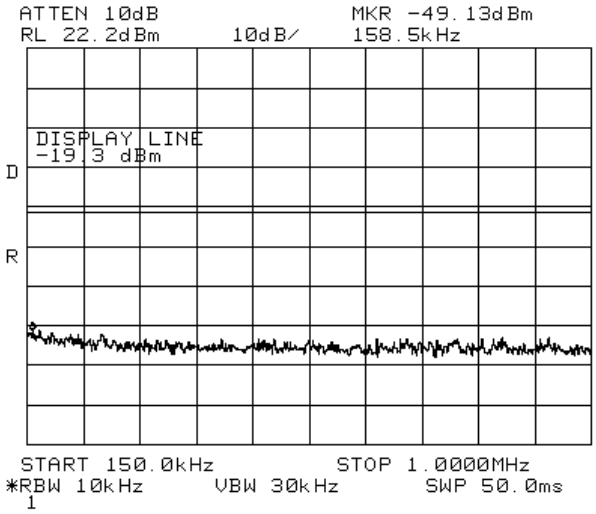


Figure 75 - Channel 1 , 54Mbps

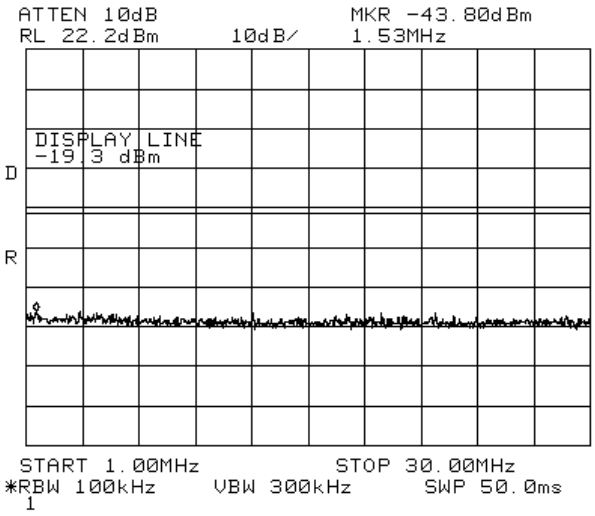


Figure 76 - Channel 1 , 54Mbps

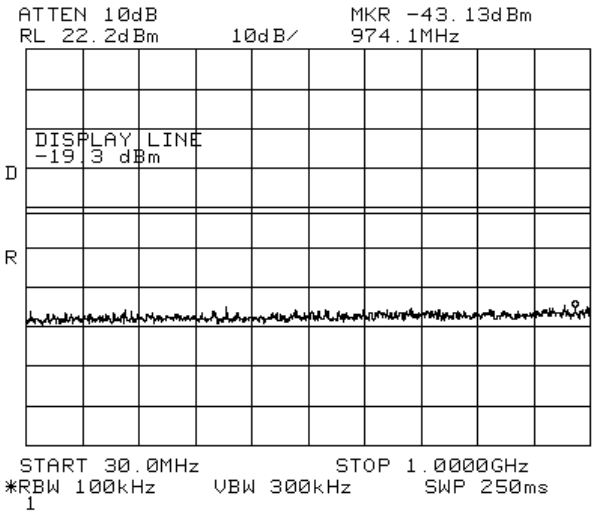


Figure 77 - Channel 1 , 54Mbps

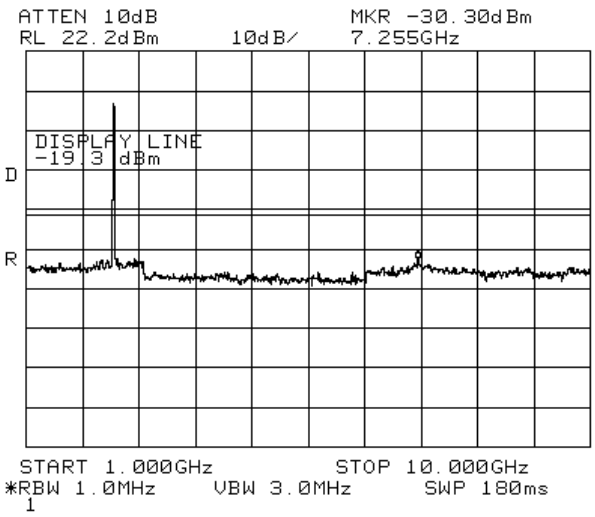


Figure 78 - Channel 1 , 54Mbps

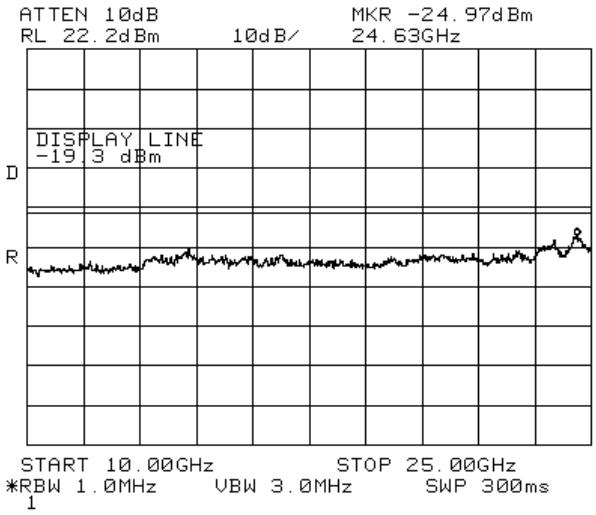


Figure 79 - Channel 1 , 54Mbps

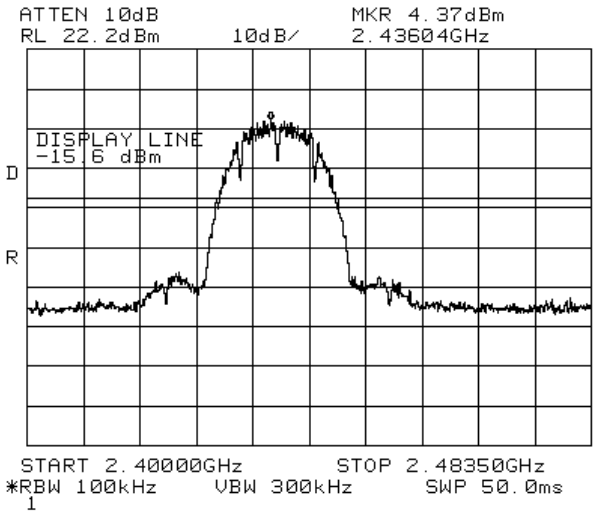


Figure 80 - Channel 6 , 1Mbps

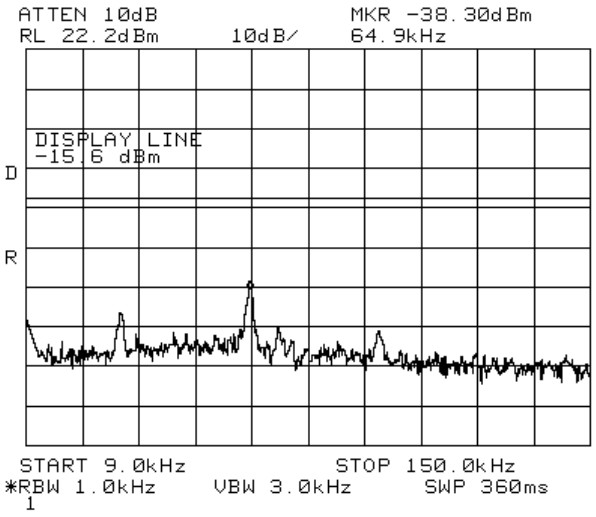


Figure 81 - Channel 6 , 1Mbps

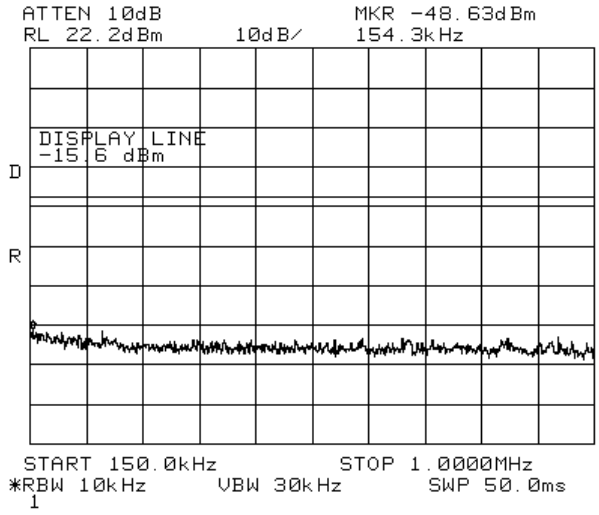


Figure 82 - Channel 6 , 1Mbps

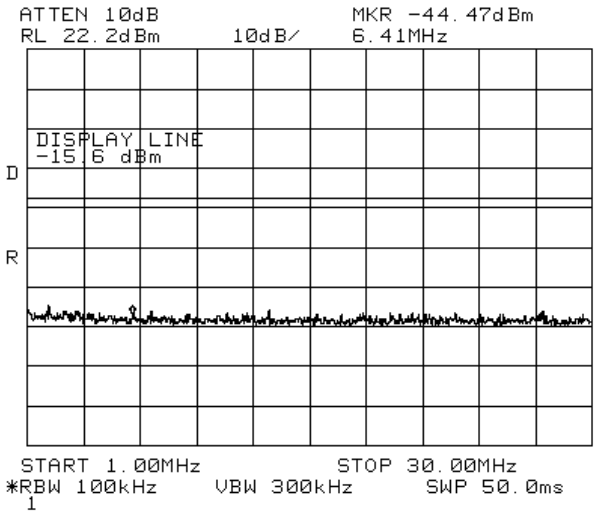


Figure 83 - Channel 6 , 1Mbps

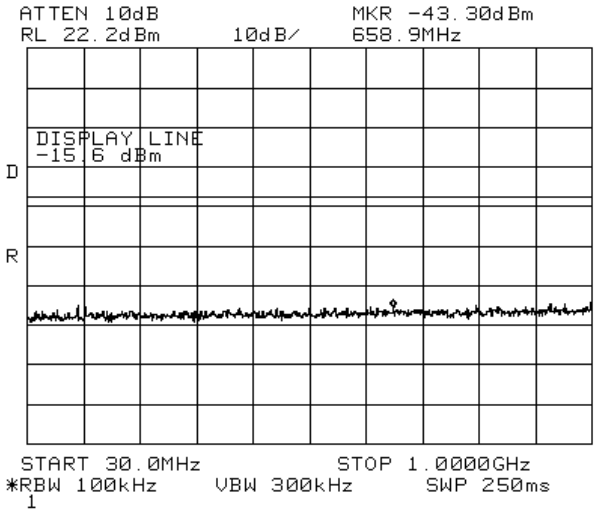


Figure 84 - Channel 6 , 1Mbps

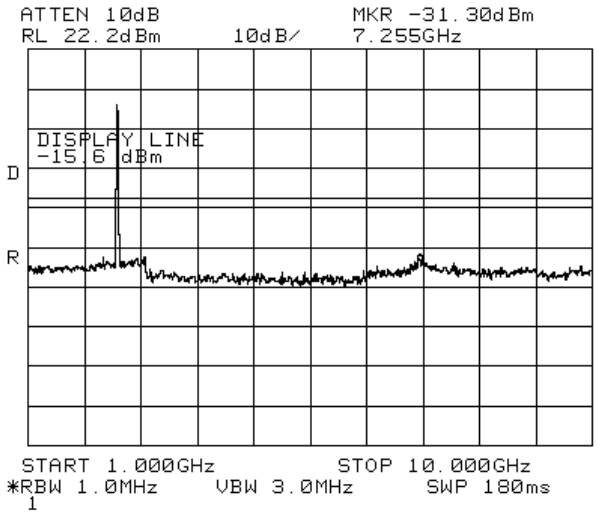


Figure 85 - Channel 6 , 1Mbps

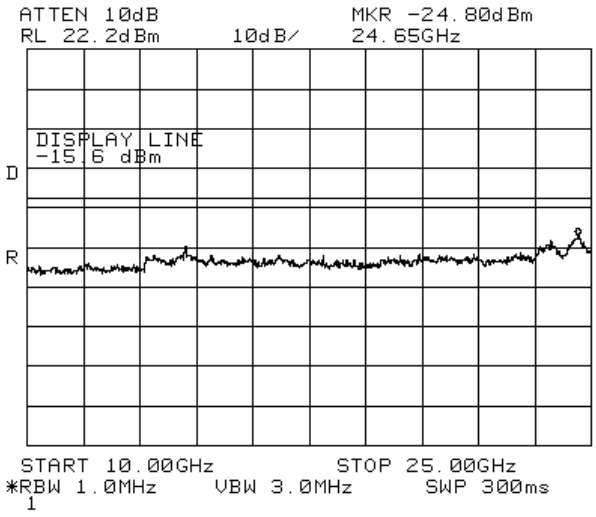


Figure 86 - Channel 6 , 1Mbps

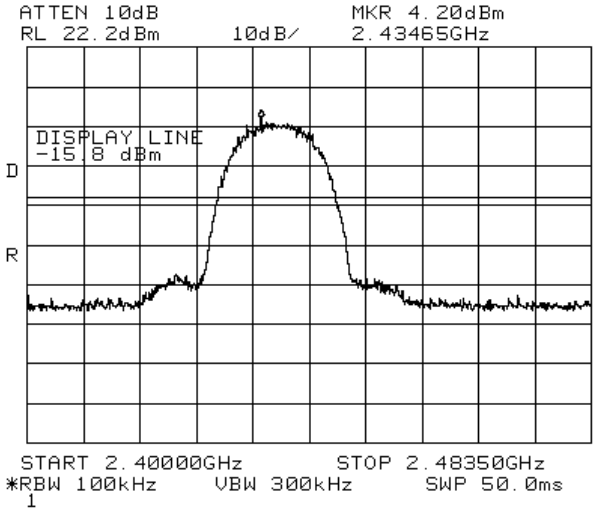


Figure 87 - Channel 6 , 11Mbps

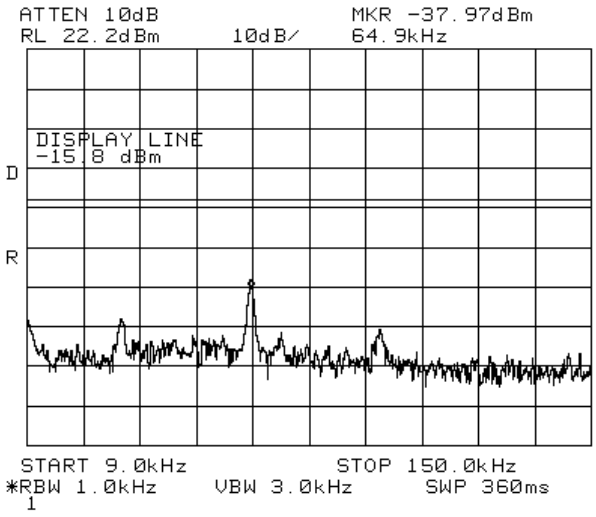


Figure 88 - Channel 6 , 11Mbps

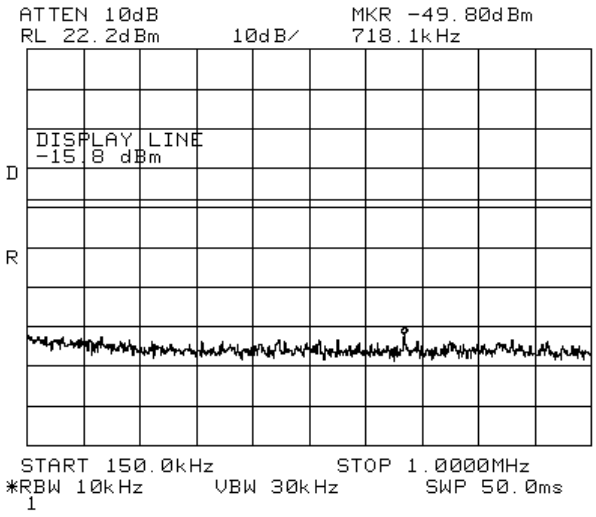


Figure 89 - Channel 6 , 11Mbps

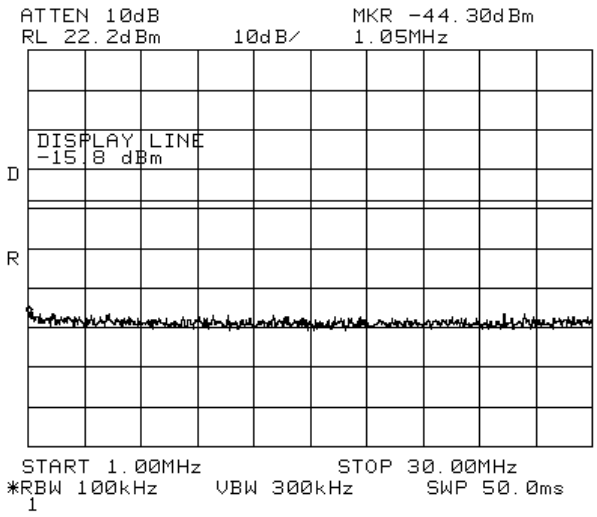


Figure 90 - Channel 6 , 11Mbps

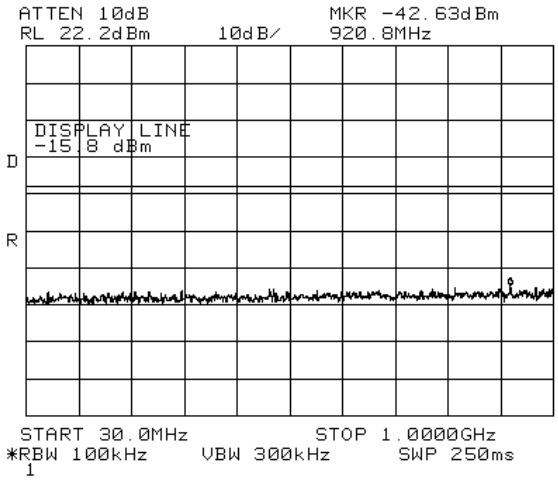


Figure 91 - Channel 6 , 11Mbps

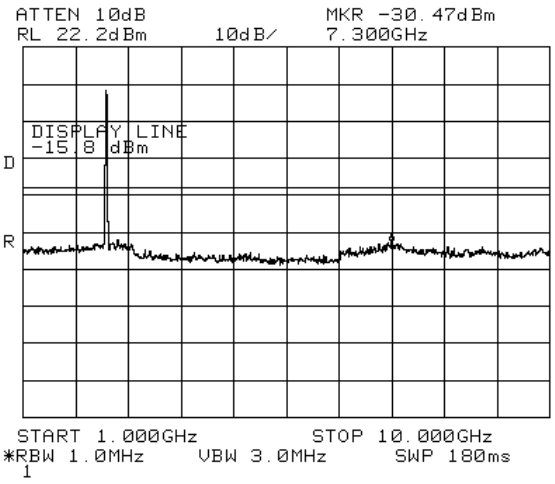


Figure 92 - Channel 6 , 11Mbps

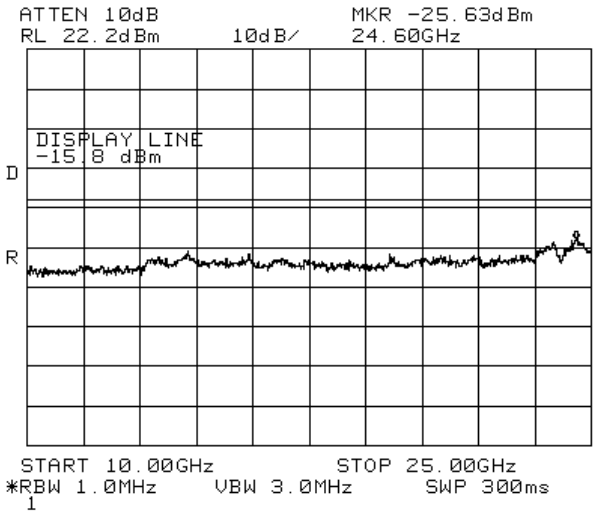


Figure 93 - Channel 6 ,11Mbps

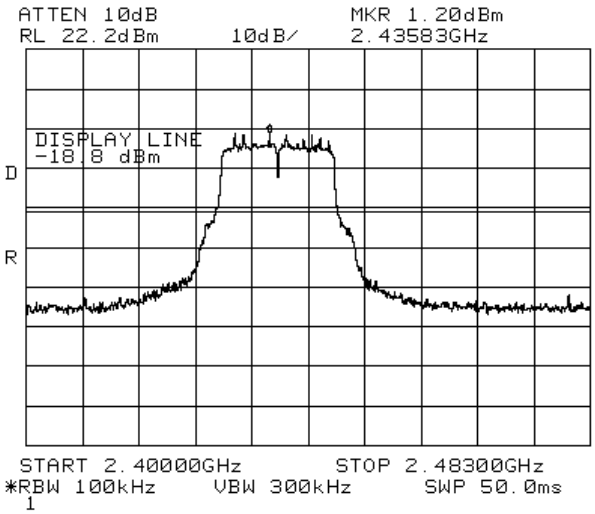


Figure 94 - Channel 6 ,6Mbps

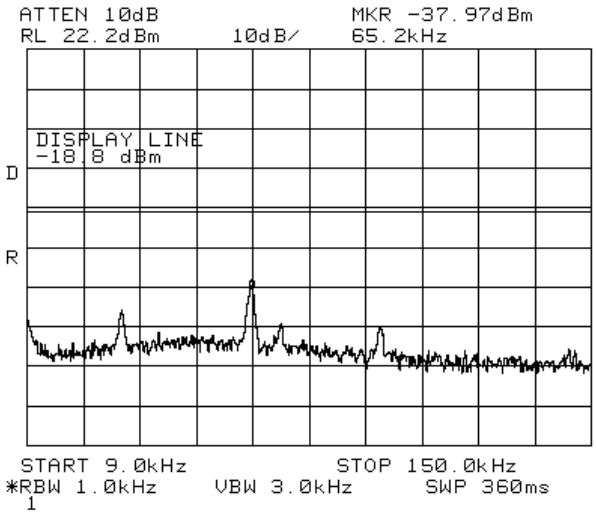


Figure 95 - Channel 6 ,6Mbps

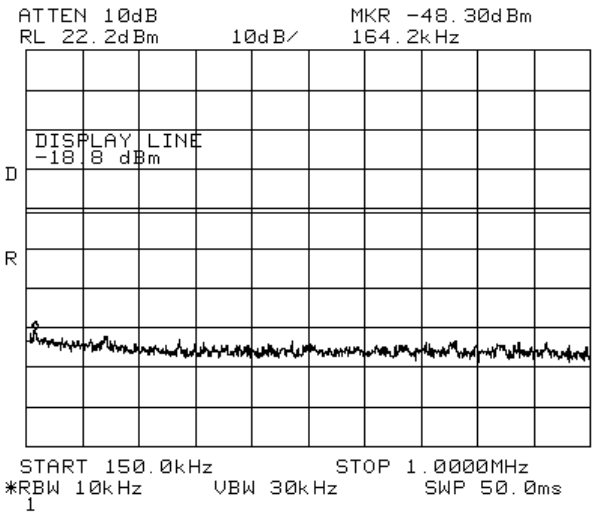


Figure 96 - Channel 6 ,6Mbps

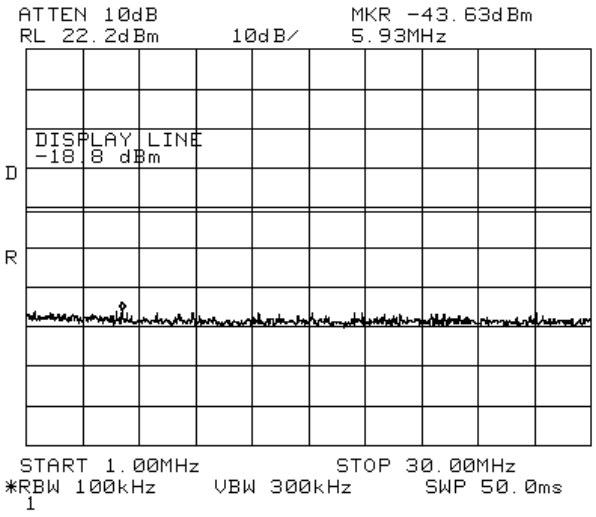


Figure 97 - Channel 6 ,6Mbps

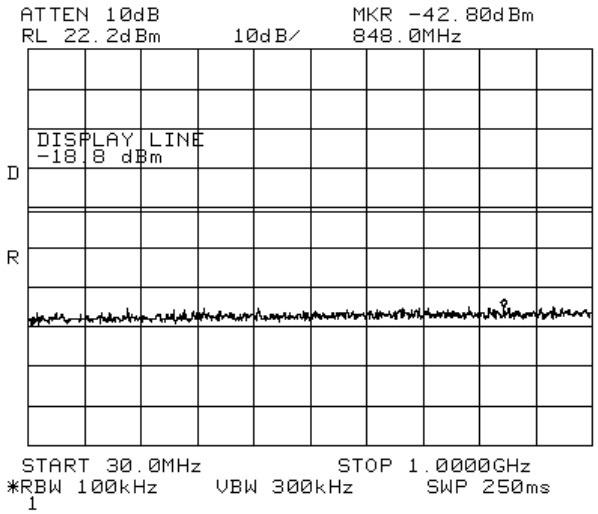


Figure 98 - Channel 6 ,6Mbps

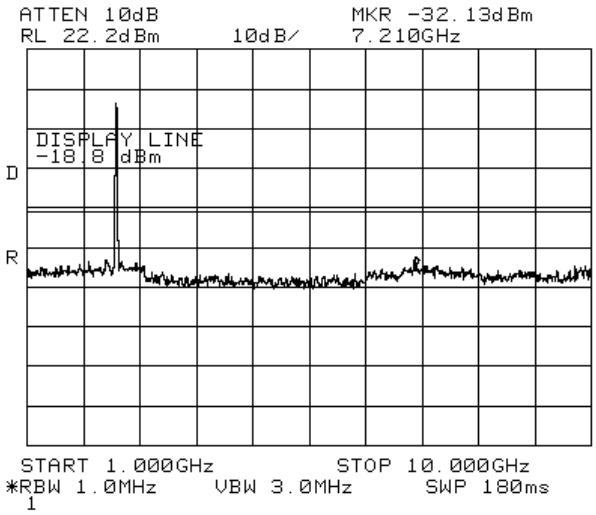


Figure 99 - Channel 6 ,6Mbps

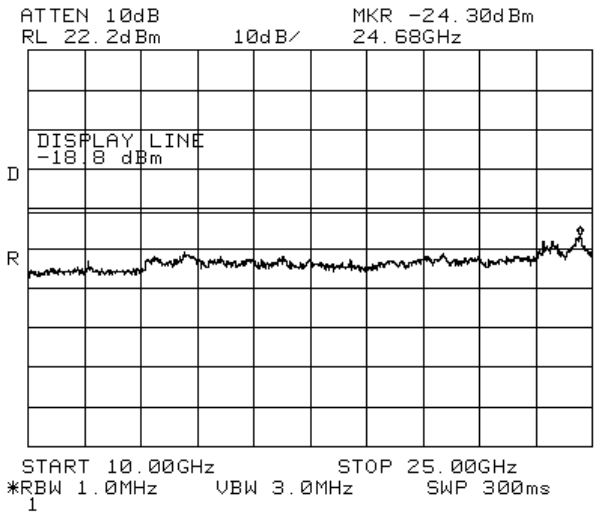


Figure 100 - Channel 6 ,6Mbps

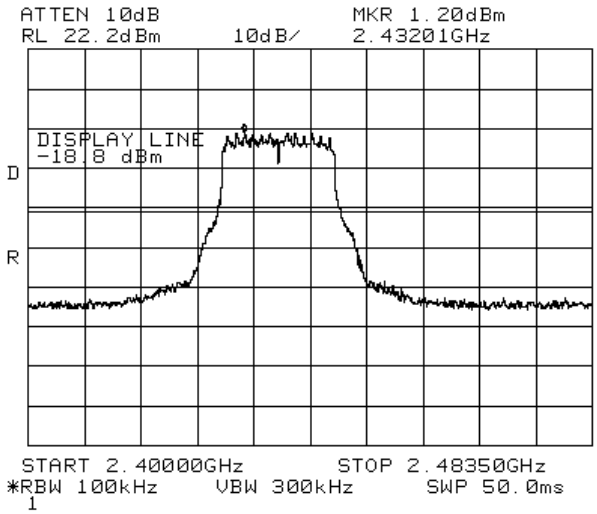


Figure 101 - Channel 6 ,54Mbps

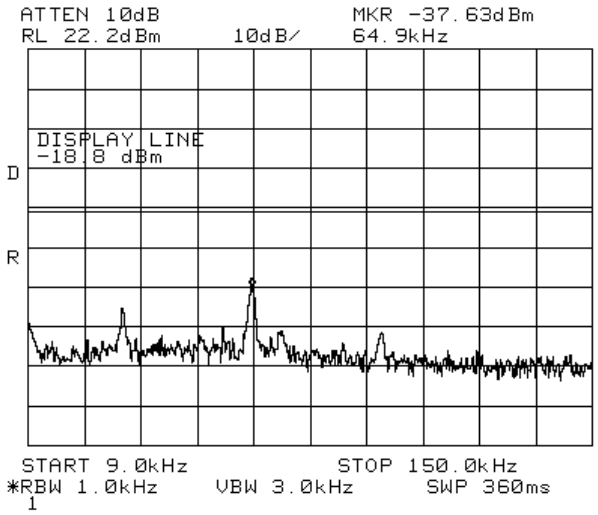


Figure 102 - Channel 6 ,54Mbps

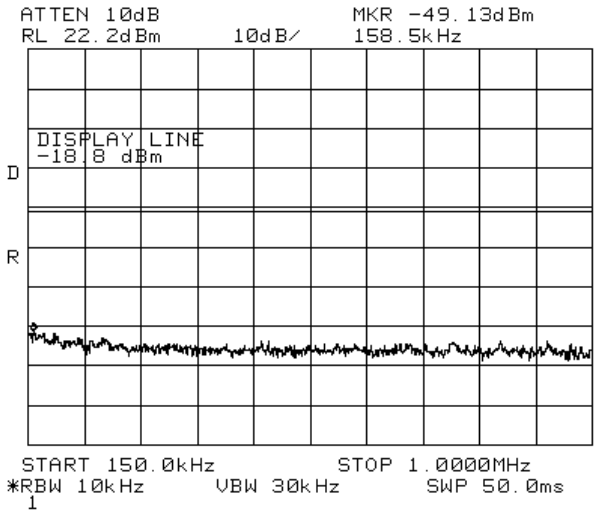


Figure 103 - Channel 6 ,54Mbps

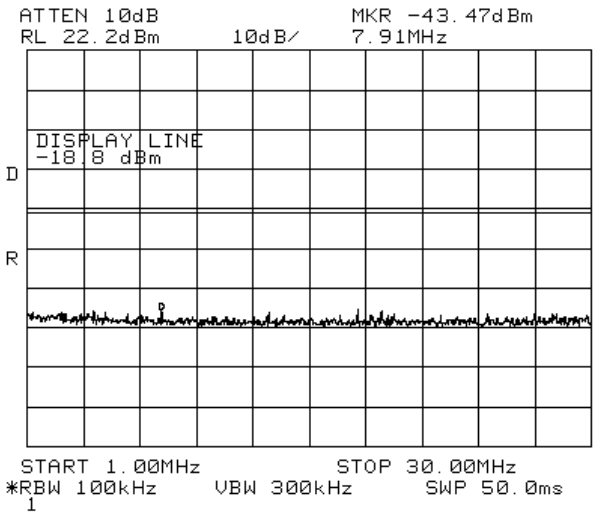


Figure 104 - Channel 6 ,54Mbps

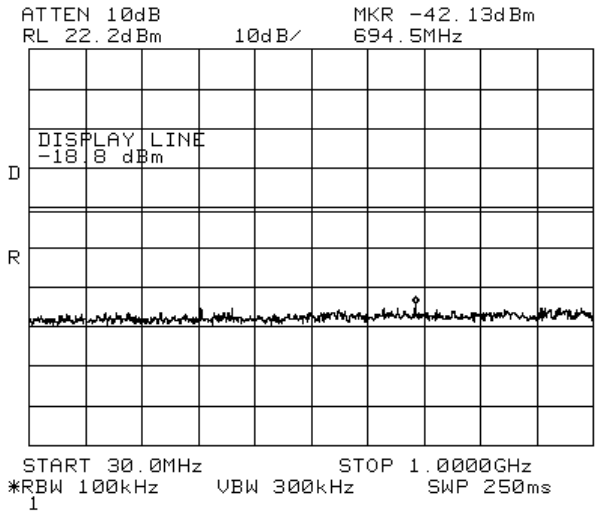


Figure 105 - Channel 6 ,54Mbps

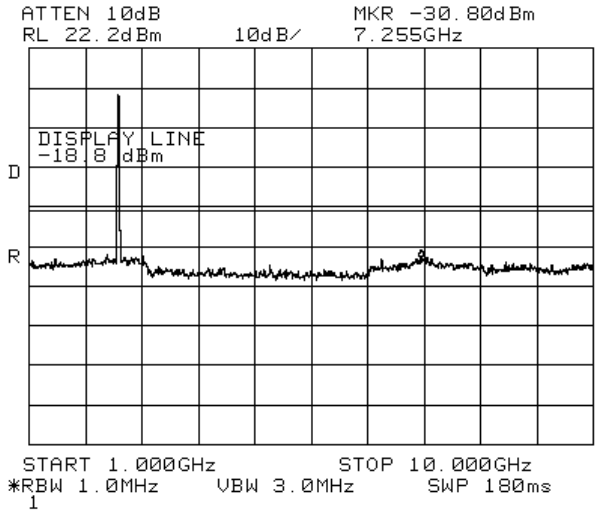


Figure 106 - Channel 6 ,54Mbps

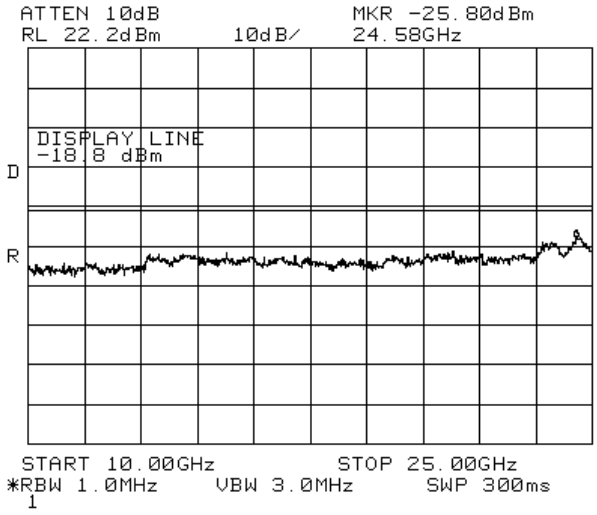


Figure 107 - Channel 6 ,54Mbps

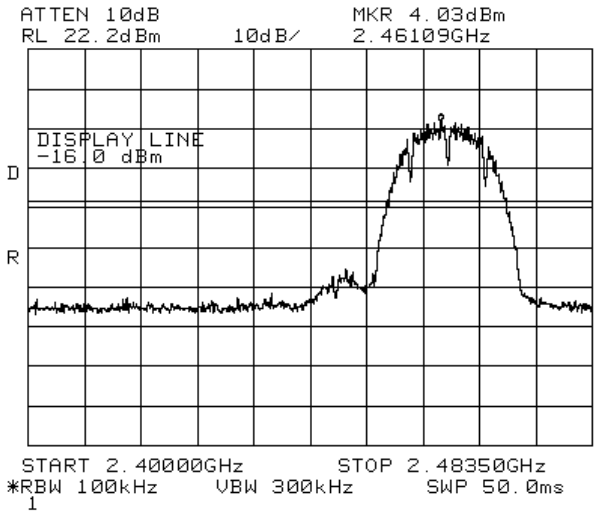


Figure 108 - Channel 11 , 1Mbps

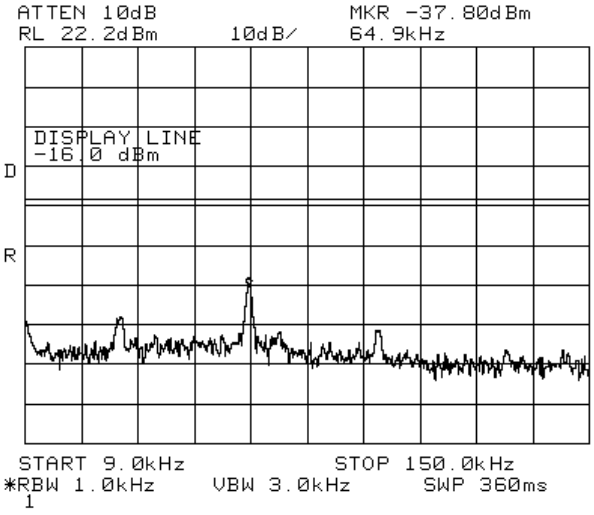


Figure 109 - Channel 11 , 1Mbps

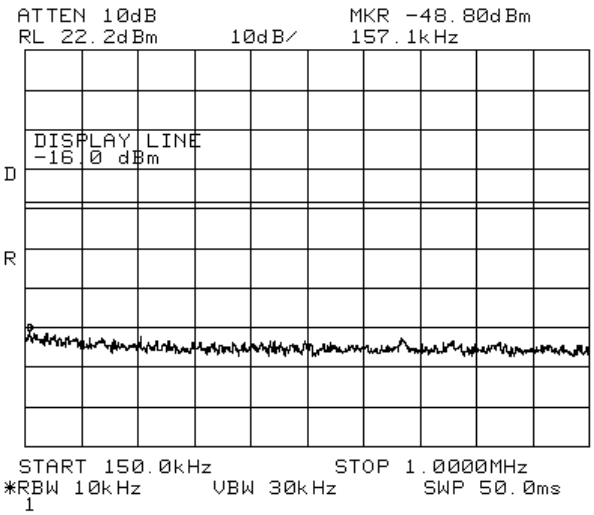


Figure 110 - Channel 11 , 1Mbps

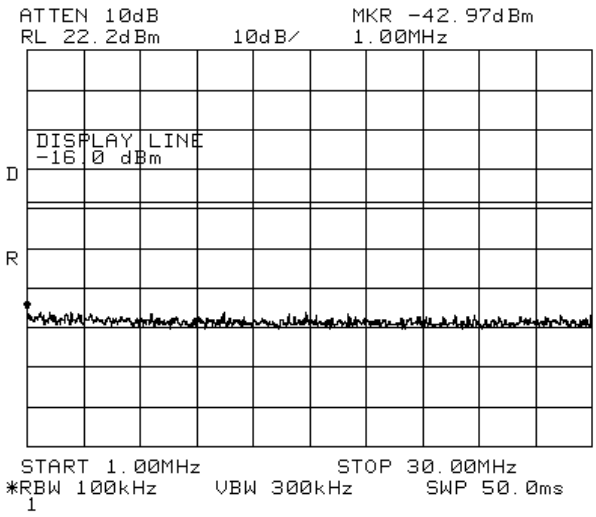


Figure 111 - Channel 11 , 1Mbps

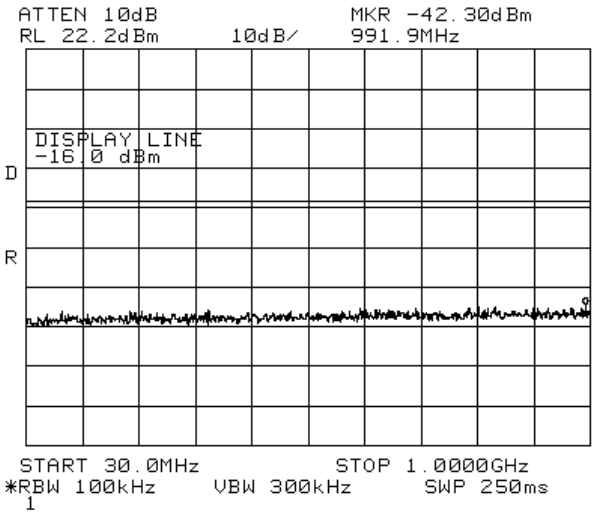


Figure 112 - Channel 11 , 1Mbps

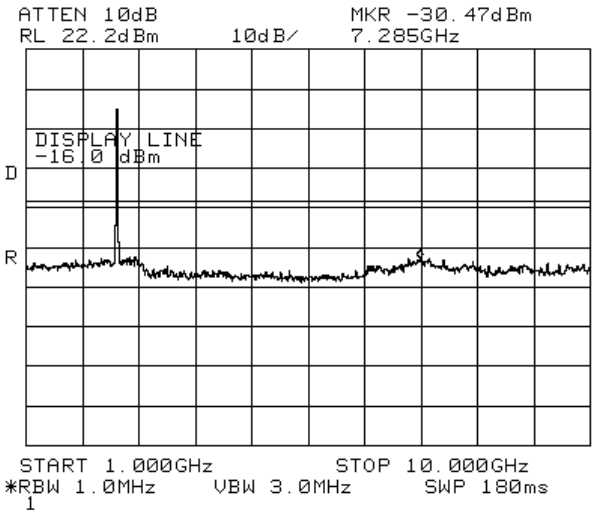


Figure 113 - Channel 11 , 1Mbps

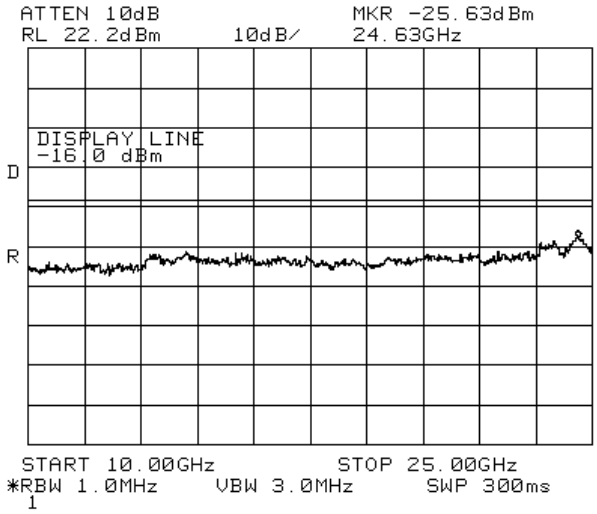


Figure 114 - Channel 11 , 1Mbps

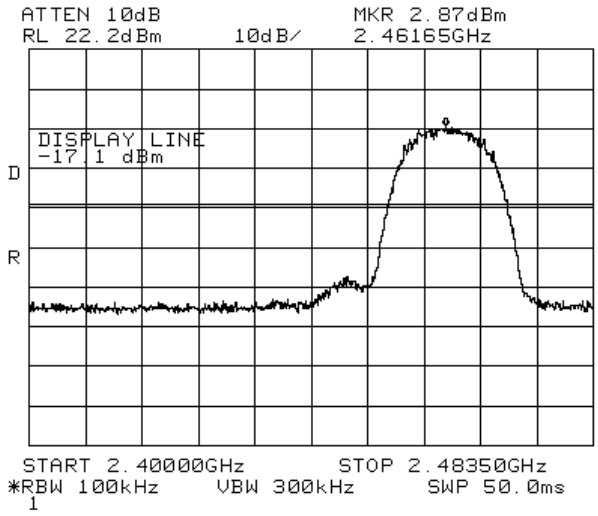


Figure 115 - Channel 11 , 11Mbps

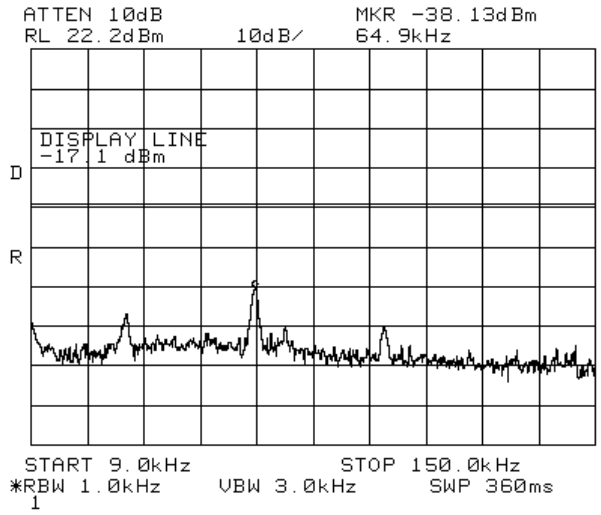


Figure 116 - Channel 11 , 11Mbps

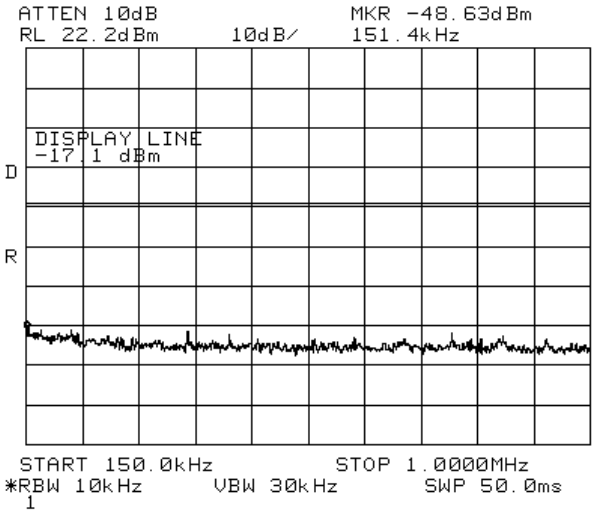


Figure 117 - Channel 11 , 11Mbps

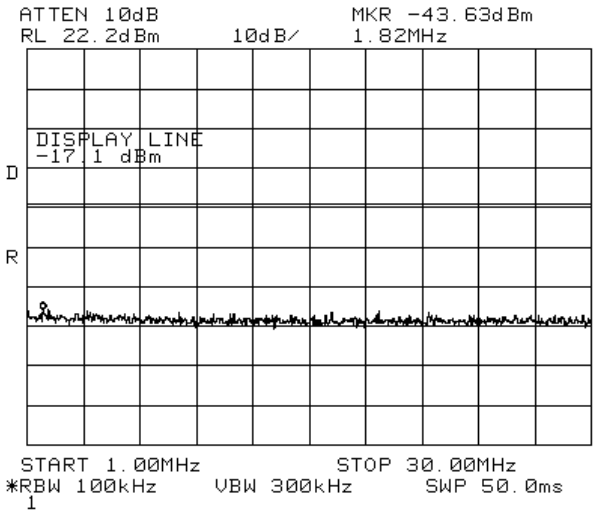


Figure 118 - Channel 11 , 11Mbps

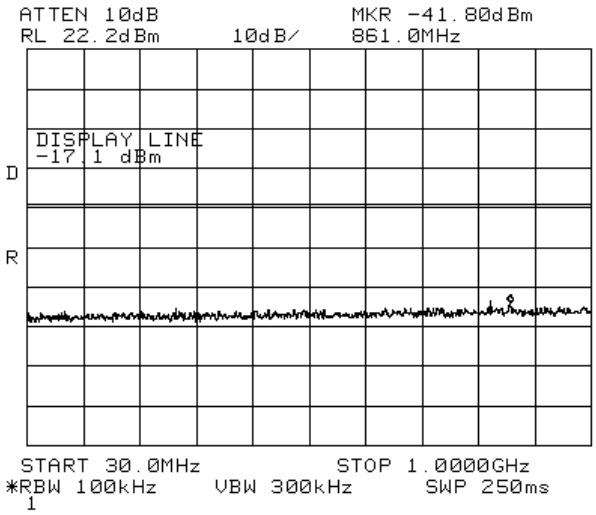


Figure 119 - Channel 11 , 11Mbps

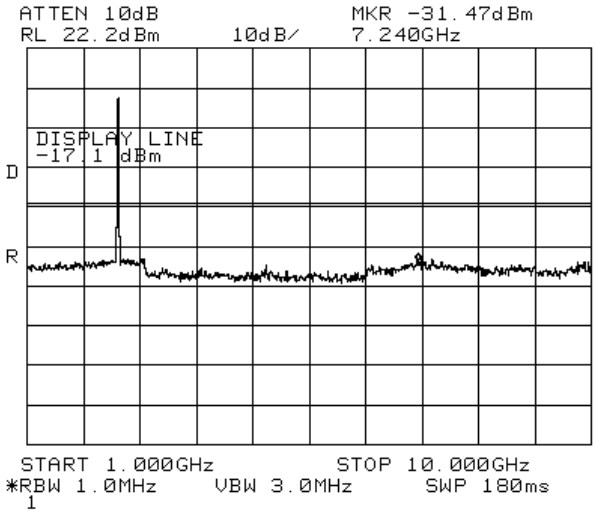


Figure 120 - Channel 11 , 11Mbps

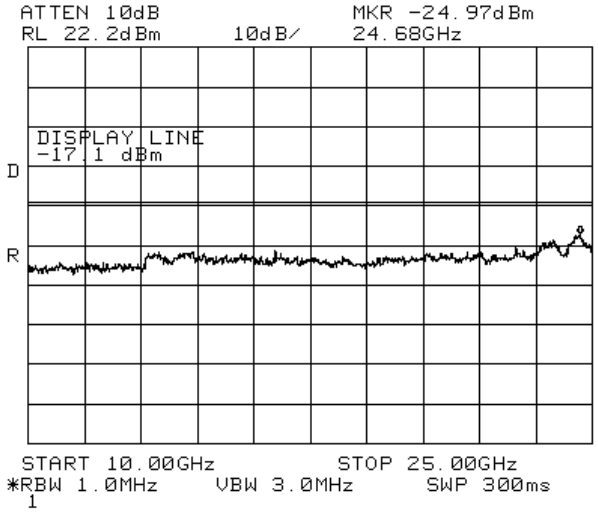


Figure 121 - Channel 11 , 11Mbps

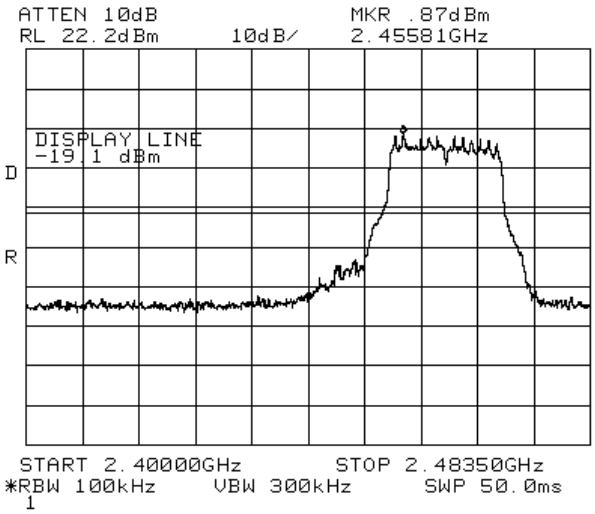


Figure 122 - Channel 11 , 6Mbps

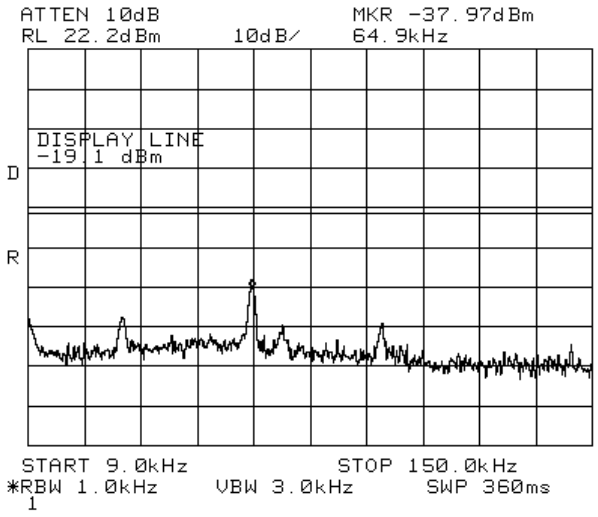


Figure 123 - Channel 11 , 6Mbps

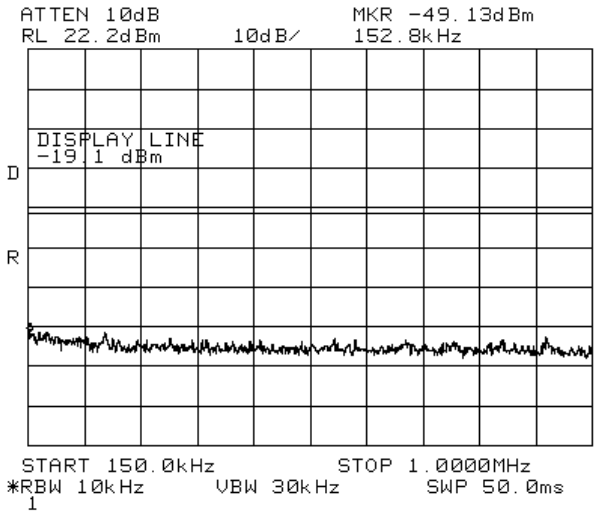


Figure 124 - Channel 11 , 6Mbps

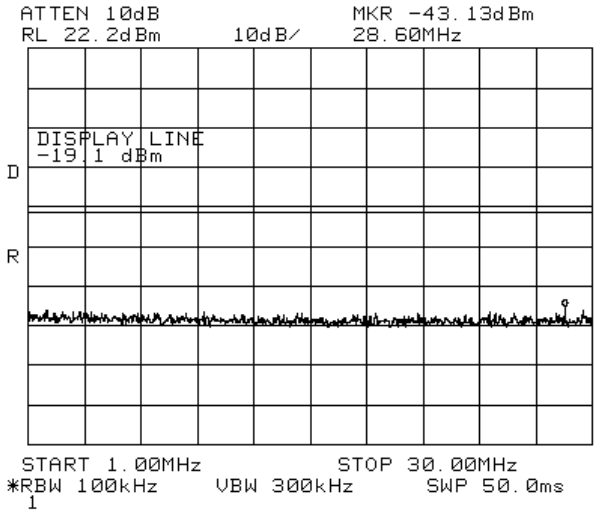


Figure 125 - Channel 11 , 6Mbps

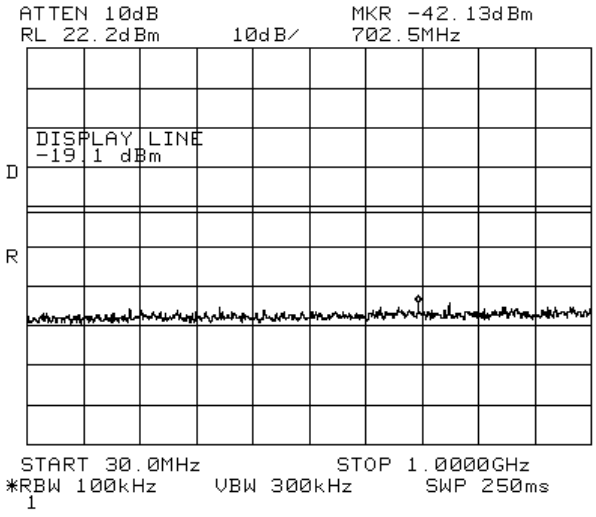


Figure 126 - Channel 11 , 6Mbps

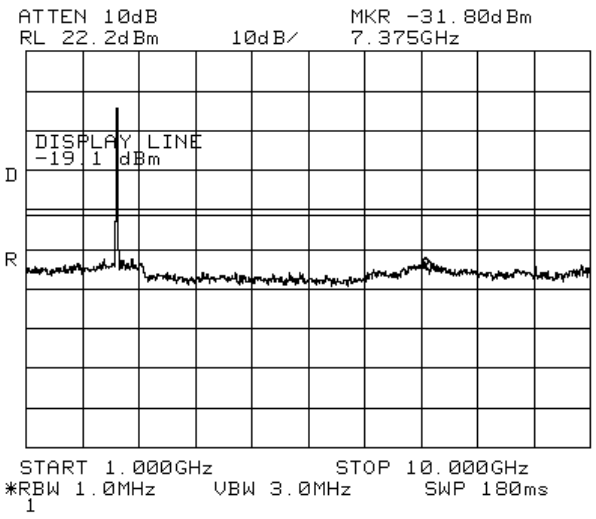
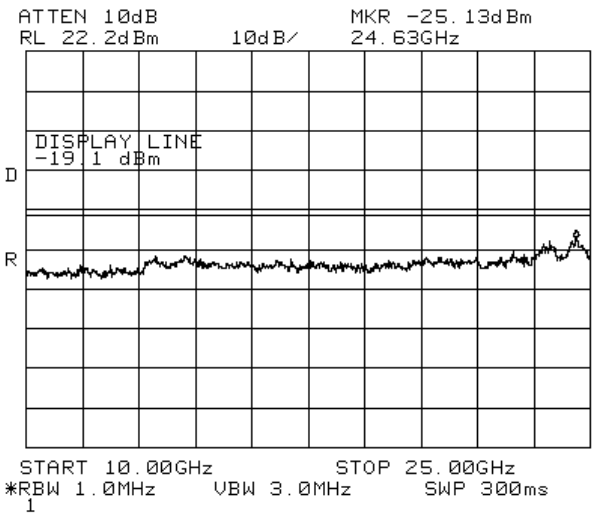


Figure 127 - Channel 11 , 6Mbps

Figure 128 - Channel 11 , 6Mbps



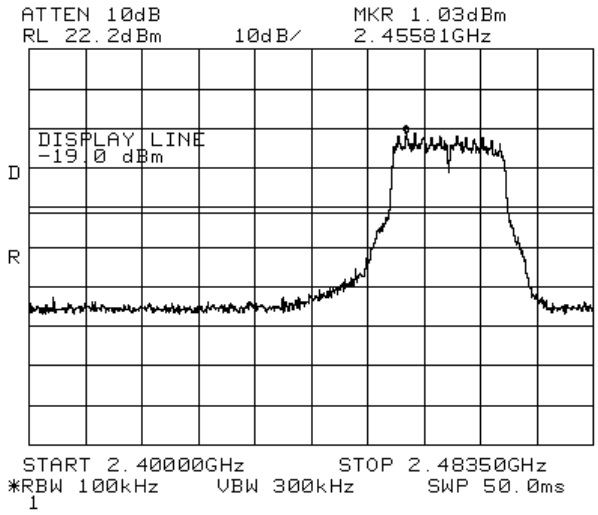


Figure 129 — Channel 11, 54Mbps

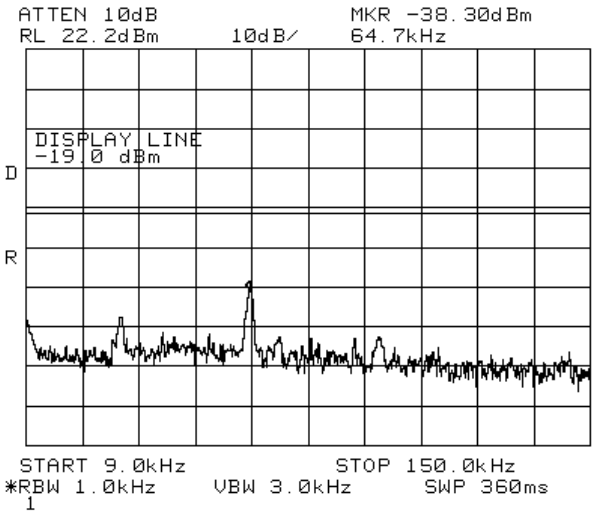


Figure 130 — Channel 11, 54Mbps

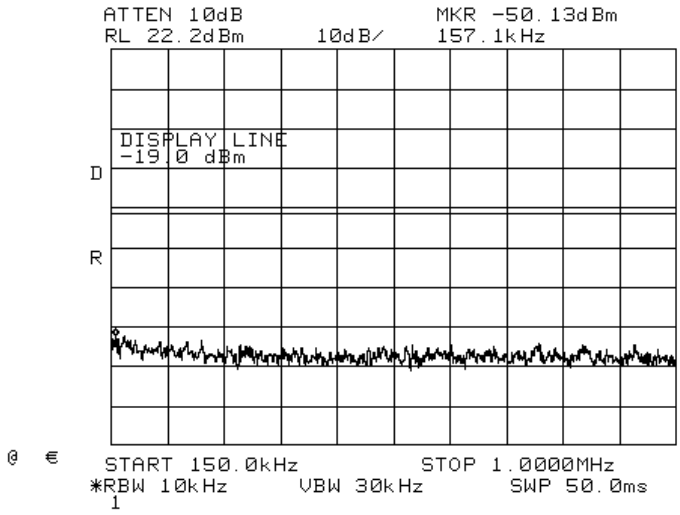


Figure 131 — Channel 11, 54Mbps

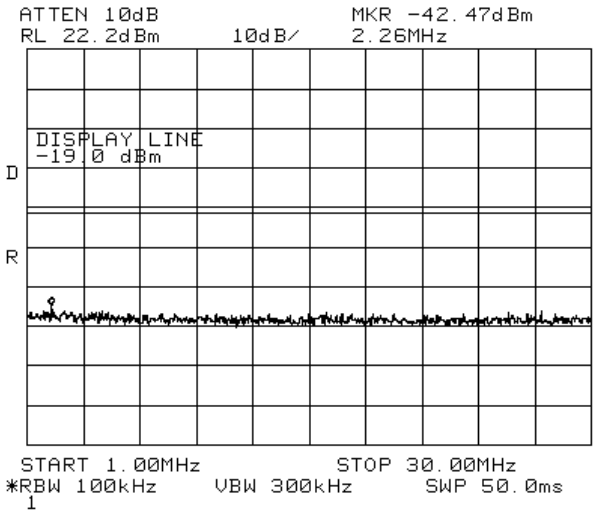


Figure 132 — Channel 11, 54Mbps

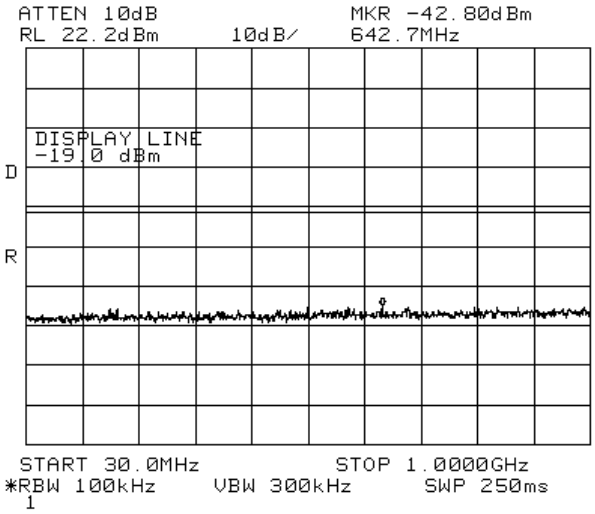


Figure 133 — Channel 11, 54Mbps

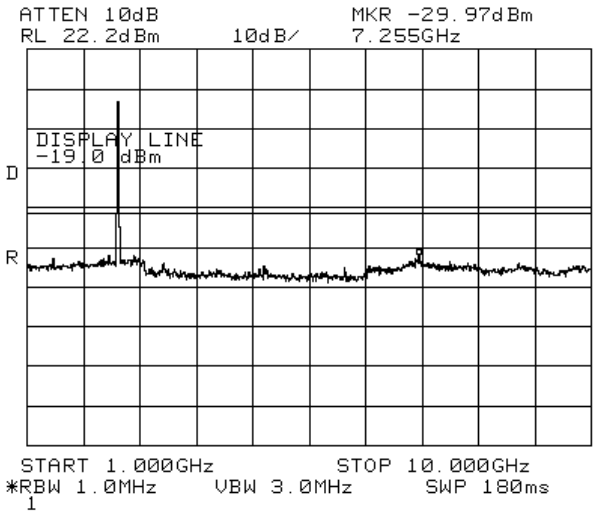


Figure 134 — Channel 11, 54Mbps

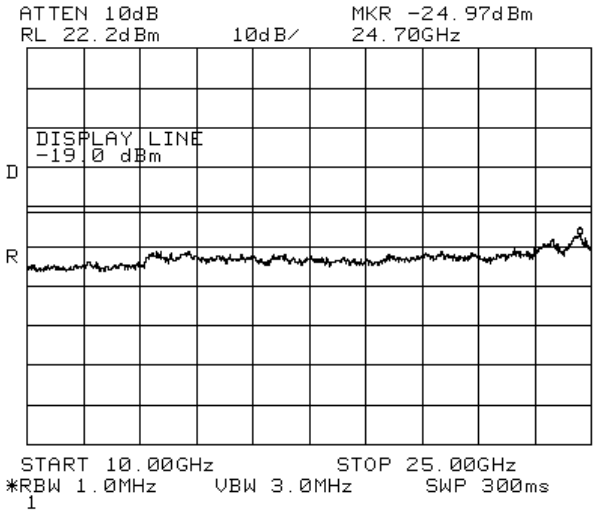


Figure 135 — Channel 11, 54Mbps

8.2 Results table

E.U.T Description: WiFi Outdoor Access Point
Model No.: MBW-3100F
Serial Number: MLMU1000802
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation (Mbps)	Reading (dBm)	Specification (dBm)	Margin (dB)
2412	1	-24.47	-18.0	-6.47
	11	-25.30	-15.8	-9.50
	6	-24.30	-19.8	-4.50
	54	-24.97	-19.3	-5.67
2437	1	-24.80	-15.6	-9.20
	11	-25.63	-15.8	-9.83
	6	-24.30	-18.8	-5.50
	54	-25.80	-18.8	-7.00
2462	1	-25.63	-16.0	-9.63
	11	-24.97	-17.1	-7.87
	6	-25.13	-19.1	-6.03
	54	-24.97	-19.0	-5.97

Figure 136 Peak Power Output of 2400-2483.5 MHz Band

JUDGEMENT: Passed by 4.5 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

8.3 Test Equipment Used.

Peak Power Output of 2400-2438.5 MHz Band

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3414U01226	January 23, 2011	1 year
Attenuator	-	30dB	-	November 10, 2011	1 year
Cable	TestLINE	18	11556	November 10, 2011	1 year

Figure 137 Test Equipment Used

9. Band Edge Spectrum

[In Accordance with section 15.247(c)]

9.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30 dB) and an appropriate coaxial cable
(cable loss = 1 dB). The spectrum analyzer was set to 100 kHz resolution BW. Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2400 MHz, and 2483.5 MHz correspondingly.
The E.U.T. was tested at 2412 and 2462 MHz with the following modulations: 1, 11, 6 and 54 Mbps.

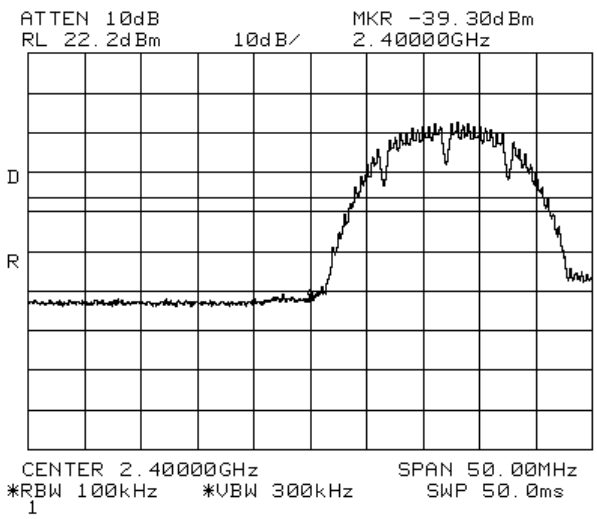


Figure 138 — Channel 1, 1Mbps

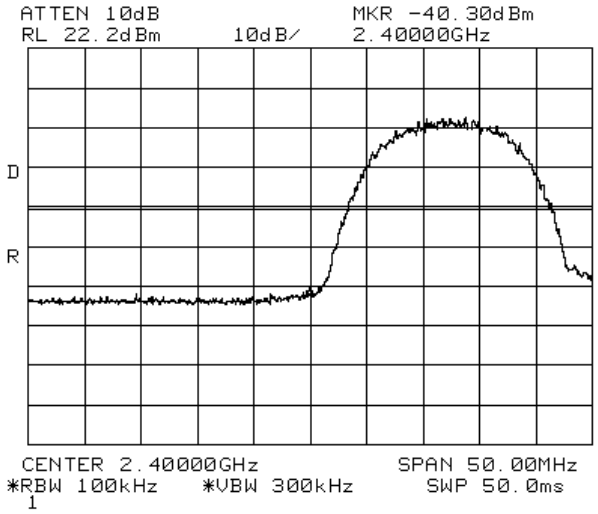


Figure 139 — Channel 1, 11Mbps

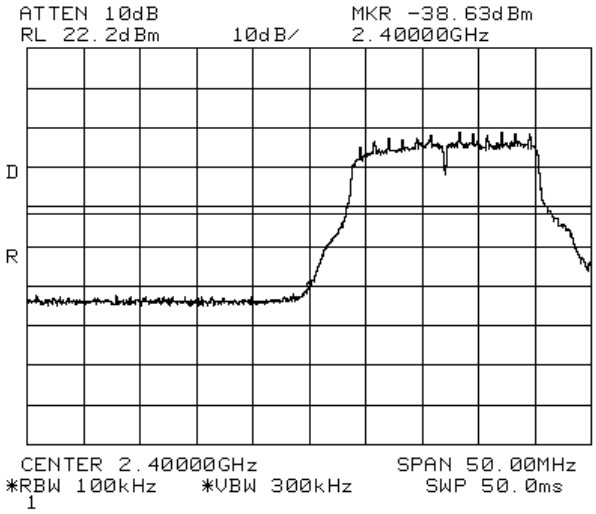


Figure 140 — Channel 1, 6Mbps

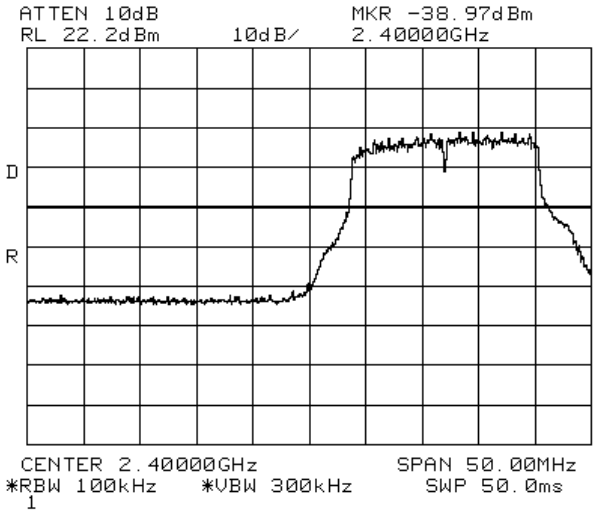


Figure 141 — Channel 1, 54Mbps

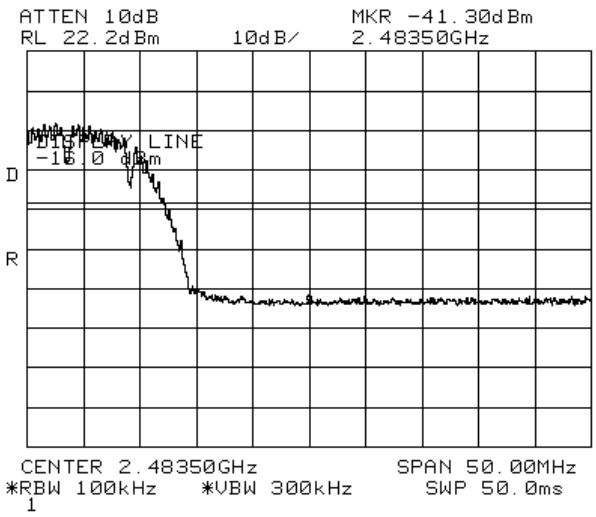


Figure 142 — Channel 11, 1Mbps

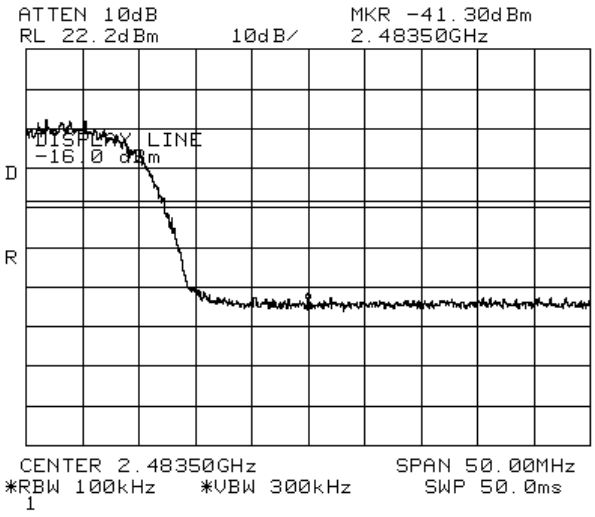


Figure 143 — Channel 11, 11Mbps

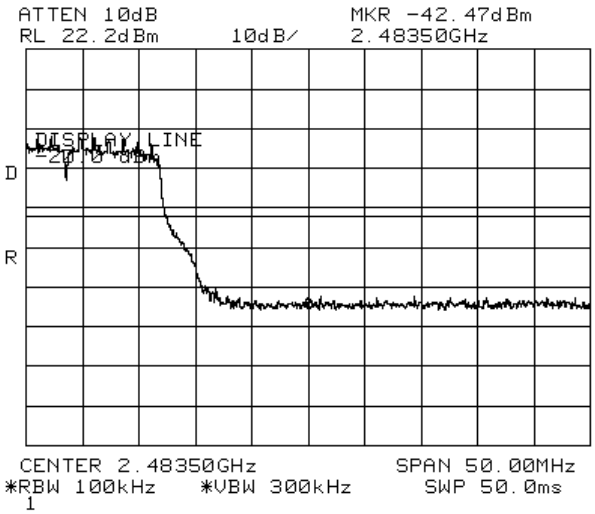


Figure 144 — Channel 11, 6Mbps

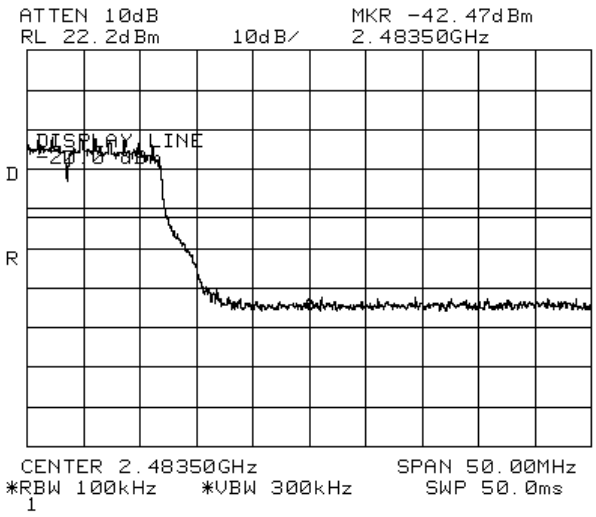


Figure 145 — Channel 11, 54Mbps

9.2 Results table

E.U.T. Description: WiFi Outdoor Access Point
Model No.: MBW-3100F
Serial Number: MLMU1000802
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation (Mbps)	Band Edge Frequency (MHz)	Peak Reading (dBm)	Band Edge Limit (dBm)	Band Edge Reading (dBm)
2412	1	2400.00	-39.30	-18.0	-21.30
	11	2400.00	-40.30	-15.8	-24.50
	6	2400.00	-38.63	-19.8	-18.83
	54	2400.00	-38.97	-19.3	-19.67
2462	1	2483.50	-41.30	-16.0	-25.30
	11	2483.50	-41.30	-17.1	-24.20
	6	2483.50	-42.47	-19.1	-23.37
	54	2483.50	-42.47	-19.0	-23.47

Figure 146 Band Edge Spectrum

JUDGEMENT: Passed by 18.83 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

9.3 Test Equipment Used.

Band edge Spectrum

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3414U01226	January 23, 2011	1 year
Attenuator	-	30dB	-	November 10, 2011	1 year
Cable	TestLINE	18	11556	November 10, 2011	1 year

Figure 147 Test Equipment Used

10. Radiated Emission, 9 kHz – 30 MHz

10.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

10.2 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 3.1.

The frequency range 9 kHz-30 MHz was scanned.

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 at a distance of 3 meters.

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: 1, 11, 6 and 54 Mbps.
Measurement was performed using a peak detector.

10.3 Measured Data

JUDGEMENT: Passed by more than 20dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

The results for all 3 operation frequencies and modulations were the same.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

10.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2011	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

10.5 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]

Example: FS = 30.7 dBµV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBµV

No external pre-amplifiers are used.

11. Radiated Emission 30 – 25000 MHz

11.1 Test Specification

30 MHz-25000 MHz, F.C.C., Part 15, Subpart C

11.2 Test Procedure

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

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

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The frequency range 30 MHz-25000 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.

In the frequency range of 30 MHz – 2.9 GHz, the emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.
The test distance was 3 meters.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was tested at 2412, 2437, and 2462 MHz with the following modulations: 1, 11, 6 and 54 Mbps.

11.3 Test Data

JUDGEMENT: Passed by 3.1 dB

For the operation frequency of 2412 MHz, the margin between the emission level and the specification limit is 3.8 dB in the worst case at the frequency of 2390.00 MHz, vertical polarization.

For the operation frequency of 2437 MHz, the margin between the emission level and the specification limit is 7.5 dB in the worst case at the frequency of 4783.00 MHz, vertical polarization.

For the operation frequency of 2462 MHz, the margin between the emission level and the specification limit is 3.1 dB in the worst case at the frequency of 2483.5 MHz, vertical polarization.

The results for all modulations were the same.

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

The details of the highest emissions are given in *Figure 148* to *Figure 153*.

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

Radiated Emission 30 MHz – 25 GHz

E.U.T Description	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

Specification: FCC, Part 15, Subpart C

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

Frequency (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2390.00	H	52.8	74.0	-21.2
2390.00	V	64.4	74.0	-9.6
4824.00	H	61.7	74.0	-12.3
4824.00	V	54.2	74.0	-19.8

Figure 148. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

"Peak Reading" includes correction factor.

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

** "Correction Factor" = Antenna Factor + Cable Loss

Radiated Emission 30 MHz – 25 GHz

E.U.T Description	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

Specification: FCC, Part 15, Subpart C

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

Frequency (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Peak. Margin (dB)
2390.00	H	40.1	54.0	-13.9
2390.00	V	50.2	54.0	-3.8
4824.00	H	46.9	54.0	-7.1
4824.00	V	44.5	54.0	-9.5

Figure 149. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

"Average Reading" includes correction factor.

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

** "Correction Factor" = Antenna Factor + Cable Loss

Radiated Emission 30 MHz – 25 GHz

E.U.T Description	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

Specification: FCC, Part 15, Subpart C

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

Freqency (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
4783.00	H	61.5	74.0	-12.5
4783.00	V	58.9	74.0	-15.1

Figure 150. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

"Peak Reading" includes correction factor.

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

Radiated Emission 30 MHz – 25 GHz

E.U.T Description	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

Specification: FCC, Part 15, Subpart C

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

Frequency (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Peak. Margin (dB)
4783.00	H	46.5	54.0	-7.5
4783.00	V	44.2	54.0	-9.8

Figure 151. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

"Average Reading" includes correction factor.

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

Radiated Emission 30 MHz – 25 GHz

E.U.T Description	WiFi Outdoor Access Point
Type	MBW-3100F
Serial Number:	MLMU1000802

Specification: FCC, Part 15, Subpart C

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

Frequency (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2483.50	H	59.1	74.0	-14.9
2483.50	V	63.8	74.0	-10.2
4924.00	H	62.4	74.0	-11.6
4924.00	V	62.3	74.0	-11.7

Figure 152. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

"Peak Reading" includes correction factor.

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

**"Correction Factor" = Antenna Factor + Cable Loss

Radiated Emission Above 1 GHz

E.U.T Description WiFi Outdoor Access Point
Type MBW-3100F
Serial Number: MLMU1000802

Specification: FCC, Part 15, Subpart C

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

Frequency (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Peak. Margin (dB)
2483.50	H	49.2	54.0	-4.8
2483.50	V	50.9	54.0	-3.1
4924.00	H	46.7	54.0	-7.3
4924.00	V	46.5	54.0	-7.5

Figure 153. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

"Average Reading" includes correction factor.

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

**"Correction Factor" = Antenna Factor + Cable Loss

11.4 Field Strength Calculation below 1 GHz

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]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

11.5 Test Instrumentation Used, Radiated Measurements 30 MHz -25 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	November 13, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 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
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 4, 2011	1 Year

12. Transmitted Power Density

[In accordance with section 15.247(d)]

12.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (30dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 3 kHz resolution BW. and sweep time of 1 second for each 3 kHz “window”. The spectrum peaks were located at each of the 3 operating frequencies.

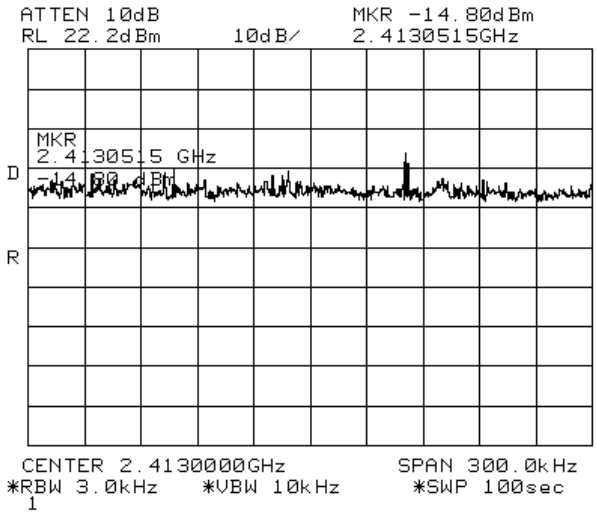


Figure 154 – Channel 1 , 1Mbps

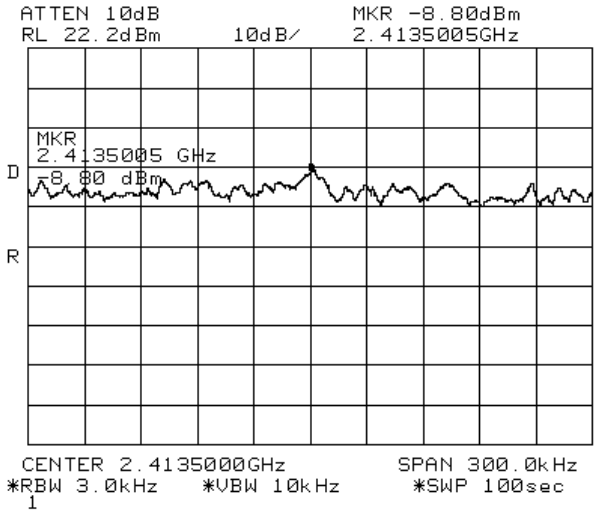


Figure 155- Channel 1 , 11Mbps

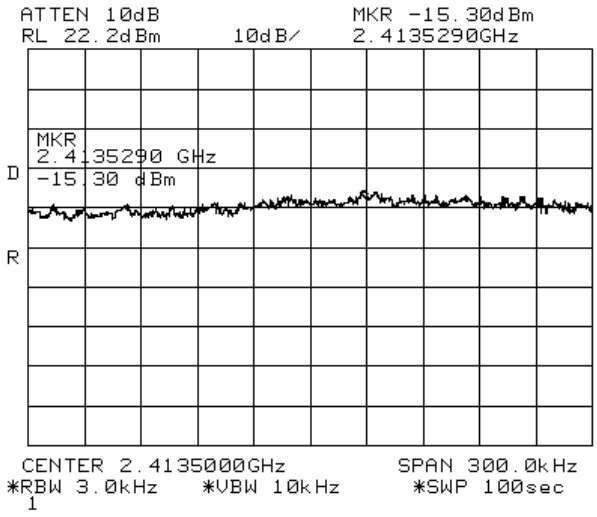


Figure 156 - Channel 1 , 6Mbps

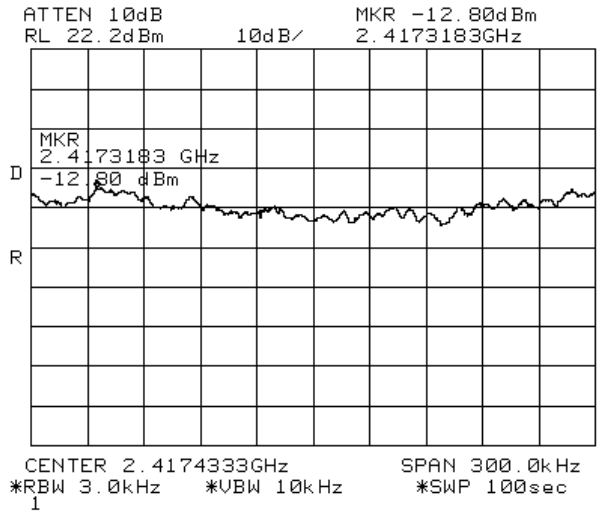


Figure 157 - Channel 1 , 54Mbps

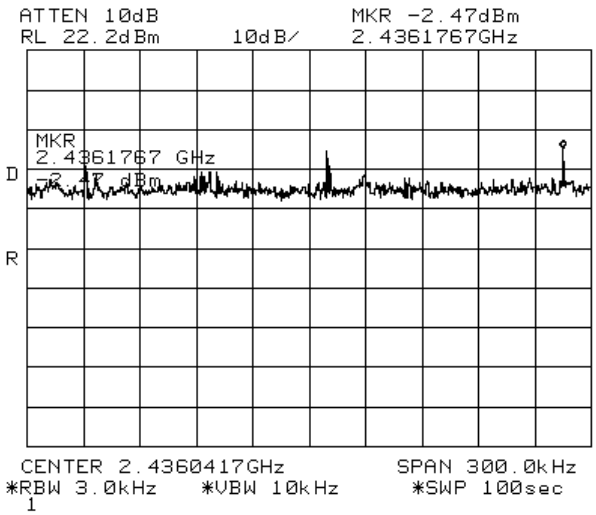


Figure 158 - Channel 6 , 1Mbps

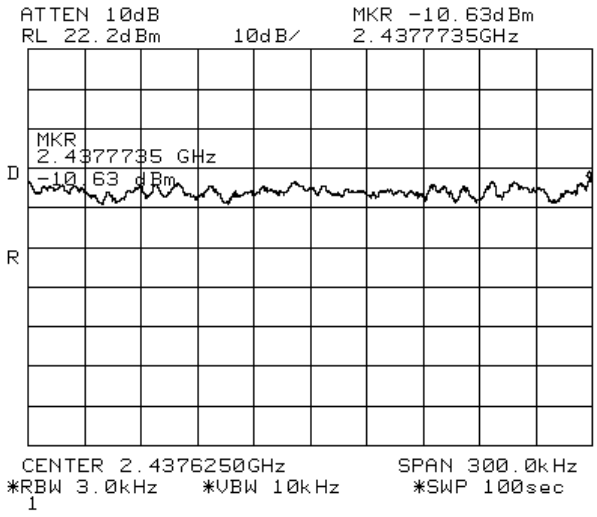


Figure 159 - Channel 6 , 11Mbps

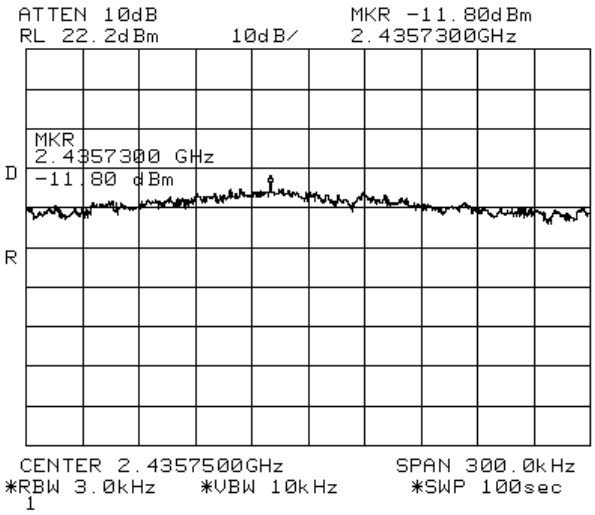


Figure 160 - Channel 6 , 6Mbps

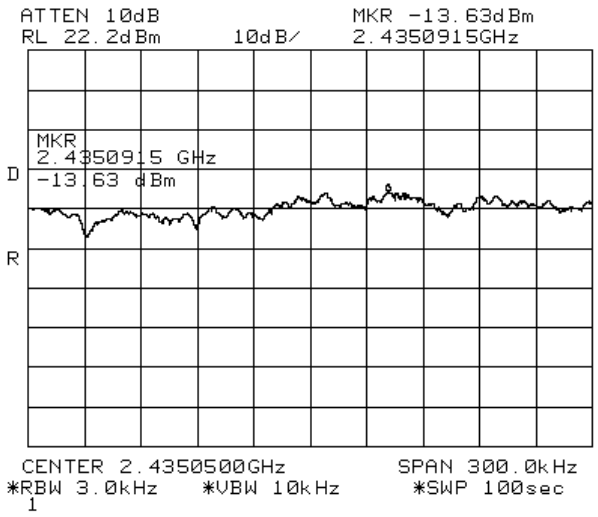


Figure 161 - Channel 6 , 54Mbps

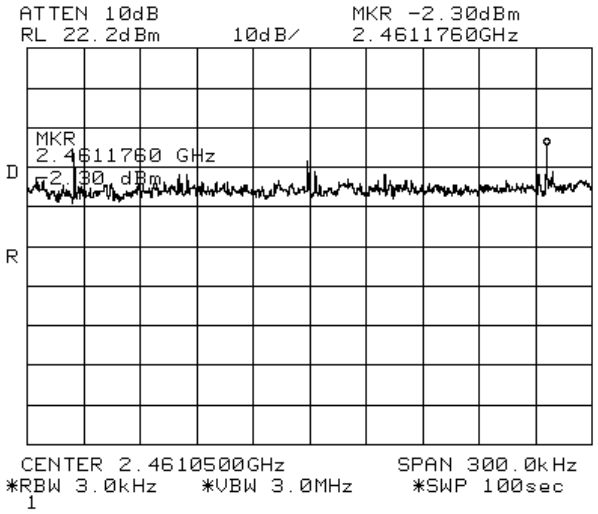


Figure 162 - Channel 11 , 1Mbps

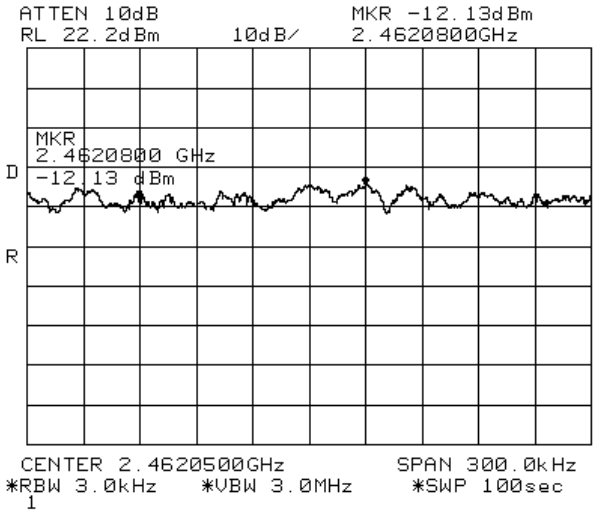


Figure 163 - Channel 11 , 11Mbps

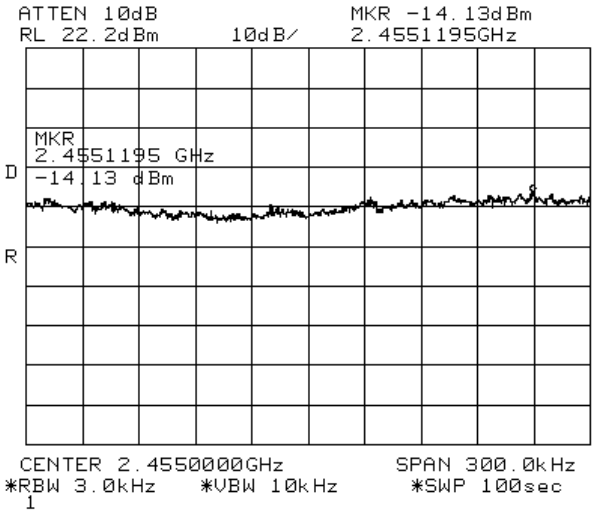


Figure 164 - Channel 11 , 6Mbps

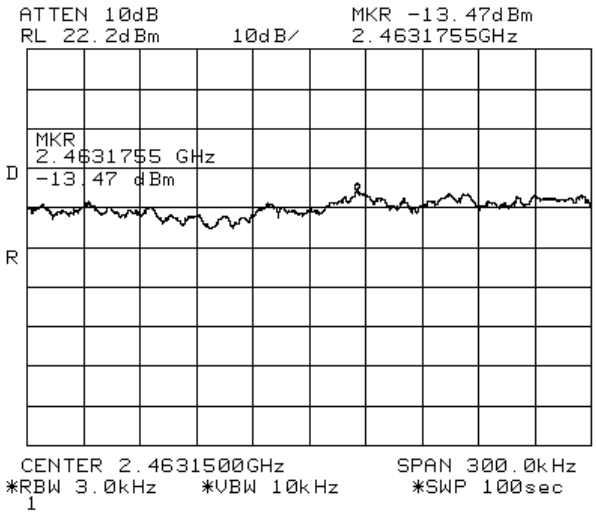


Figure 165 - Channel 11 , 54Mbps

E.U.T. Description: WiFi Outdoor Access Point
Model No.: MBW-3100F
Serial Number: MLMU1000802
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation (Mbps)	Reading (dBm)	Specification (dBm)	Margin (dB)
2412	1	-14.80	2.0	-16.80
	11	-8.80	2.0	-10.80
	6	-15.30	2.0	-17.30
	54	-12.80	2.0	-14.80
2437	1	-2.47	2.0	-4.47
	11	-10.63	2.0	-12.63
	6	-11.80	2.0	-13.80
	54	-13.63	2.0	-15.63
2462	1	-2.30	2.0	-4.30
	11	-12.13	2.0	-14.13
	6	-14.13	2.0	-16.13
	54	-13.47	2.0	-15.47

Figure 166 Test Results

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

JUDGEMENT: Passed by 4.3 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 19.01.12

Typed/Printed Name: A. Sharabi

12.2 Test Equipment Used.

Transmitted Power Density

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3414U01226	January 23, 2011	1 year
Attenuator	-	30dB	-	November 10, 2011	1 year
Cable	TestLINE	18	11556	November 10, 2011	1 year

Figure 167 Test Equipment Used

13. Antenna Gain/Information

The antenna gain is 14 dBi.

14. Intermodulation

14.1 Test procedure

The E.U.T. antenna terminal of the Access Port was connected to the spectrum analyzer through an external attenuator (30 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 1MHz resolution BW except for the frequency range.

Both transmitters were operating at 2.427GHz and 5.745GHz (from different RF ports) the spectrum was scanned for intermodulation products in the range of 9KHz to 40GHz.

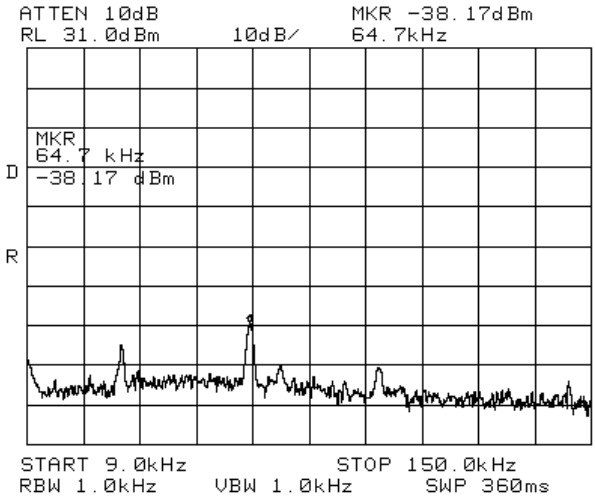


Figure 168 - Intermodulation

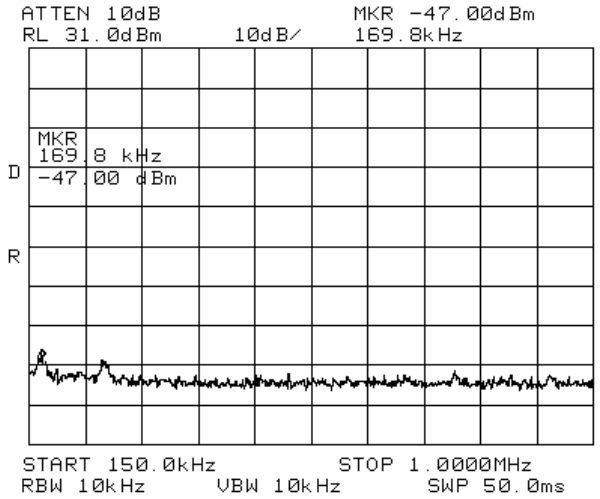


Figure 169 - Intermodulation

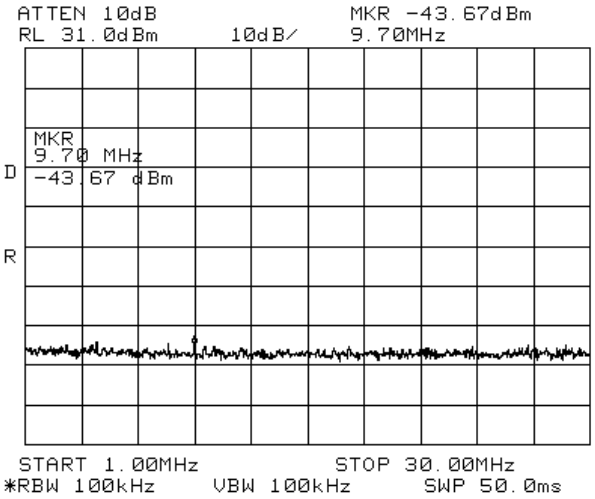


Figure 170 - Intermodulation

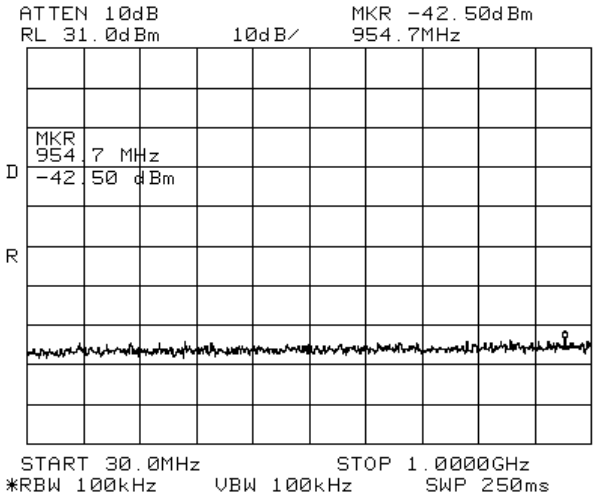


Figure 171 - Intermodulation

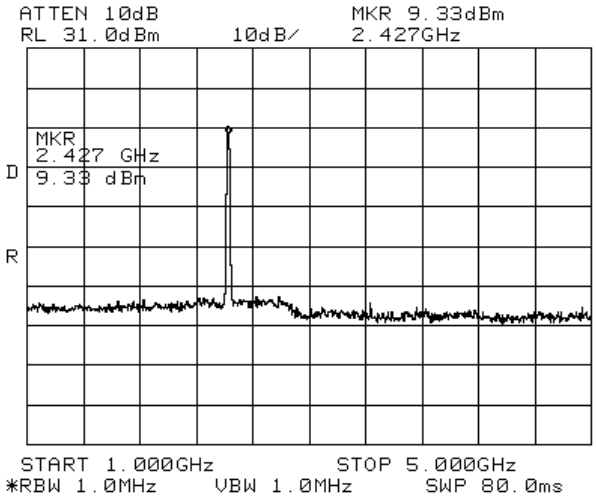


Figure 172 - Intermodulation

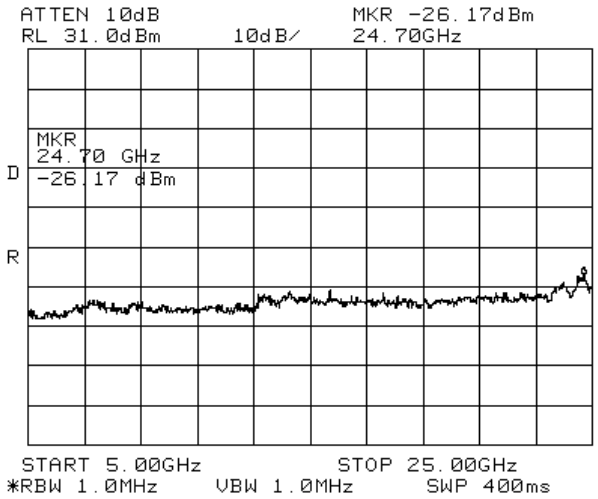


Figure 173 - Intermodulation

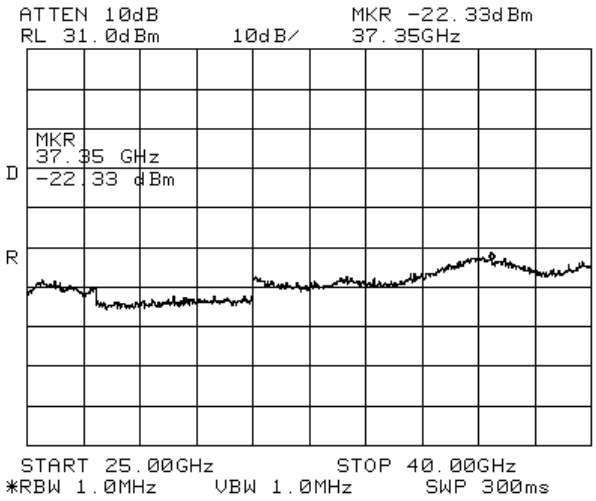


Figure 174 - Intermodulation

15. R.F Exposure/Safety

The typical placement of the E.U.T. is on a pole. The typical distance between the E.U.T. and the user in the worst case application, is >20 cm .

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

P_t- Transmitted Peak Power 19.8 dBm = 95.5 mw

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

G_T-Antenna Gain, 14 dBi = 25.11

R- Distance from Transmitter using 20 cm worst case

(c) The peak power density is :

$$S_p = \frac{95.5 \times 25.11}{4\pi (20)^2} = 0.477 \frac{mW}{cm^2}$$

(f) This is below the FCC limit.

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 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			

16.7 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

16.8 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