



DATE: 21 February 2008

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

Equipment under test:

**WLAN Module With WCE (WiFi Coverage Extender) for
DAS With 4 Aruba AP70 Access Points**

860M With WCE*

* See customer's declaration on page 7.

Written by: D. Shidowsky
D. Shidowsky, Documentation

Approved by: E. Pitt
E. Pitt, Test Engineer

Approved by: I. Raz
I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



Measurement/Technical Report for MobileAccess Networks

WLAN Module With WCE (WiFi Coverage Extender) for DAS With
4 Aruba AP70 Access Points
860M With WCE

FCC ID: OJFMA860WAR

21 February 2008

This report concerns: Original Grant x Class II change

Class B verification Class A verification Class I change

Equipment type: Direct Sequence Spread Spectrum Transmitter

Request Issue of Grant:

x Immediately upon completion of review

Limits used:

CISPR 22 Part 15 x

Measurement procedure used is ANSI C63.4-2003.

Application for Certification
prepared by:

Ishaishou Raz

ITL (Product Testing) Ltd.

Kfar Bin Nun

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Israel

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

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TABLE OF CONTENTS

1. GENERAL INFORMATION -----	6
1.1 Administrative Information.....	6
1.2 List of Accreditations	8
1.3 Product Description	9
1.4 Test Methodology.....	9
1.5 Test Facility	9
1.6 Measurement Uncertainty	9
2. SYSTEM TEST CONFIGURATION-----	10
2.1 Justification.....	10
2.2 EUT Exercise Software	10
2.3 Special Accessories	10
2.4 Equipment Modifications	10
2.5 Configuration of Tested System.....	11
3. THEORY OF OPERATION -----	12
3.1 Theory of Operation	12
4. SPURIOUS RADIATED EMISSION IN THE RESTRICTED BAND, BELOW 1 GHZ 5GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS-----	14
4.1 Test Specification	14
4.2 Test Procedure.....	14
4.3 Test Data	15
4.4 Test Instrumentation Used, Radiated Measurements	24
4.5 Field Strength Calculation	25
5. SPURIOUS RADIATED EMISSION IN THE RESTRICTED BAND, ABOVE 1 GHZ 5GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS-----	26
5.1 Radiated Emission Above 1 GHz.....	26
5.2 Test Data.....	27
5.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz	34
6. 26 DB BANDWIDTH 5 GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS -----	35
6.1 Test procedure	35
6.2 Test Equipment Used.....	42
7. MAXIMUM CONDUCTED OUTPUT POWER 5 GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS-----	43
7.1 Test procedure	43
7.2 Results table.....	50
7.3 Test Equipment Used.....	51
7.4 Peak Power Spectral Density 5GHz Transmitter 802.11b/g+802.11a Signals.....	52
7.5 Test procedure	52
7.6 Results table.....	58
7.7 Test Equipment Used.....	59
8. RATIO OF PEAK EXCURSION OF MODULATION ENVELOPE TO MAXIMUM CONDUCTED OUTPUT POWER 5GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS -----	60
8.1 Test procedure	60
8.2 Results table.....	66
8.3 Test Equipment Used.....	67
9. PEAK POWER OUTPUT OUT OF 5150-5250; 5725-5825 MHZ BANDS 5 GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS-----	68
9.1 Test procedure	68
9.2 Results table.....	131
9.3 Test Equipment Used.....	132

10. BAND EDGE SPECTRUM 5GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS	133
10.1 Test procedure	133
10.2 Results table.....	138
10.3 Results table.....	139
10.4 Test Equipment Used.....	140
11. ANTENNA GAIN 5GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS	141
12. R.F EXPOSURE/SAFETY 5GHZ TRANSMITTER 802.11B/G+802.11A SIGNALS	142
13. RADIATED EMISSION PER FCC PART 15 SUB-PART B TEST DATA 802.11B/G+802.11A SIGNALS	143
13.1 Test Specification	143
13.2 Test Procedure.....	143
13.3 Test Data.....	144
13.4 Test Instrumentation Used, Radiated Measurements	153
13.5 Field Strength Calculation	154
14. SPURIOUS RADIATED EMISSION IN THE RESTRICTED BAND, BELOW 1 GHZ 5GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS	155
14.1 Test Specification	155
14.2 Test Procedure.....	155
14.3 Test Data.....	156
14.4 Test Instrumentation Used, Radiated Measurements	165
14.5 Field Strength Calculation	166
15. SPURIOUS RADIATED EMISSION IN THE RESTRICTED BAND, ABOVE 1 GHZ 5GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS	167
15.1 Radiated Emission Above 1 GHz.....	167
15.2 Test Data.....	168
15.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz.....	175
16. 26 DB BANDWIDTH 5 GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS	176
16.1 Test procedure	176
16.2 Test Equipment Used.....	183
17. MAXIMUM CONDUCTED OUTPUT POWER 5 GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS	184
17.1 Test procedure	184
17.2 Results table.....	191
17.3 Test Equipment Used.....	192
18. PEAK POWER SPECTRAL DENSITY 5GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS	193
18.1 Test procedure	193
18.2 Results table.....	199
18.3 Test Equipment Used.....	200
19. RATIO OF PEAK EXCURSION OF MODULATION ENVELOPE TO MAXIMUM CONDUCTED OUTPUT POWER 5GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS	201
19.1 Test procedure	201
19.2 Results table.....	207
19.3 Test Equipment Used.....	208
20. PEAK POWER OUTPUT OUT OF 5150-5250; 5725-5825 MHZ BANDS 5 GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS	209
20.1 Test procedure	209
20.2 Results table.....	258
20.3 Test Equipment Used.....	259

21. BAND EDGE SPECTRUM 5GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS -----	260
21.1 Test procedure	260
21.2 Results table.....	265
21.3 Results table.....	266
21.4 Test Equipment Used.....	267
22. ANTENNA GAIN 5GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS -----	268
23. R.F EXPOSURE/SAFETY 5GHZ TRANSMITTER 802.11B/G+802.11A + CELL + PCS SIGNALS -----	269
24. RADIATED EMISSION PER FCC PART 15 SUB-PART B TEST DATA 802.11B/G+802.11A + CELL + PCS SIGNALS -----	270
24.1 Test Specification	270
24.2 Test Procedure.....	270
24.3 Test Data.....	271
24.4 Test Instrumentation Used, Radiated Measurements	280
24.5 Field Strength Calculation	281
25. INTERMODULATION TESTS-----	282
25.1 Test procedure	282
25.2 Test Equipment Used.....	290
26. APPENDIX A - CORRECTION FACTORS-----	291
26.1 Correction factors for CABLE	291
26.2 Correction factors for CABLE	292
26.3 Correction factors for CABLE	293
26.4 Correction factors for CABLE	294
26.6 Correction factors for LOG PERIODIC ANTENNA	295
26.5 Correction factors for LOG PERIODIC ANTENNA	296
26.6 Correction factors for BICONICAL ANTENNA	297
26.7 Correction factors for BICONICAL ANTENNA.....	298
26.8 Correction factors for Double-Ridged Waveguide Horn	299
26.9 Correction factors for Horn Antenna	300
26.10 Correction factors for Horn Antenna	301
26.11 Correction factors for ACTIVE LOOP ANTENNA	302



1. General Information

1.1 Administrative Information

Manufacturer: MobileAccess Networks

Manufacturer's Address: 8391 Old Courthouse Rd.
Suite #300
Vienna, VA 22182
U.S.A.
Tel: +1-541-758-2880
Fax: +1-703-848-0260

Manufacturer's Representative: Steve Blum

Equipment Under Test (E.U.T): WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points

Equipment Model No.: 860M With WCE (See customer's declaration on following page).

Equipment Serial No.: 1. 860M: 73903D
2. WCE: 739038

Date of Receipt of E.U.T: 11.02.08

Start of Test: 11.02.08

End of Test: 21.02.08

Test Laboratory Location: I.T.L (Product Testing) Ltd.
Kfar Bin Nun,
ISRAEL 99780

Test Specifications: See Section 2

15/11/2007

DECLARATION

I HEREBY DECLARE THAT THE FOLLOWING PRODUCT:

860M

IS IDENTICAL ELECTRONICALLY, PHYSICALLY, AND
MECHANICALLY TO:

MA-860

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

Thank you,

Signature: 

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

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1.2 List of Accreditations

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

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

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

1.3 Product Description

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

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

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

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

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

1.4 Test Methodology

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

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.’s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing August 22, 2006).

I.T.L.’s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

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

2. System Test Configuration

2.1 *Justification*

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

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

2.2 *EUT Exercise Software*

The Acces Point (AP) (as part of the EUT) was triggered to transmit using an “Exercise SW”.

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

2.3 *Special Accessories*

No special accessories were needed to achieve compliance.

2.4 *Equipment Modifications*

No modifications were necessary in order o achieve compliance.

2.5 Configuration of Tested System

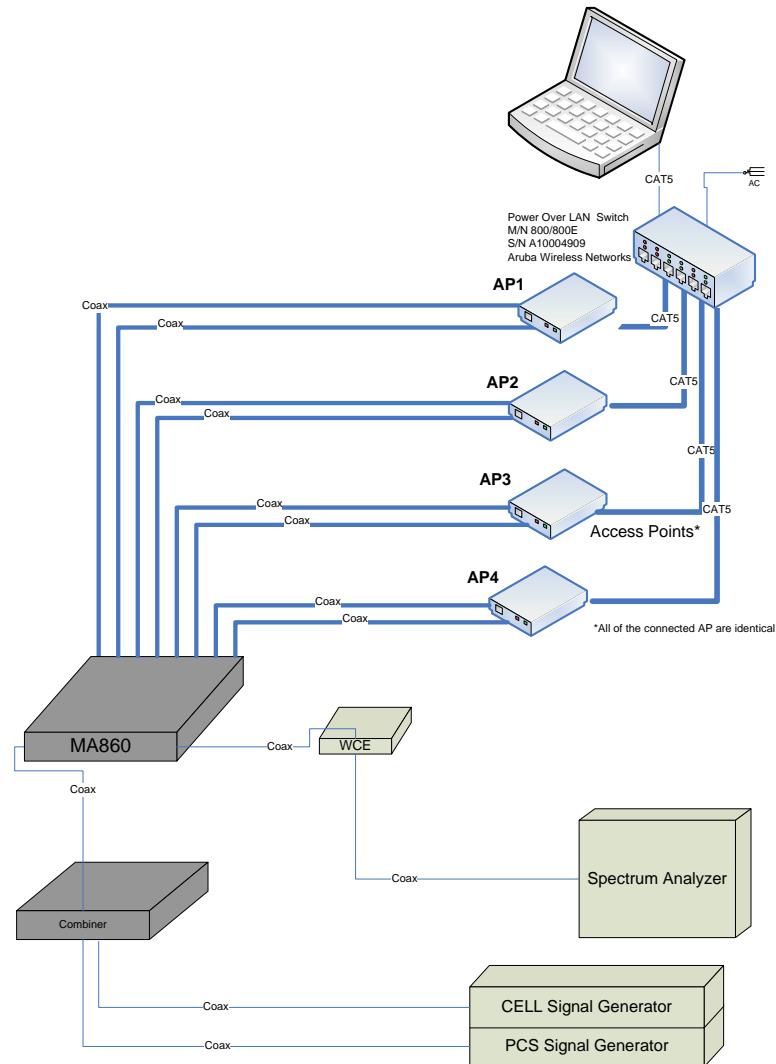


Figure 1. Configuration of Tested System

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

3. Theory of Operation

3.1 Theory of Operation



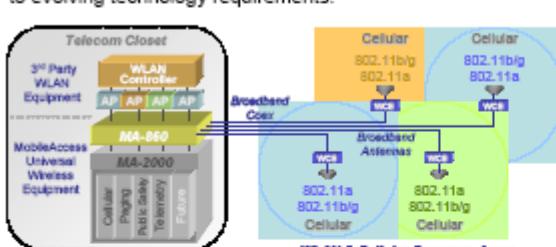
MA-860 WLAN Solution

MA-860 Solution Overview

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

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

MobileAccess 860 WLAN Module



Benefits

Cost-Effective Multi-Service Solution

- ▶ Delivers WLAN and other wireless RF signals over a single multi-service infrastructure
- ▶ Spreads WLAN deployment costs across multiple wireless services

Dependable WLAN Coverage

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

Centralized & Secure AP Management

- ▶ Lowers operating expenses
- ▶ Provides physical security and simplifies management

Proactive End-to-End Monitoring

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

Simplified IT Deployment Model

- ▶ Uses standard WLAN design techniques



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MA-860 Product Specifications

802.11 RF Parameters			Power																									
860(M/R) with Wi-Fi Coverage Expander (WCE):			Power																									
<table border="1"> <thead> <tr> <th></th><th>802.11a</th><th>802.11b/g</th></tr> </thead> <tbody> <tr> <td>Gain TX (dB)</td><td>0</td><td>0</td></tr> <tr> <td>Output Power (dBm)</td><td>17</td><td>b: 20 g: 17</td></tr> <tr> <td>Gain RX (dB)</td><td>4</td><td>4</td></tr> <tr> <td>NF RX (dB)</td><td>5</td><td>5</td></tr> <tr> <td>Flatness (dB)</td><td>+/- 2.0</td><td>+/- 1.5</td></tr> </tbody> </table>				802.11a	802.11b/g	Gain TX (dB)	0	0	Output Power (dBm)	17	b: 20 g: 17	Gain RX (dB)	4	4	NF RX (dB)	5	5	Flatness (dB)	+/- 2.0	+/- 1.5	2 DC Power Inputs DC-1 = 28V Mandatory DC Power, 86 Watts DC-2= 9.8V Optional Redundant Power, 40 Watts							
	802.11a	802.11b/g																										
Gain TX (dB)	0	0																										
Output Power (dBm)	17	b: 20 g: 17																										
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Flatness (dB)	+/- 2.0	+/- 1.5																										
860(M/R) Module Standalone:			Physical Specifications																									
<table border="1"> <thead> <tr> <th></th><th>802.11a</th><th>802.11b/g</th></tr> </thead> <tbody> <tr> <td>Insertion Loss (dB)</td><td>3</td><td>2</td></tr> <tr> <td>Flatness (dB)</td><td>+/- 1.0</td><td>+/- 1.0</td></tr> </tbody> </table>				802.11a	802.11b/g	Insertion Loss (dB)	3	2	Flatness (dB)	+/- 1.0	+/- 1.0	860(M/R): 242 mm x 279 mm x 38 mm (9.54 in x 10.98 in x 1.5 in) WCE: 130 mm x 120 mm x 20 mm (5.12 in x 4.73in x 0.8 in)																
	802.11a	802.11b/g																										
Insertion Loss (dB)	3	2																										
Flatness (dB)	+/- 1.0	+/- 1.0																										
Mobile Services Parameters			Weight																									
<table border="1"> <thead> <tr> <th></th><th>Cell</th><th></th><th>PCS</th></tr> </thead> <tbody> <tr> <td>Band (MHz)</td><td>896-960</td><td></td><td>1710-1990</td></tr> <tr> <td>Insertion Loss (dB)</td><td></td><td></td><td></td></tr> <tr> <td>MA-860</td><td>1.0</td><td></td><td>2.5</td></tr> <tr> <td>WCE</td><td>1.2</td><td></td><td>3.5</td></tr> <tr> <td>System</td><td>2.2</td><td></td><td>6.0</td></tr> </tbody> </table>				Cell		PCS	Band (MHz)	896-960		1710-1990	Insertion Loss (dB)				MA-860	1.0		2.5	WCE	1.2		3.5	System	2.2		6.0	860(M/R): 2.82 kg (6.2 lb) WCE: 0.80 kg (1.8 lb)	
	Cell		PCS																									
Band (MHz)	896-960		1710-1990																									
Insertion Loss (dB)																												
MA-860	1.0		2.5																									
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System	2.2		6.0																									
RF Connections			Environmental Specifications																									
<table border="1"> <thead> <tr> <th>860(M/R)</th><th></th><th></th></tr> </thead> <tbody> <tr> <td>802.11 b/g</td><td>(4) SMA Female, 50 ohm</td><td></td></tr> <tr> <td>802.11 a</td><td>(4) SMA Female, 50 ohm</td><td></td></tr> <tr> <td>Mobile Services</td><td>(4) SMA Female, 50 ohm</td><td></td></tr> <tr> <td>Antenna Ports</td><td>(4) N-type Female, 50 ohm</td><td></td></tr> </tbody> </table>			860(M/R)			802.11 b/g	(4) SMA Female, 50 ohm		802.11 a	(4) SMA Female, 50 ohm		Mobile Services	(4) SMA Female, 50 ohm		Antenna Ports	(4) N-type Female, 50 ohm		Temperature Operating: 0°C to +50°C (32°F to 122°F) Storage: -20°C to +85°C (-4°C to 185°C) Humidity Operating: 95% (non-condensing) Storage: 95% (non-condensing)										
860(M/R)																												
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WCE			Ordering Information																									
<table border="1"> <thead> <tr> <th>Coax (860 facing)</th><th>(1) N-type Male</th></tr> <tr> <th>Coax (Ant facing)</th><th>(1) N-type Female</th></tr> </thead> </table>			Coax (860 facing)	(1) N-type Male	Coax (Ant facing)	(1) N-type Female	860M 860 WLAN Module 860R 860 WLAN Module - Redundant Power Supply Option WCE Wi-Fi Coverage Expander																					
Coax (860 facing)	(1) N-type Male																											
Coax (Ant facing)	(1) N-type Female																											
Standards and Approvals			Accessory Kits for mounting 860(M/R):																									
FCC-47, CFR 15.109, Part 15 Sections B, C, and E UL / IEC 60950 -1 UL1980 Fire Safety requirements UL2043 Fire/Plenum (WCE) CE EN 60950 CAN/CSA C22.2 No 60950			AK-860-1000 860 with MA-1000 AK-860-1200 860 with MA-1200 AK-860-MDLT 860 with ModuLite AK-860-2000 860 with MA-2000 AK-860-SA 860 stand alone AK-860-2000L 860 with MA-2000 Lite AK-860-PWR Redundant Power Supply																									
Management			Wiring Diagram																									
The 860(M/R) can be configured and monitored through either a local RS-485 connection or a Web browser application via an RJ-45 Ethernet connection																												

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Tel: (800)436-9266, (703) 848-0200 TAC (600) 737-1266 Fax: (703) 848-0280

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

4.1 **Test Specification**

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

4.2 **Test Procedure**

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

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

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

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

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

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

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

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

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

Turning the E.U.T on and off.

Using a frequency span less than 10 MHz.

Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T. was tested at the operating frequencies of, 5180, 5200, 5240, 5745, 5765, and 5805 MHz using the following modulations: 64QAM, and BPSK.



4.3 Test Data

JUDGEMENT: Passed by 1.5 dB.

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

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

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

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

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

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

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

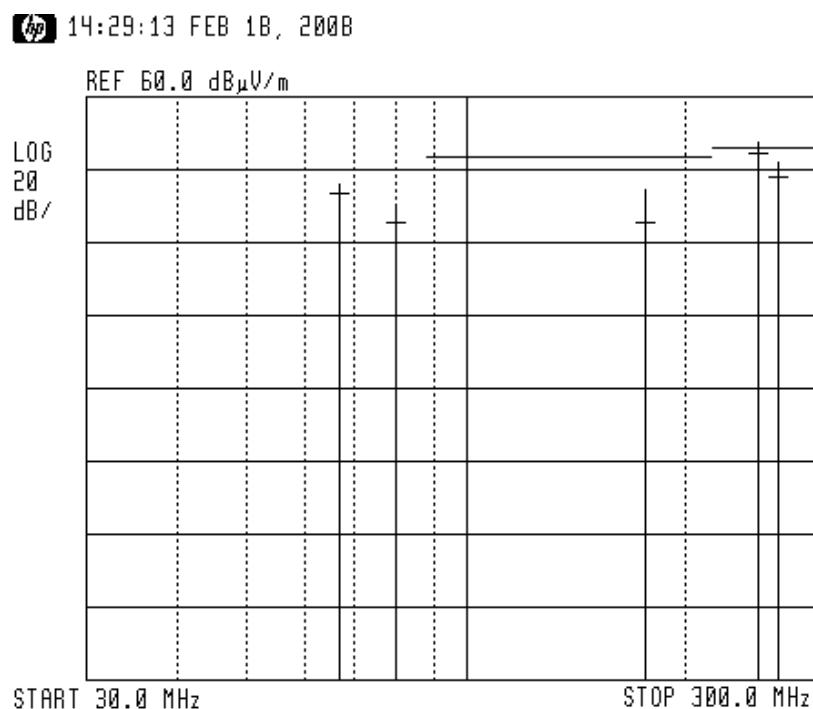
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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



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

Note:

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in dB 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 WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

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

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

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

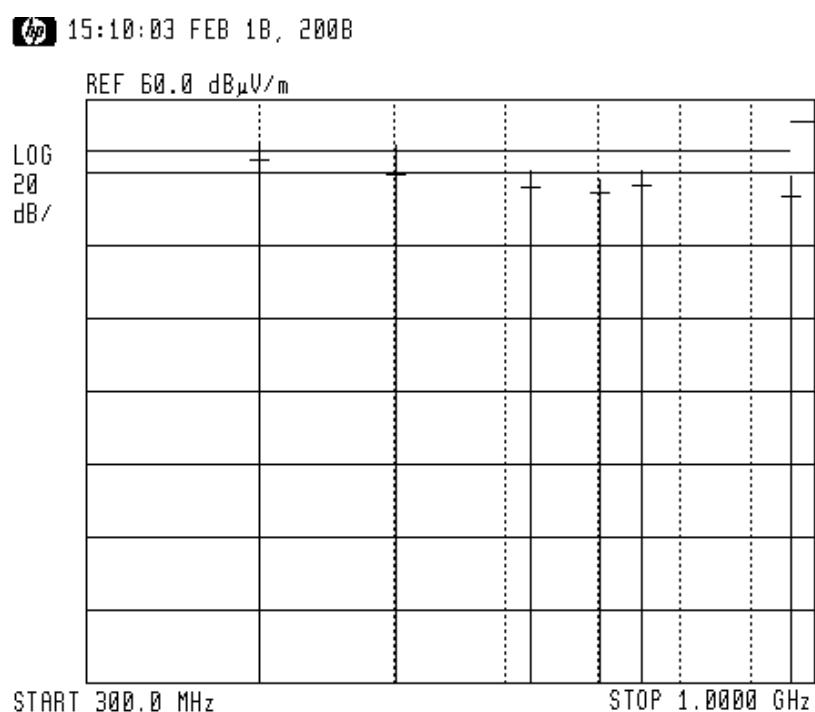
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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



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

Note:

1. Horizontal axis shows logarithmic frequency scale.
2. The vertical axis shows amplitude (in $\text{dB } \mu\text{V/m}$).
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 WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

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

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

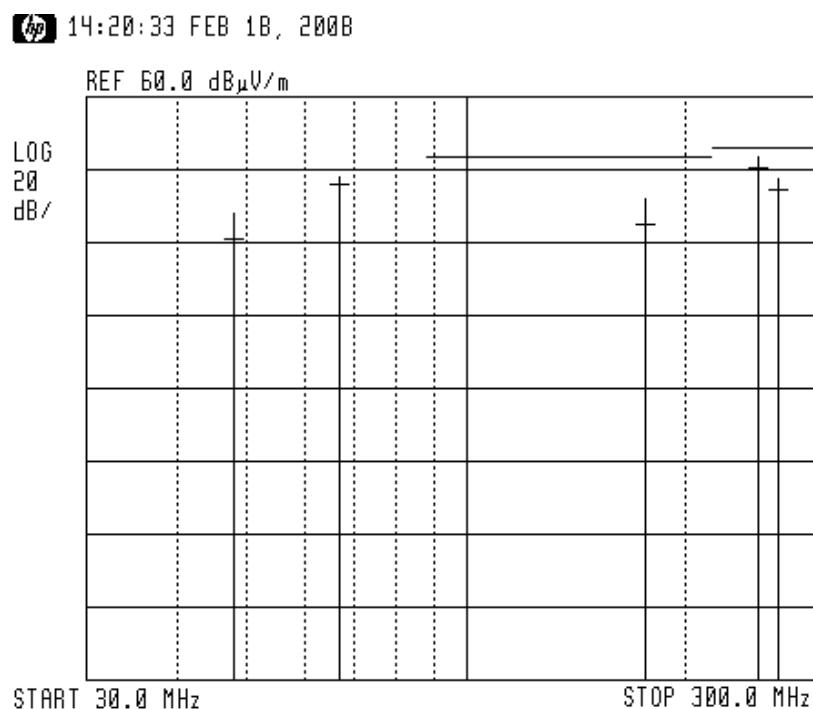
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



**Figure 7. 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.

Radiated Emission

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

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

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

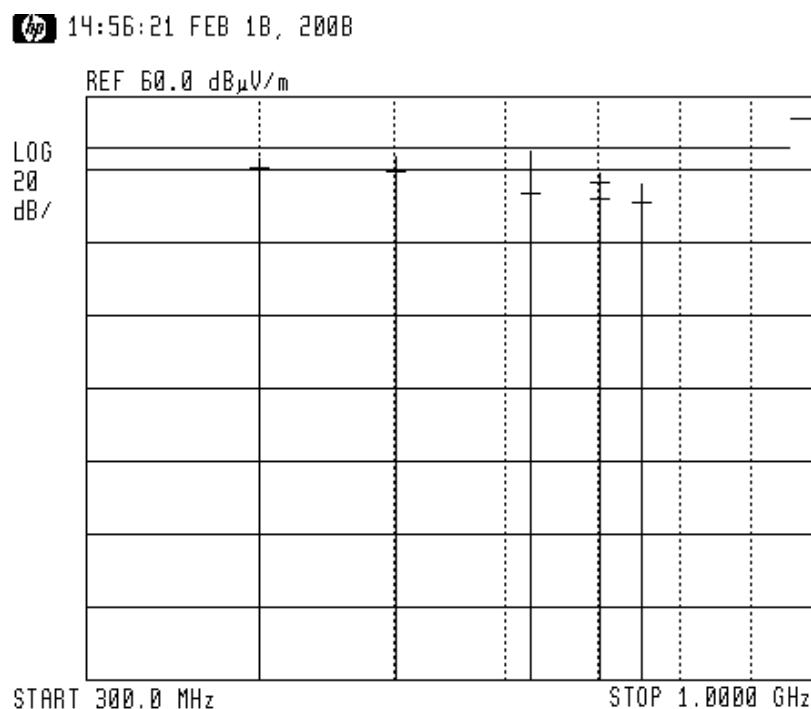
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



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

Note:

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

4.4 ***Test Instrumentation Used, Radiated Measurements***

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



4.5 Field Strength Calculation

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

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

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.

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

5.1 Radiated Emission Above 1 GHz

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

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

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

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

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

In the frequency range 2.9-40.0 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 tested at the operating frequencies of, 5180, 5200, 5240, 5745, 5765, and 5805 MHz using the following modulations: 64QAM, and BPSK.

5.2 **Test Data**

JUDGEMENT: Passed by 0.9 dB

For the operating frequencies of 5180, 5200, and 5240, the signals in the frequency range of 1.0 – 40.0 GHz were more than 20 dB below the specification limit.

For the operation frequency of 5745 MHz, the margin between the emission level and the specification limit is 1.0 dB in the worst case at the frequency of 11490.00 MHz, polarization.

For the operation frequency of 5765 MHz, the margin between the emission level and the specification limit is 0.9 dB in the worst case at the frequency of 11530.00 MHz, polarization.

For the operation frequency of 5805 MHz, the margin between the emission level and the specification limit is 1.6 dB in the worst case at the frequency of 11610.00 MHz, polarization.

The results for all modulations were the same.

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

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 5745 MHz

Freq. (MHz)	Polarity (H/V)	Peak Amp (dB μ V/m)	Peak. Specification (dB μ V/m)	Peak. Margin (dB)
11490.00	H	64.3*	74.0	-9.7
11490.00	V	64.4*	74.0	-9.6

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

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

“Peak Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 5745 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11490.00	H	52.7*	54.0	-1.3
11490.00	V	53.0*	54.0	-1.0

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

Notes:

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

“Average Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 5765 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11530.00	H	64.3*	74.0	-9.7
11530.00	V	62.7*	74.0	-11.3

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

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

“Peak Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 5765 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11530.00	H	53.1*	54.0	-0.9
11530.00	V	53.0*	54.0	1.0

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

Notes:

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

“Average Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical	Frequency range: 1.0 GHz to 40.0 GHz
Test Distance: 3 meters	Detector: Peak
Operation Frequency: 5805 MHz	

Freq. (MHz)	Polarity (H/V)	Peak Amp (dB μ V/m)	Peak. Specification (dB μ V/m)	Peak. Margin (dB)
11610.00	H	63.6*	74.0	-10.4
11610.00	V	65.4*	74.0	-8.6

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

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

“Peak Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 5805 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11610.00	H	52.0*	54.0	-2.0
11610.00	V	52.4*	54.0	-1.6

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

Notes:

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

“Average Amp” includes correction factor.

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

5.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	November 12, 2007	1 year
RF Section	HP	85420E	3427A00103	November 12, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 year
Horn Antenna	Narda	V637	0410	December 8, 2006	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2007	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2008	1 year
Low Noise Amplifier	MK Milliwave	MKT6-3000 400-30-13P	399	January 9, 2008	1 year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Spectrum Analyzer	HP	8546E	3442A00275	November 14, 2007	1 year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

6. 26 dB Bandwidth 5 GHz Transmitter 802.11b/g+802.11a Signals

6.1 *Test procedure*

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 300 kHz resolution BW. The spectrum bandwidth of the E.U.T. was measured and recorded.

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

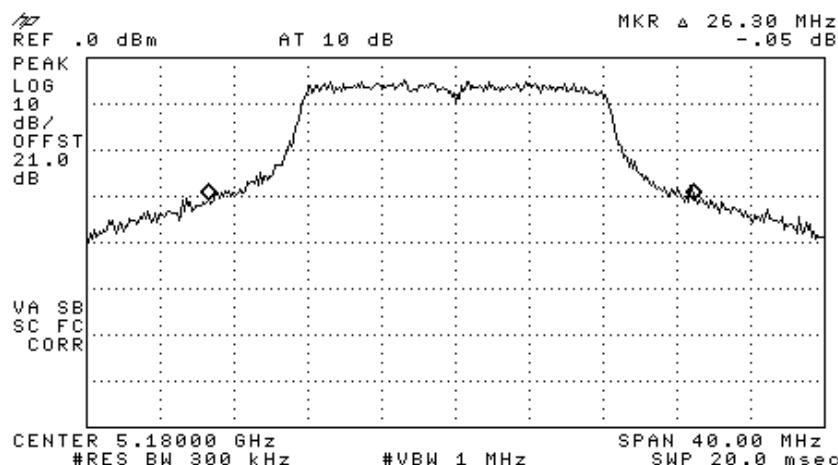


Figure 16 —5180 MHz 64QAM

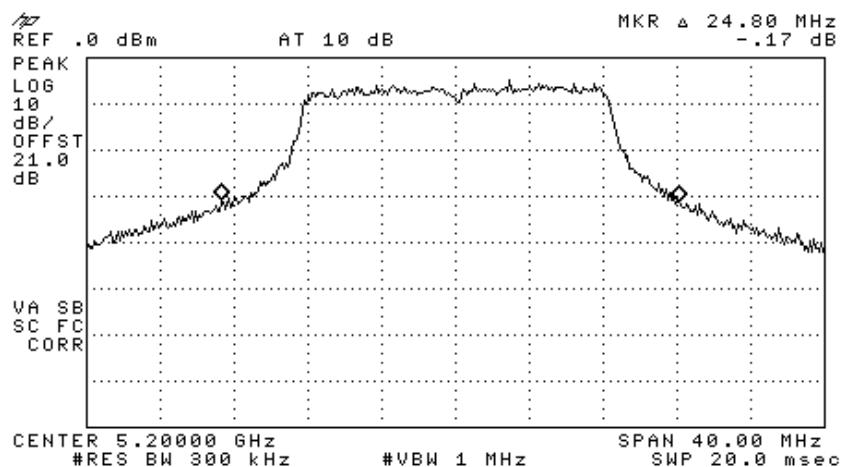


Figure 17 —5200 MHZ 64QAM

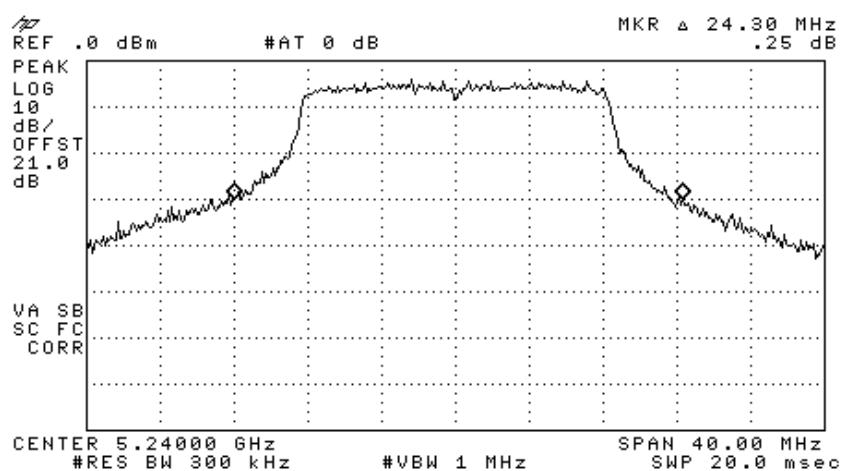


Figure 18 —5240 MHZ 64QAM

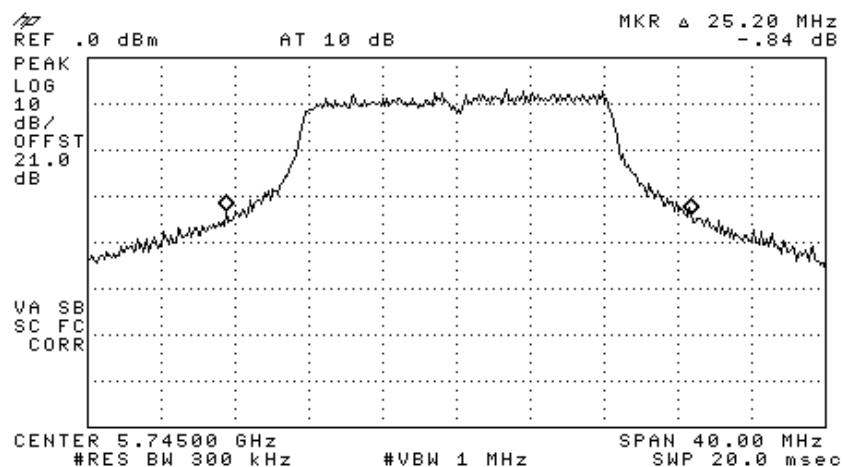


Figure 19 —5745 MHz 64QAM

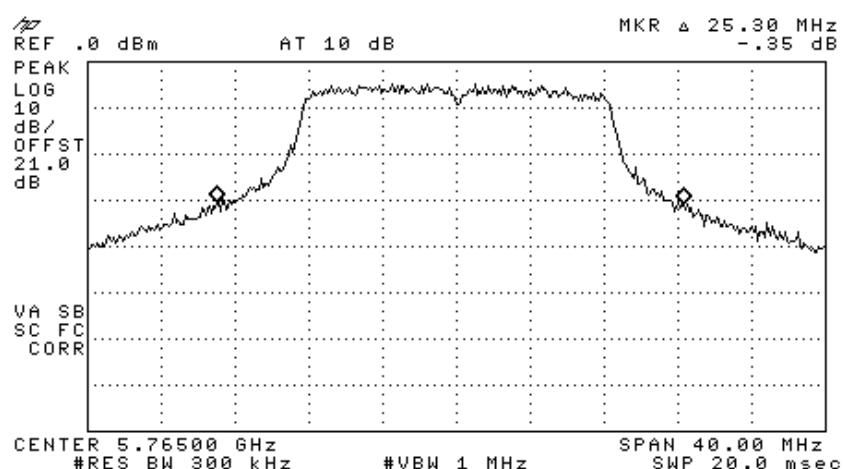


Figure 20 —5765 MHz 64QAM

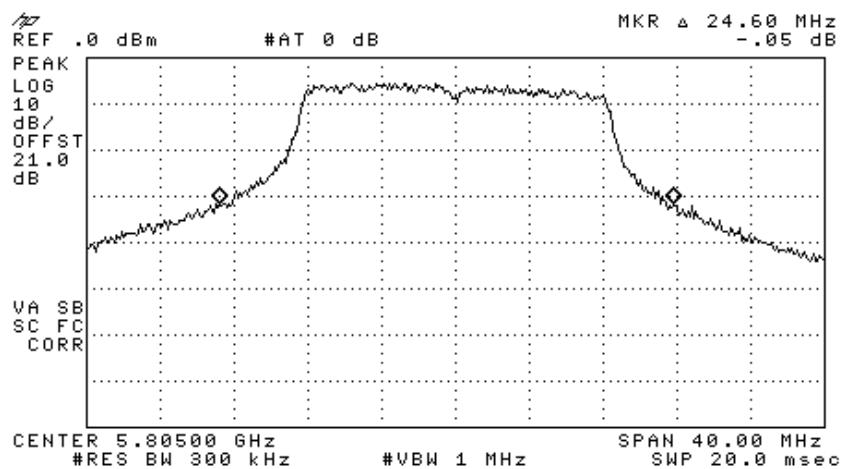


Figure 21 —5805 MHZ 64QAM

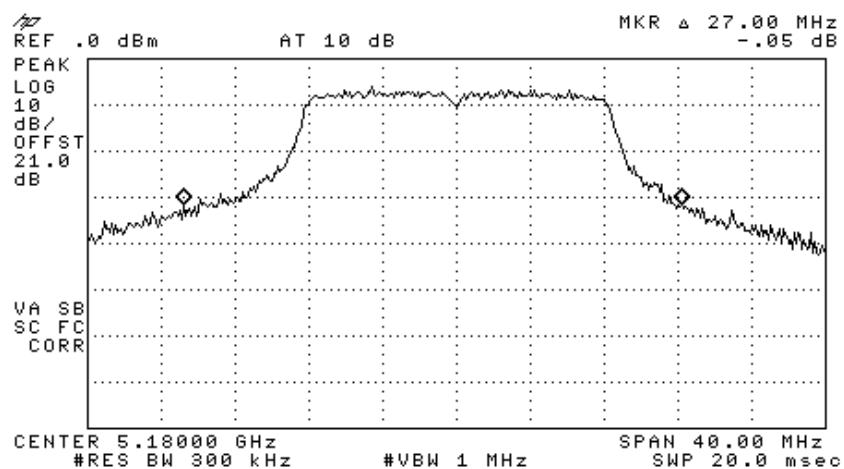


Figure 22 —5180 MHz BPSK

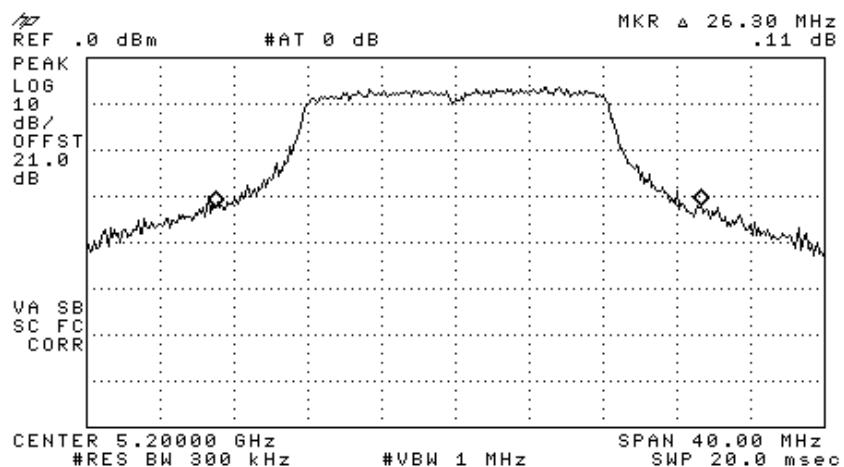


Figure 23 —5200 MHZ BPSK

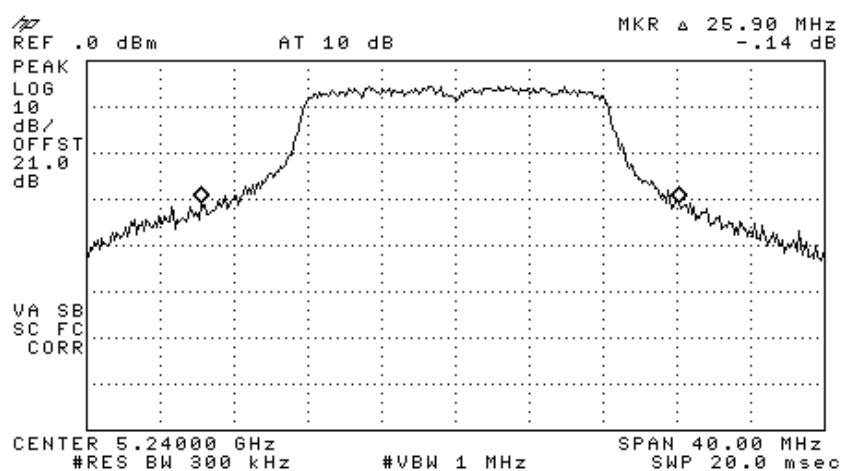


Figure 24 —5240 MHZ BPSK

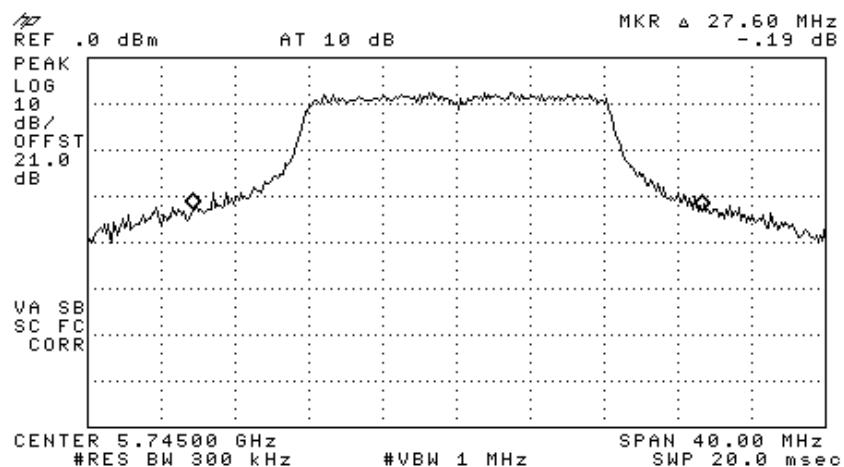


Figure 25 —5745 MHz BPSK

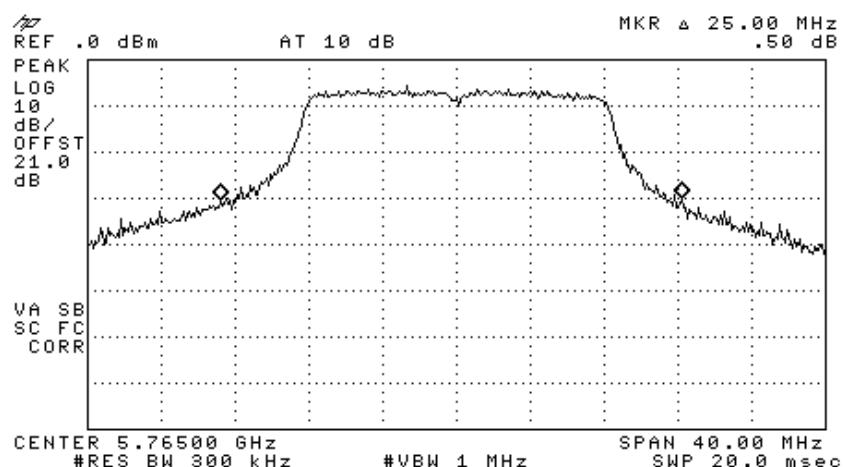


Figure 26 —5765 MHz BPSK

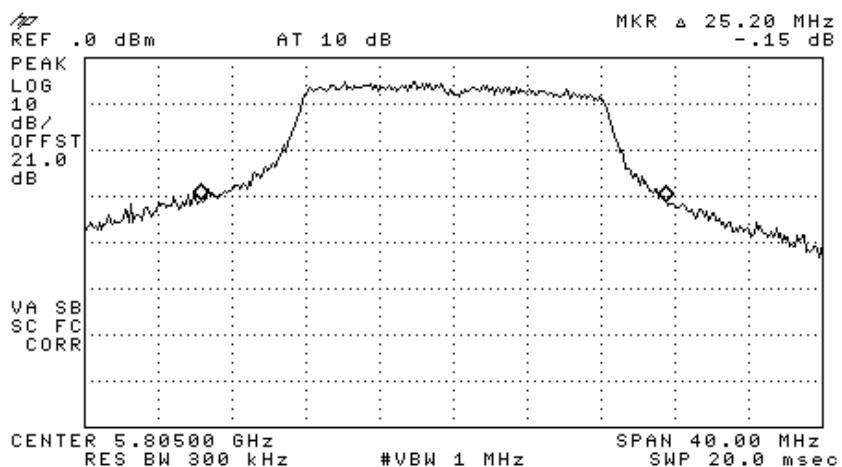


Figure 27 —5805 MHZ BPSK

Operation Frequency (MHz)	Modulation	26 dB Bandwidth (dBm)
5180	64QAM	26.30
	BPSK	27.08
5200	64QAM	24.80
	BPSK	26.30
5240	64QAM	24.30
	BPSK	25.90
5745	64QAM	25.20
	BPSK	27.60
5765	64QAM	25.30
	BPSK	25.00
5805	64QAM	24.60
	BPSK	25.20

TEST PERSONNEL:

Tester Signature: E. Pitt

Date: 21.02.08

Typed/Printed Name: E. Pitt

6.2 **Test Equipment Used.**

26 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year
Cable	Rhophase	KPS-1501-1000	A1675	February 8, 2008	1 year

Figure 28 Test Equipment Used

7. Maximum Conducted Output Power 5 GHz Transmitter 802.11b/g+802.11a Signals

7.1 *Test procedure*

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (Cable Loss = 1 dB). The Spectrum Analyzer was set to 1.0 MHz resolution BW. Sample detector and maximum hold were used.

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

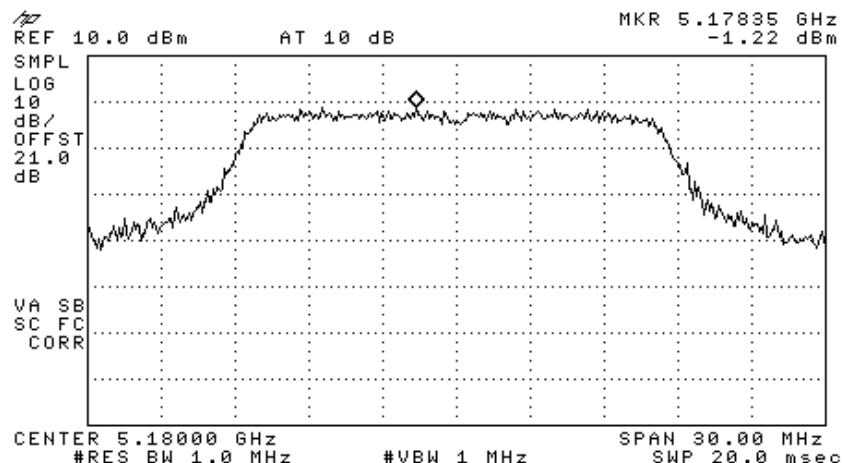


Figure 29 5180 MHz 64QAM

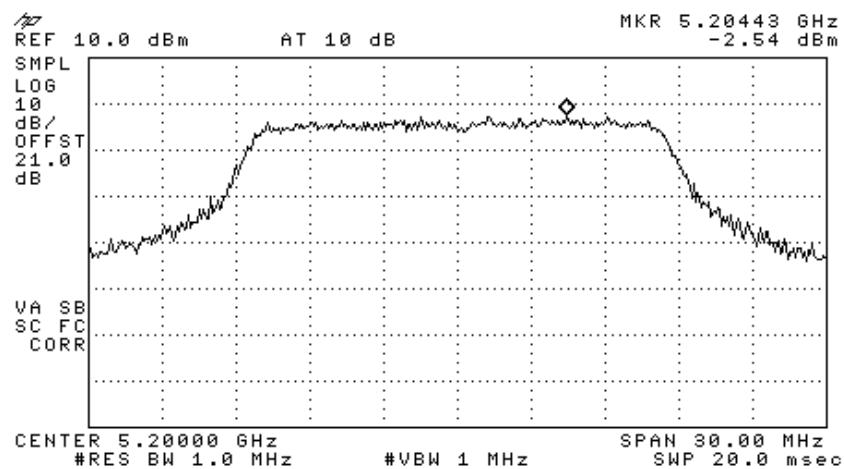


Figure 30 5200 MHz 64QAM

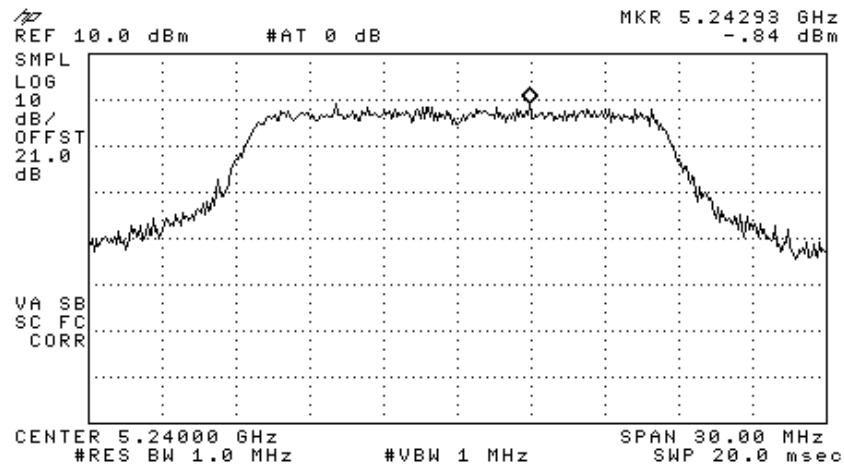


Figure 31 5240 MHz 64QAM

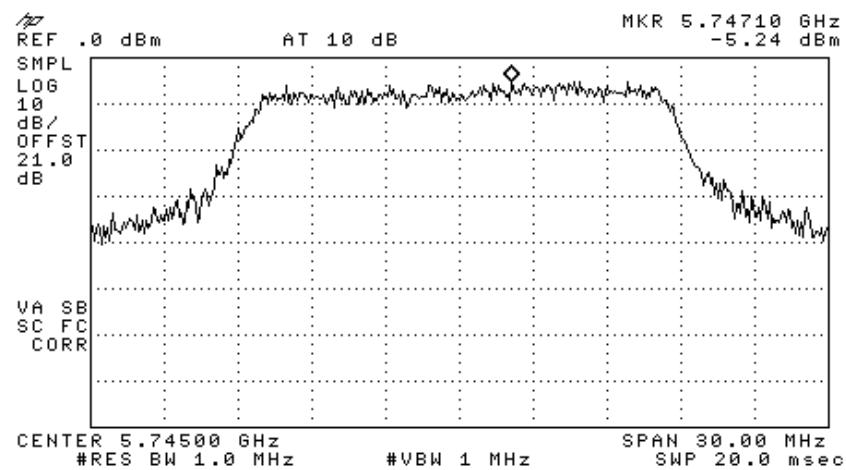


Figure 32 5745 MHz 64QAM

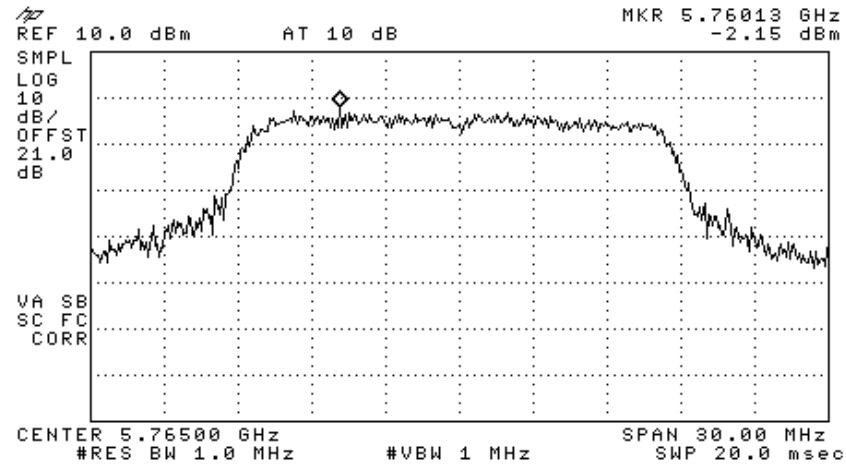


Figure 33 5765 MHz 64QAM

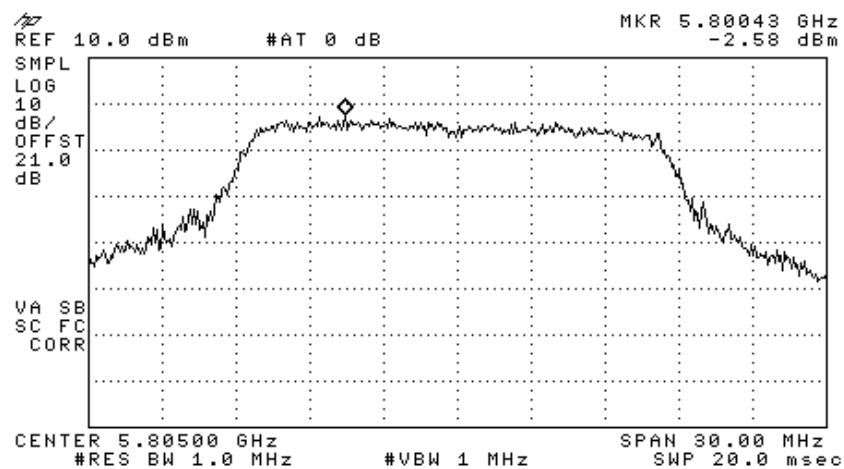


Figure 34 5805 MHz 64QAM

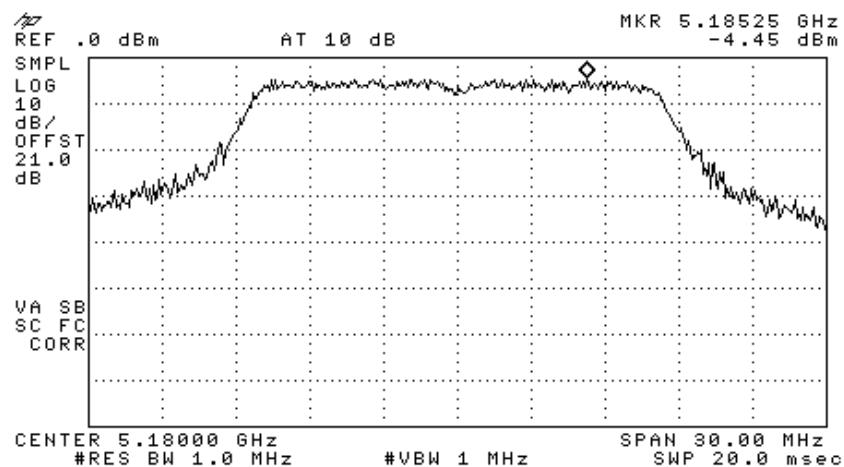


Figure 35 5180 MHz BPSK

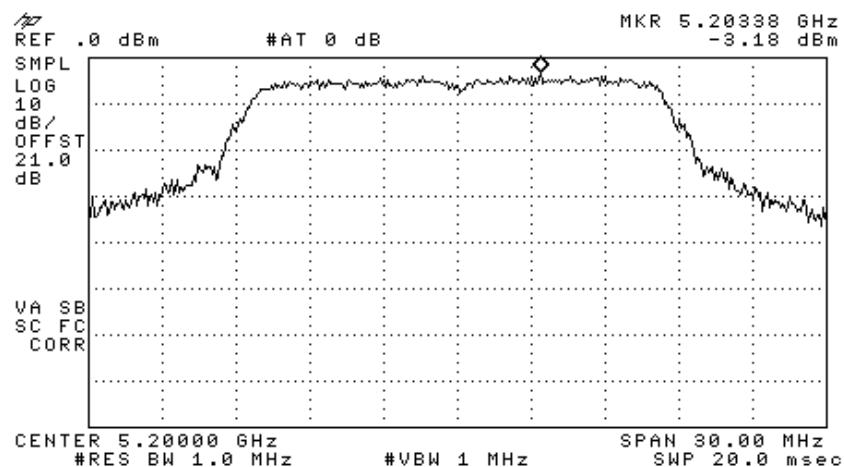


Figure 36 5200 MHz BPSK

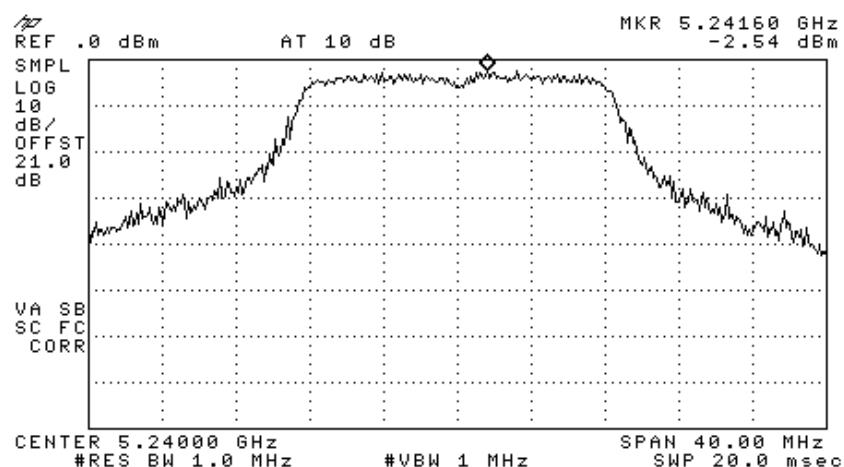


Figure 37 5240 MHz BPSK

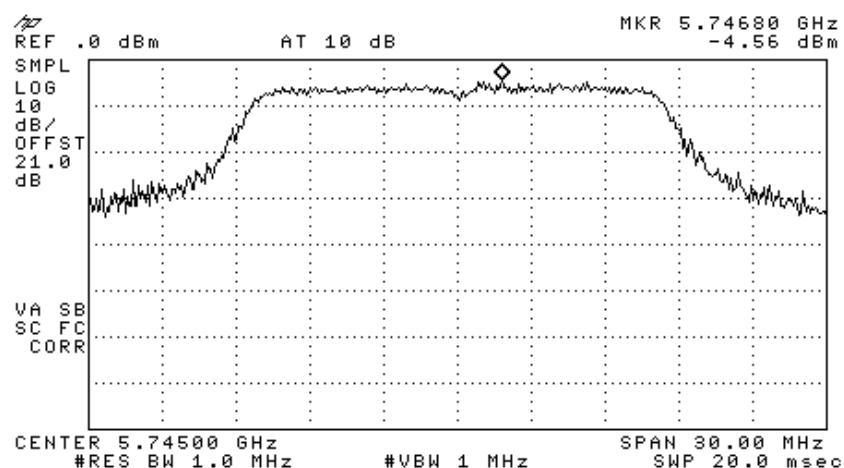


Figure 38 5745 MHz BPSK

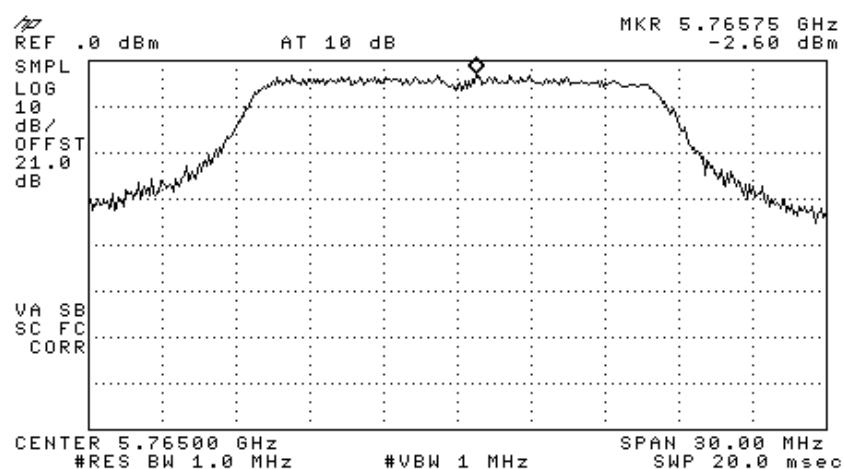


Figure 39 5765 MHz BPSK

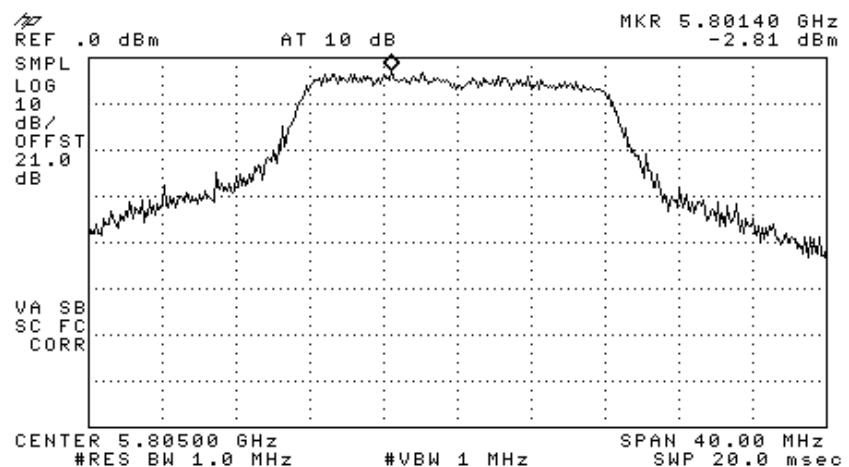


Figure 40 5805 MHz BPSK

7.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

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

Operation Frequency (MHz)	Modulation	Power (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	13.0	16.0	-3.00
	BPSK	9.83	16.0	-6.17
5200	64QAM	11.4	16.0	-4.60
	BPSK	11.0	16.0	-5.00
5240	64QAM	13.0	16.0	-3.00
	BPSK	11.6	16.0	-4.40
5745	64QAM	8.76	29.0	-20.24
	BPSK	9.85	29.0	-19.15
5765	64QAM	11.85	29.0	-17.15
	BPSK	11.4	29.0	-17.60
5805	64QAM	11.32	29.0	-17.68
	BPSK	11.1	29.0	-17.90

Figure 41 Maximum Peak Power Output

Note: Antenna Gain is 7 dBi

Peak Output Power = Reading + $10\log_{10} EBW$

For 5.18; 5.20, 5.24 GHz Peak Output Power Limit = $4 + 10\log_{10} EBW - (\text{Antenna Gain} - 6)$ or 16 whichever is less.

For 5.745; 5.765, 5.805 GHz Peak Output Power Limit = $17 + 10\log_{10} EBW - (\text{Antenna Gain} - 6)$ or 29 whichever is less.

JUDGEMENT: Passed by 3.00 dB

TEST PERSONNEL:

Tester Signature: E. Pitt Date: 21.02.08
Typed/Printed Name: E. Pitt

7.3 Test Equipment Used.

Peak Power Output

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

Figure 42 Test Equipment Used

7.4 Peak Power Spectral Density 5GHz Transmitter 802.11b/g+802.11a Signals

[In accordance with section 15.407(a)]

7.5 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (Cable Loss = 1 dB). The spectrum analyzer was set to 1 MHz resolution BW. and 1 MHz video BW. The spectrum peaks were located at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

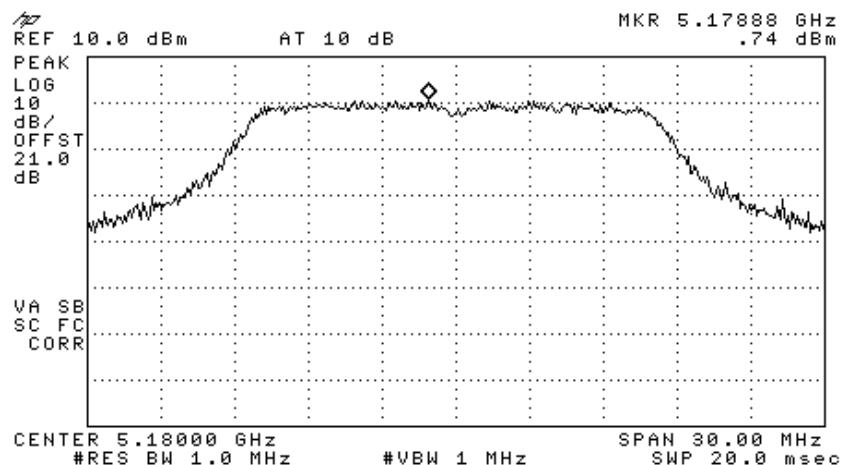


Figure 43 —5180 MHz 64QAM

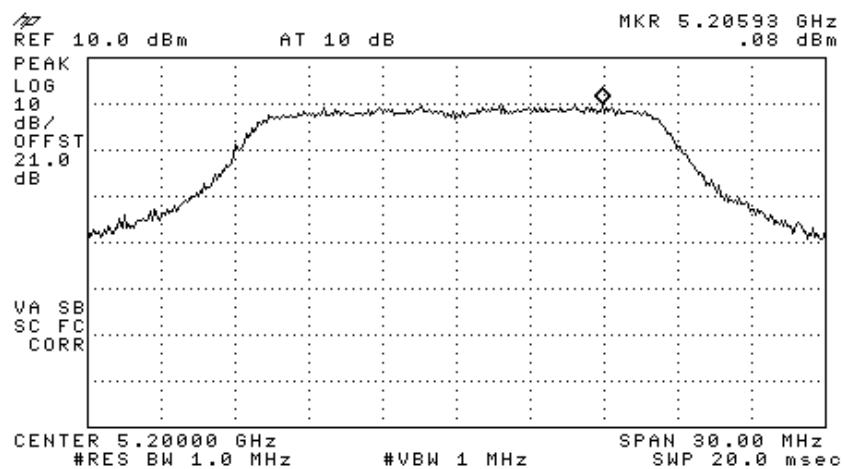


Figure 44 —5200 MHz 64QAM

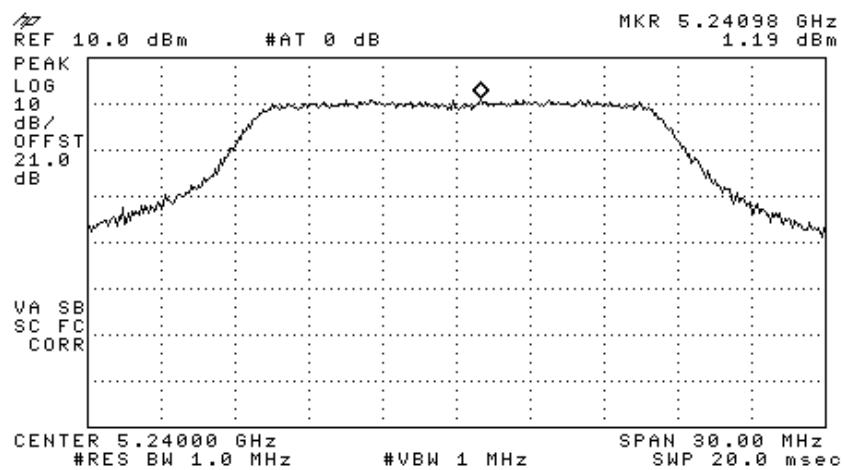


Figure 45 —5240 MHz 64QAM

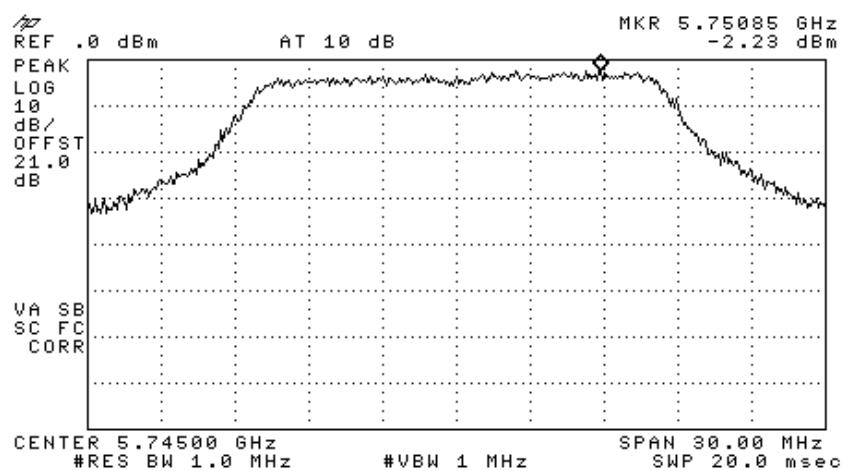


Figure 46 —5745 MHz 64QAM

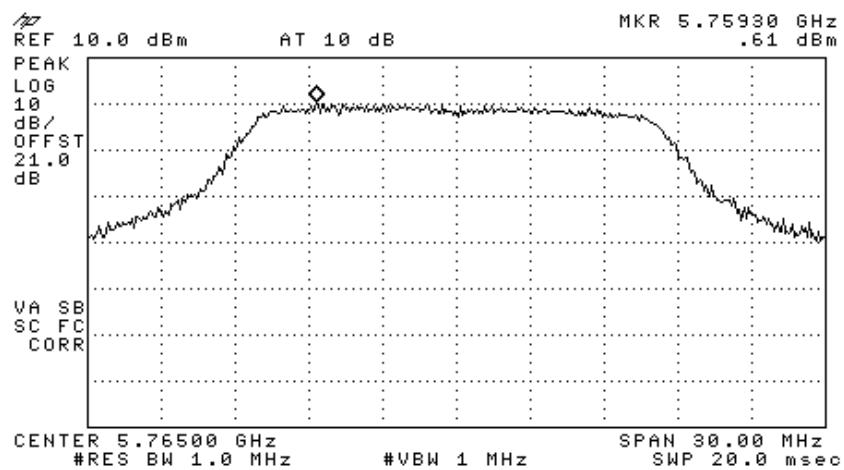


Figure 47 —5765 MHz 64QAM

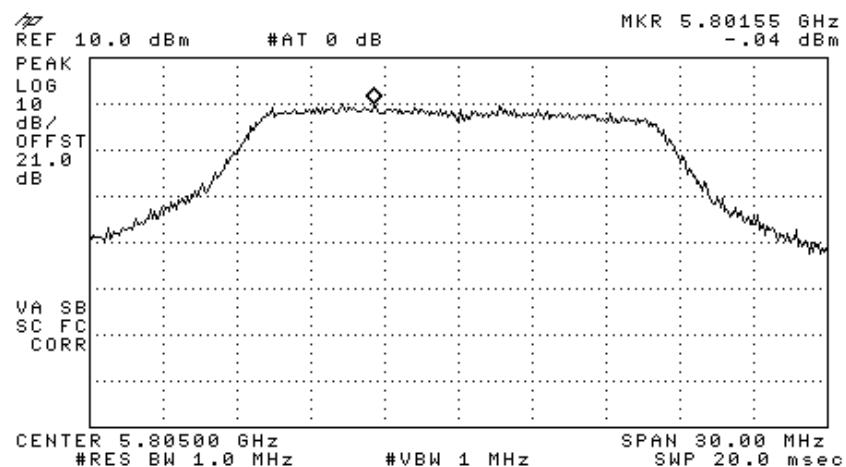


Figure 48 —5805 MHz 64QAM

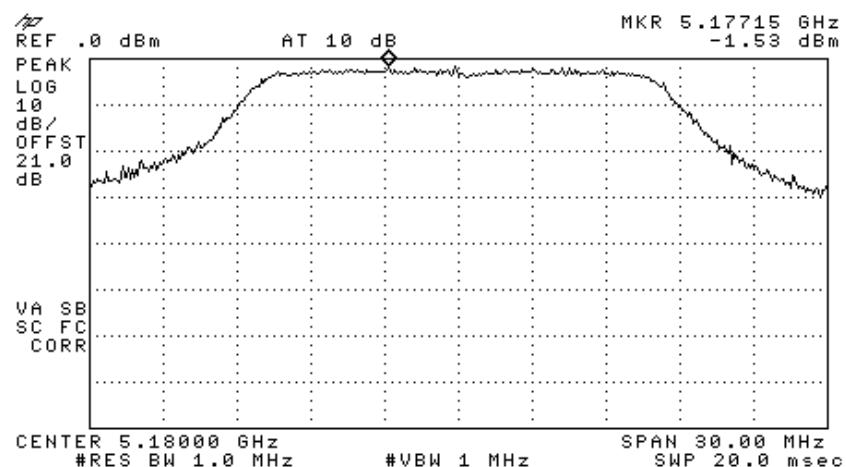


Figure 49 —5180 MHz BPSK

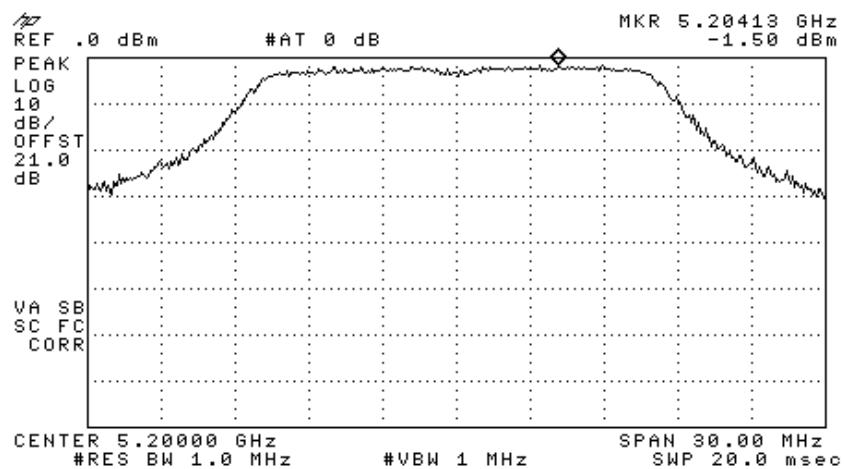


Figure 50 —5200 MHz BPSK

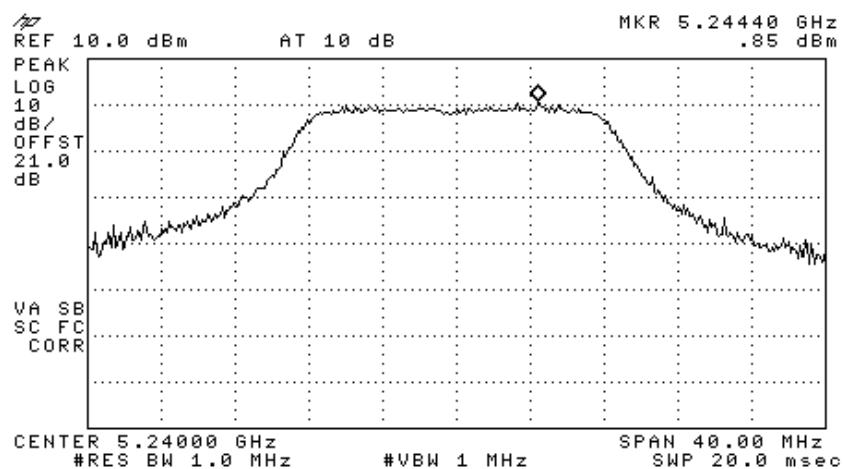


Figure 51 —5240 MHz BPSK

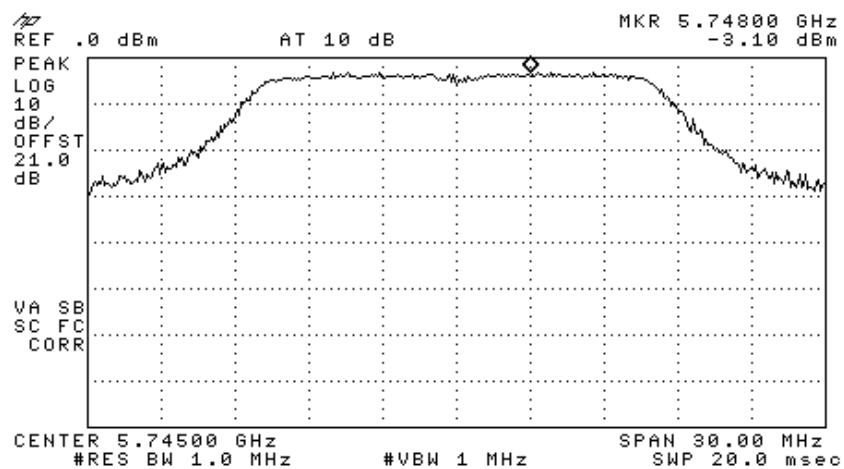


Figure 52 —5745 MHz BPSK

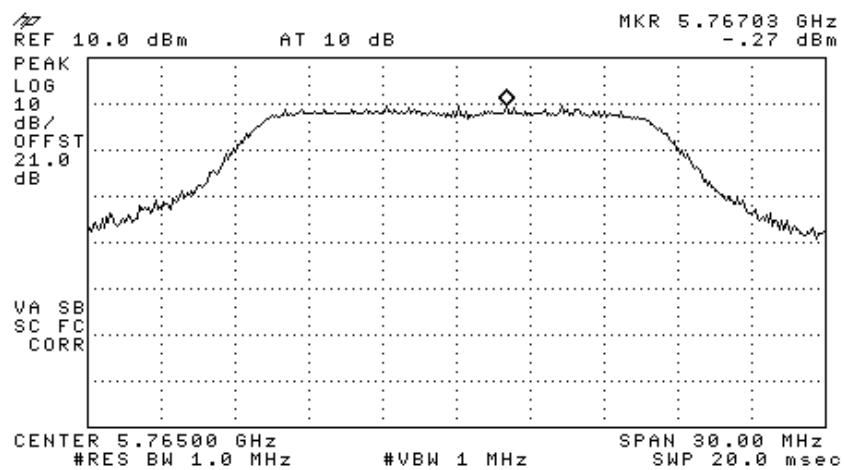


Figure 53 —5765 MHz BPSK

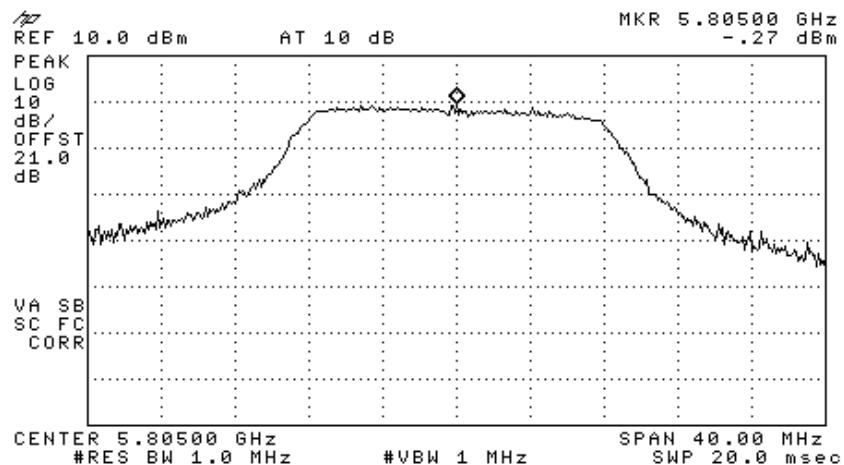


Figure 54 —5805 MHz BPSK

7.6 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Model No.: 860M With WCE
 Serial Number: 1. 860M: 73903D 2. WCE: 739038
 Specification: F.C.C. Part 15, Subpart E (15.407(a))

Operation Frequency (MHz)	Modulation	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	0.74	3	-2.26
	BPSK	1.53	3	-1.47
5200	64QAM	0.08	3	-2.92
	BPSK	1.5	3	-1.50
5240	64QAM	1.19	3	-1.81
	BPSK	0.85	3	-2.15
5745	64QAM	2.23	16	-13.77
	BPSK	3.1	16	-12.90
5765	64QAM	0.61	16	-15.39
	BPSK	0.27	16	-15.73
5805	64QAM	4.86	16	-11.14
	BPSK	0.27	16	-15.73

Figure 55 Test Results



JUDGEMENT: Passed by 1.47 dB

TEST PERSONNEL:

Tester Signature: Date: 21.02.08

Typed/Printed Name: E. Pitt

7.7 Test Equipment Used.

Peak Power Spectral Density

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

Figure 56 Test Equipment Used

8. Ratio of Peak Excursion of Modulation Envelope to Maximum Conducted Output Power 5GHz Transmitter 802.11b/g+802.11a Signals

[In accordance with section 15.407(a)(6)]

8.1 ***Test procedure***

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (Cable Loss = 1 dB). The spectrum analyzer was set to 1 MHz resolution BW. and 1 MHz video BW.

Trace A: Sample Detector

Trace B: Peak Detector

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

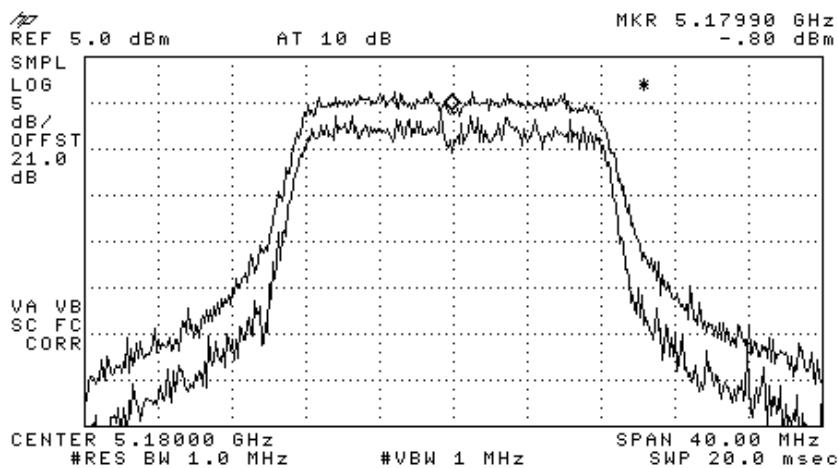


Figure 57 —5180 MHz 64QAM

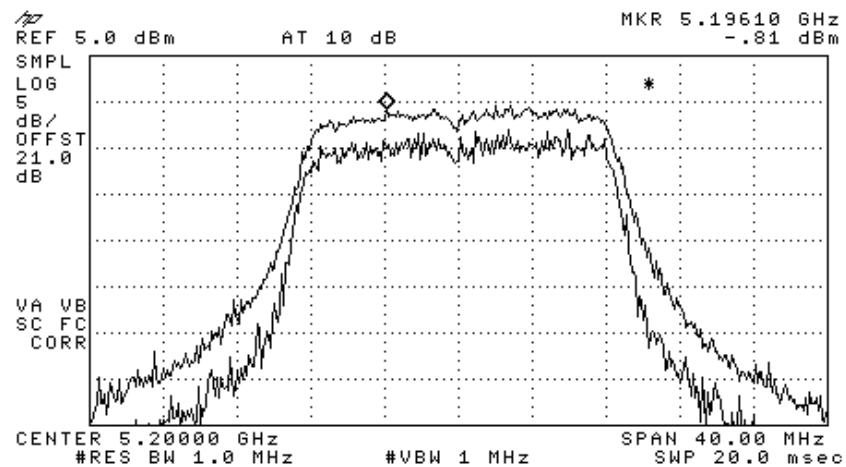


Figure 58 —5200 MHz 64QAM

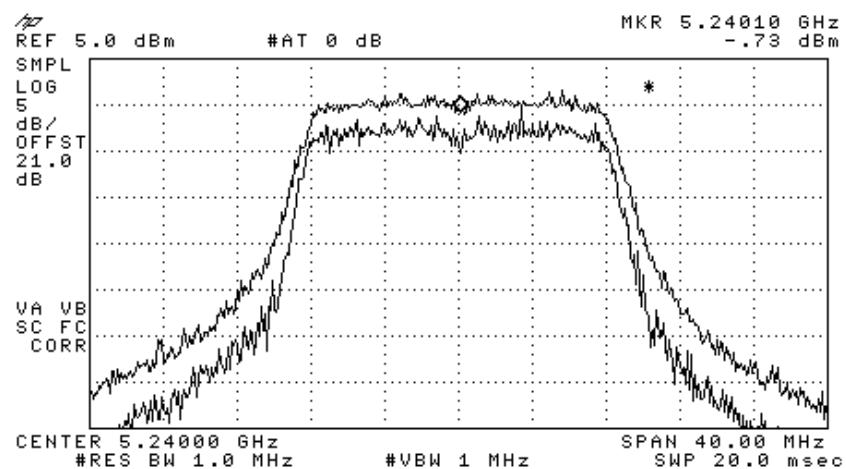


Figure 59 —5240 MHz 64QAM

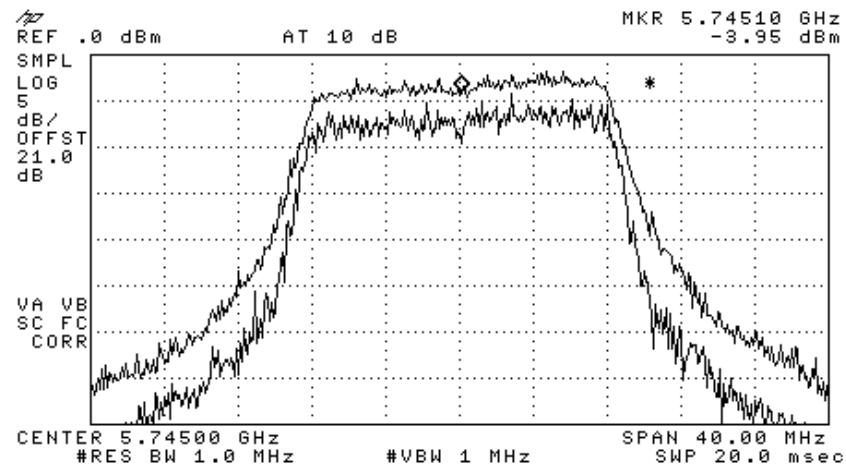


Figure 60 — 5745 MHz 64QAM

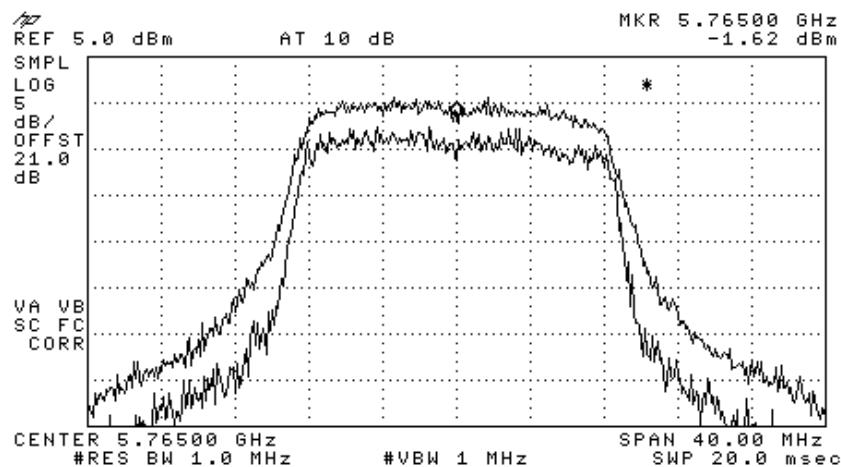


Figure 61 — 5765 MHz 64QAM

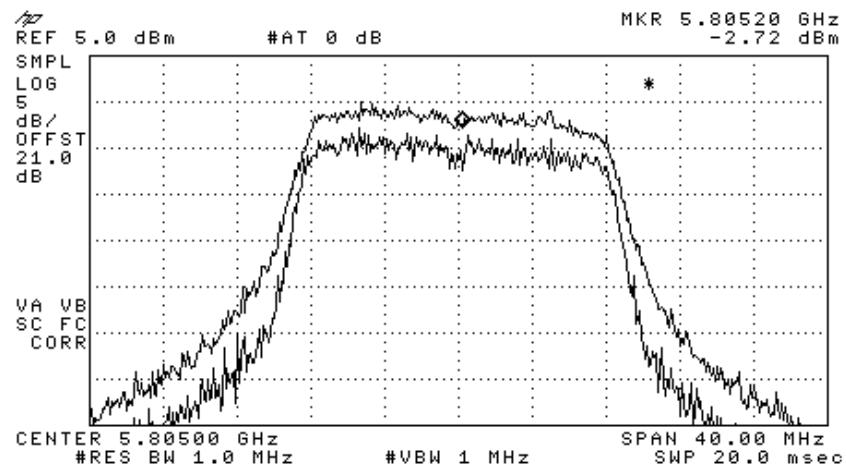


Figure 62 —5805 MHz 64QAM

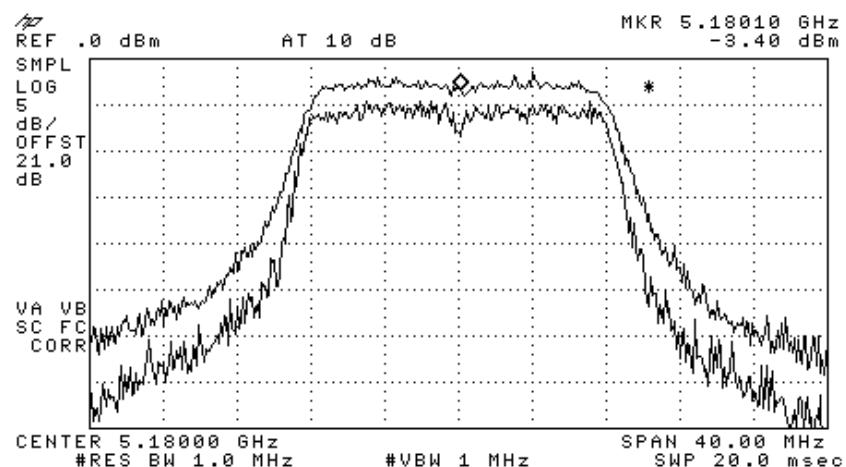


Figure 63 —5180 MHz BPSK

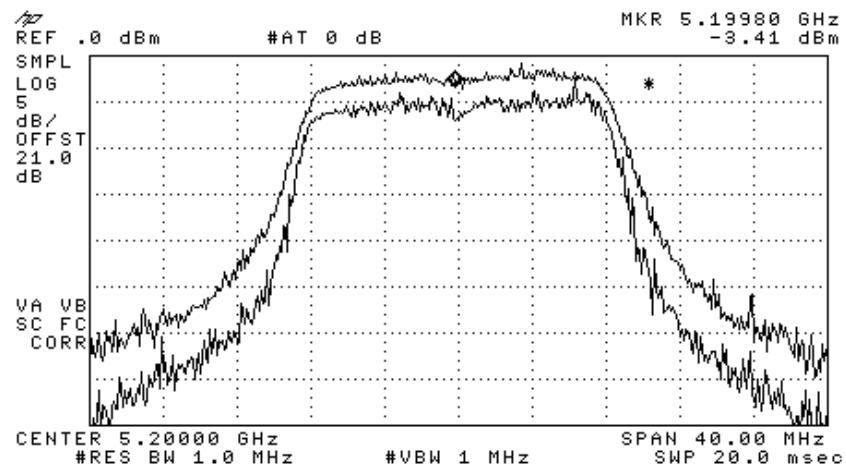


Figure 64 —5200 MHz BPSK

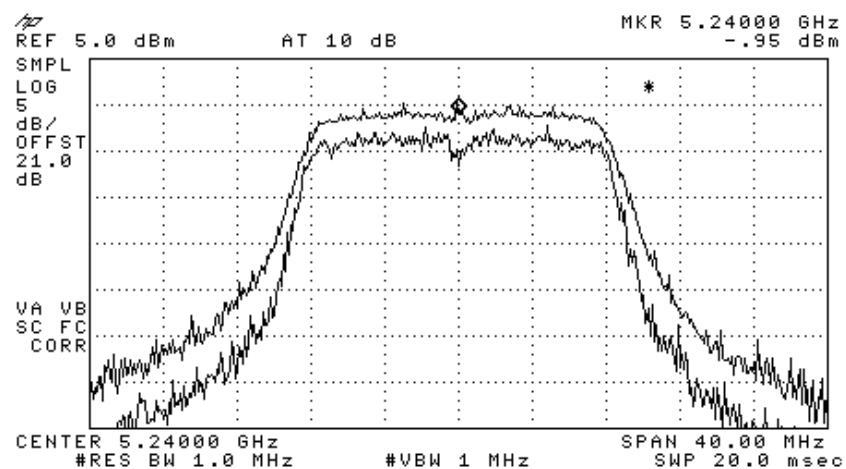


Figure 65 —5240 MHz BPSK

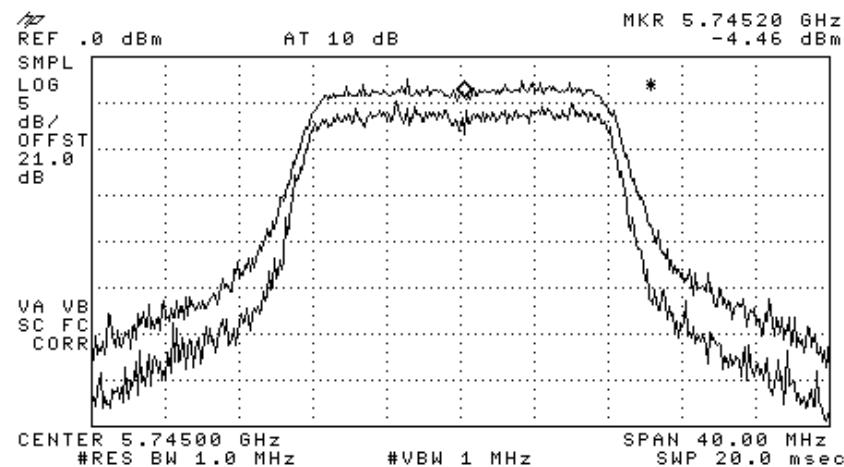


Figure 66 —5745 MHz BPSK

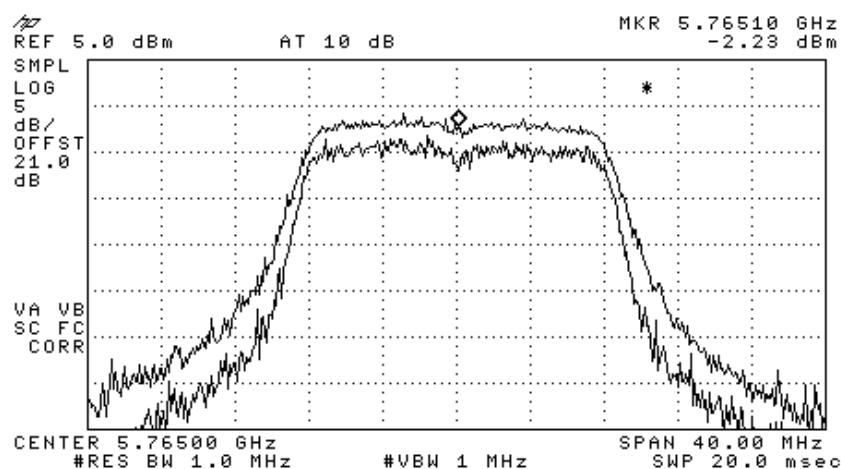


Figure 67 —5765 MHz BPSK

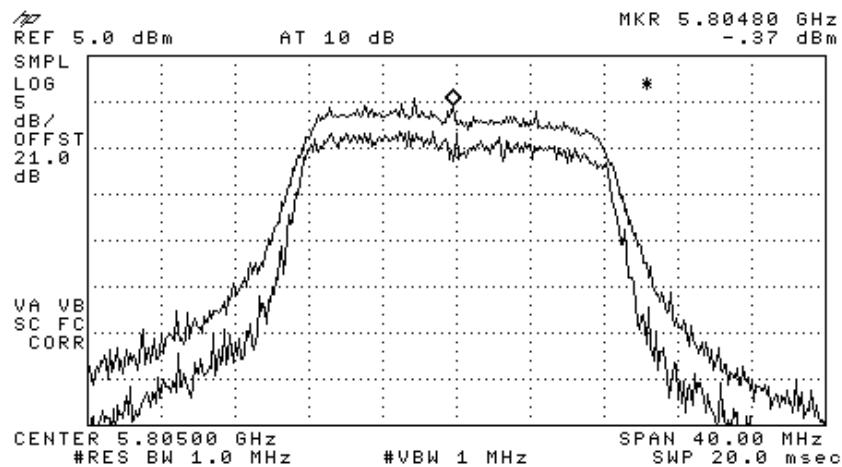


Figure 68 —5805 MHz BPSK

8.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Model No.: 860M With WCE
 Serial Number: 1. 860M: 73903D 2. WCE: 739038
 Specification: F.C.C. Part 15, Subpart E (15.407(a)(6))

Operation Frequency (MHz)	Modulation	Delta (dB)	Specification (dB)	Margin (dB)
5180	64QAM	4.6	13	-8.4
	BPSK	4.9	13	-8.1
5200	64QAM	4.1	13	-8.9
	BPSK	3.9	13	-9.1
5240	64QAM	4.6	13	-8.4
	BPSK	5.8	13	-7.2
5745	64QAM	5.5	13	-7.5
	BPSK	4.0	13	-9.0
5765	64QAM	4.6	13	-8.4
	BPSK	4.7	13	-8.3
5805	64QAM	4.6	13	-8.4
	BPSK	5.9	13	-7.1

Figure 69 Test Results



JUDGEMENT: Passed by 7.1 dB

TEST PERSONNEL:

Tester Signature: *Pitt* Date: 21.02.08
Typed/Printed Name: E. Pitt

8.3 Test Equipment Used.

Peak Power Spectral Density

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

Figure 70 Test Equipment Used

9. Peak Power Output Out of 5150-5250; 5725-5825 MHz Bands 5 GHz Transmitter 802.11b/g+802.11a Signals

9.1 ***Test procedure***

The E.U.T. antenna terminal was connected to the spectrum analyzer through an appropriate coaxial cable. The spectrum analyzer was set to 1 MHz resolution BW except for the frequency range 9 kHz-150 kHz where the RBW was set to 1kHz and the frequency range 150 kHz-10.0 MHz where the RBW was set to 10kHz. The frequency range from 9 kHz to 40 GHz was scanned. Level of spectrum components out of the 5150-5250; 5725-5825 MHz bands was measured at the selected operation frequencies.

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

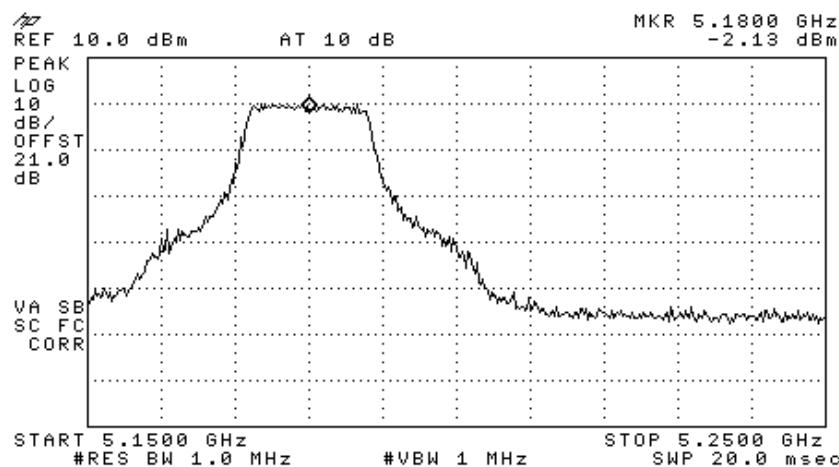


Figure 71 —5180 MHz 64QAM

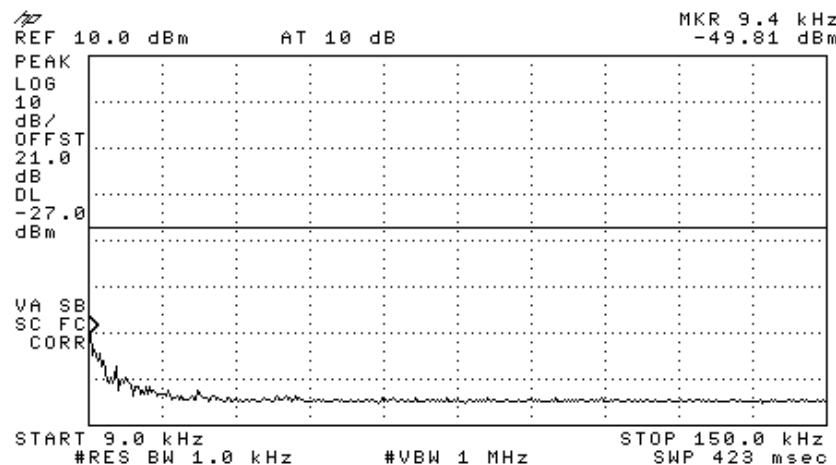


Figure 72 —5180 MHz 64QAM

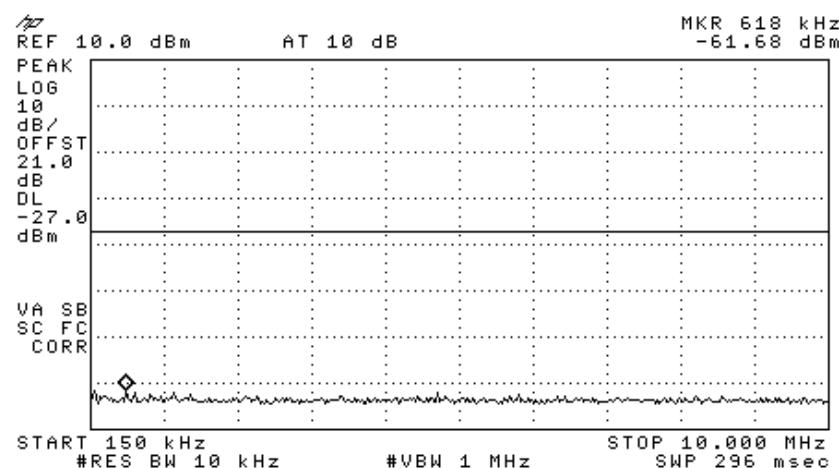


Figure 73 —5180 MHz 64QAM

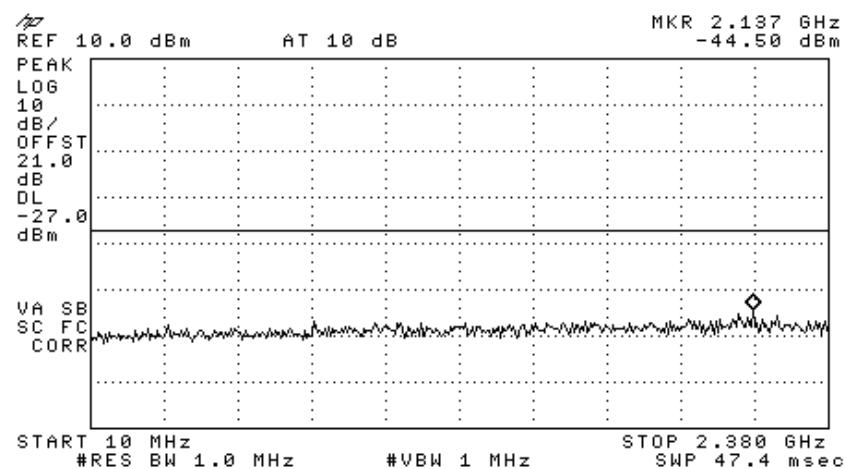


Figure 74 —5180 MHz 64QAM

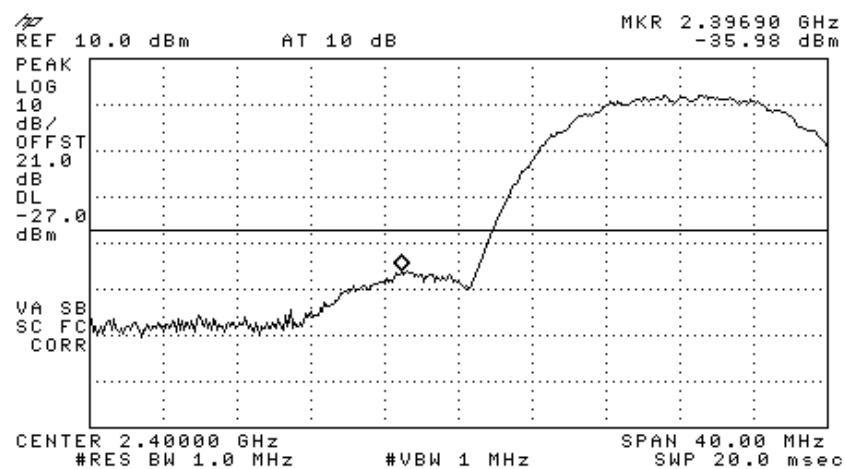


Figure 75 —5180 MHz 64QAM

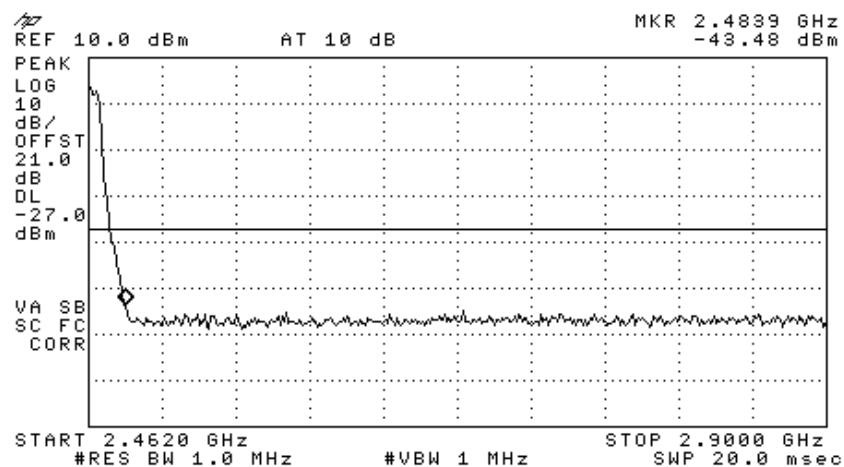


Figure 76 —5180 MHz 64QAM

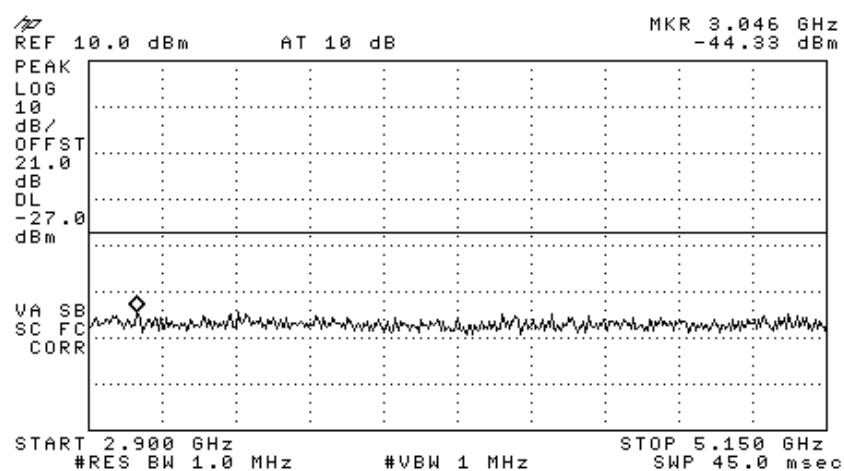


Figure 77 —5180 MHz 64QAM

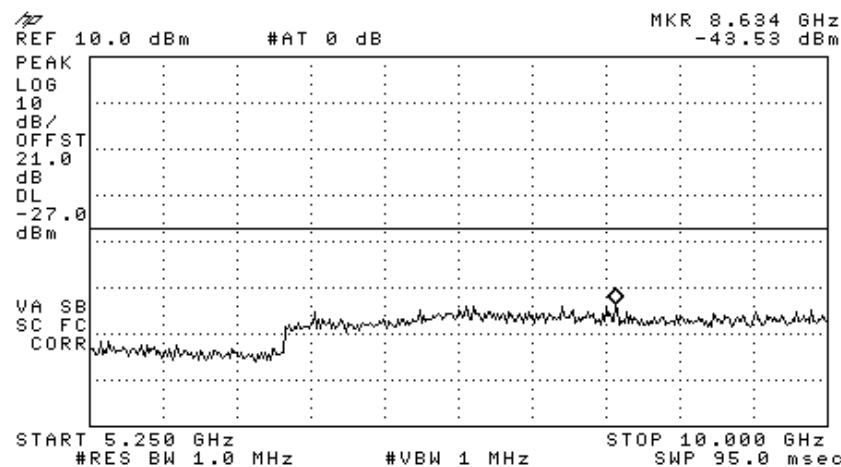


Figure 78 —5180 MHz 64QAM

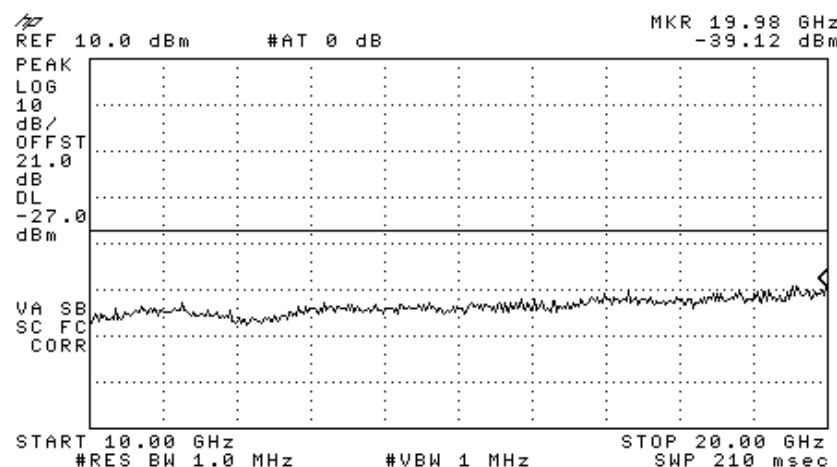


Figure 79 —5180 MHz 64QAM

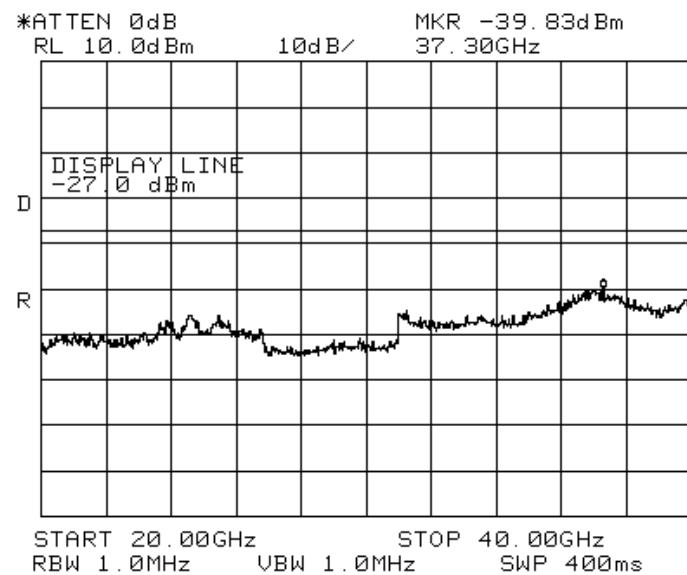


Figure 80 — 5180 MHz 64QAM

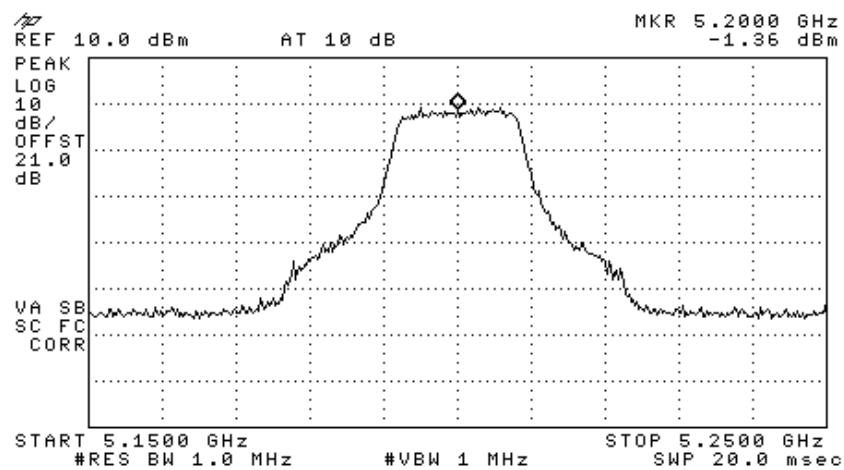


Figure 81 — 5200 MHz 64QAM

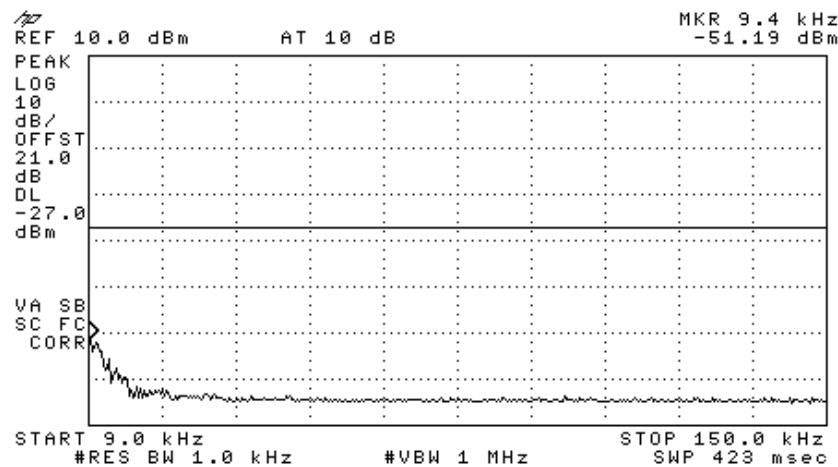


Figure 82 —5200 MHz 64QAM

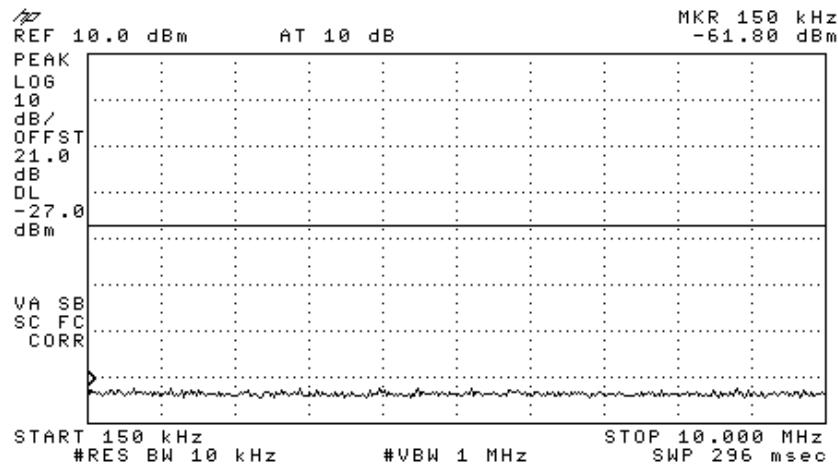


Figure 83 —5200 MHz 64QAM

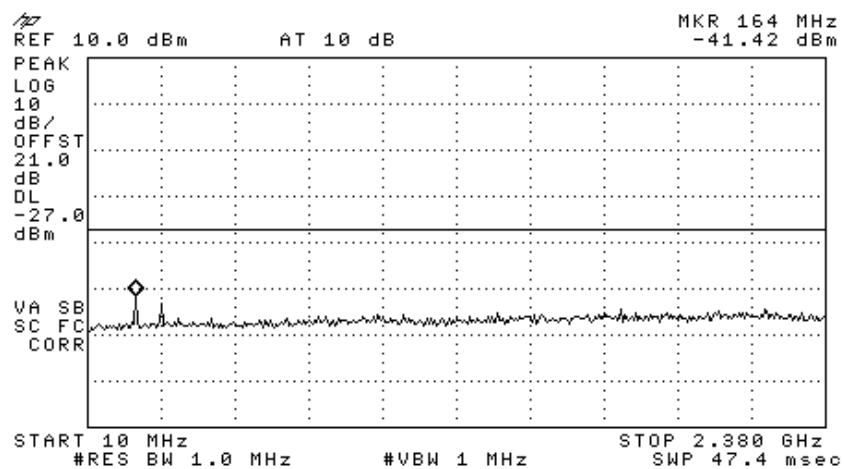


Figure 84 —5200 MHz 64QAM

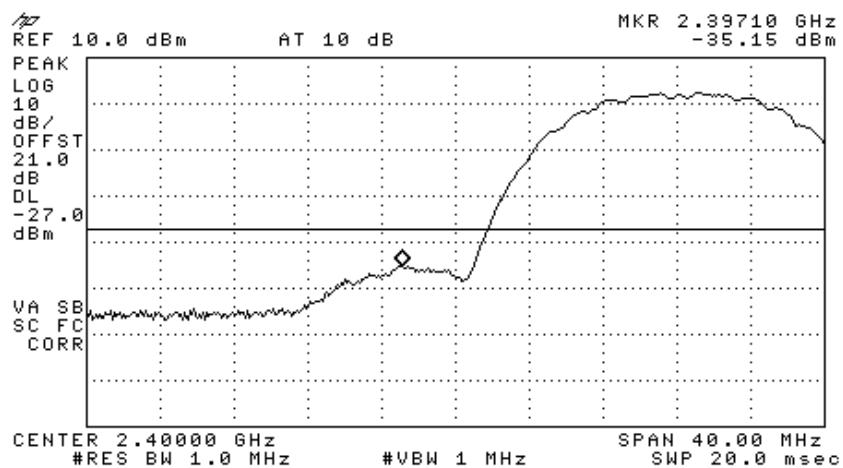


Figure 85 —5200 MHz 64QAM

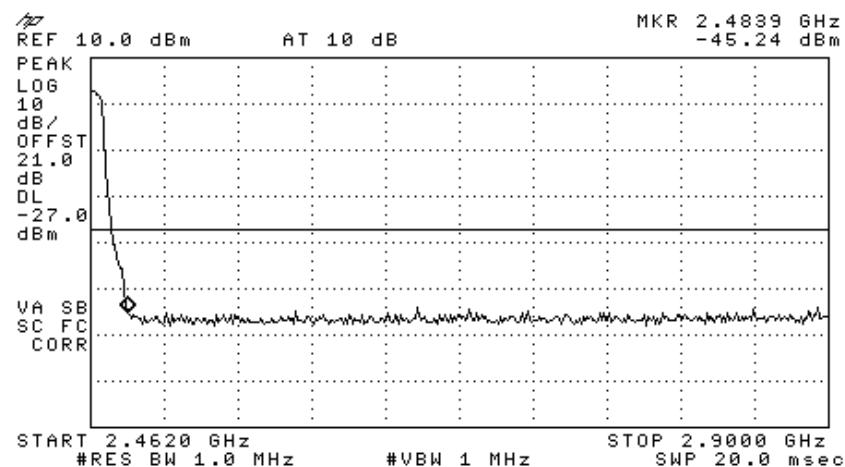


Figure 86 —5200 MHz 64QAM

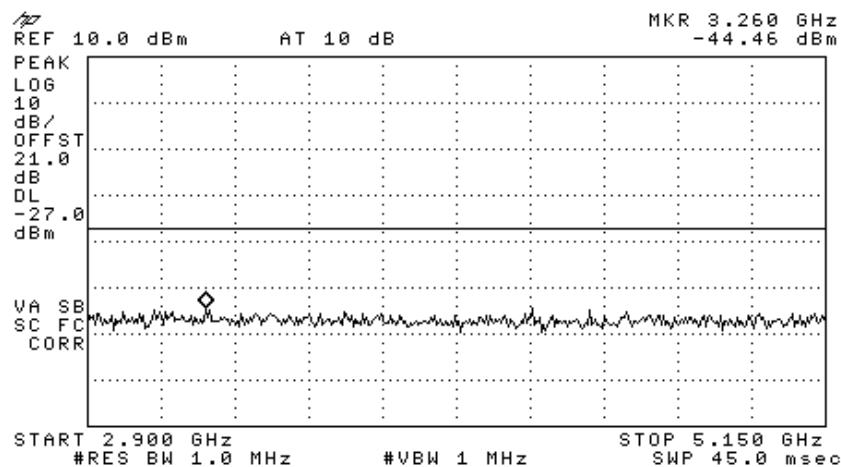


Figure 87 —5200 MHz 64QAM

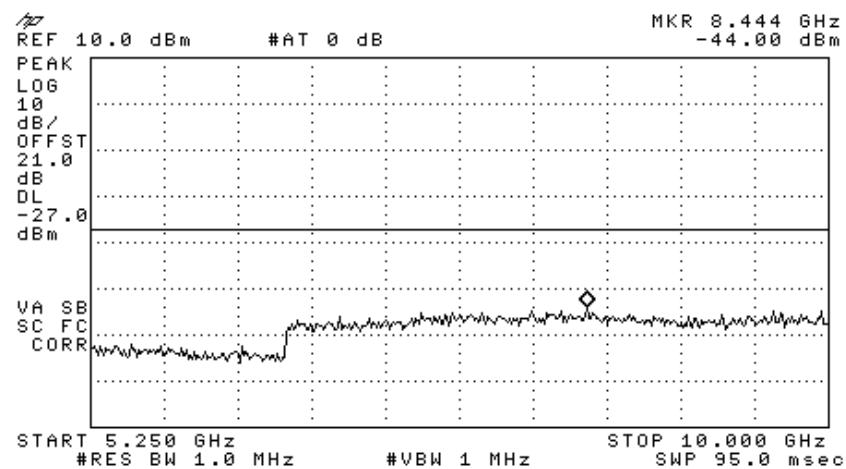


Figure 88 —5200 MHz 64QAM

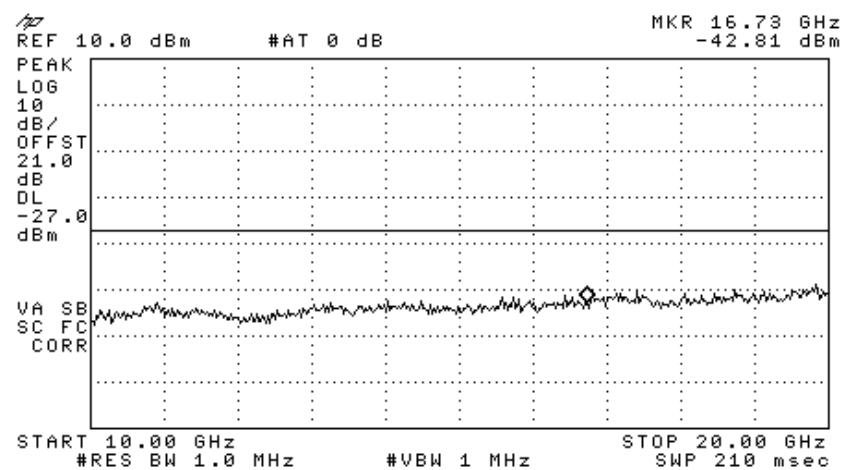


Figure 89 —5200 MHz 64QAM

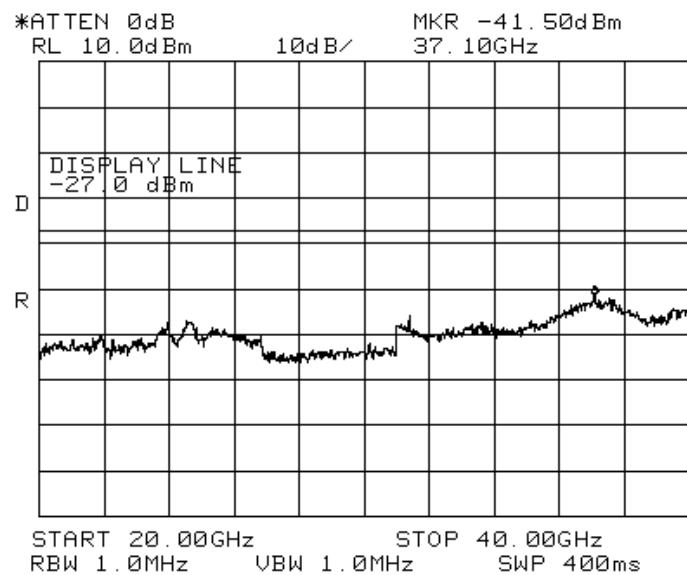


Figure 90 — 5200 MHz 64QAM

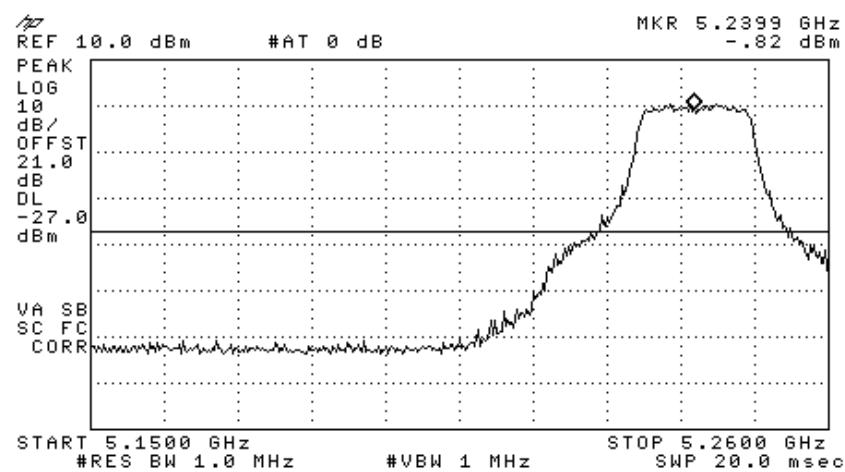


Figure 91 — 5240 MHz 64QAM

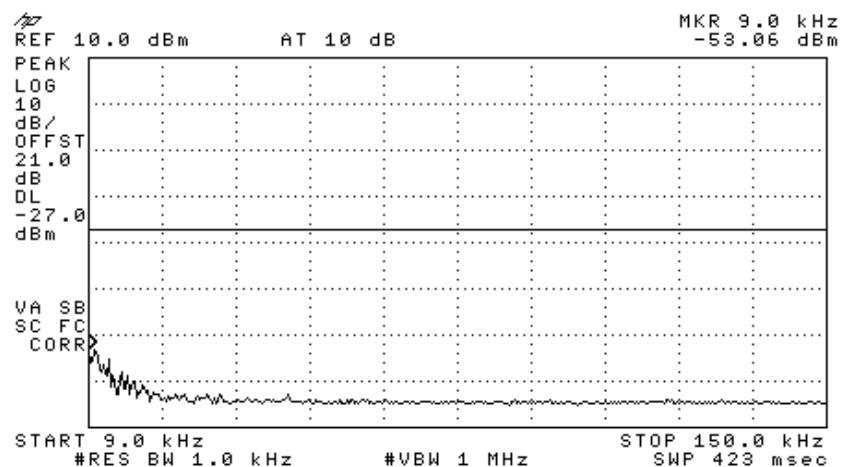


Figure 92 —5240 MHz 64QAM

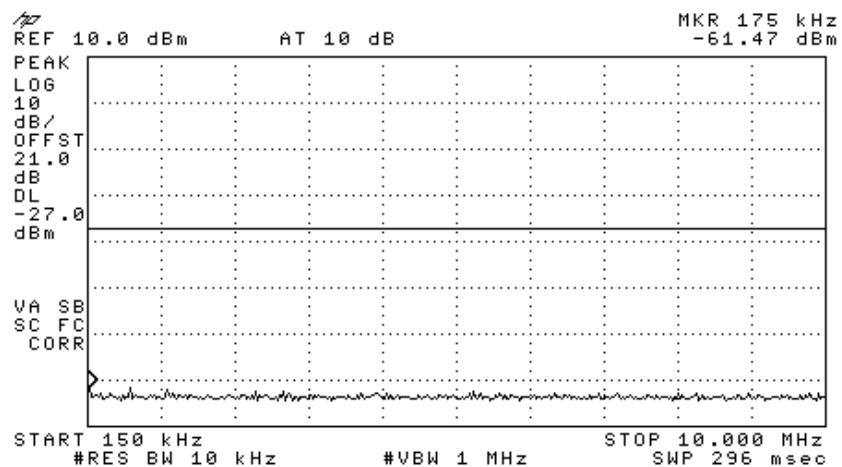


Figure 93 —5240 MHz 64QAM

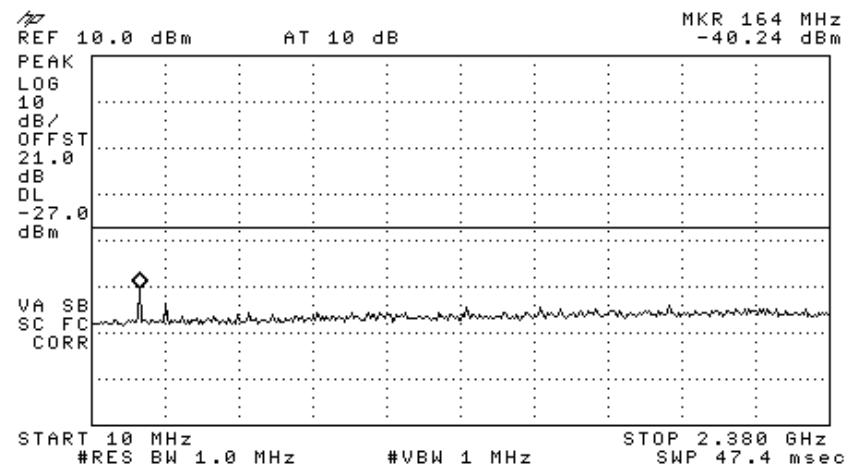


Figure 94 —5240 MHz 64QAM

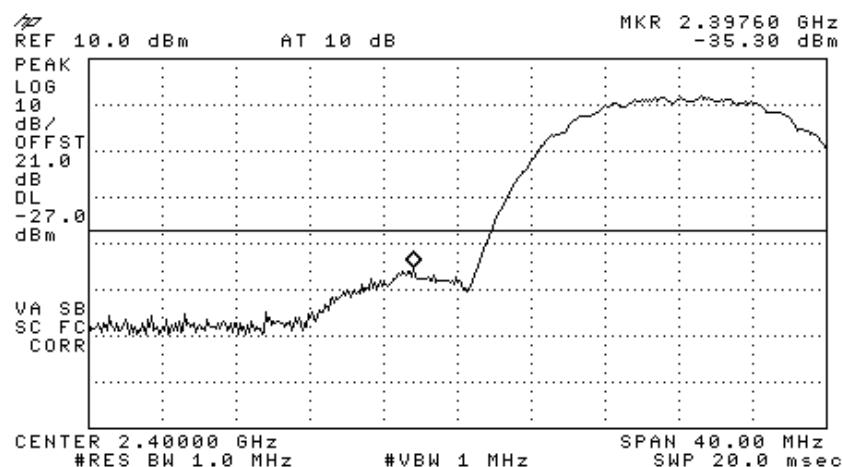


Figure 95 —5240 MHz 64QAM

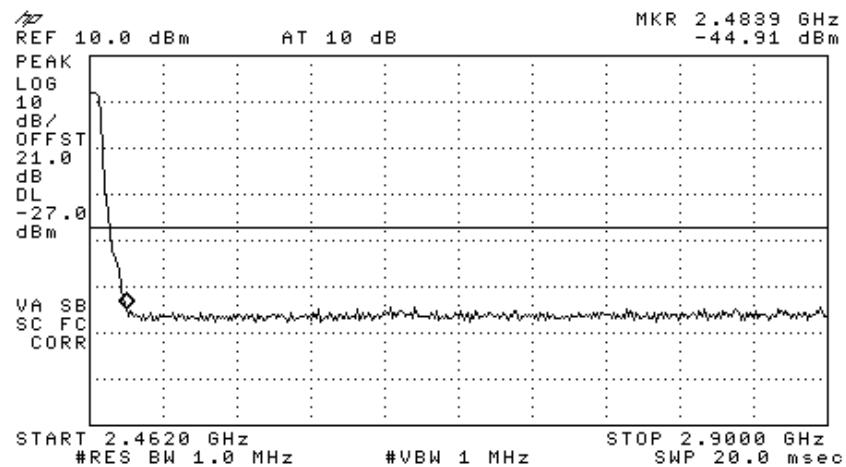


Figure 96 —5240 MHz 64QAM

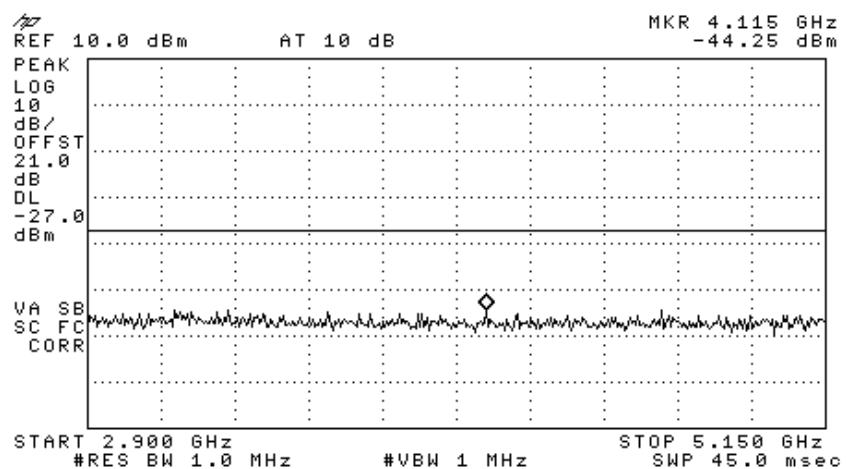


Figure 97 —5240 MHz 64QAM

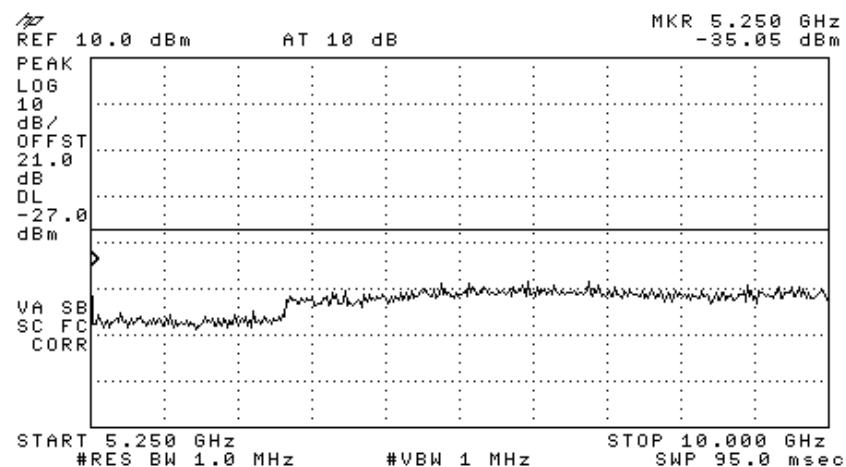


Figure 98 —5240 MHz 64QAM

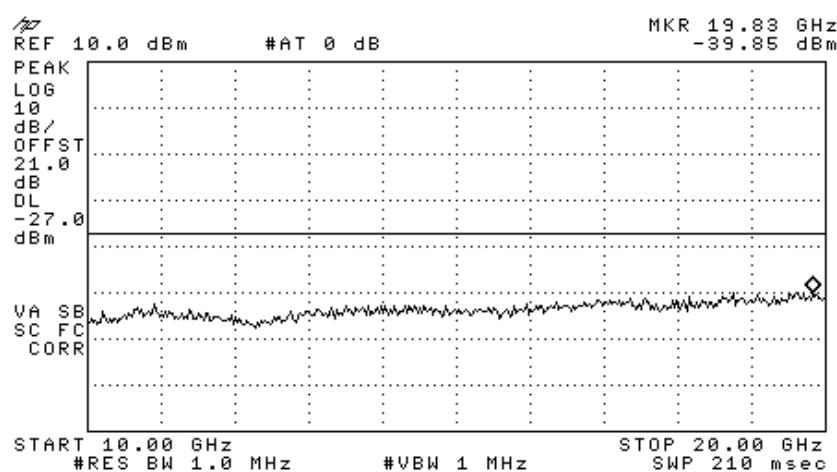


Figure 99 —5240 MHz 64QAM

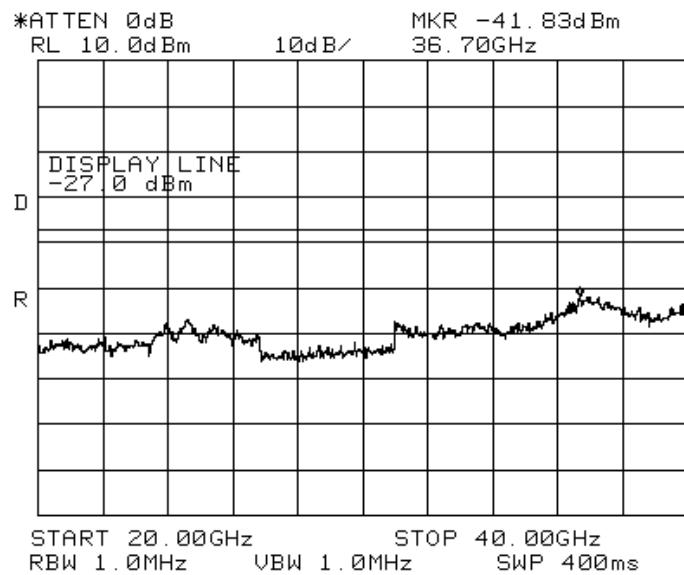


Figure 100 —5240 MHz 64QAM

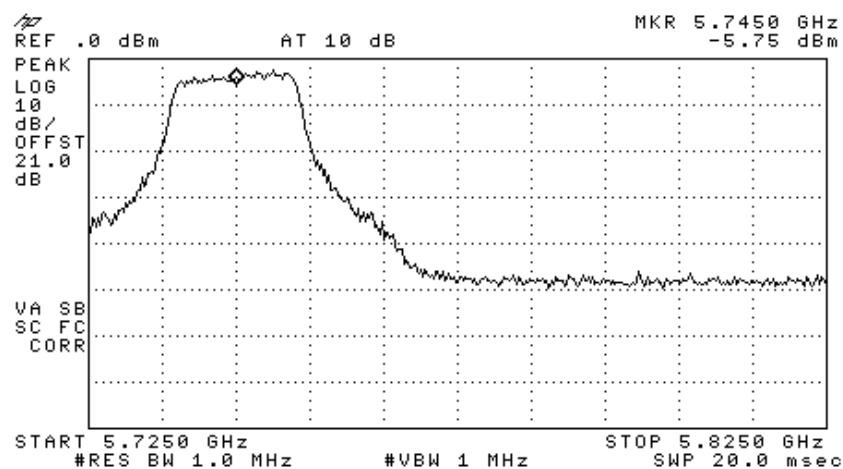


Figure 101 —5745 MHz 64QAM

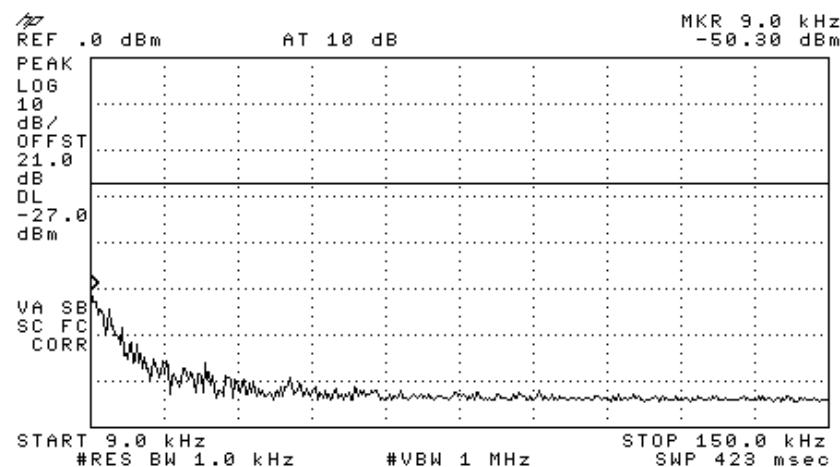


Figure 102 —5745 MHz 64QAM

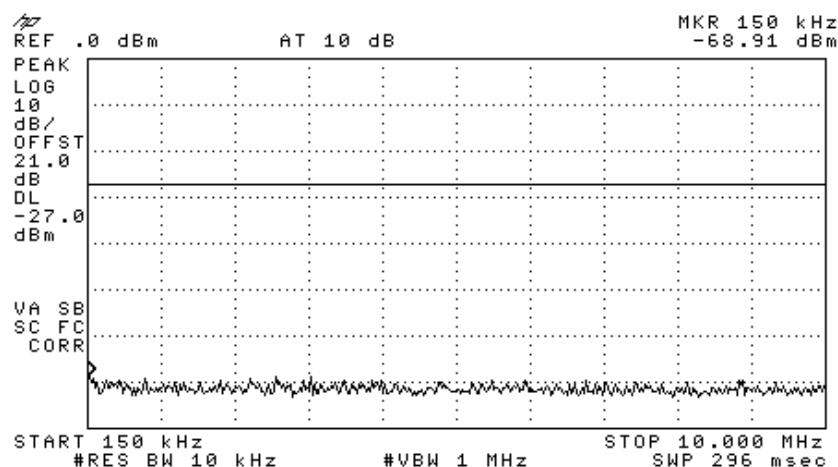


Figure 103 —5745 MHz 64QAM

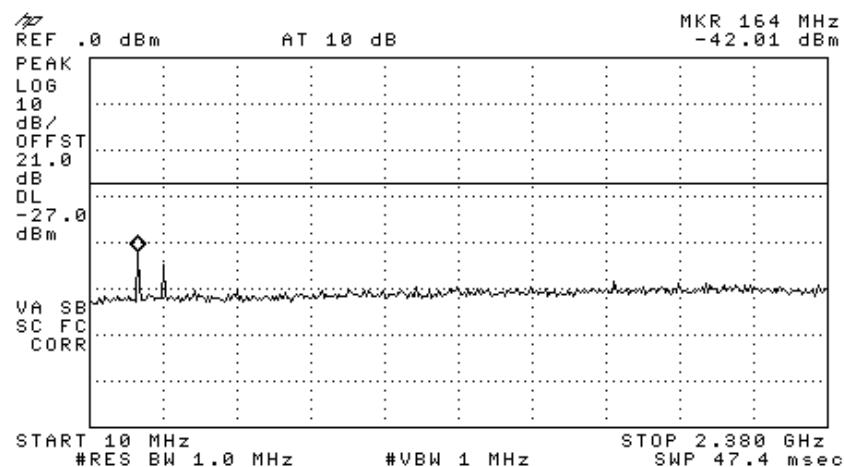


Figure 104 — 5745 MHz 64QAM

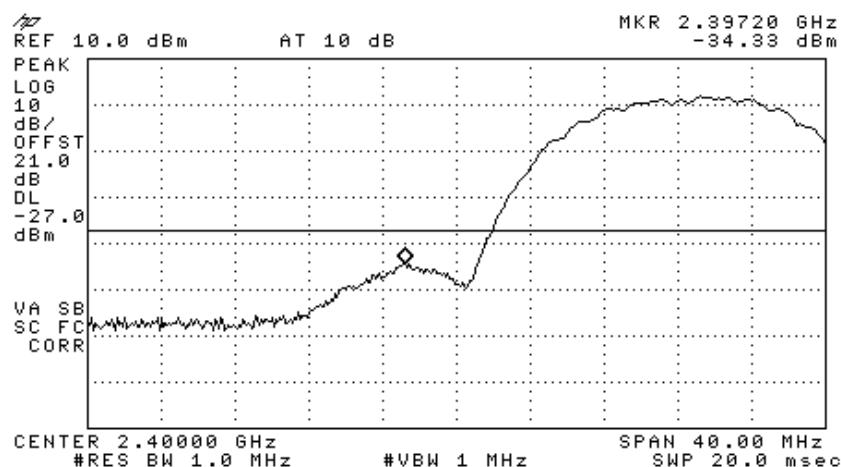


Figure 105 — 5745 MHz 64QAM

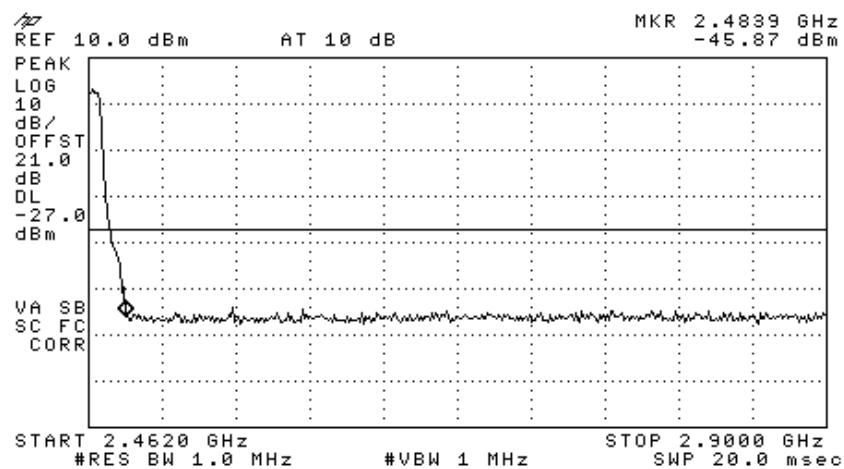


Figure 106 —5745 MHz 64QAM

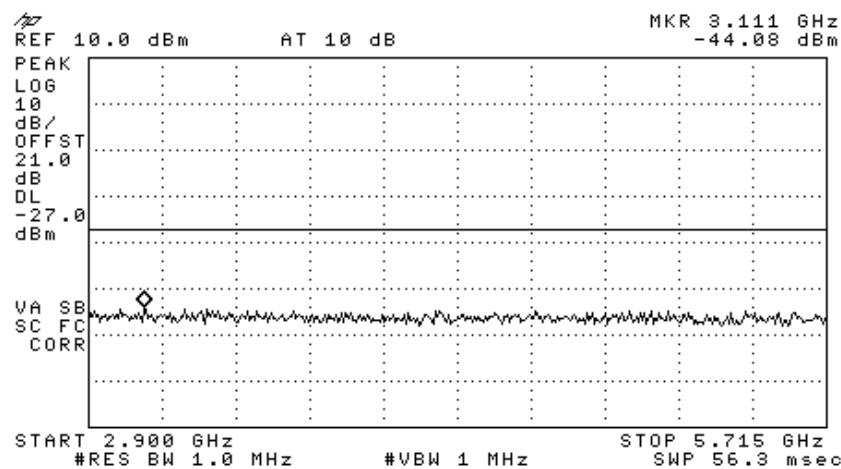


Figure 107 —5745 MHz 64QAM

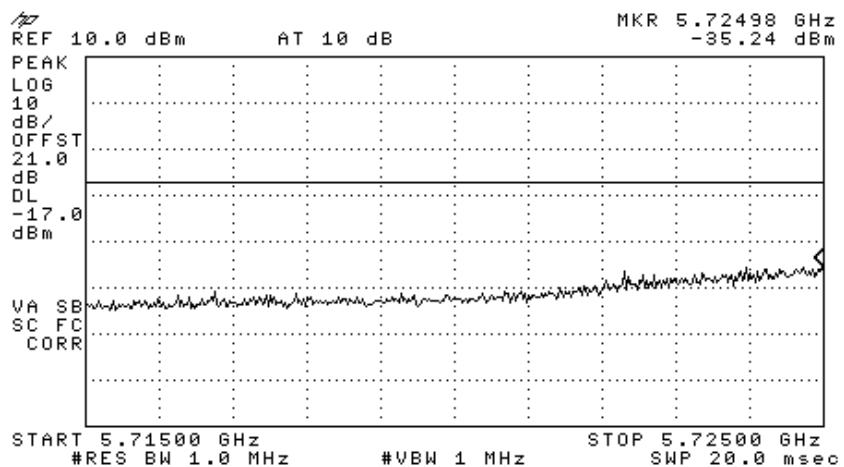


Figure 108 — 5745 MHz 64QAM

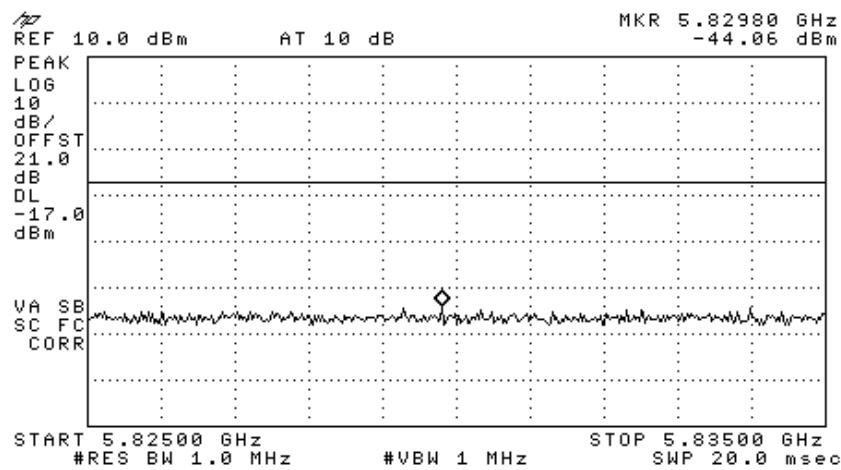


Figure 109 — 5745 MHz 64QAM

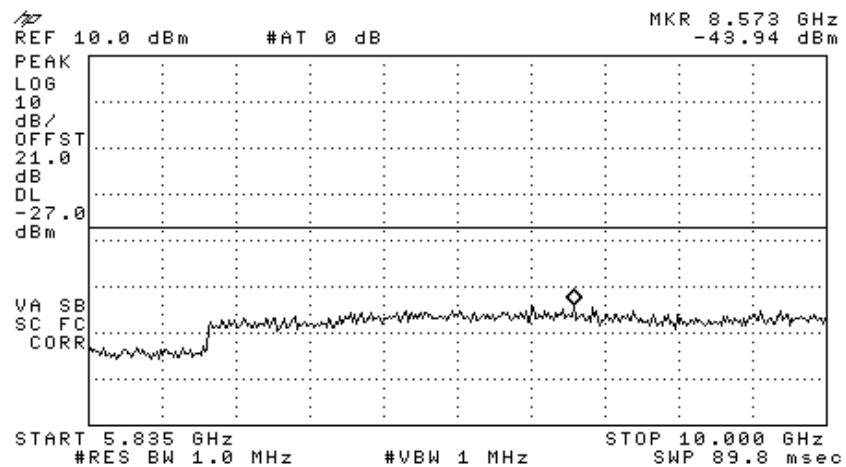


Figure 110 — 5745 MHz 64QAM

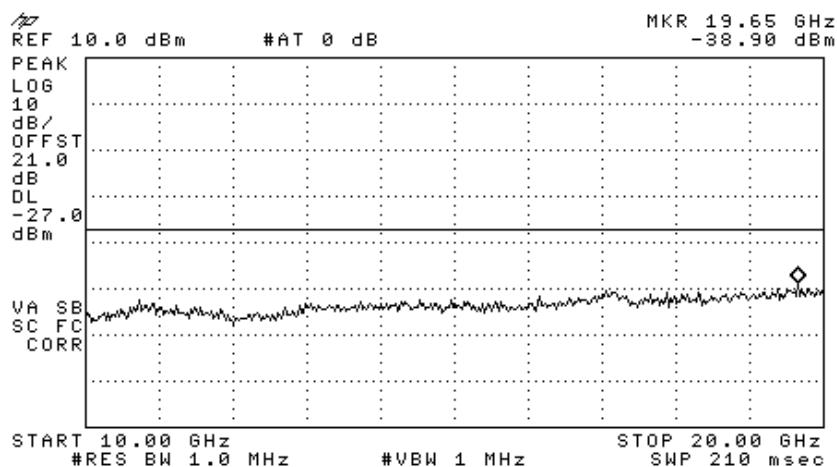


Figure 111 — 5745 MHz 64QAM

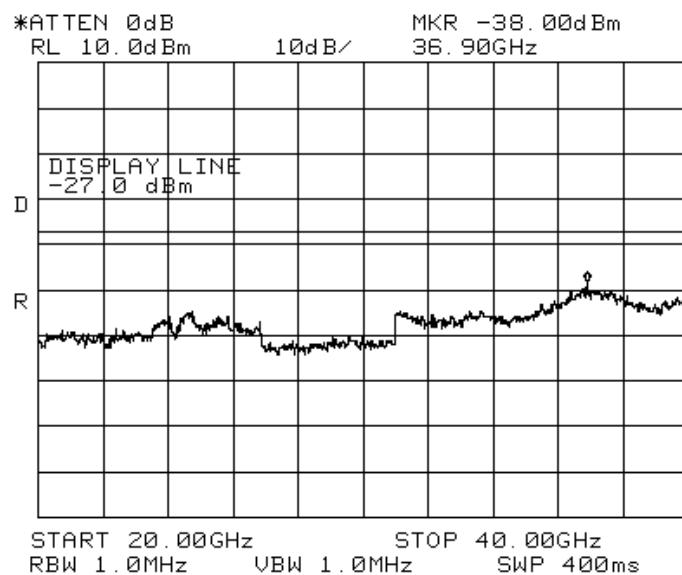


Figure 112 —5745 MHz 64QAM

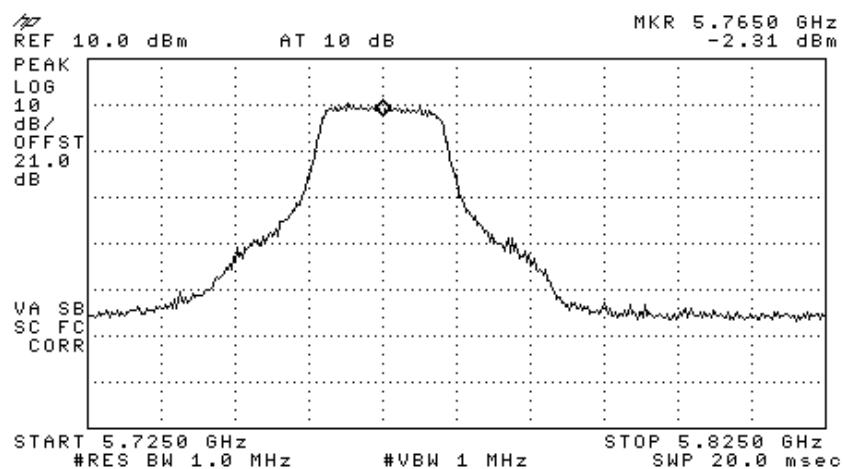


Figure 113 —5765 MHz 64QAM

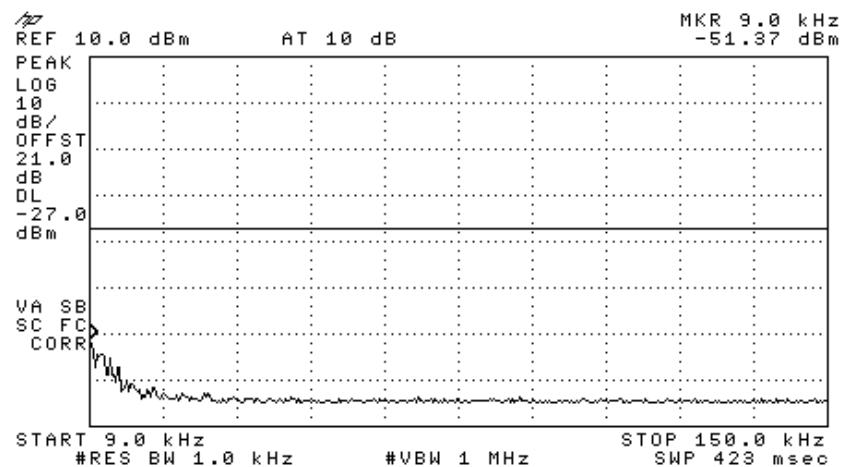


Figure 114 — 5765 MHz 64QAM

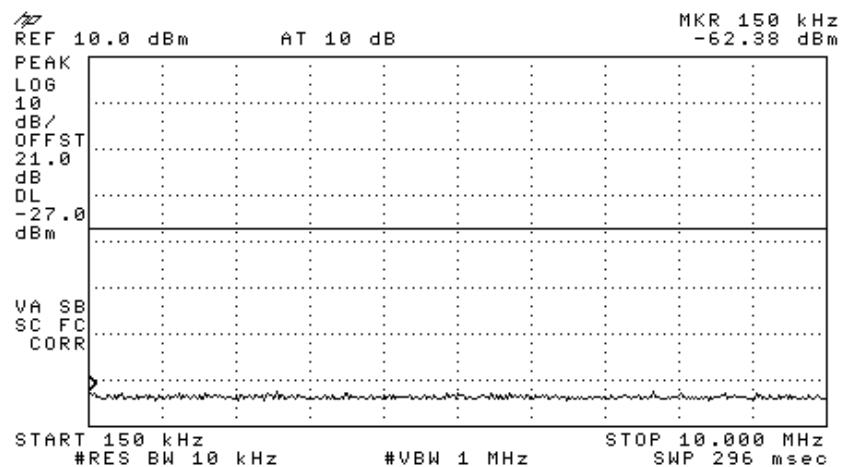


Figure 115 — 5765 MHz 64QAM

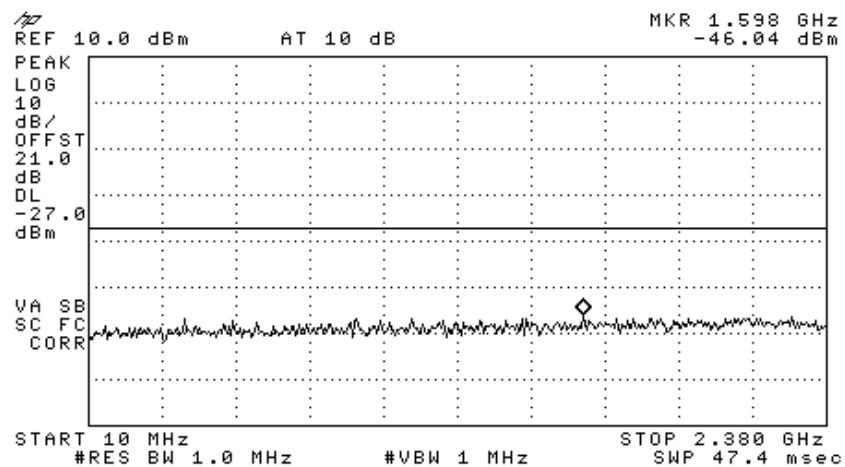


Figure 116 — 5765 MHz 64QAM

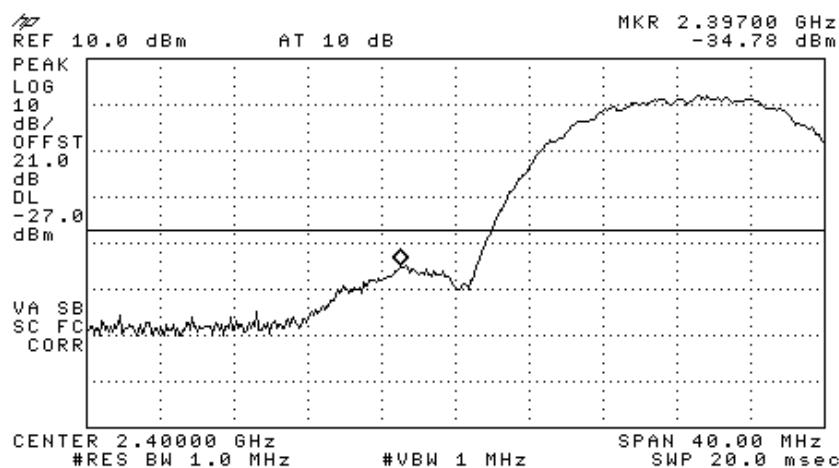


Figure 117 — 5765 MHz 64QAM

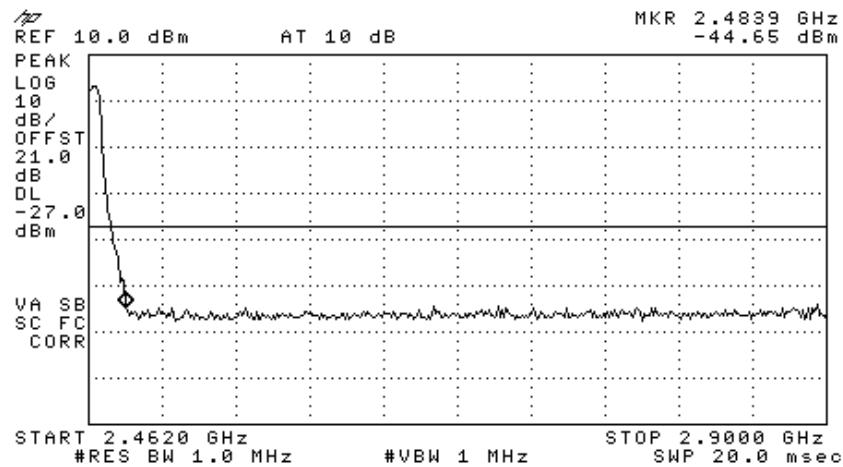


Figure 118 — 5765 MHz 64QAM

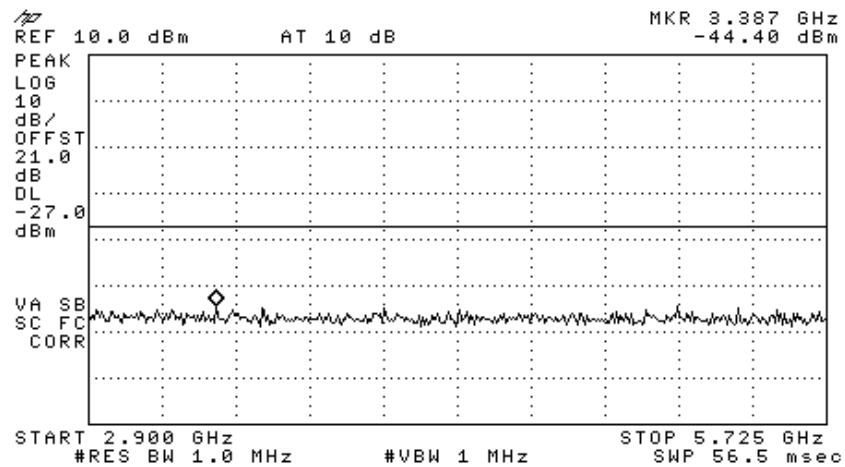


Figure 119 — 5765 MHz 64QAM

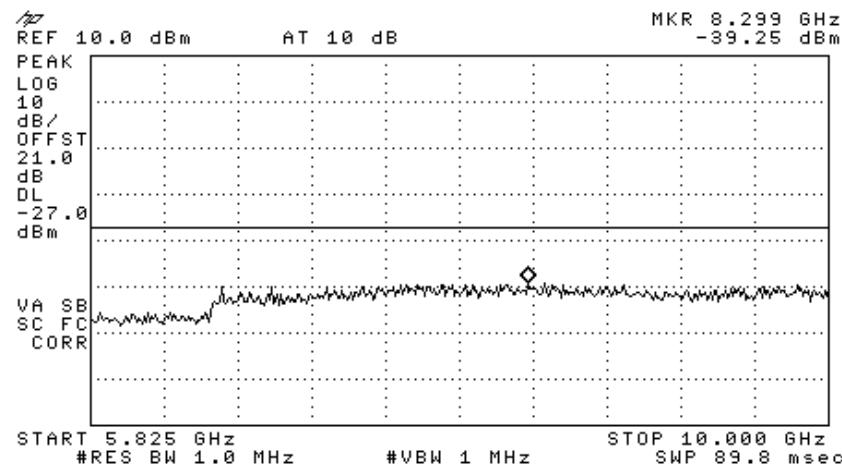


Figure 120 — 5765 MHz 64QAM

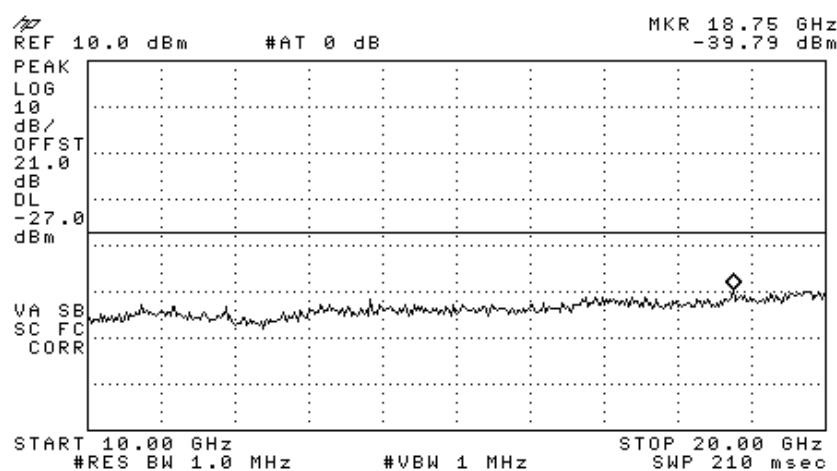


Figure 121 — 5765 MHz 64QAM

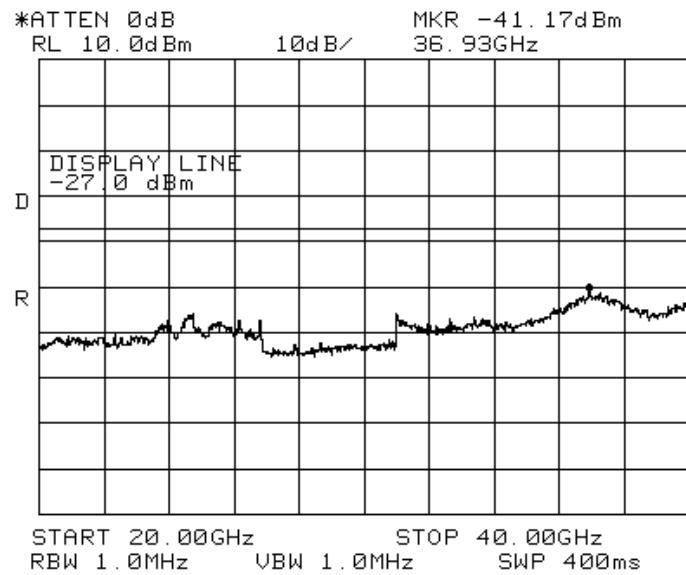


Figure 122 —5765 MHz 64QAM

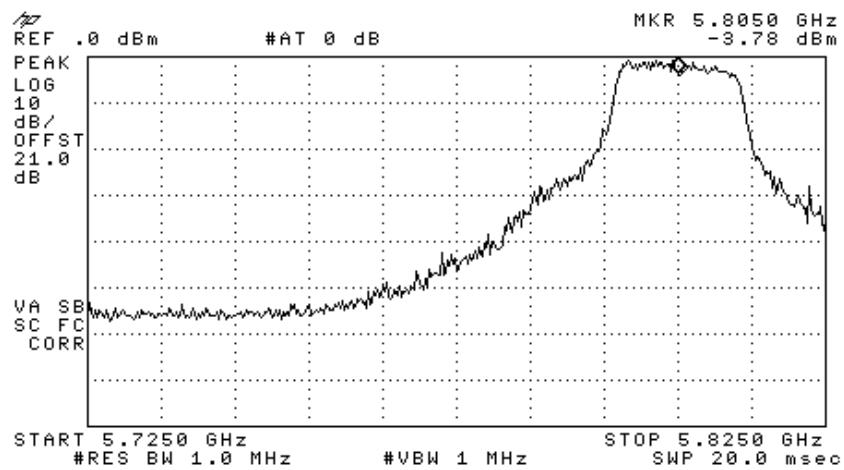


Figure 123 —5805 MHz 64QAM

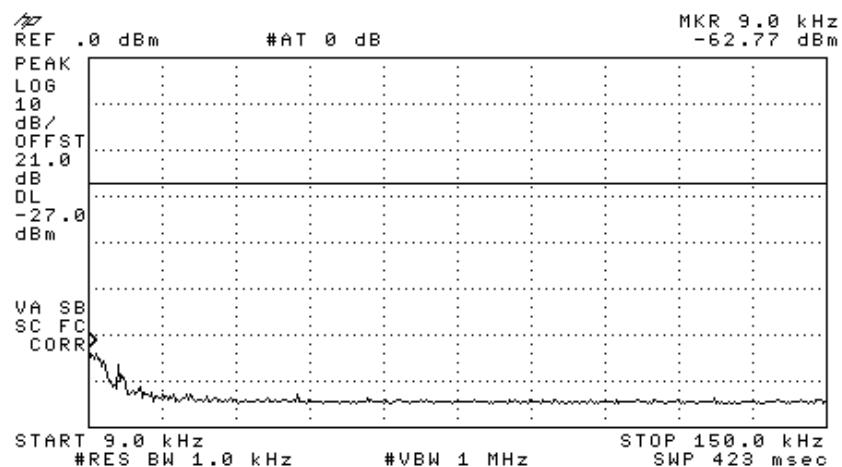


Figure 124 — 5805 MHz 64QAM

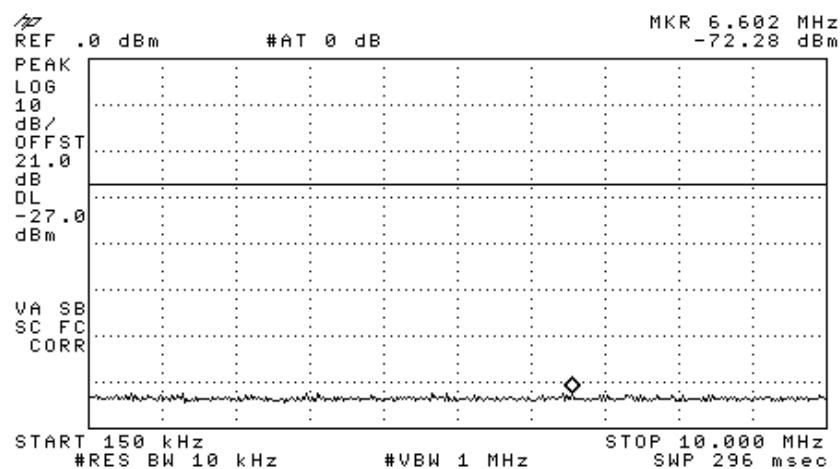


Figure 125 — 5805 MHz 64QAM

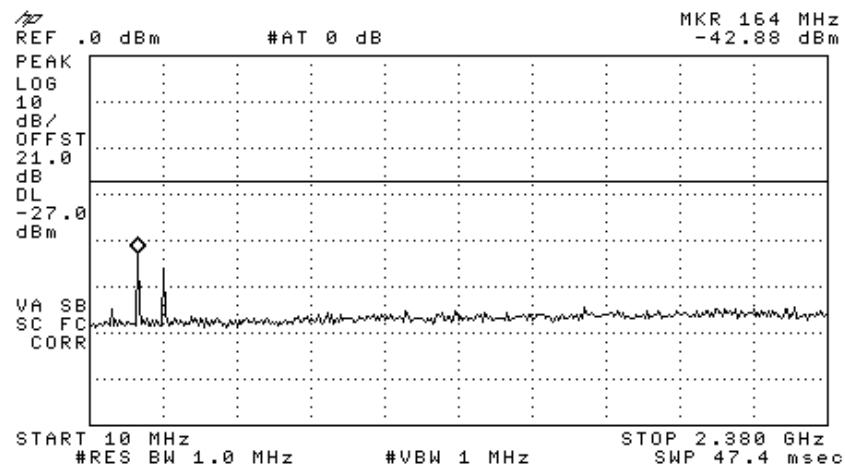


Figure 126 — 5765 MHz 64QAM

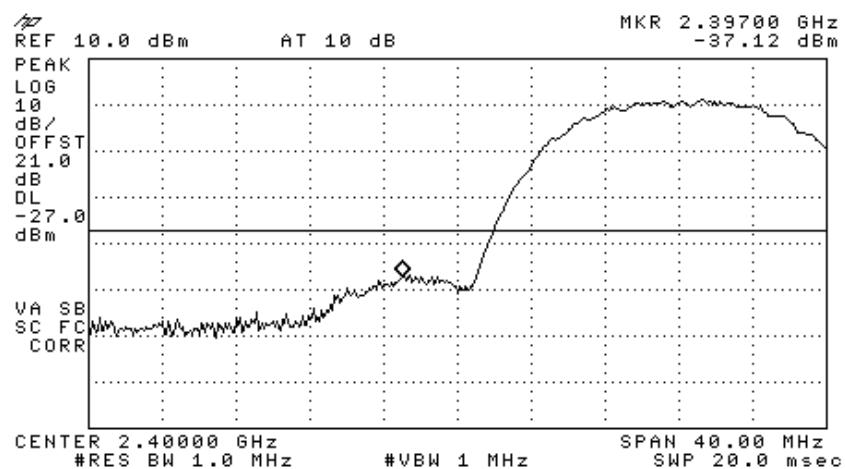


Figure 127 — 5805 MHz 64QAM

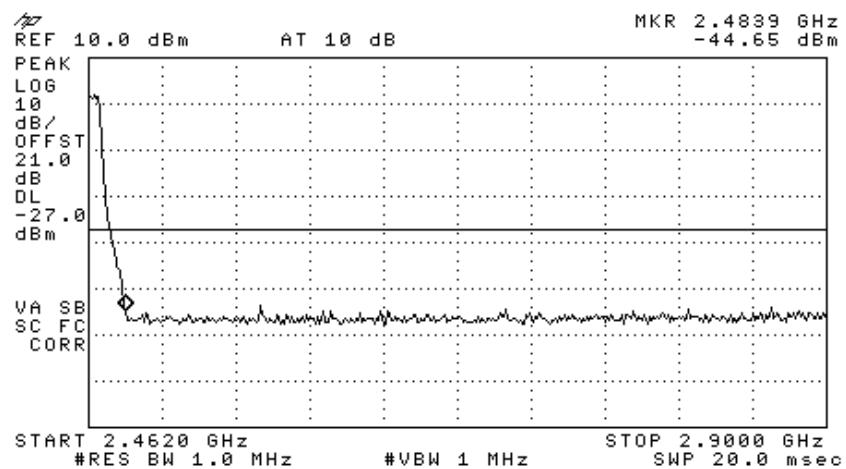


Figure 128 — 5805 MHz 64QAM

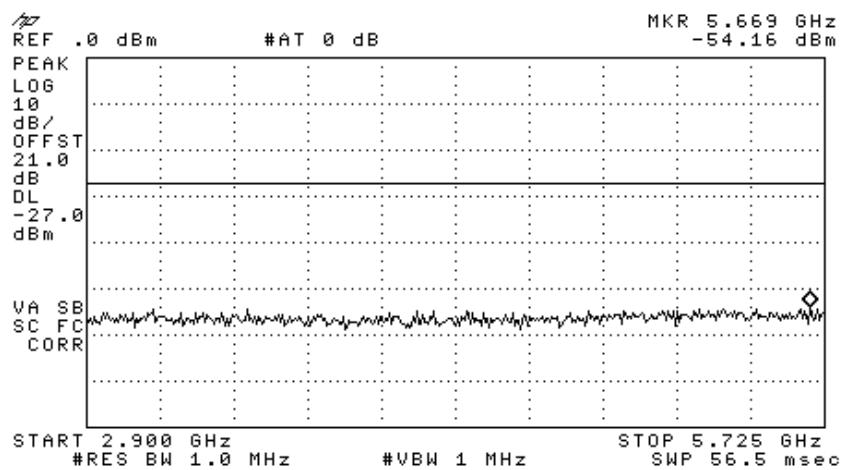


Figure 129 — 5805 MHz 64QAM

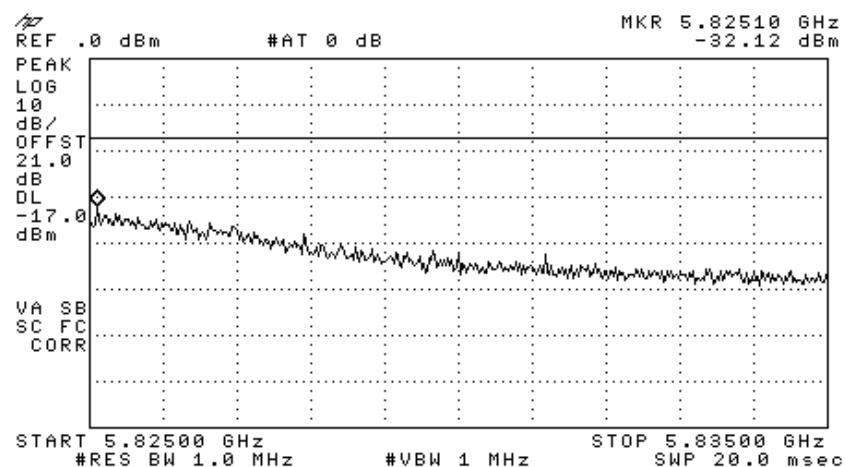


Figure 130 —5805 MHz 64QAM

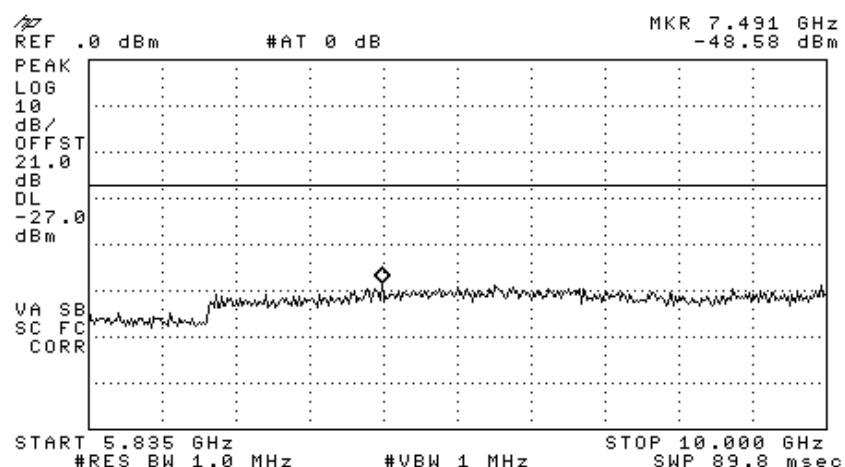


Figure 131 —5805 MHz 64QAM

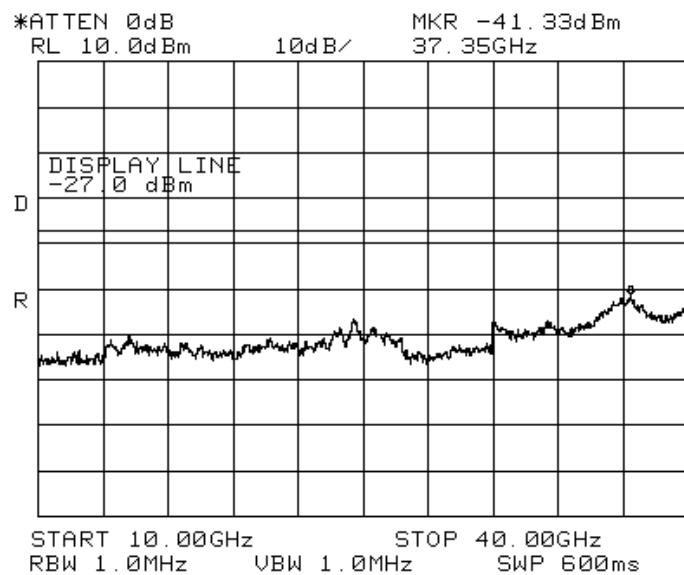


Figure 132 —5805 MHz 64QAM

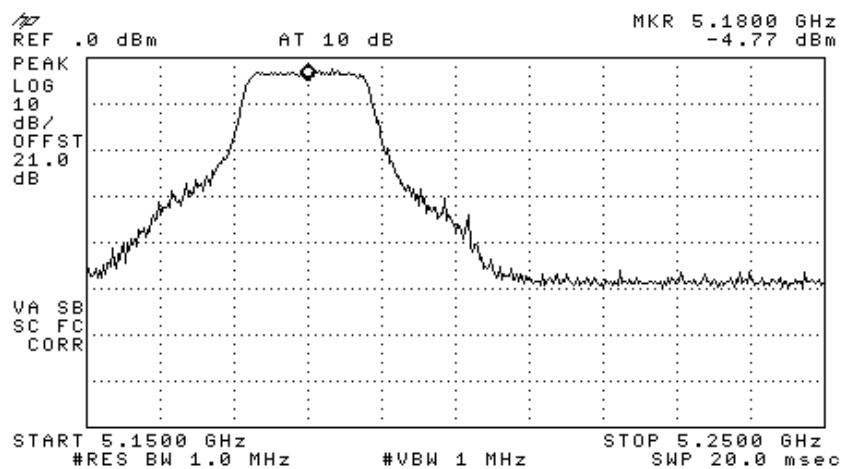


Figure 133 —5180 MHz BPSK

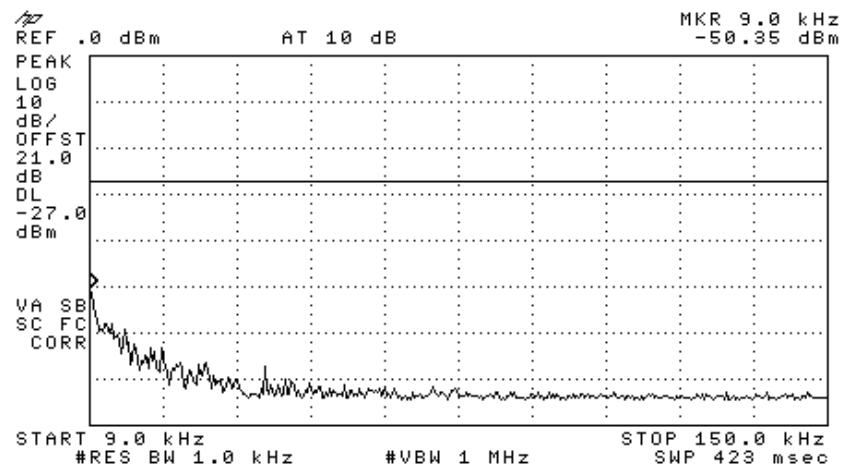


Figure 134 —5180 MHz BPSK

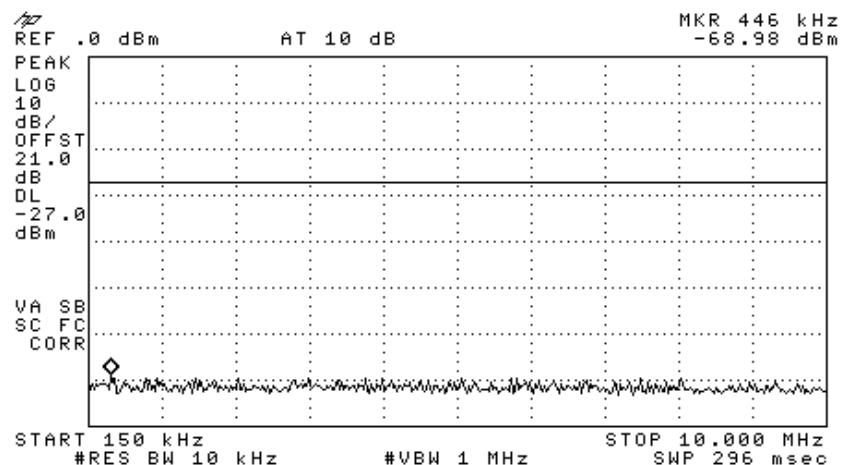


Figure 135 —5180 MHz BPSK

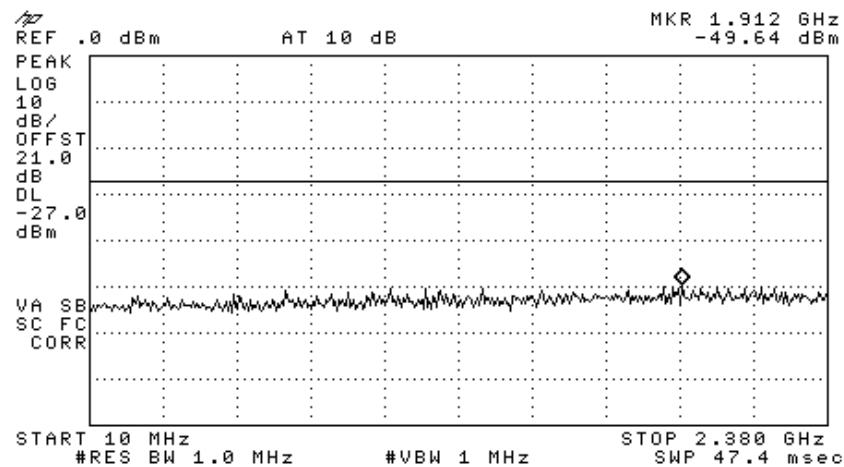


Figure 136 — 5180 MHz BPSK

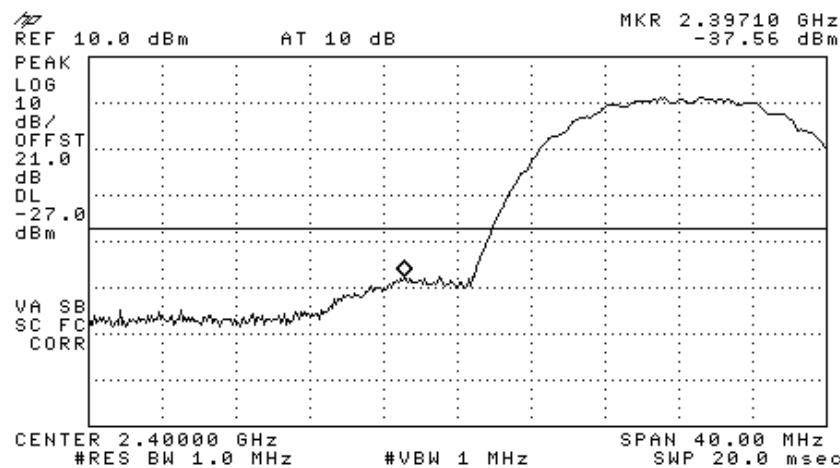


Figure 137 — 5180 MHz BPSK

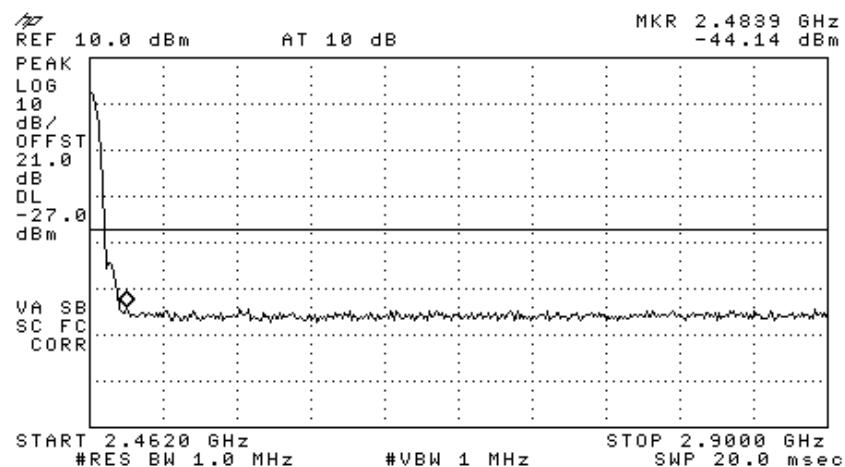


Figure 138 —5180 MHz BPSK

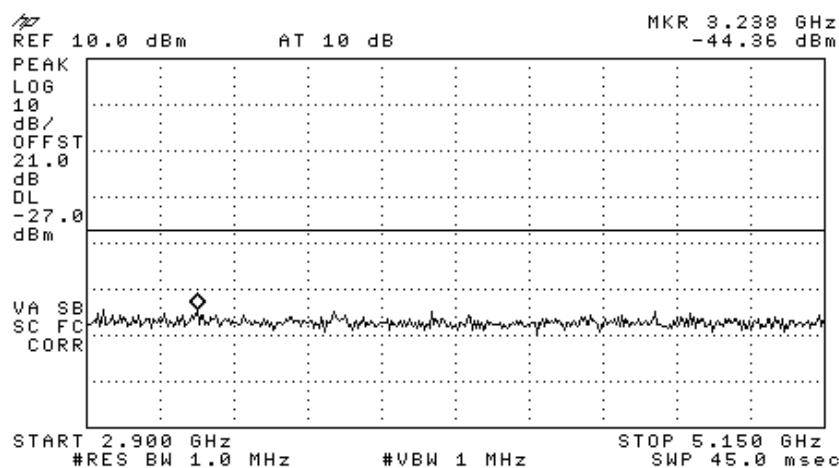


Figure 139 —5180 MHz BPSK

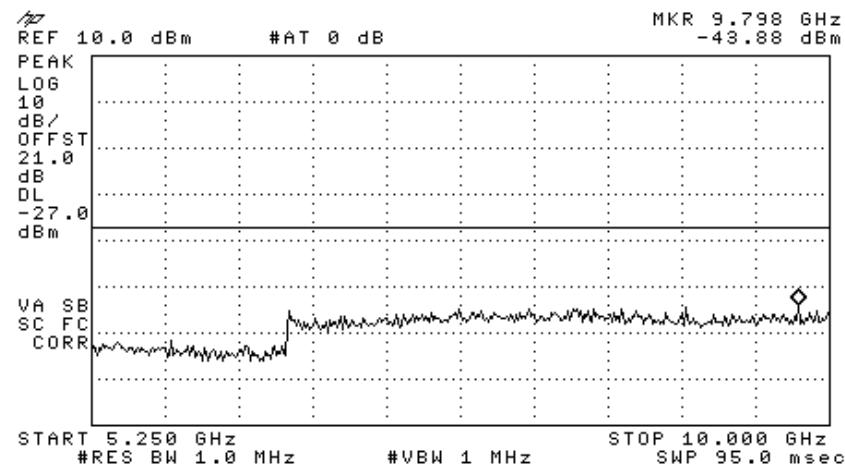


Figure 140 —5180 MHz BPSK

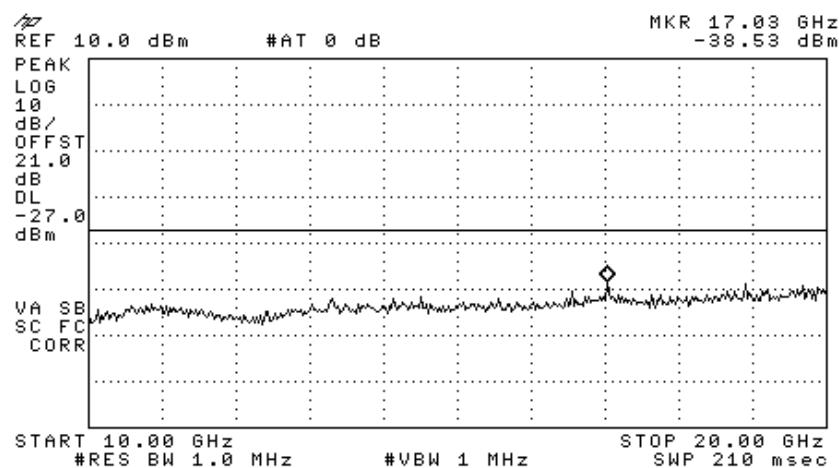


Figure 141 —5180 MHz BPSK

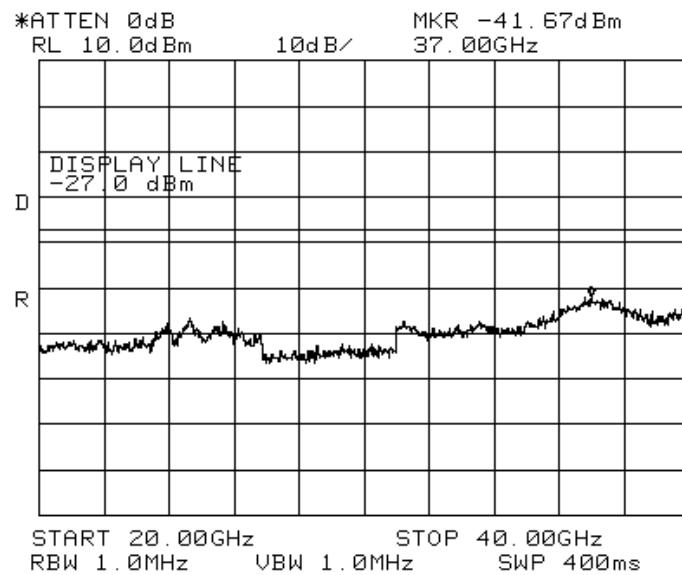


Figure 142 —5180 MHz BPSK

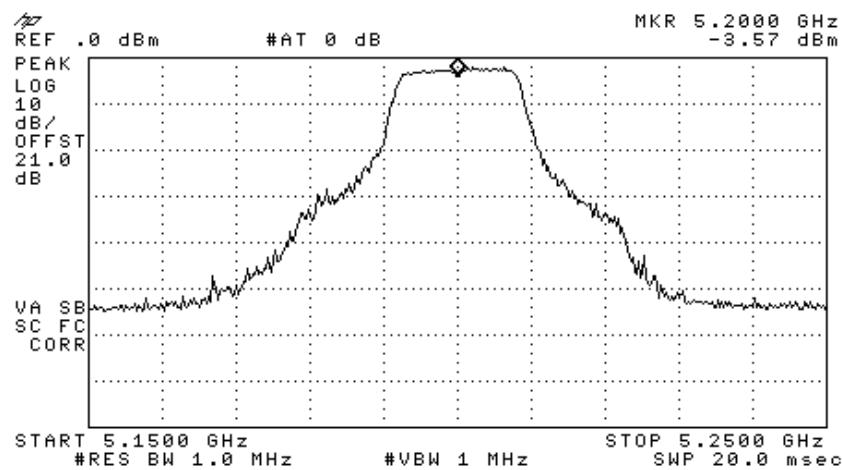


Figure 143 —5200 MHz BPSK

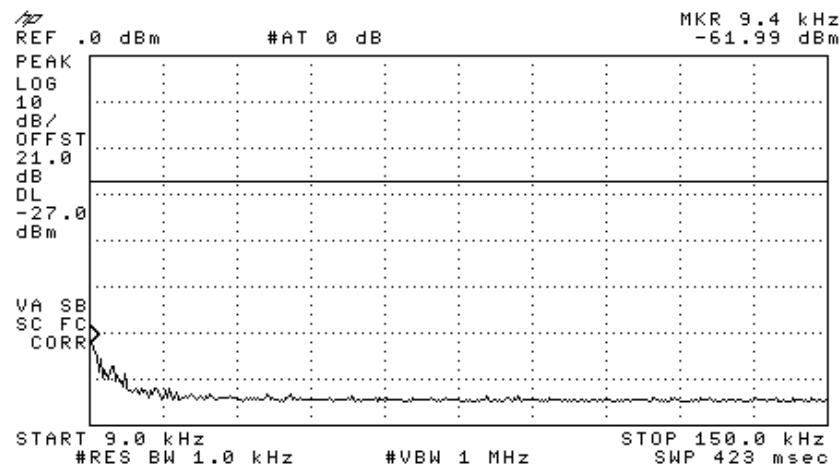


Figure 144 —5200 MHz BPSK

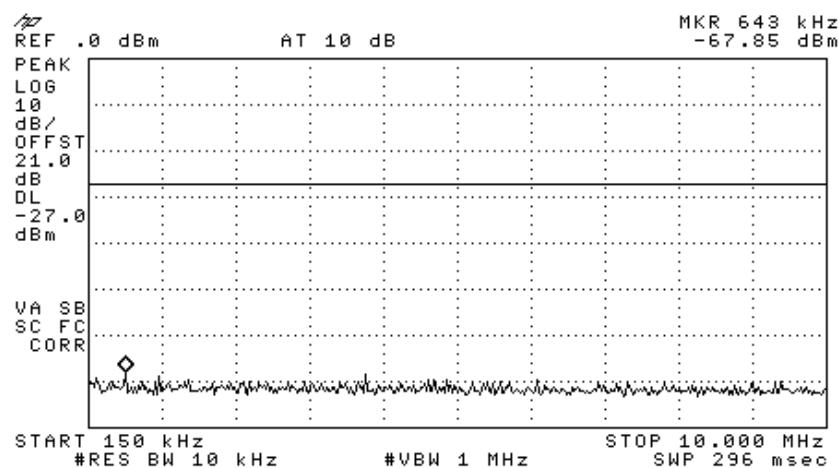


Figure 145 —5200 MHz BPSK

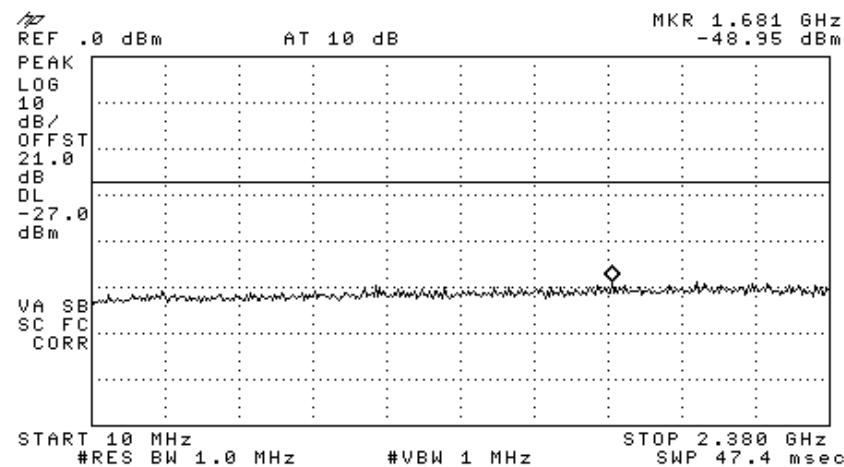


Figure 146 —5200 MHz BPSK

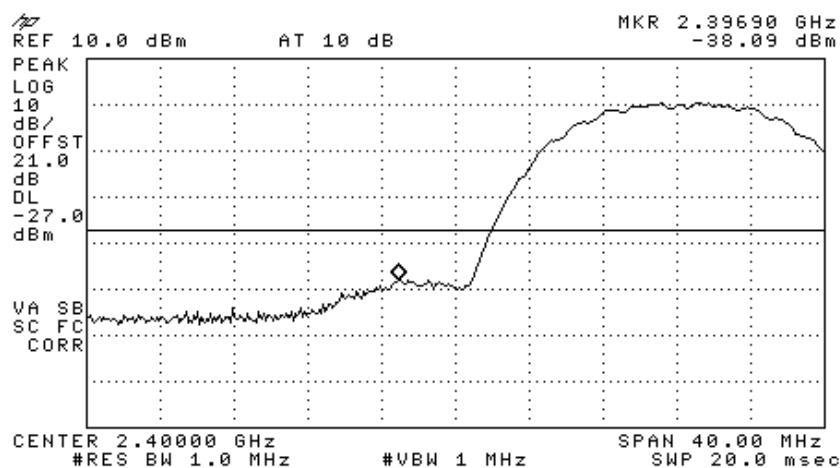


Figure 147 —5200 MHz BPSK

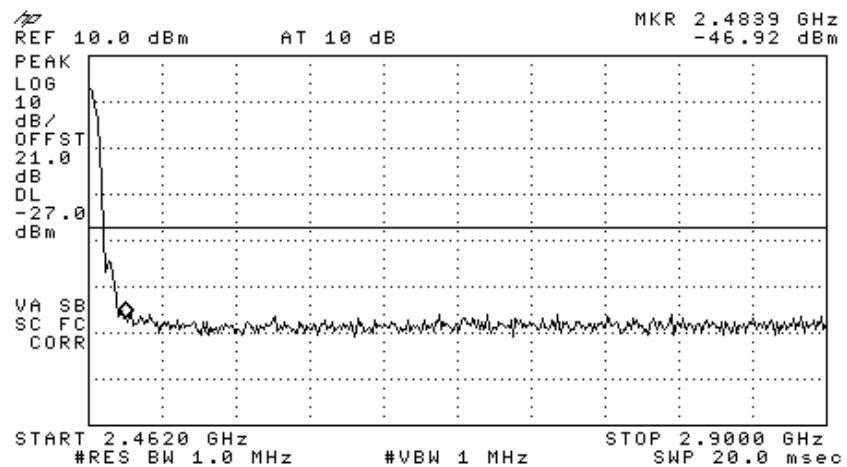


Figure 148 —5200 MHz BPSK

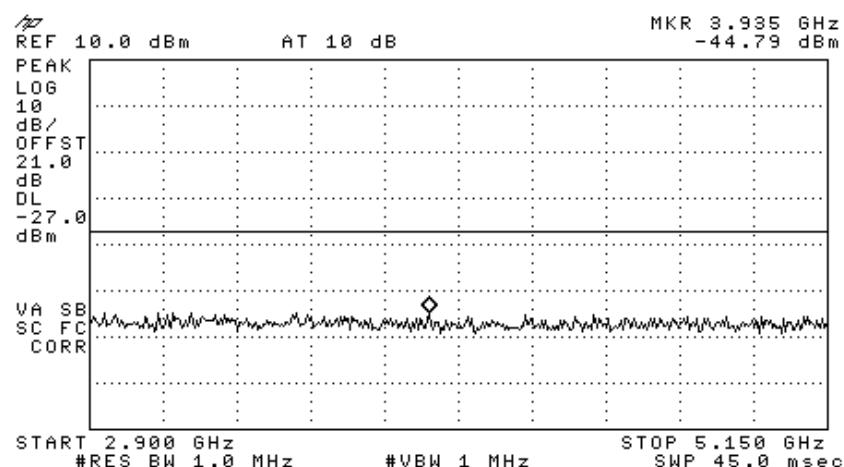


Figure 149 —5200 MHz BPSK

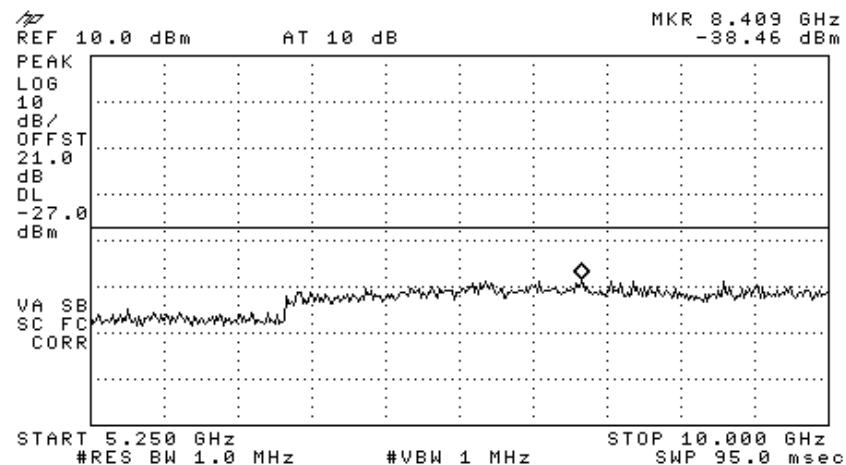


Figure 150 —5200 MHz BPSK

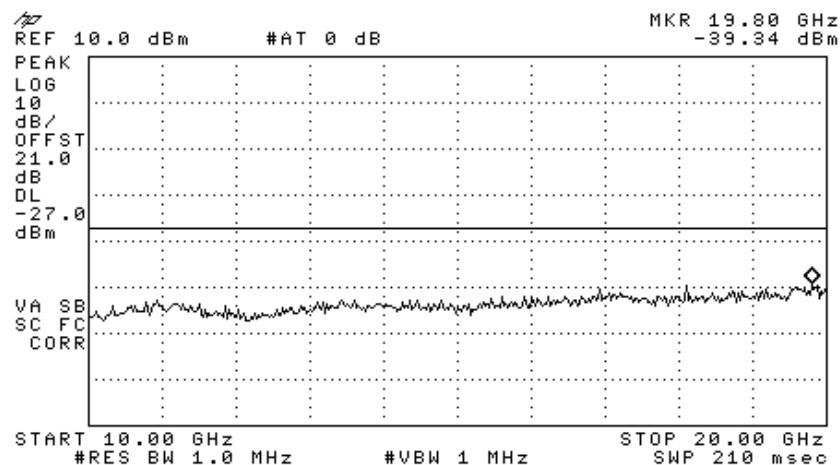


Figure 151 —5200 MHz BPSK

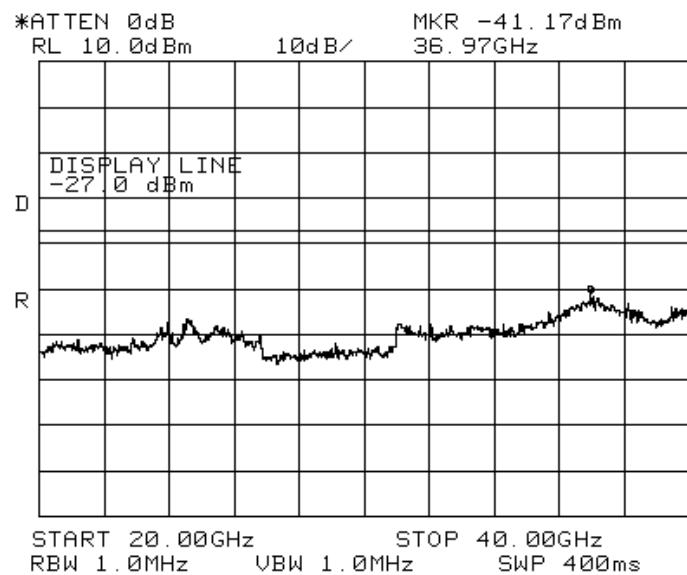


Figure 152 —5200 MHz BPSK

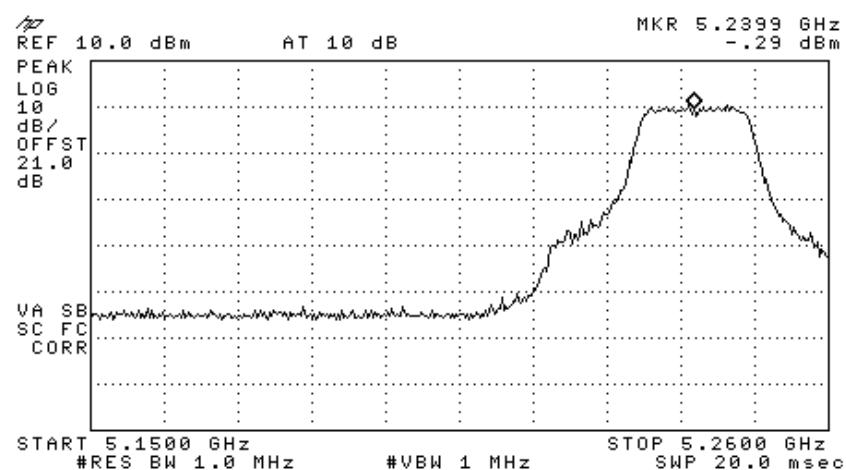


Figure 153 —5240 MHz BPSK

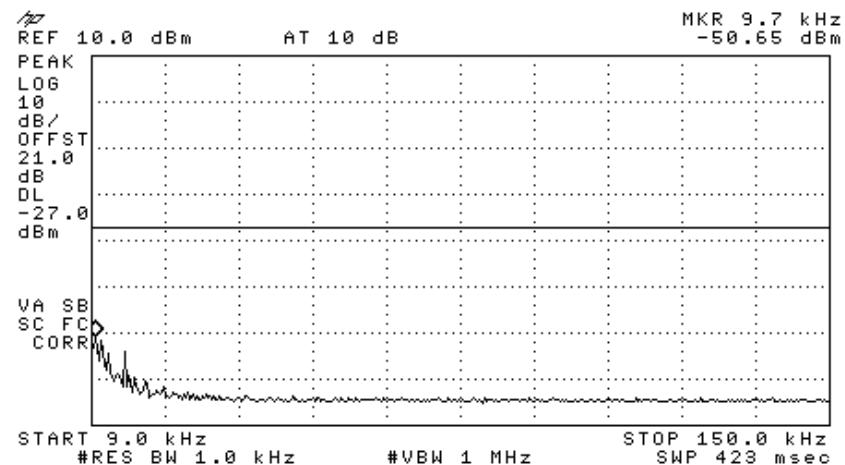


Figure 154 —5240 MHz BPSK

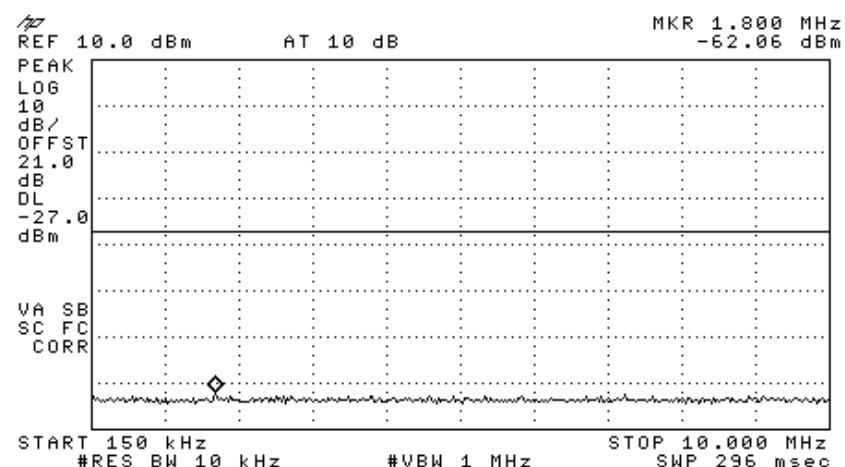


Figure 155 —5240 MHz BPSK

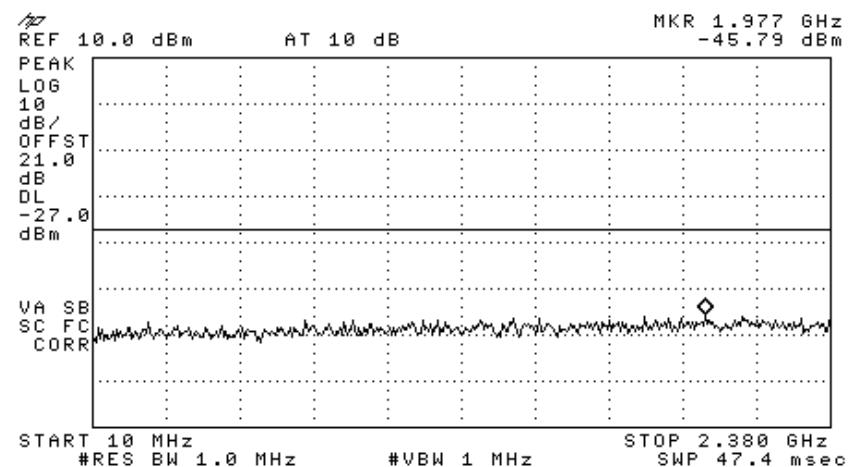


Figure 156 —5240 MHz BPSK

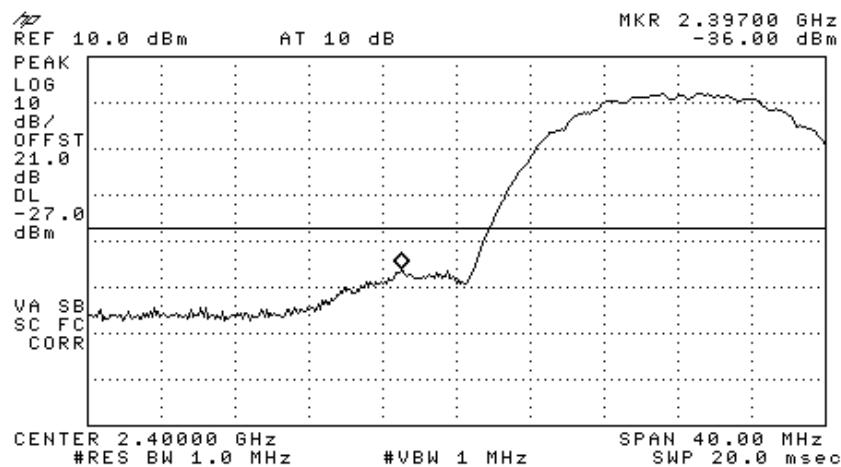


Figure 157 —5240 MHz BPSK

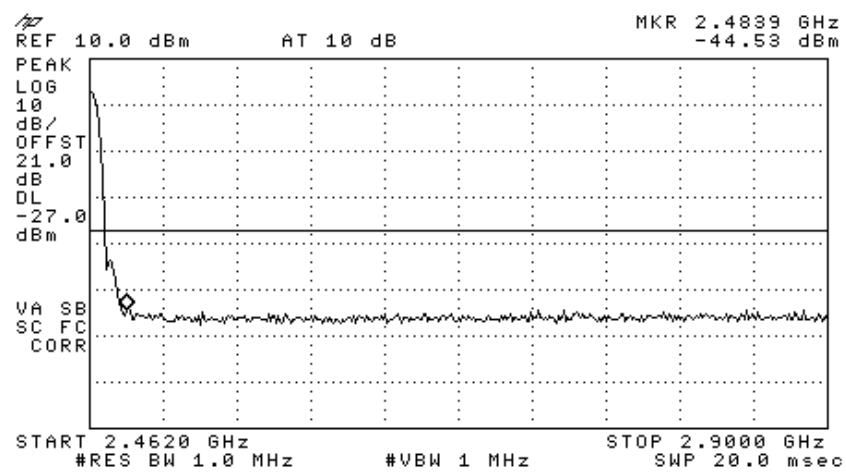


Figure 158 —5240 MHz BPSK

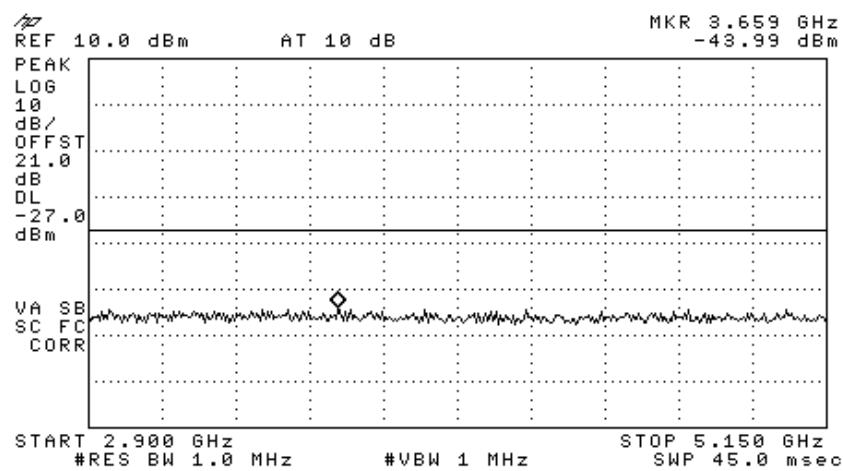


Figure 159 —5240 MHz BPSK

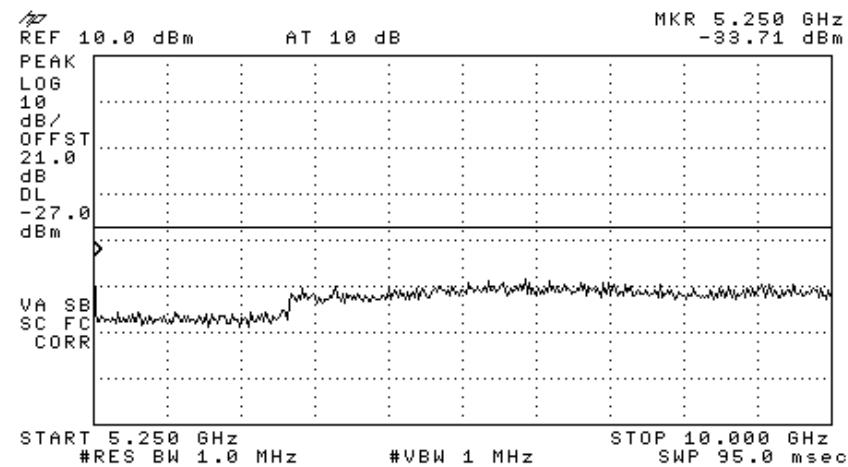


Figure 160 —5240 MHz BPSK

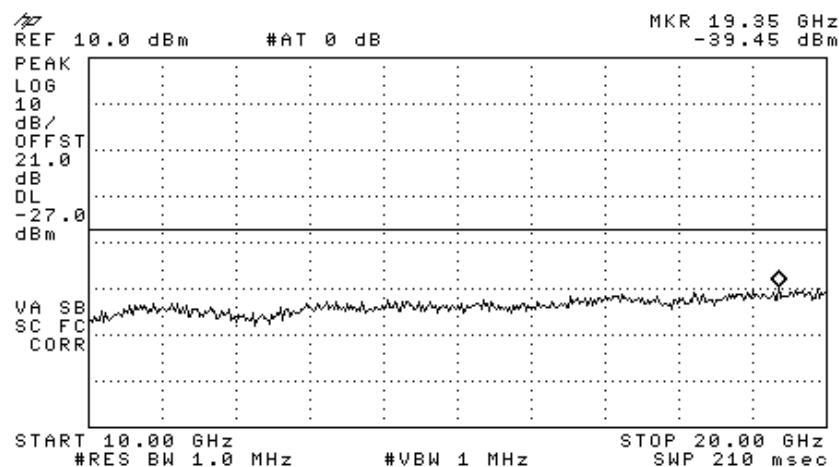


Figure 161 —5240 MHz BPSK

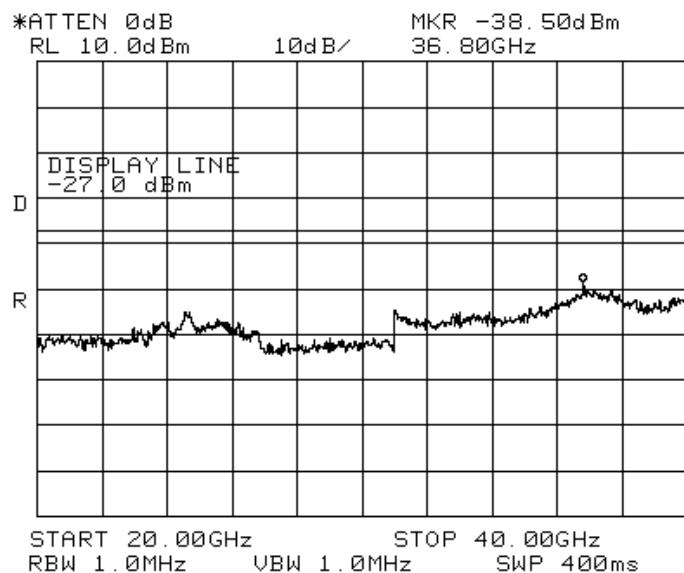


Figure 162 —5240 MHz BPSK

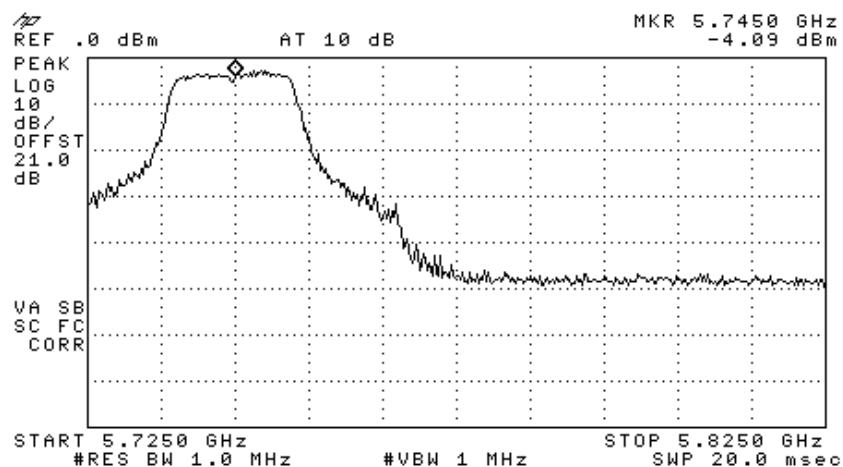


Figure 163 —5745 MHz BPSK

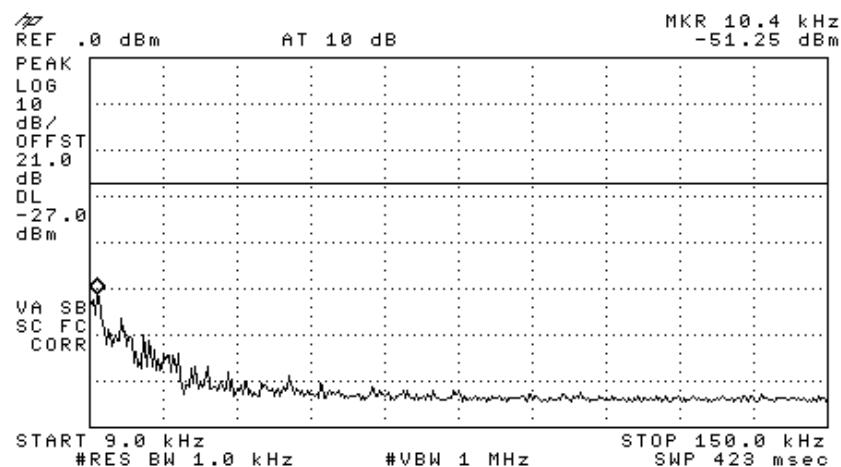


Figure 164 —5745 MHz BPSK

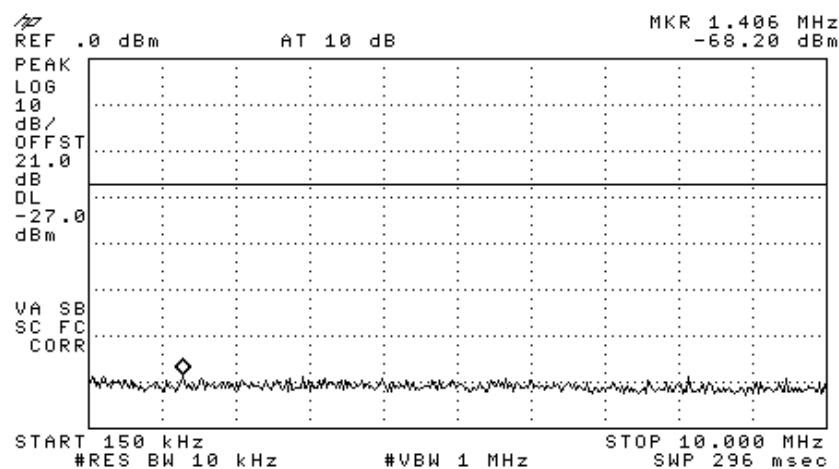


Figure 165 —5745 MHz BPSK

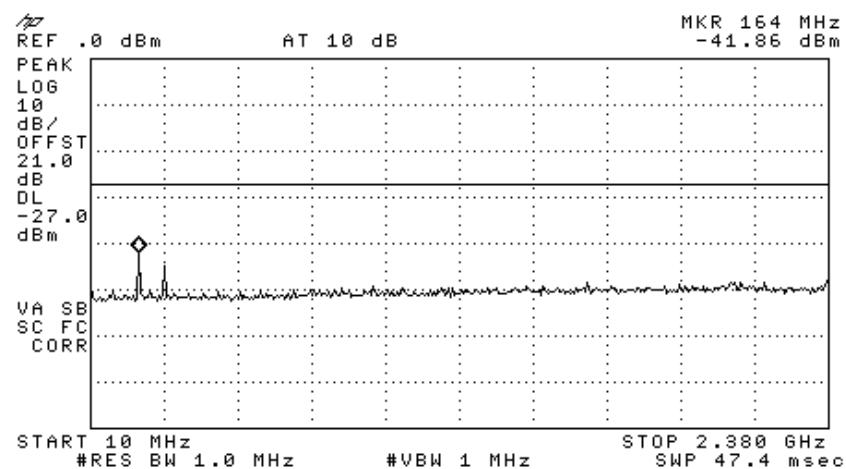


Figure 166 — 5745 MHz BPSK

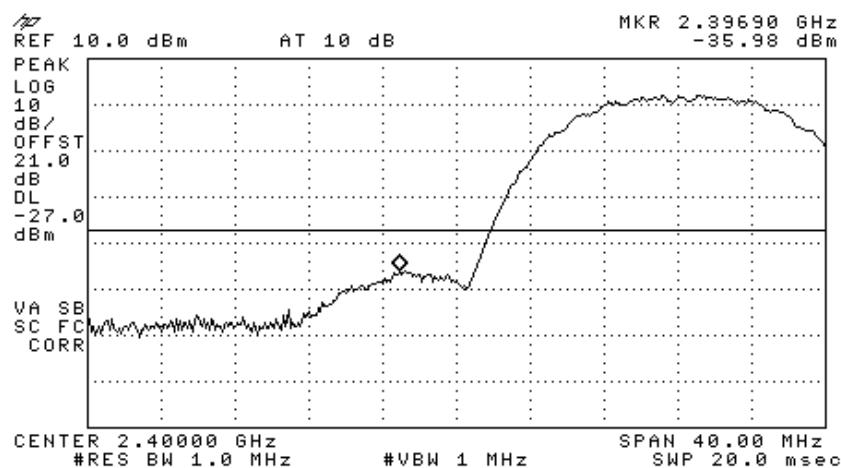


Figure 167 — 5745 MHz BPSK

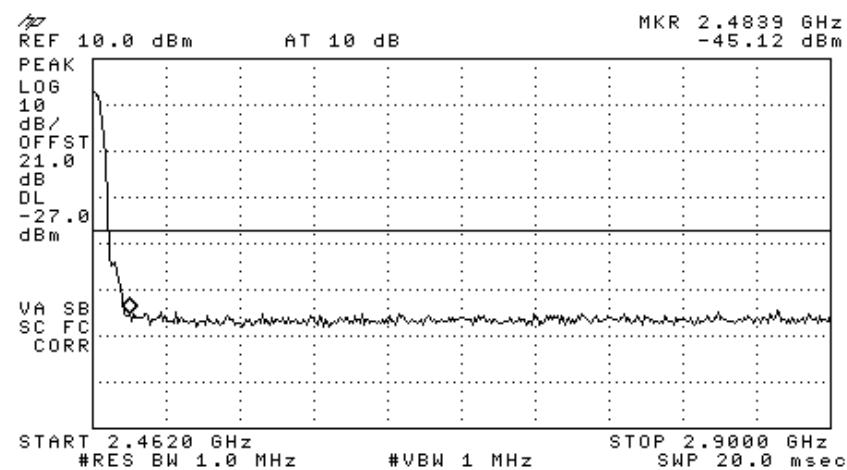


Figure 168 —5745 MHz BPSK

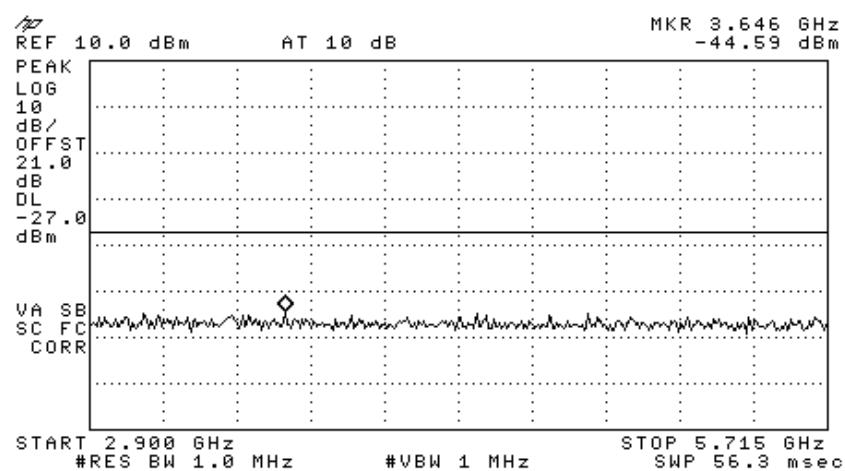


Figure 169 —5745 MHz BPSK

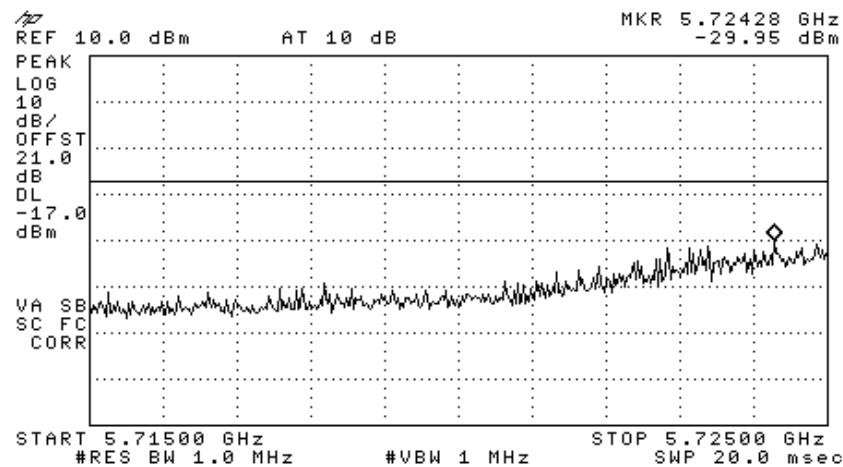


Figure 170 —5745 MHz BPSK

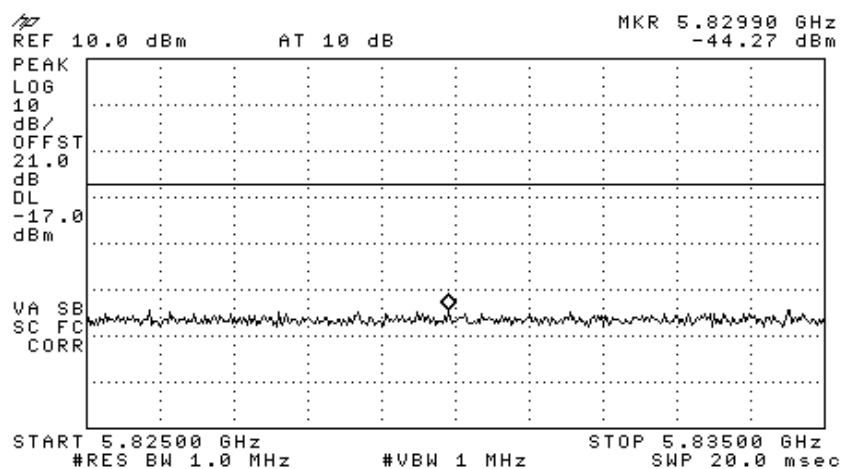


Figure 171 —5745 MHz BPSK

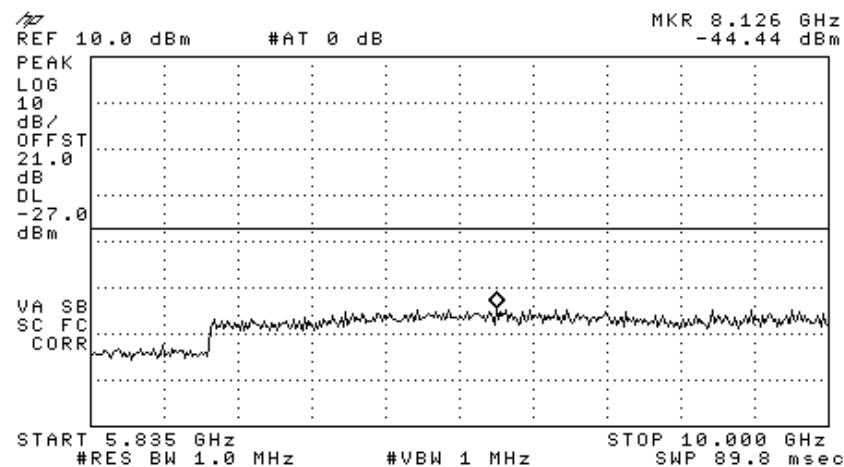


Figure 172 —5745 MHz BPSK

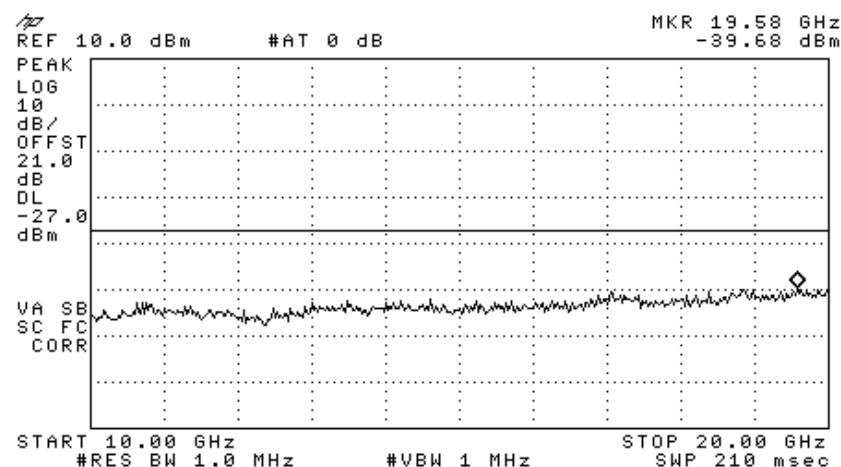


Figure 173 —5745 MHz BPSK

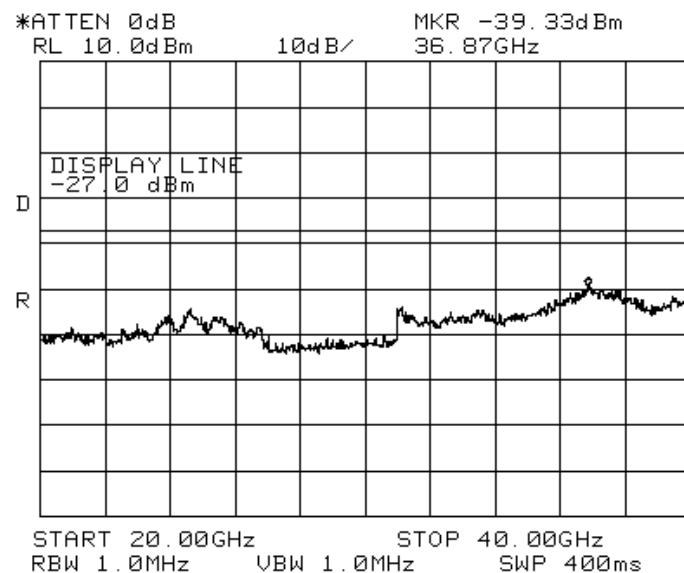


Figure 174 —5745 MHz BPSK

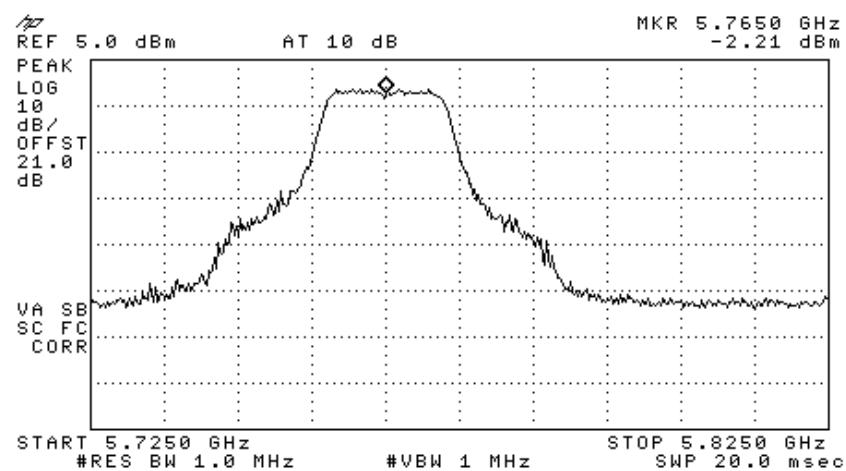


Figure 175 —5765 MHz BPSK

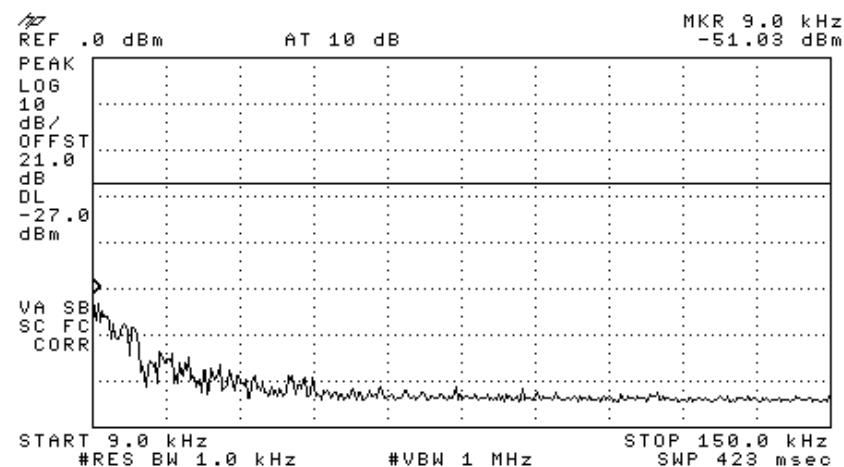


Figure 176 —5765 MHz BPSK

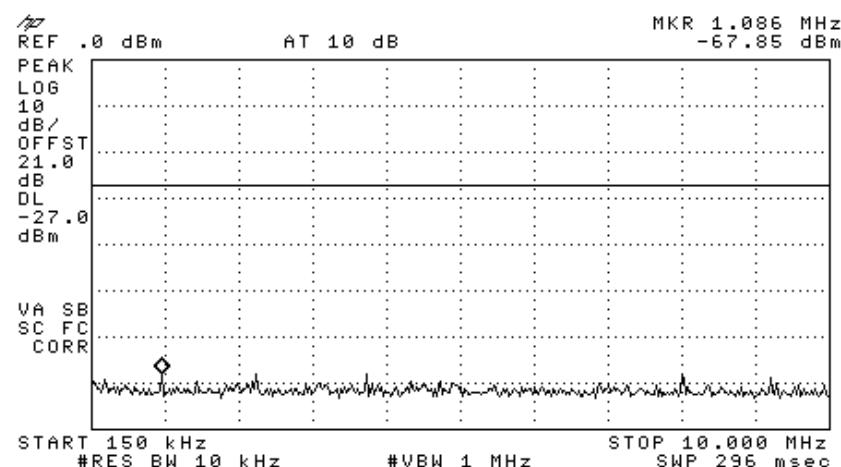


Figure 177 —5765 MHz BPSK

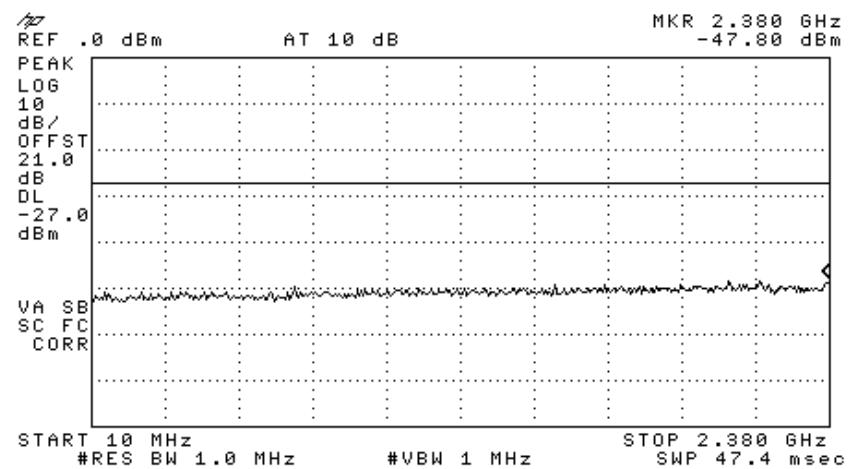


Figure 178 —5765 MHz BPSK

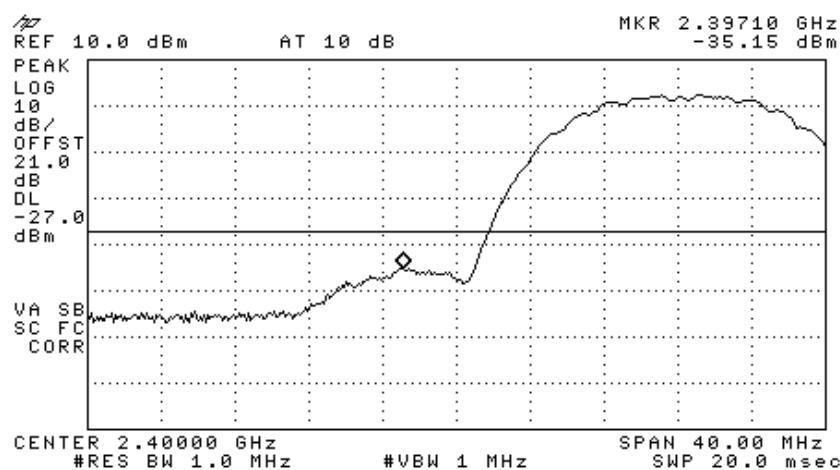


Figure 179 —5765 MHz BPSK

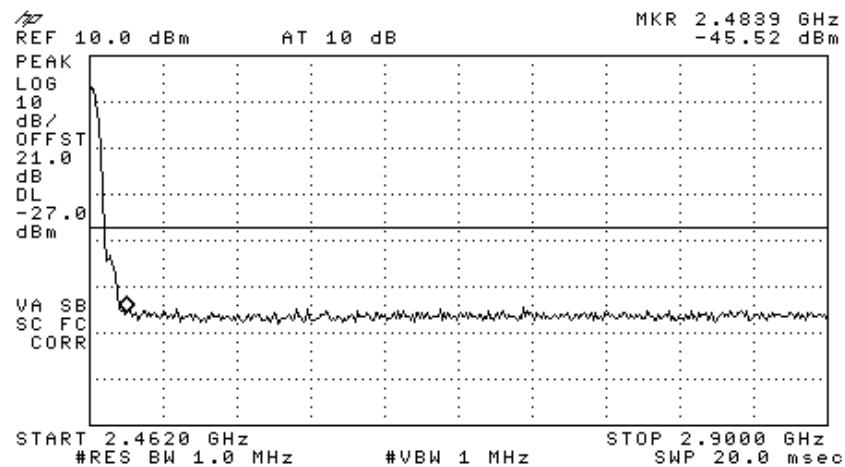


Figure 180 —5765 MHz BPSK

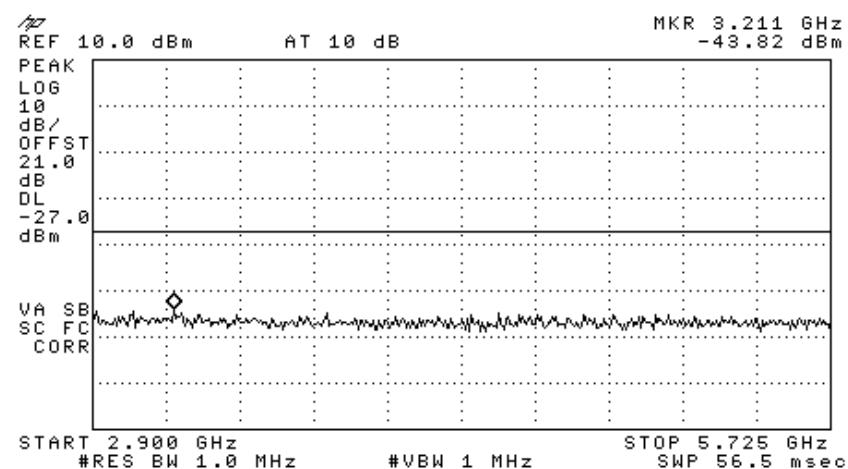


Figure 181 —5765 MHz BPSK

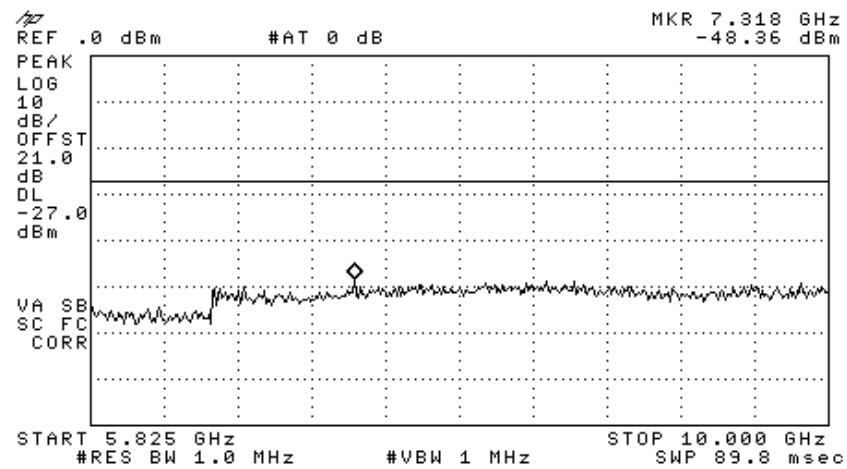


Figure 182 —5765 MHz BPSK

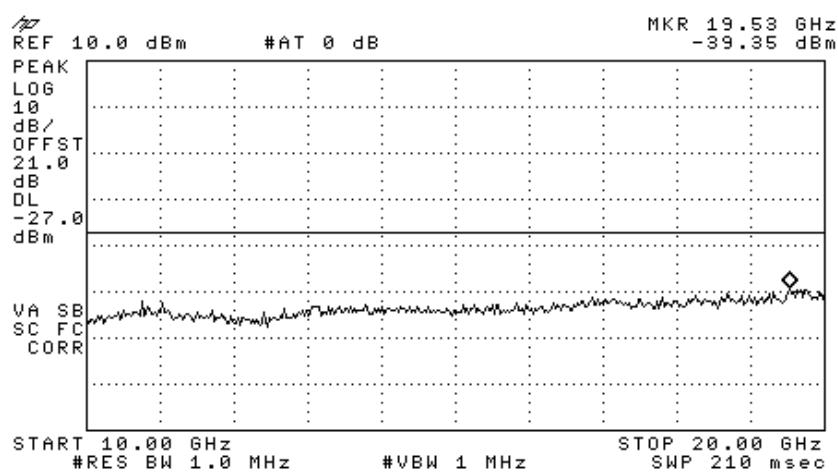


Figure 183 —5765 MHz BPSK

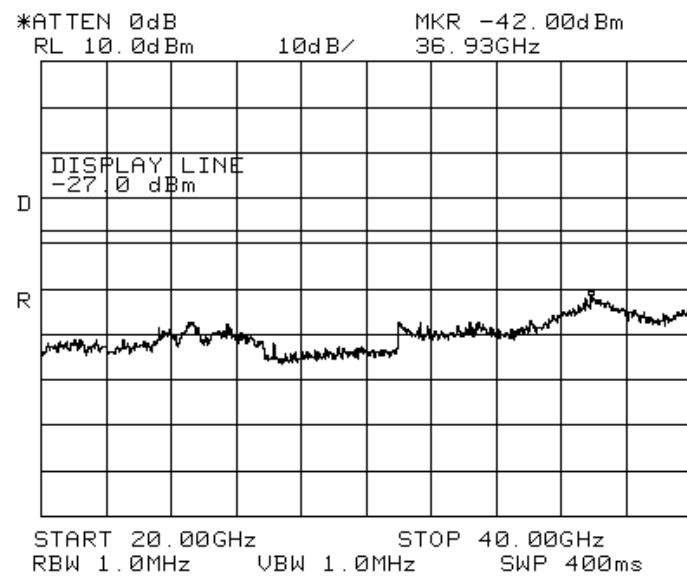


Figure 184 —5765 MHz BPSK

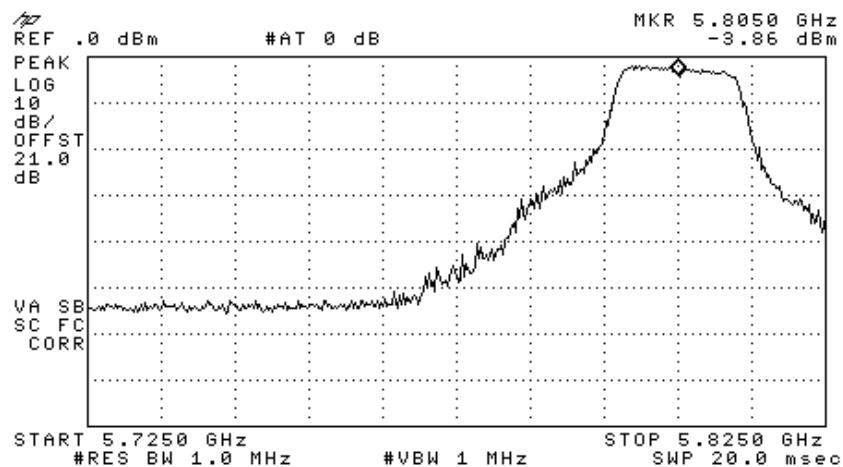


Figure 185 —5805 MHz BPSK

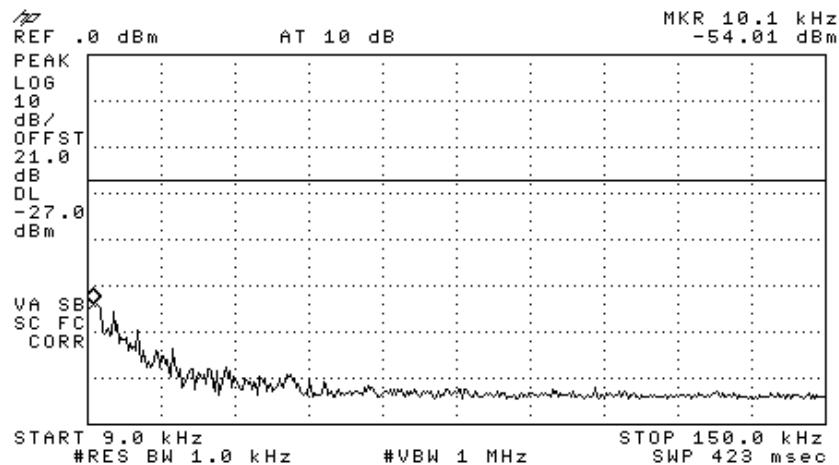


Figure 186 —5805 MHz BPSK

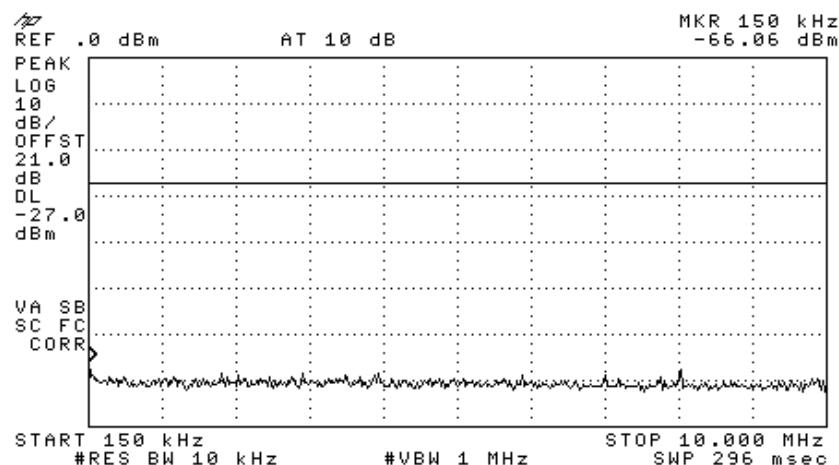


Figure 187 —5805 MHz BPSK

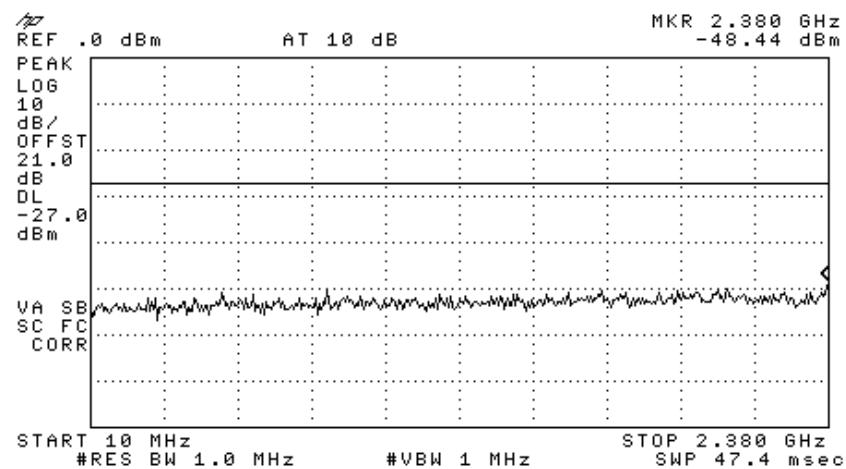


Figure 188 —5805 MHz BPSK

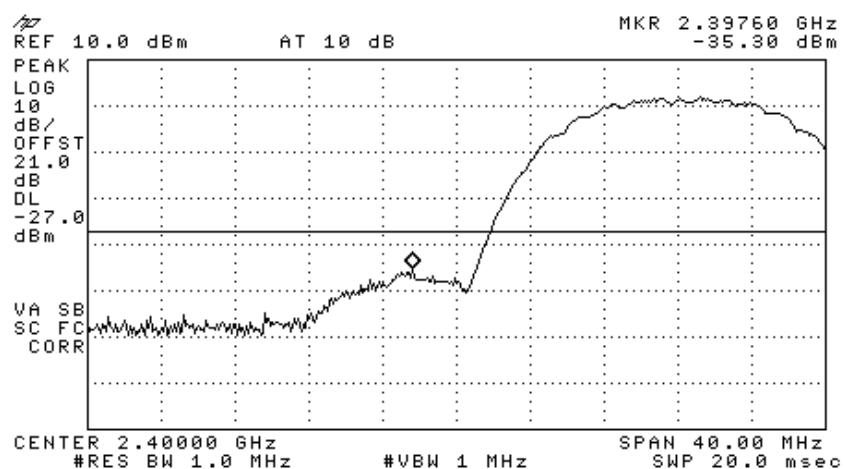


Figure 189 —5805 MHz BPSK

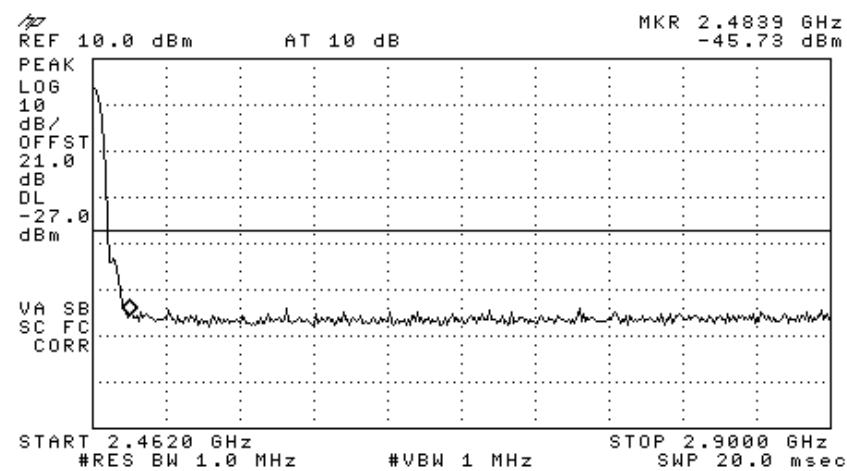


Figure 190 —5805 MHz BPSK

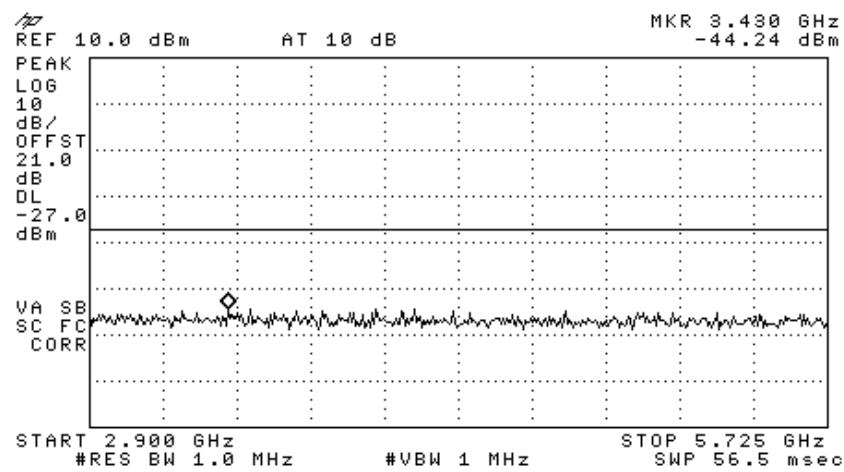


Figure 191 —5805 MHz BPSK

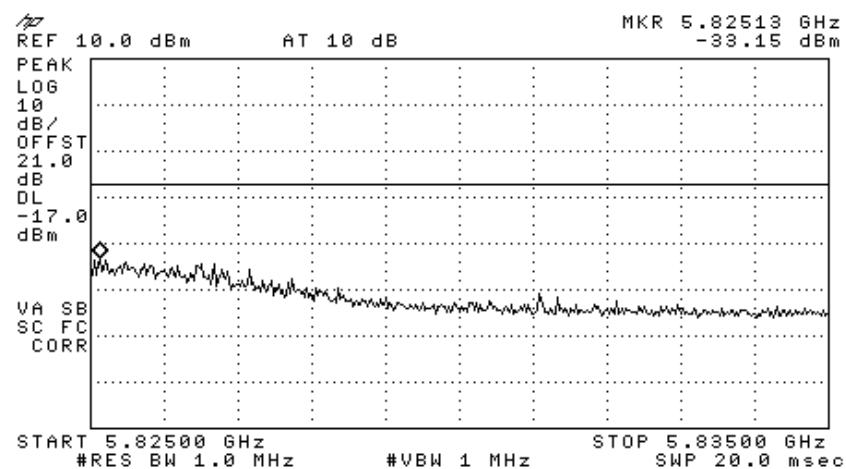


Figure 192 —5805 MHz BPSK

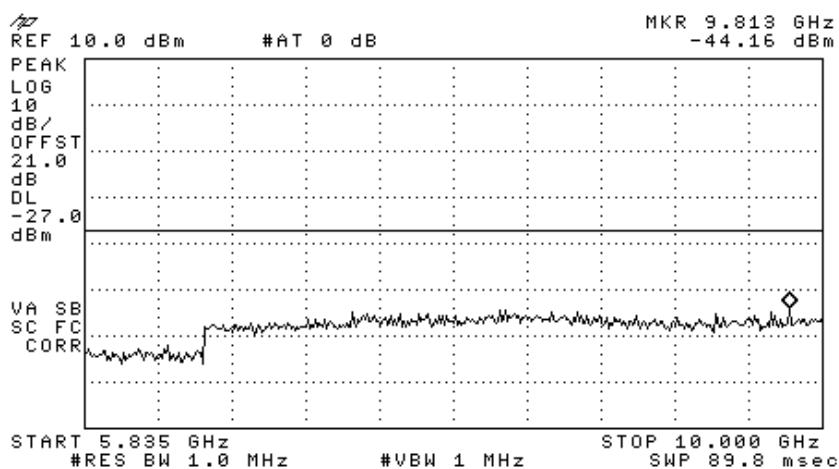


Figure 193 —5805 MHz BPSK

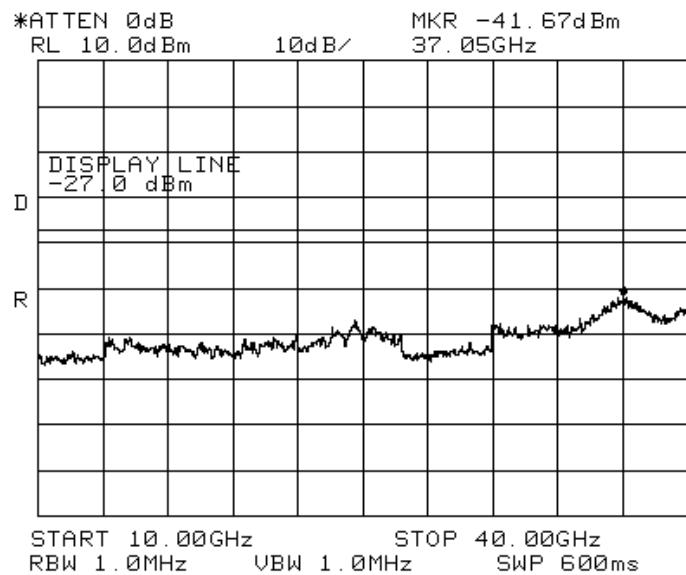


Figure 194 — 5805 MHz BPSK

9.2 Results table

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

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

Operation Frequency (MHz)	Modulation	Reading (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	-35.98	-27.0	-8.98
	BPSK	-37.56	-27.0	-10.56
5200	64QAM	-35.15	-27.0	-8.15
	BPSK	-38.09	-27.0	-11.09
5240	64QAM	-35.05	-27.0	-8.05
	BPSK	-33.71	-27.0	-6.71
5745	64QAM	-34.33	-27.0	-7.33
	BPSK	-35.98	-27.0	-8.98
5765	64QAM	-34.78	-27.0	-7.78
	BPSK	-35.15	-27.0	-8.15
5805	64QAM	-37.12	-27.0	-10.12
	BPSK	-35.30	-27.0	-8.30

Figure 195 Peak Power Output of 5150-5250; 5725-5825 MHz Bands

JUDGEMENT: Passed by 6.71 dB

TEST PERSONNEL:

Tester Signature: E. Pitt Date: 21.02.08

Typed/Printed Name: E. Pitt

9.3 **Test Equipment Used.**

Peak Power Output of 5150-5825 MHz Band

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 196 Test Equipment Used

10. Band Edge Spectrum 5GHz Transmitter 802.11b/g+802.11a Signals

[In Accordance with section 15.407)

10.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 1 MHz resolution BW. Maximum power level below 5150 MHz and above 5350 MHz was measured at 5180 MHz and 5240MHz correspondingly. Maximum power level below 5725 MHz and above 5825 MHz was measured at 5745 MHz and 5805 MHz correspondingly.

The E.U.T. was tested at 5180, 5240, 5745, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

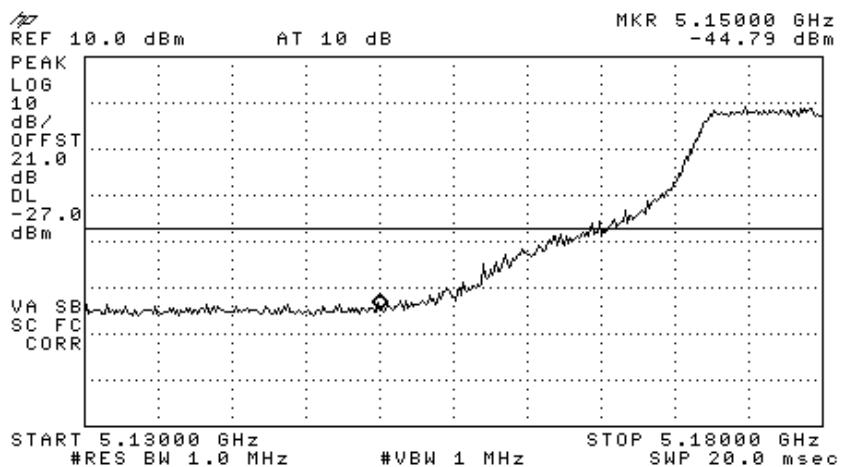


Figure 197 —5180 MHz 64QAM

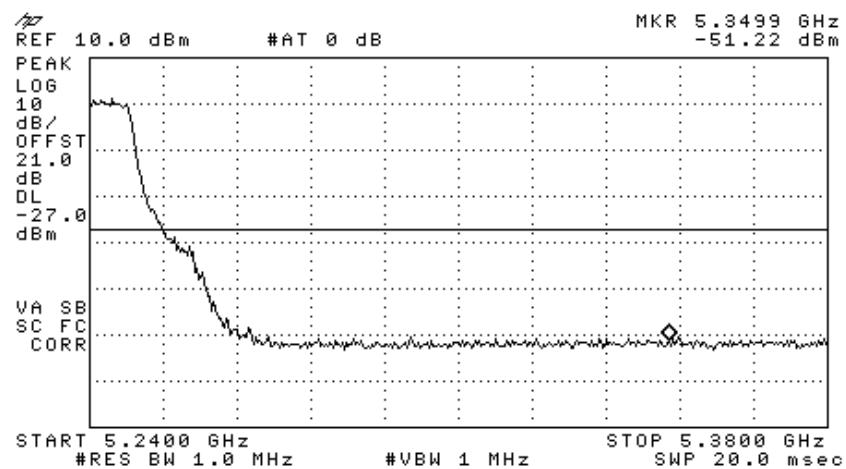


Figure 198 —5240 MHz 64QAM

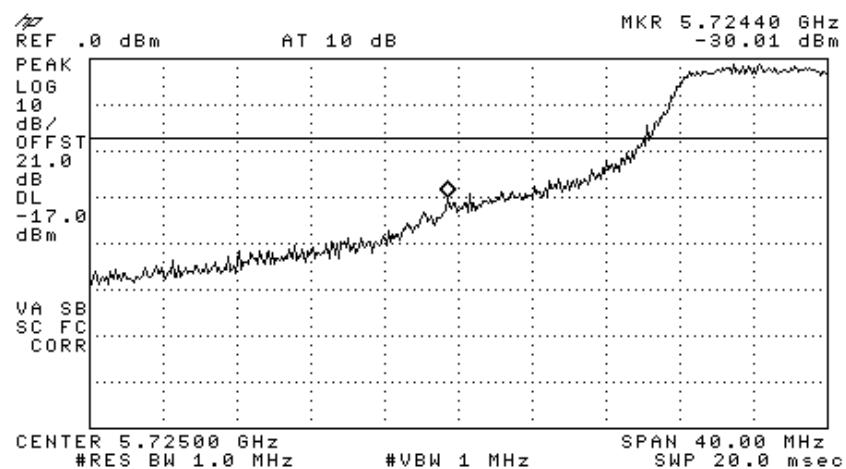


Figure 199 —5745 MHz 64QAM

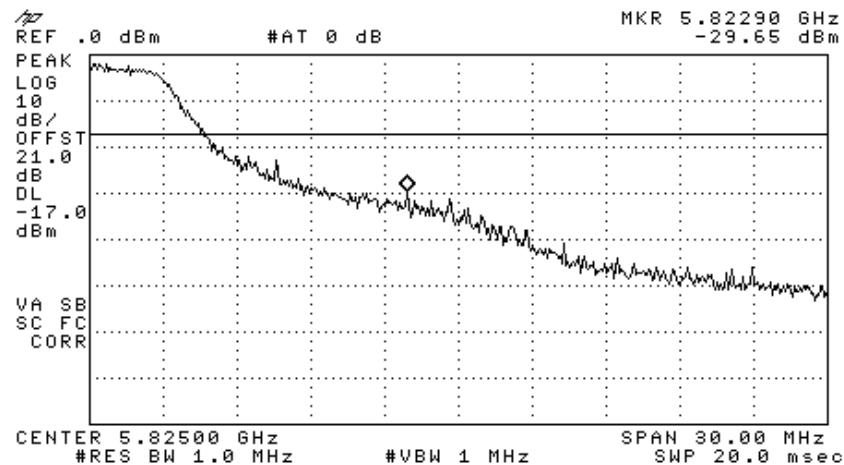


Figure 200 —5805 MHz 64QAM

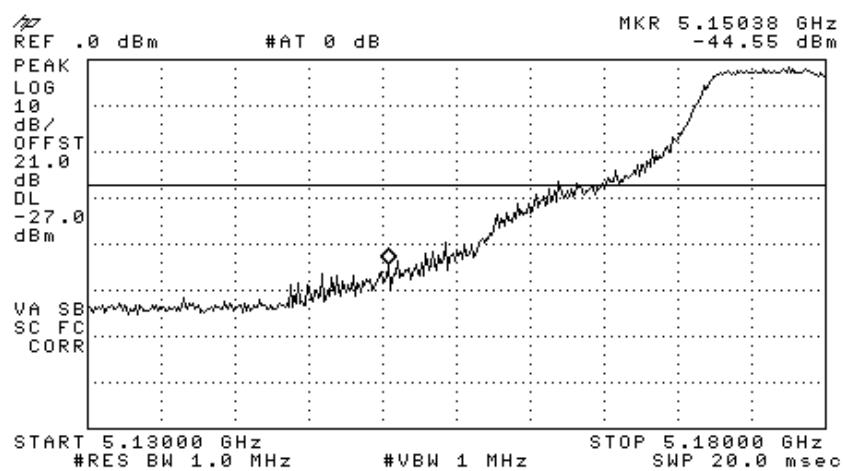


Figure 201 —5180 MHz BPSK

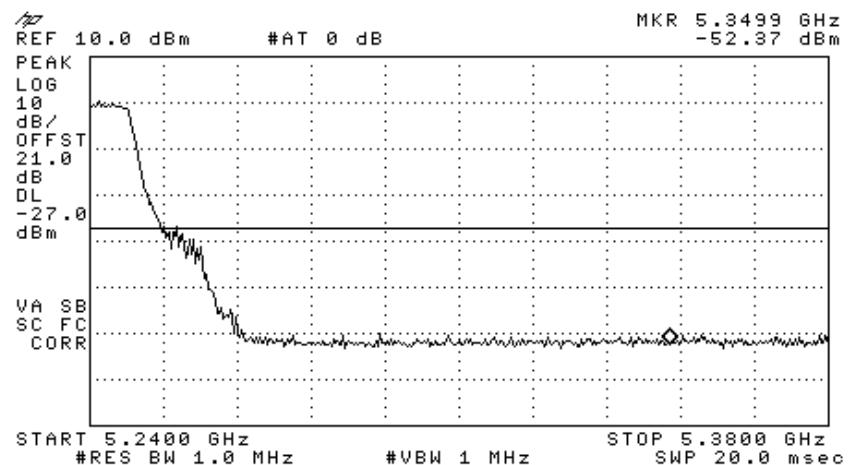


Figure 202 —5240 MHz BPSK

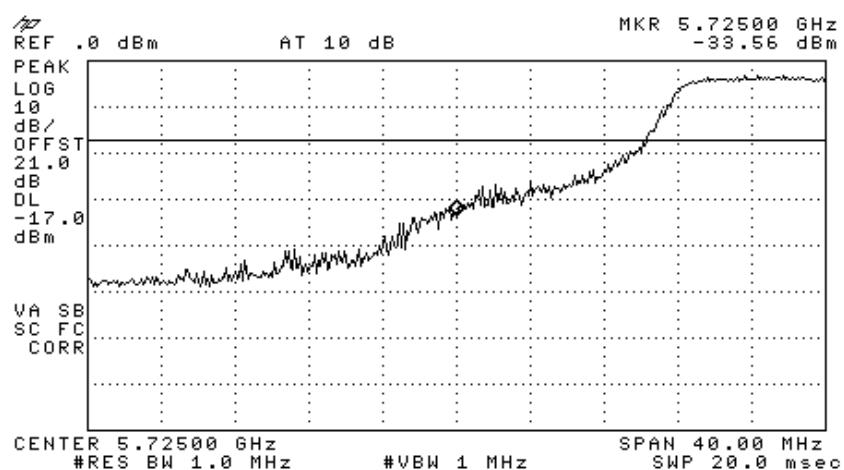


Figure 203 —5745 MHz BPSK

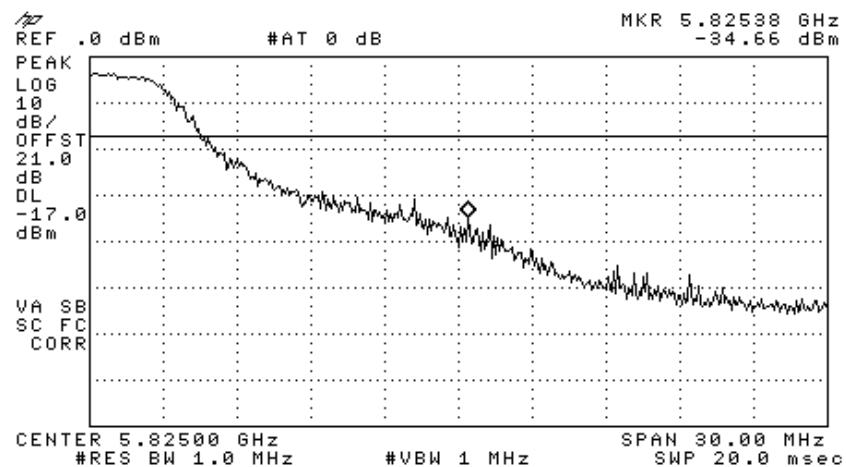


Figure 204 —5805 MHz BPSK

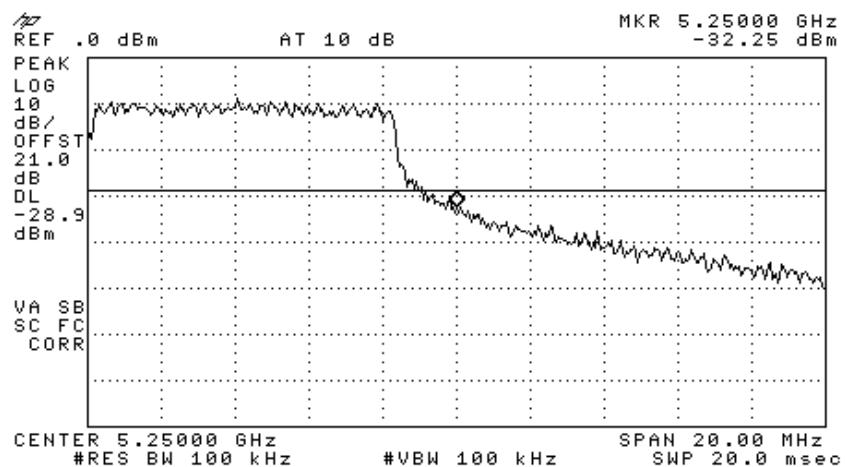


Figure 205 —Band Edge at 5.25 GHz Operation at 5.24 GHz 64QAM (Section 15.215(c))

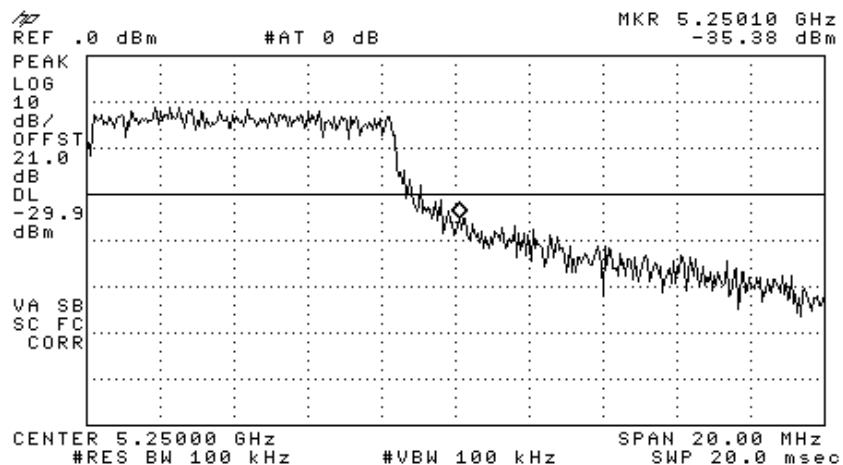


Figure 206 —Band Edge at 5.25 GHz Operation at 5.24 GHz BPSK (Section 15.215(c))

10.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

Specification: F.C.C. Part 15, Subpart C (15.215(c))

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Result (dBc)	Specification (dBc)	Margin (dB)
5240	64QAM	5252	23.55	20.0	-3.55
	BPSK	5252	25.48	20.0	-5.48

Figure 207 Band Edge at 5.25 GHz operation at 5.24 GHz

JUDGEMENT: Passed by 3.55 dB

TEST PERSONNEL:

Tester Signature: _____

Date:

Typed/Printed Name: E. Pitt

10.3 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS
With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

Specification: F.C.C. Part 15, Subpart C (15.407)

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Result (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	5150	-44.79	-27.0	-17.79
	BPSK	5150	-44.55	-27.0	-17.55
5240	64QAM	5350	-51.22	-27.0	-24.22
	BPSK	5250	-35.38	-27.0	-8.38
5725	64QAM	5744	-30.01	-17.0	-13.01
	BPSK	5725	-33.56	-17.0	-16.56
5825	64QAM	5823	-29.65	-17.0	-12.65
	BPSK	5825	-34.66	-17.0	-17.66

Figure 208 Band Edge Spectrum

JUDGEMENT: Passed by 8.38 dB

TEST PERSONNEL:

Tester Signature: Pitt Date: 21.02.08

Typed/Printed Name: E. Pitt

10.4 **Test Equipment Used.**

Band edge Spectrum

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

Figure 209 Test Equipment Used



11. Antenna Gain 5GHz Transmitter 802.11b/g+802.11a Signals

The antenna gain is 7 dBi.

12. R.F Exposure/Safety 5GHz Transmitter 802.11b/g+802.11a Signals

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

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(a) FCC limits at 5745 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 (Peak) 20 mW= 13 dBm

G_t - Antenna Gain, 7 dBi = 5

R- Distance from Transmitter using 1 m worst case

(c) The peak power density is :

$$S_p = \frac{20 \times 5}{4\pi(100)^2} = 0.8 \times 10^{-3} \frac{mW}{cm^2}$$

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

The average power source is:

10mW

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

$$S_{AV} = 0.4 \times 10^{-3} \frac{mW}{cm^2}$$

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

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

13.1 ***Test Specification***

30-40000 MHz, FCC Part 15, Subpart B, CLASS B

13.2 ***Test Procedure***

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

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

The frequency range 30-40000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

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

In the frequency range 2.9 - 40 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz.

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

The emissions were measured at a distance of 3 meters.

The E.U.T. was tested in both Rx and Tx modes.

The E.U.T. was tested at the operating frequencies of, 5180, 5200, 5240, 5745, 5765, and 5805 MHz using the following modulations: 64QAM, and BPSK.

13.3 **Test Data**

JUDGEMENT: Passed by 1.5 dB.

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

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

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

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

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type: 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

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

Figure 210. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

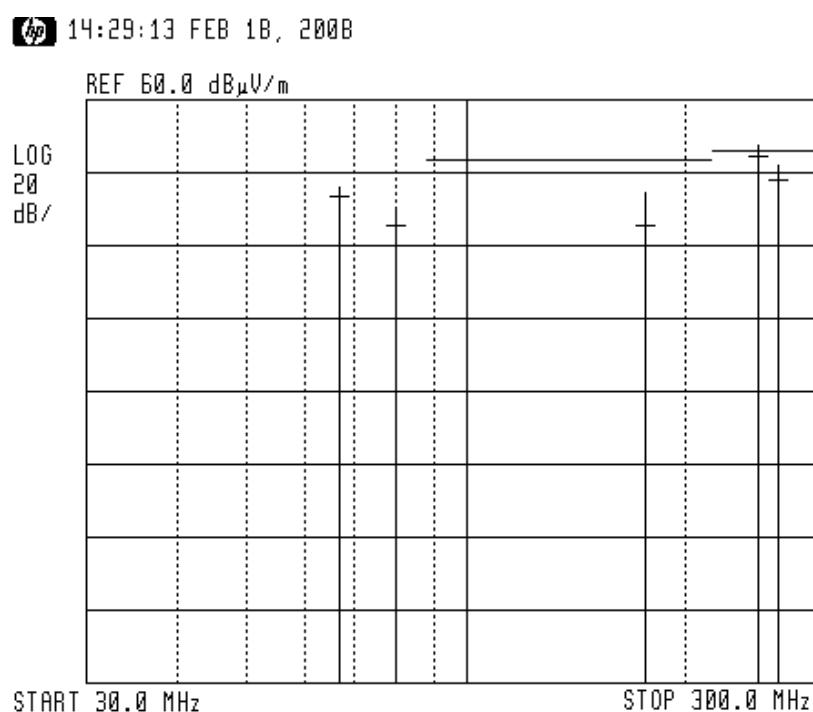
Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

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



**Figure 211. 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 WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

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

Figure 212. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

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

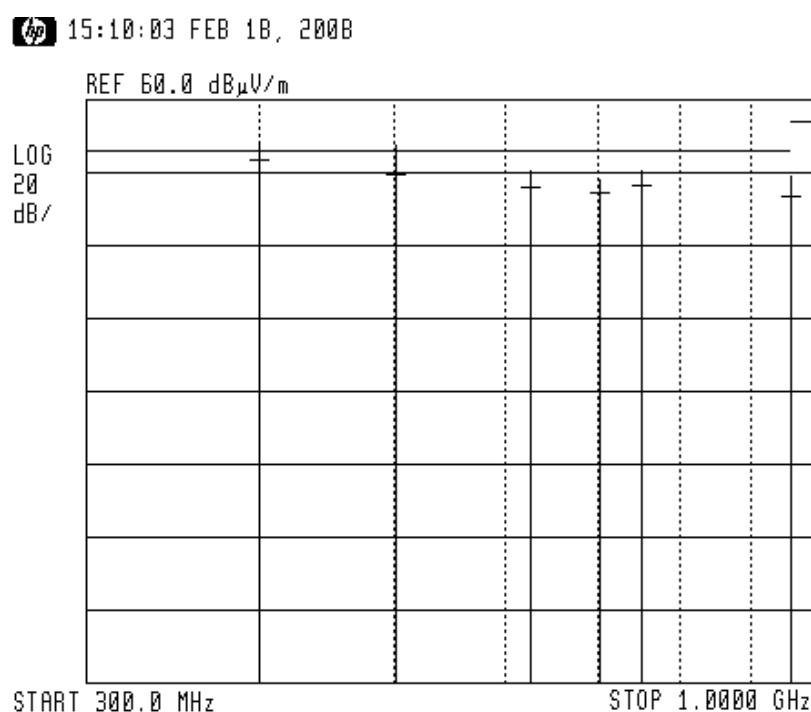
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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



**Figure 213. 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 WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

Figure 214. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

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

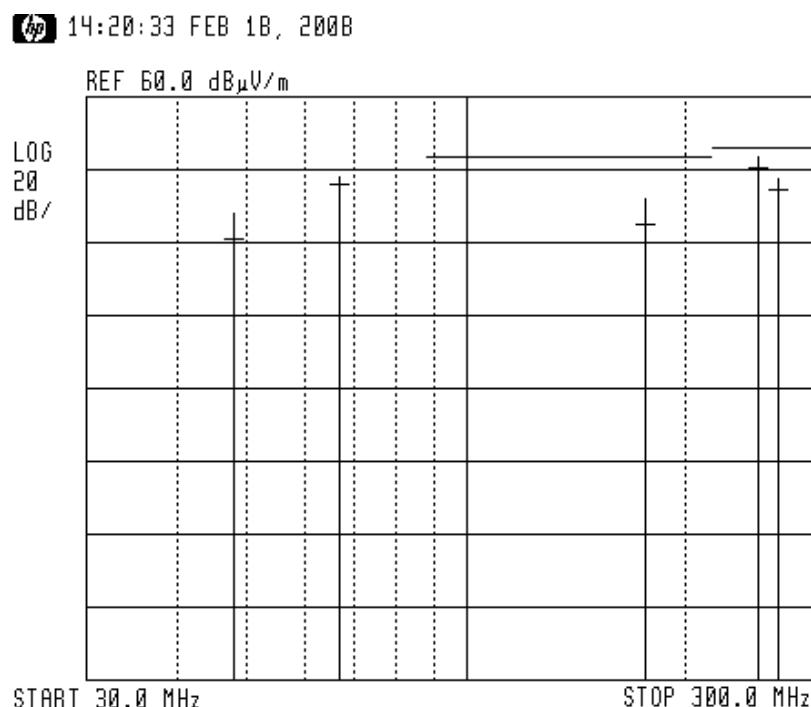
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



**Figure 215. 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.

Radiated Emission

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

Figure 216. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

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

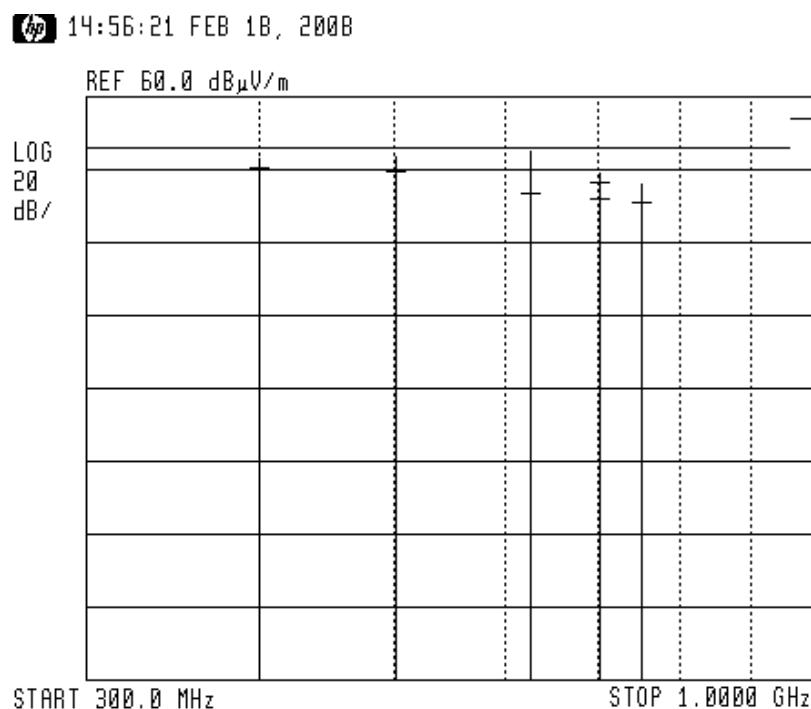
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



**Figure 217. 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.

13.4 Test Instrumentation Used, Radiated Measurements

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



13.5 **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.

14. Spurious Radiated Emission in the Restricted Band, Below 1 GHz 5GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

14.1 ***Test Specification***

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

14.2 ***Test Procedure***

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

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

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

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

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

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

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

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

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

Turning the E.U.T on and off.

Using a frequency span less than 10 MHz.

Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T. was tested at the operating frequencies of, 5180, 5200, 5240, 5745, 5765, and 5805 MHz using the following modulations:,64QAM, and BPSK.



14.3 **Test Data**

JUDGEMENT: Passed by 1.5 dB.

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

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

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

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

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

Figure 218. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

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

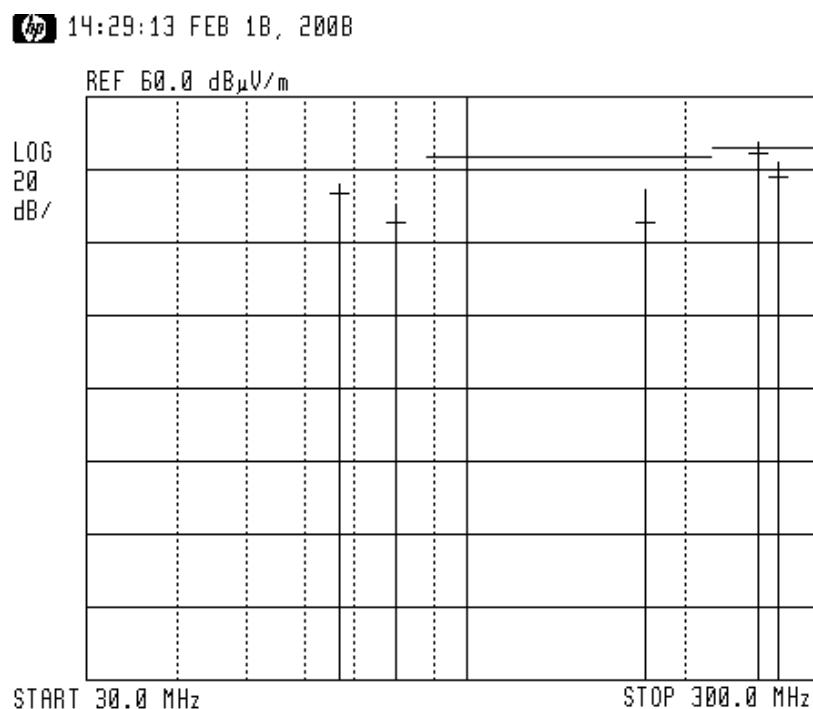
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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



**Figure 219. 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 WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

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

Figure 220. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

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

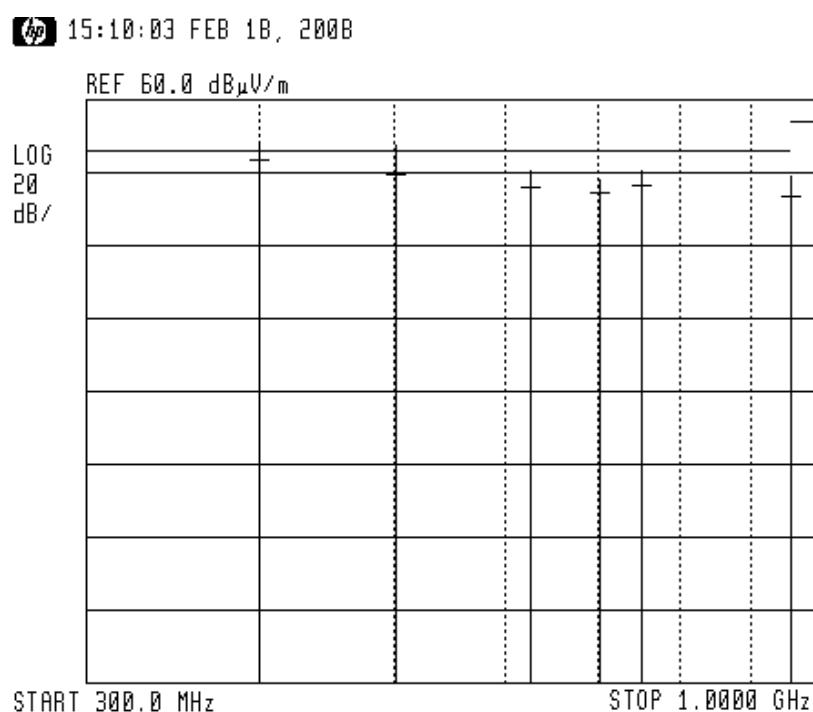
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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



**Figure 221. 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 WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

Figure 222. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

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

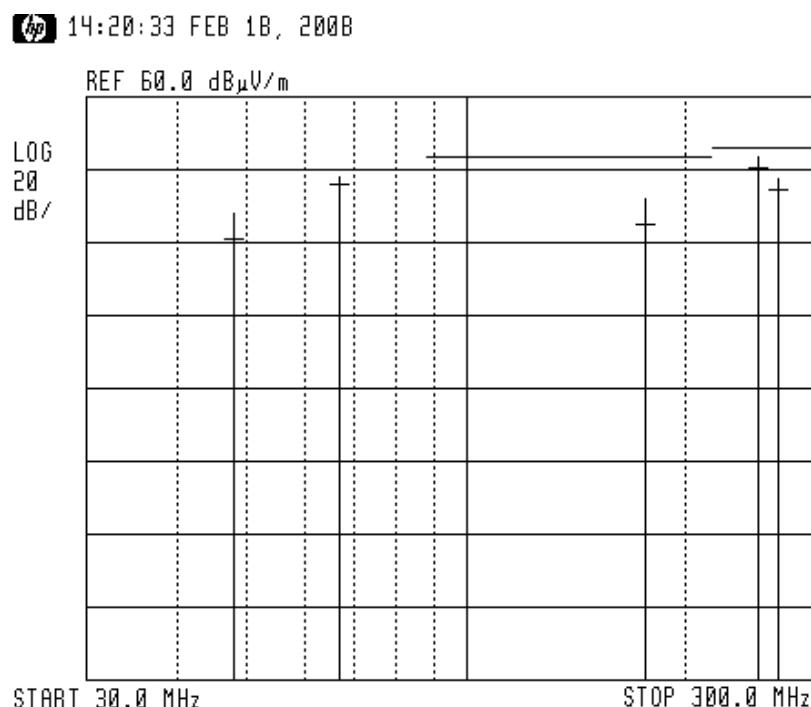
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



**Figure 223. 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.

Radiated Emission

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

Figure 224. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

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

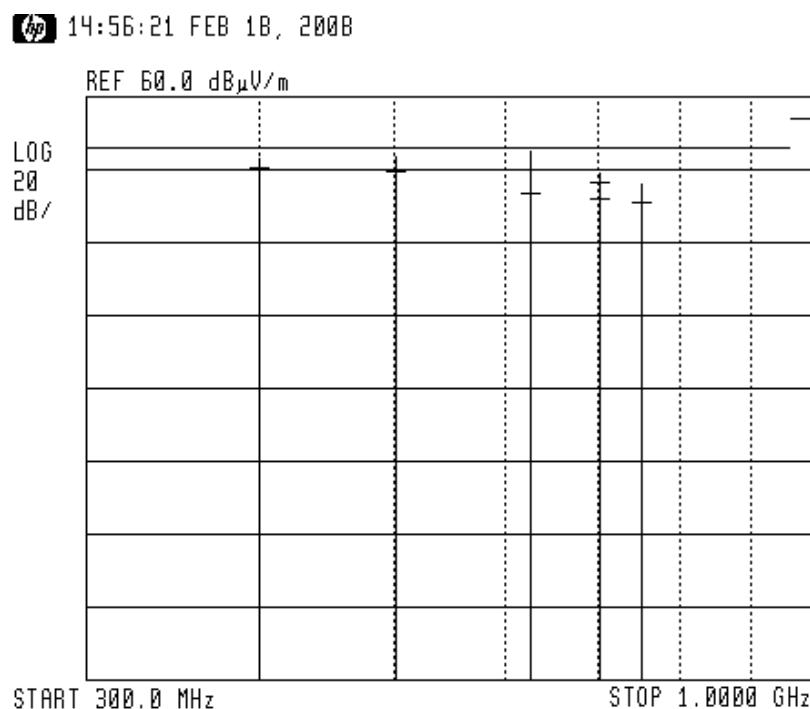
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart C

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



**Figure 225. 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.

14.4 ***Test Instrumentation Used, Radiated Measurements***

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



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:

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

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 5GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

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 3.1.

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

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

In the frequency range 2.9-40.0 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 tested at the operating frequencies of, 5180, 5200, 5240, 5745, 5765, and 5805 MHz using the following modulations: 64QAM, and BPSK.

15.2 **Test Data**

JUDGEMENT: Passed by 0.9 dB

For the operating frequencies of 5180, 5200, and 5240, the signals in the frequency range of 1.0 – 40.0 GHz were more than 20 dB below the specification limit.

For the operation frequency of 5745 MHz, the margin between the emission level and the specification limit is 1.0 dB in the worst case at the frequency of 11490.00 MHz, polarization.

For the operation frequency of 5765 MHz, the margin between the emission level and the specification limit is 0.9 dB in the worst case at the frequency of 11530.00 MHz, polarization.

For the operation frequency of 5805 MHz, the margin between the emission level and the specification limit is 1.6 dB in the worst case at the frequency of 11610.00 MHz, polarization.

The results for all modulations were the same.

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

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: E. Pitt

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 5745 MHz

Freq. (MHz)	Polarity (H/V)	Peak Amp (dB μ V/m)	Peak. Specification (dB μ V/m)	Peak. Margin (dB)
11490.00	H	64.3*	74.0	-9.7
11490.00	V	64.4*	74.0	-9.6

Figure 226. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

“Peak Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 5745 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11490.00	H	52.7*	54.0	-1.3
11490.00	V	53.0*	54.0	-1.0

Figure 227. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

“Average Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type: 860M With WCE
 Serial Number:
 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 5765 MHz

Freq. (MHz)	Polarity (H/V)	Peak Amp (dB μ V/m)	Peak. Specification (dB μ V/m)	Peak. Margin (dB)
11530.00	H	64.3*	74.0	-9.7
11530.00	V	62.7*	74.0	-11.3

Figure 228. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

“Peak Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 5765 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11530.00	H	53.1*	54.0	-0.9
11530.00	V	53.0*	54.0	1.0

Figure 229. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

“Average Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 5805 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11610.00	H	63.6*	74.0	-10.4
11610.00	V	65.4*	74.0	-8.6

Figure 230. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

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

“Peak Amp” includes correction factor.

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

Radiated Emission Above 1 GHz

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 40.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 5805 MHz

Freq.	Polarity	Average Amp	Average Specification	Peak Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
11610.00	H	52.0*	54.0	-2.0
11610.00	V	52.4*	54.0	-1.6

Figure 231. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

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

“Average Amp” includes correction factor.

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

15.3 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	November 12, 2007	1 year
RF Section	HP	85420E	3427A00103	November 12, 2007	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 year
Horn Antenna	Narda	V637	0410	December 8, 2006	2 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2007	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2008	1 year
Low Noise Amplifier	MK Milliwave	MKT6-3000 400-30-13P	399	January 9, 2008	1 year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Spectrum Analyzer	HP	8546E	3442A00275	November 14, 2007	1 year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

16. 26 dB Bandwidth 5 GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

16.1 *Test procedure*

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 300 kHz resolution BW. The spectrum bandwidth of the E.U.T. was measured and recorded.

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

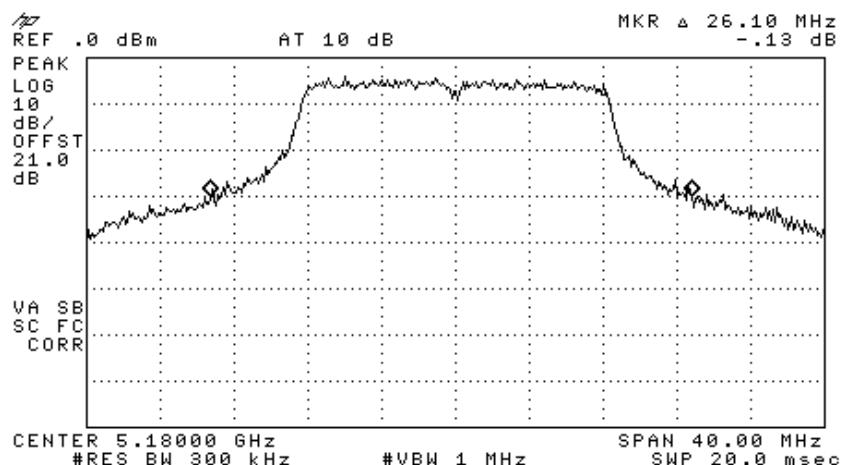


Figure 232 — 5180 MHz 64QAM

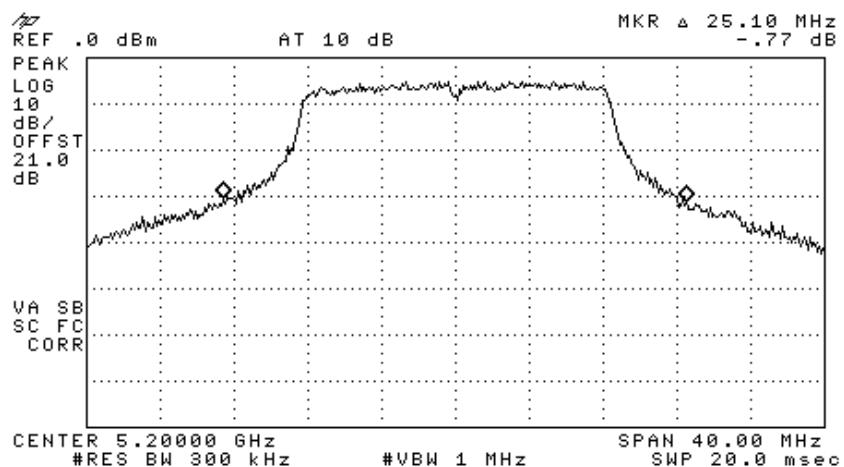


Figure 233 —5200 MHZ 64QAM

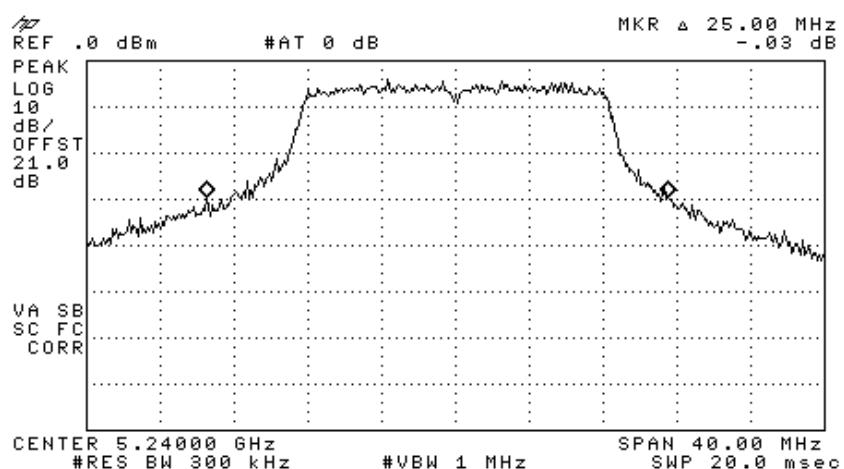


Figure 234 —5240 MHZ 64QAM

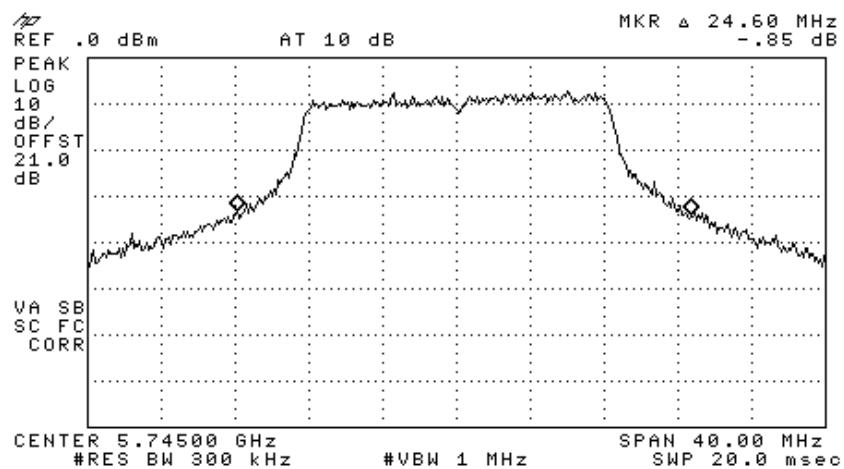


Figure 235 —5745 MHz 64QAM

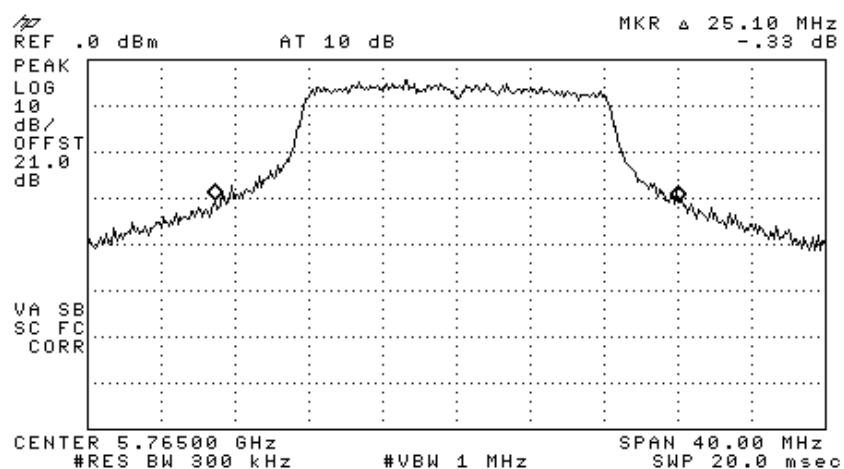


Figure 236 —5765 MHz 64QAM

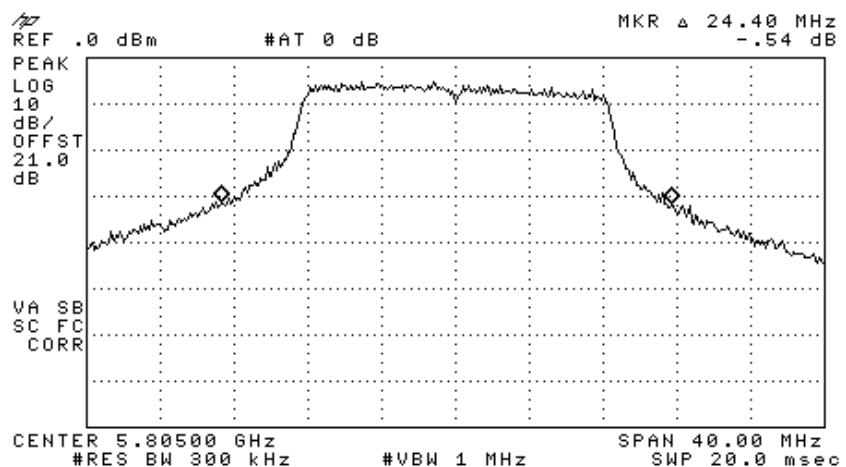


Figure 237 —5805 MHZ 64QAM

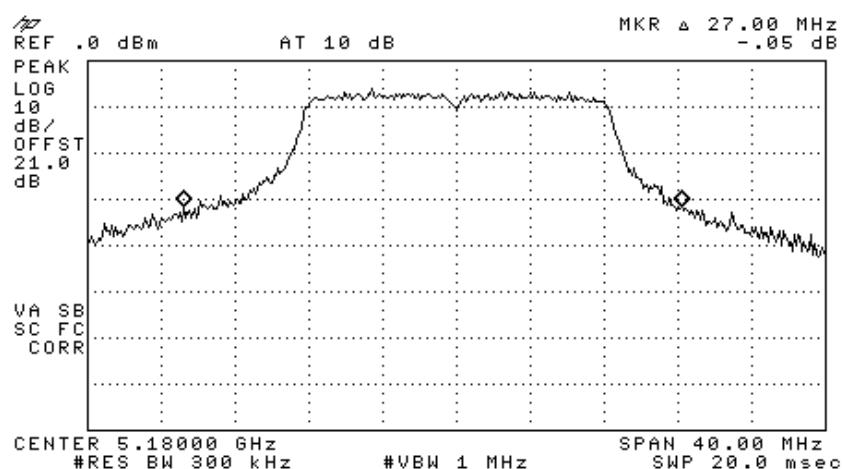


Figure 238 —5180 MHz BPSK

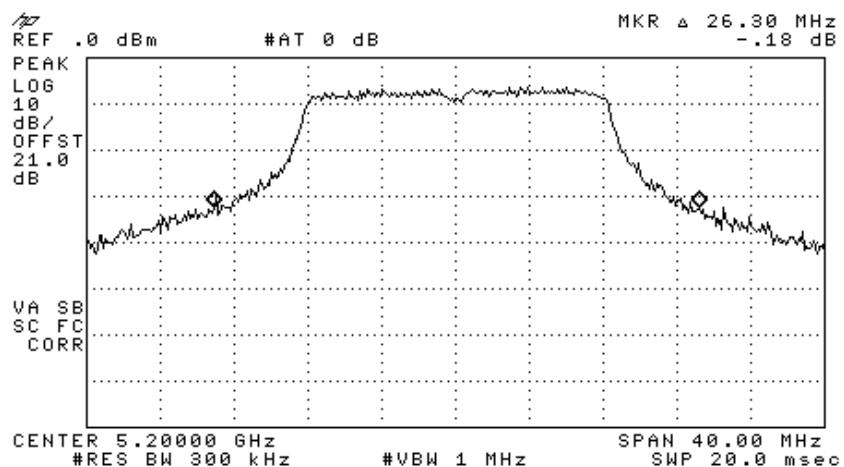


Figure 239 —5200 MHZ BPSK

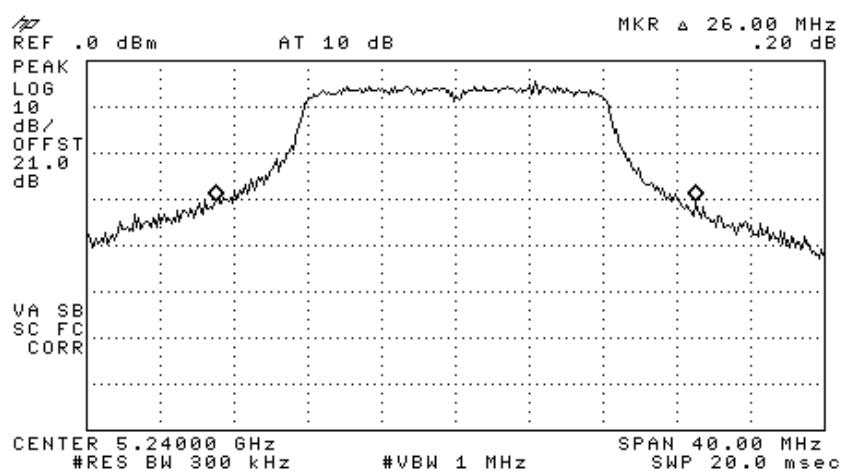


Figure 240 —5240 MHZ BPSK

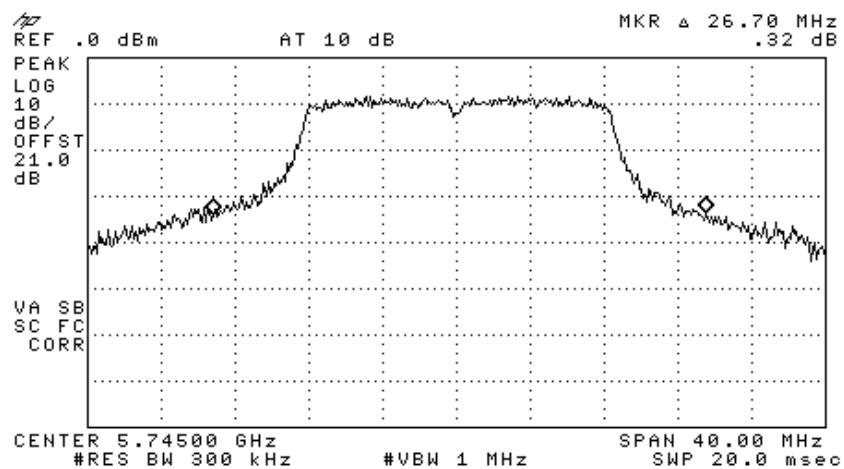


Figure 241 —5745 MHz BPSK

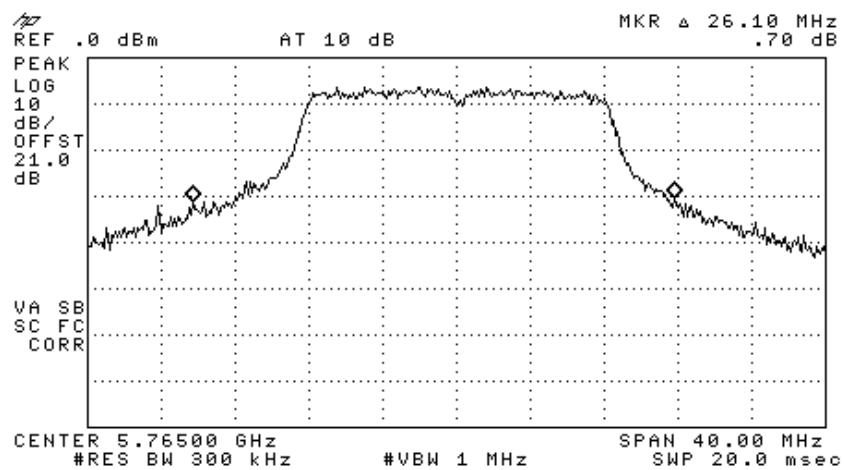


Figure 242 —5765 MHz BPSK

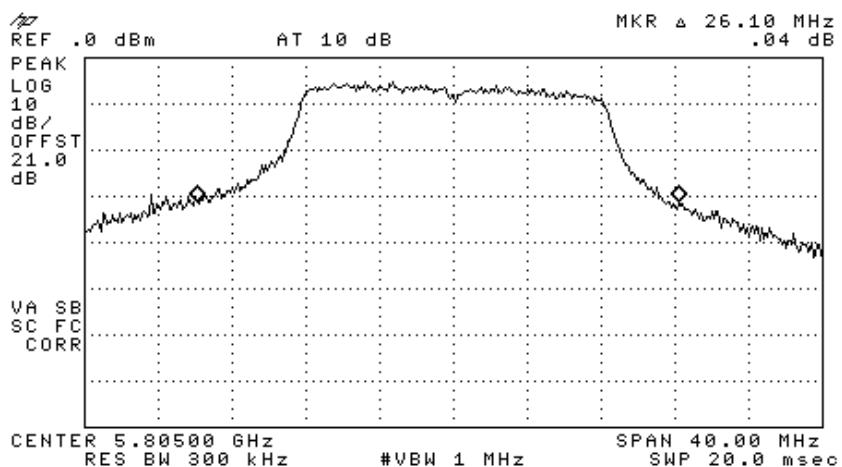


Figure 243 —5805 MHZ BPSK

Operation Frequency (MHz)	Modulation	26 dB Bandwidth (dBm)
5180	64QAM	26.10
	BPSK	27.00
5200	64QAM	25.10
	BPSK	26.30
5240	64QAM	25.00
	BPSK	26.00
5745	64QAM	24.60
	BPSK	26.70
5765	64QAM	25.10
	BPSK	26.10
5805	64QAM	24.40
	BPSK	26.10

TEST PERSONNEL:

Tester Signature: *E. Pitt*

Date: 21.02.08

Typed/Printed Name: E. Pitt

16.2 **Test Equipment Used.**

26 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year
Cable	Rhophase	KPS-1501-1000	A1675	February 8, 2008	1 year

Figure 244 Test Equipment Used

17. Maximum Conducted Output Power 5 GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

17.1 *Test procedure*

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (Cable Loss = 1 dB). The Spectrum Analyzer was set to 1.0 MHz resolution BW. Sample detector and maximum hold were used.

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

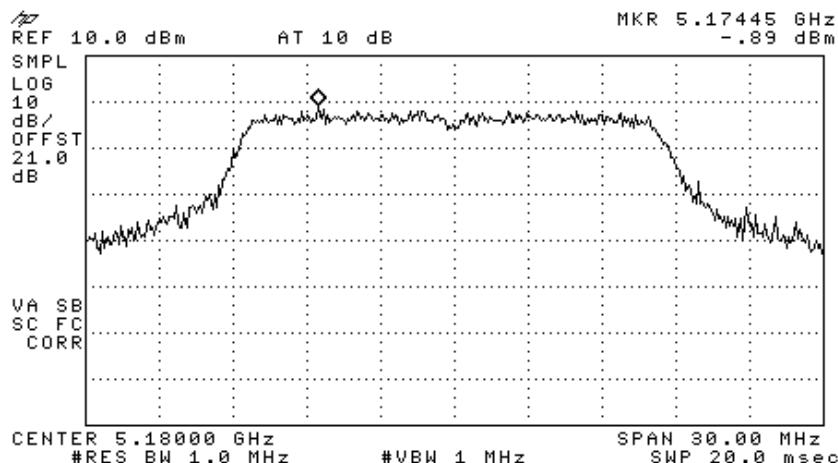


Figure 245 5180 MHz 64QAM

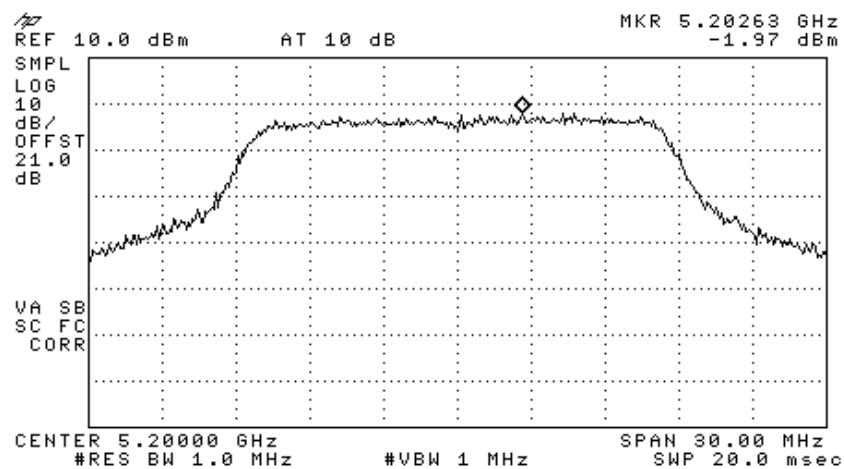


Figure 246 5200 MHz 64QAM

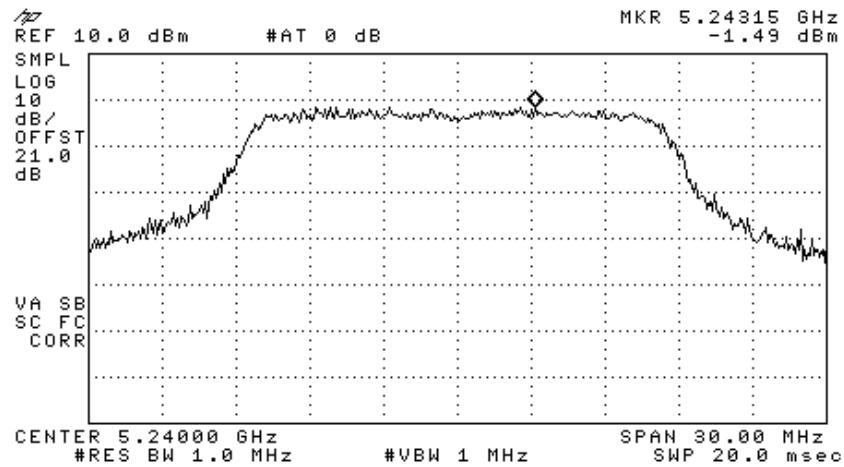


Figure 247 5240 MHz 64QAM

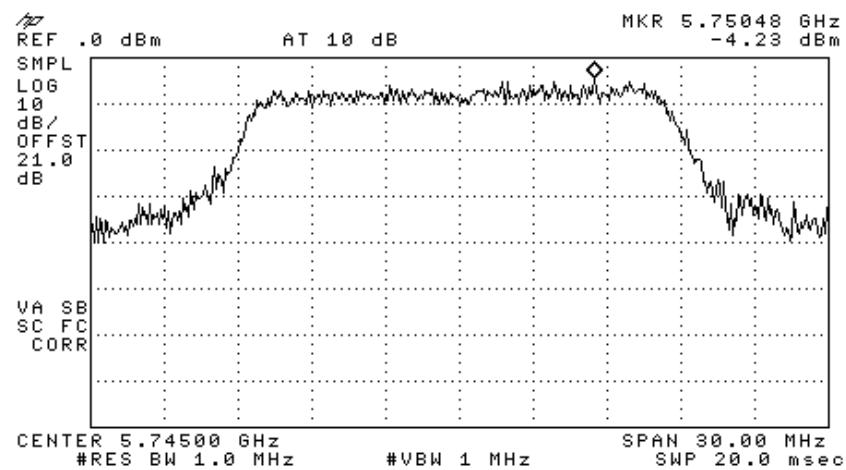


Figure 248 5745 MHz 64QAM

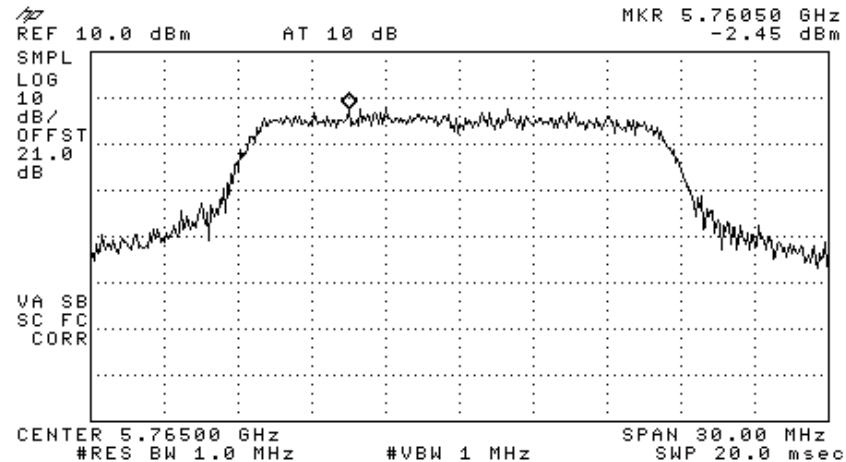


Figure 249 5765 MHz 64QAM

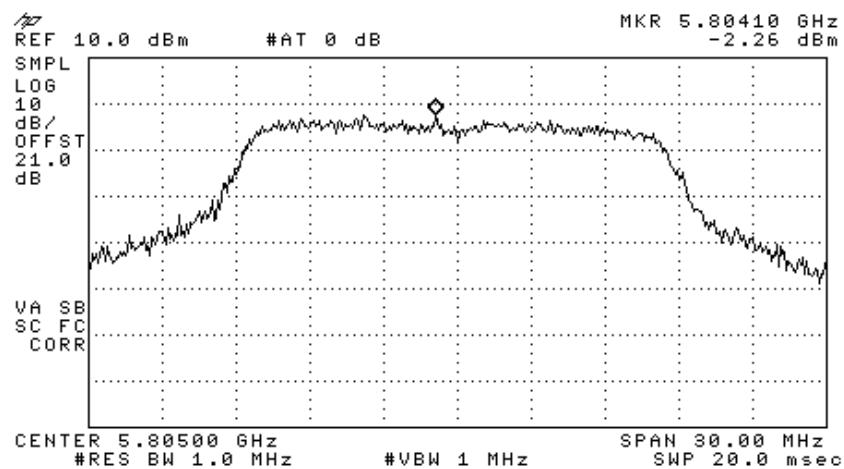


Figure 250 5805 MHz 64QAM

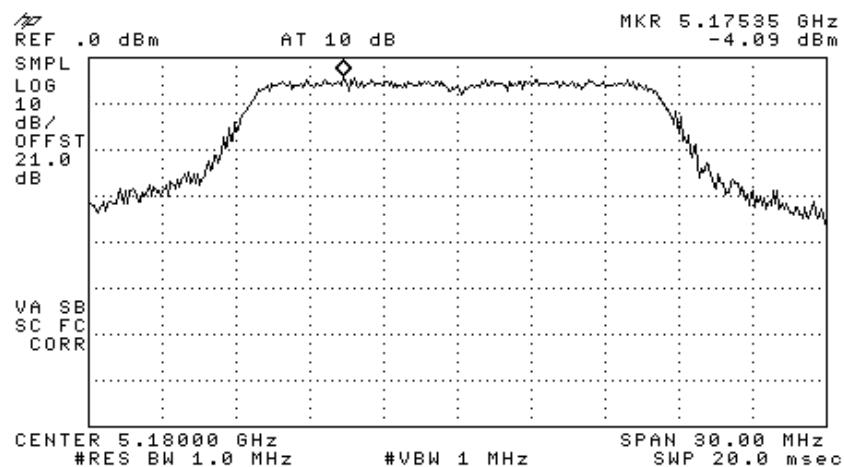


Figure 251 5180 MHz BPSK

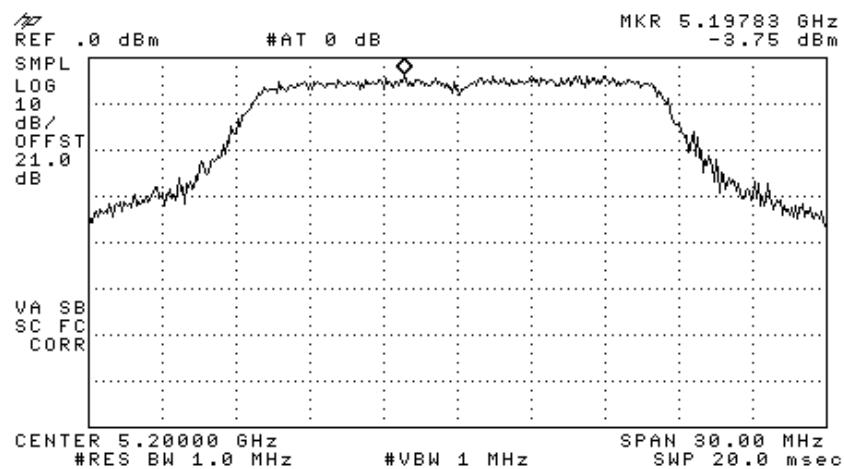


Figure 252 5200 MHz BPSK

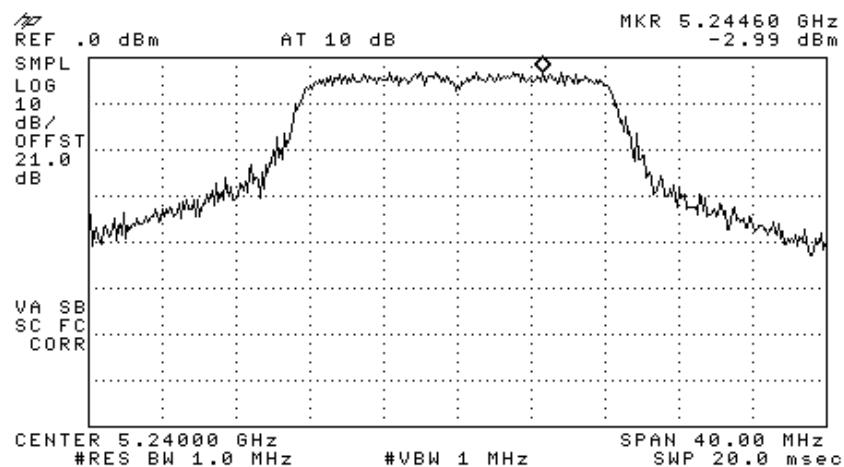


Figure 253 5240 MHz BPSK

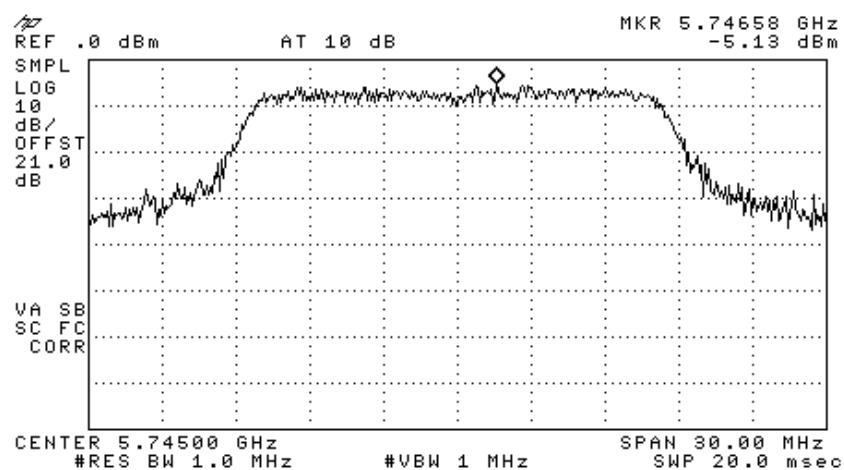


Figure 254 5745 MHz BPSK

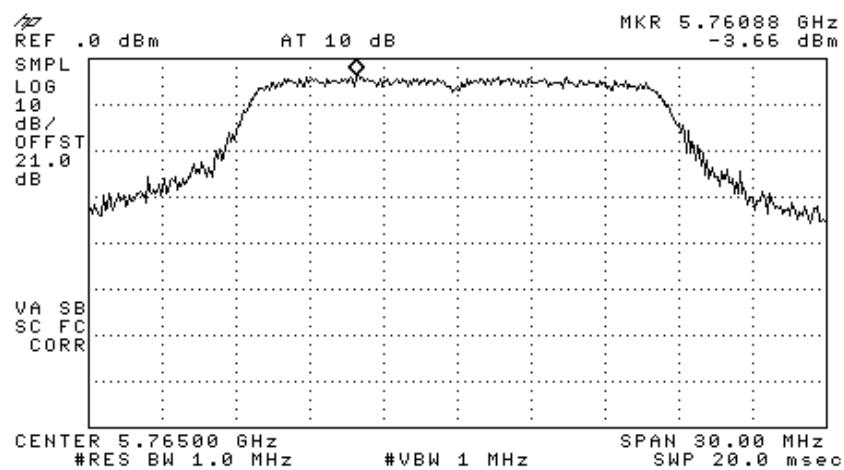


Figure 255 5765 MHz BPSK

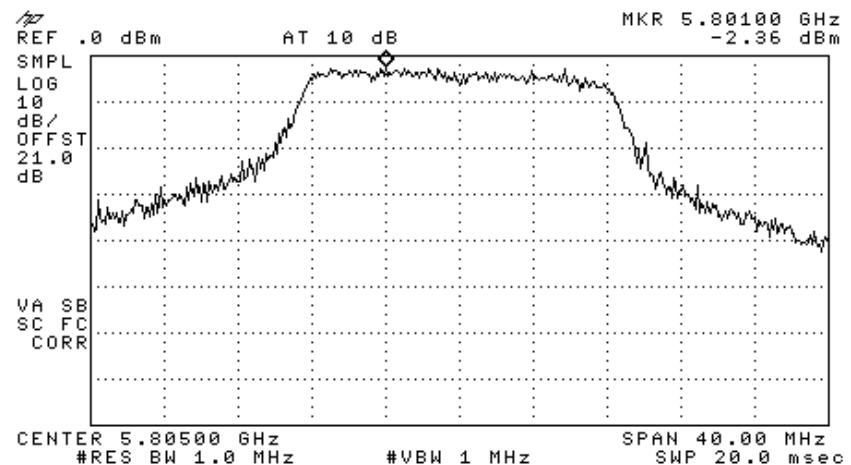


Figure 256 5805 MHz BPSK

17.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

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

Operation Frequency (MHz)	Modulation	Power (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	13.28	16.0	-2.72
	BPSK	10.22	16.0	-5.78
5200	64QAM	12.0	16.0	-4.00
	BPSK	10.45	16.0	-5.55
5240	64QAM	12.5	16.0	-3.50
	BPSK	11.2	16.0	-4.80
5745	64QAM	9.67	29.0	-19.33
	BPSK	9.14	29.0	-19.86
5765	64QAM	11.55	29.0	-17.45
	BPSK	10.5	29.0	-18.50
5805	64QAM	11.61	29.0	-17.39
	BPSK	11.8	29.0	-17.20

Figure 257 Maximum Peak Power Output

Note: Antenna Gain is 7 dBi

Peak Output Power = Reading + $10\log_{10} EBW$

For 5.18; 5.20, 5.24 GHz Peak Output Power Limit = $4 + 10\log_{10} EBW - (\text{Antenna Gain} - 6)$ or 16 whichever is less.

For 5.745; 5.765, 5.805 GHz Peak Output Power Limit = $17 + 10\log_{10} EBW - (\text{Antenna Gain} - 6)$ or 29 whichever is less.

JUDGEMENT: Passed by 2.72 dB

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: E. Pitt

17.3 Test Equipment Used.

Peak Power Output

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

Figure 258 Test Equipment Used

18. Peak Power Spectral Density 5GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

[In accordance with section 15.407(a)]

18.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (Cable Loss = 1 dB). The spectrum analyzer was set to 1 MHz resolution BW. and 1 MHz video BW. The spectrum peaks were located at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

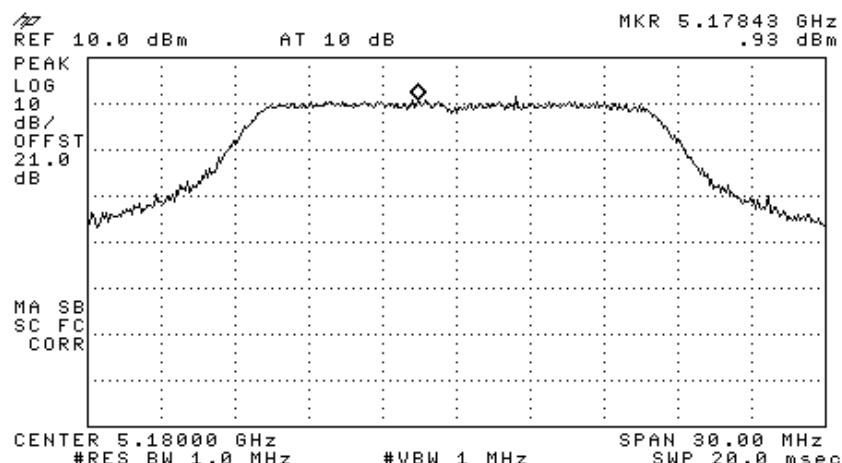


Figure 259 —5180 MHz 64QAM

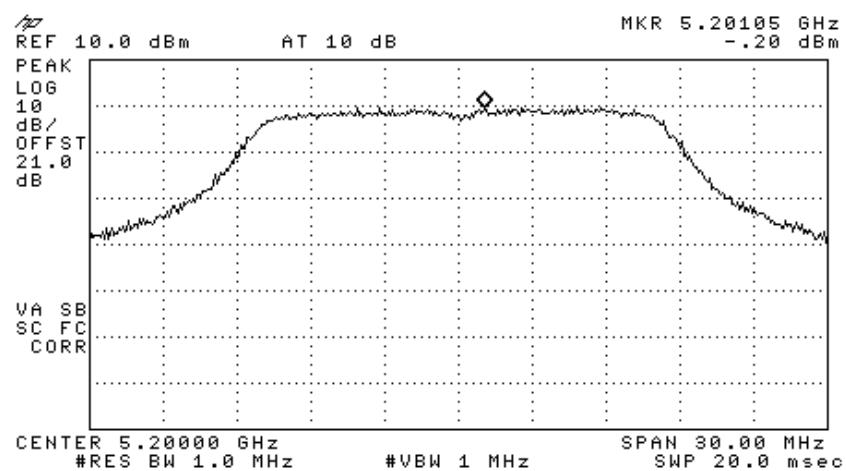


Figure 260 —5200 MHz 64QAM

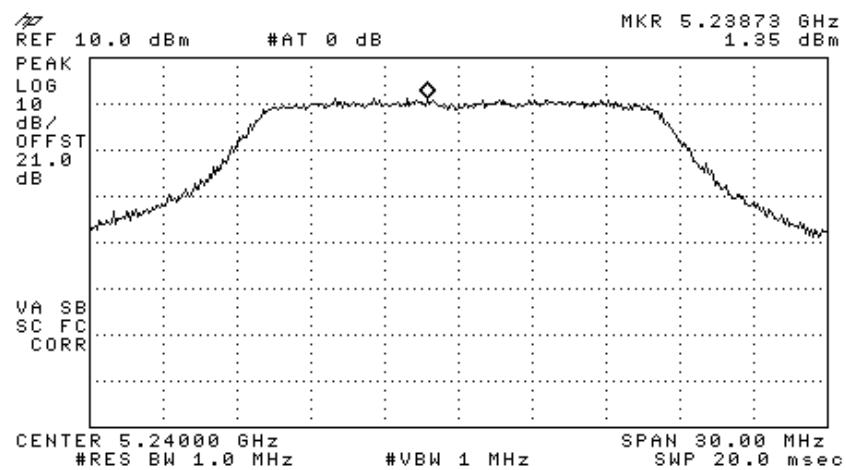


Figure 261 —5240 MHz 64QAM

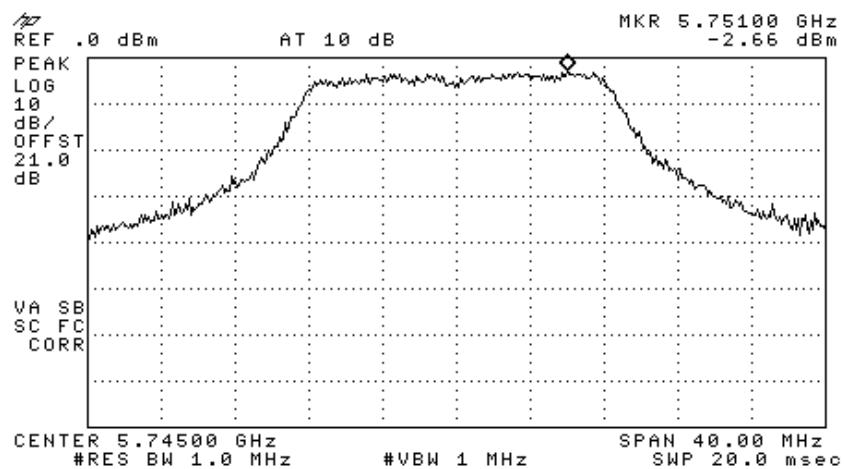


Figure 262 —5745 MHz 64QAM

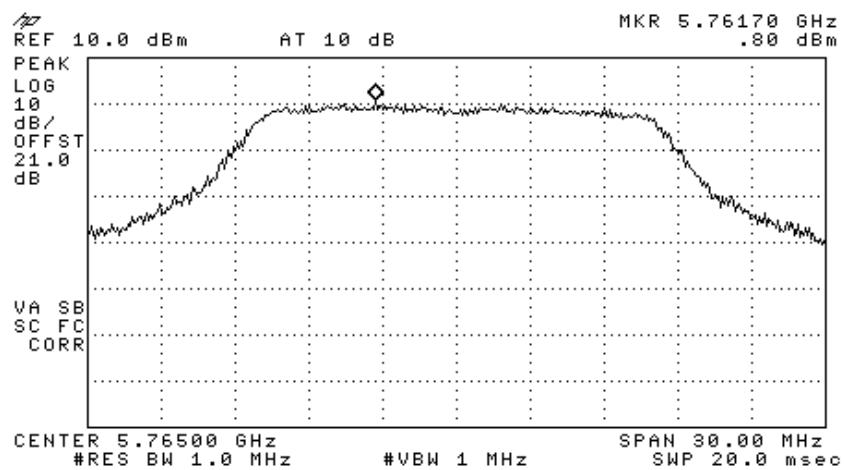


Figure 263 —5765 MHz 64QAM

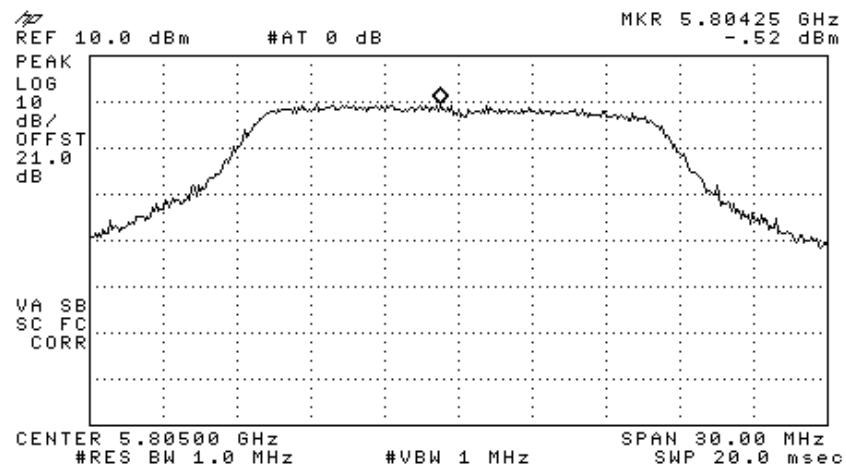


Figure 264 —5805 MHz 64QAM

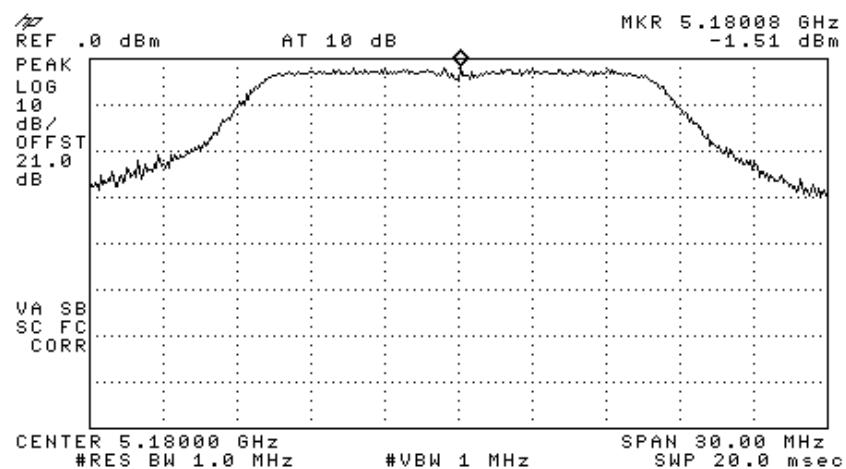


Figure 265 —5180 MHz BPSK

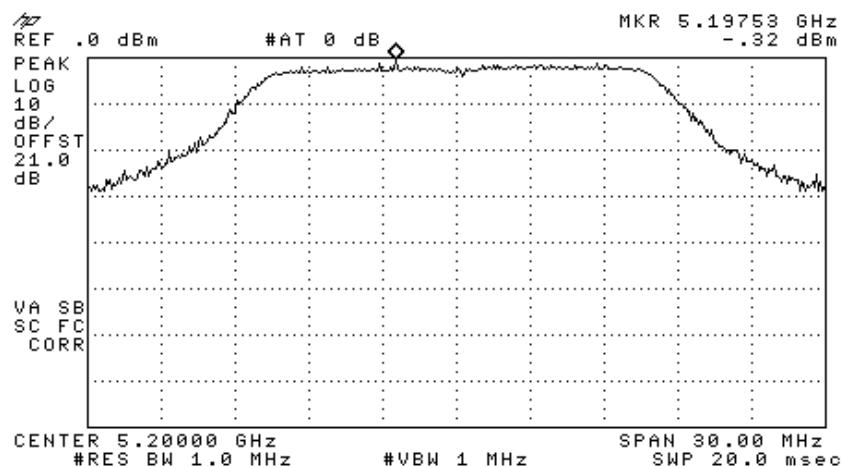


Figure 266 —5200 MHz BPSK

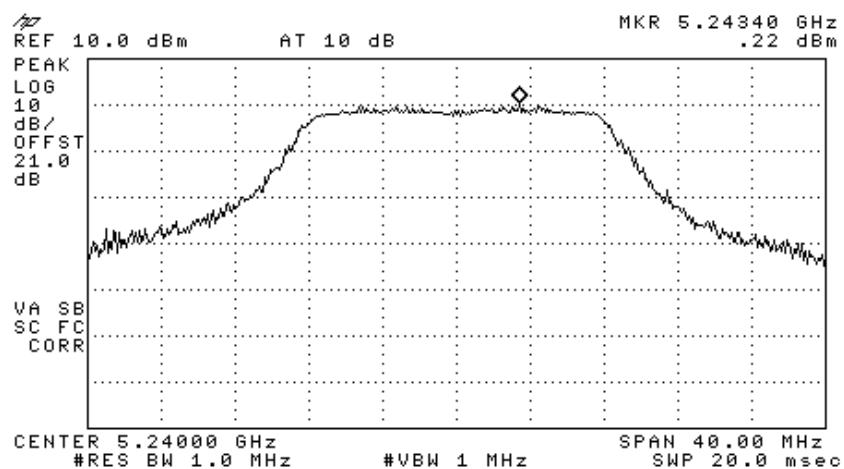


Figure 267 —5240 MHz BPSK

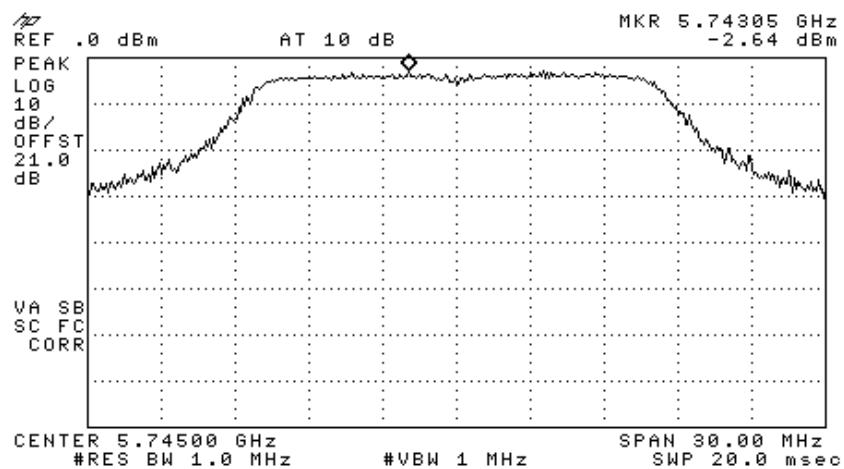


Figure 268 —5745 MHz BPSK

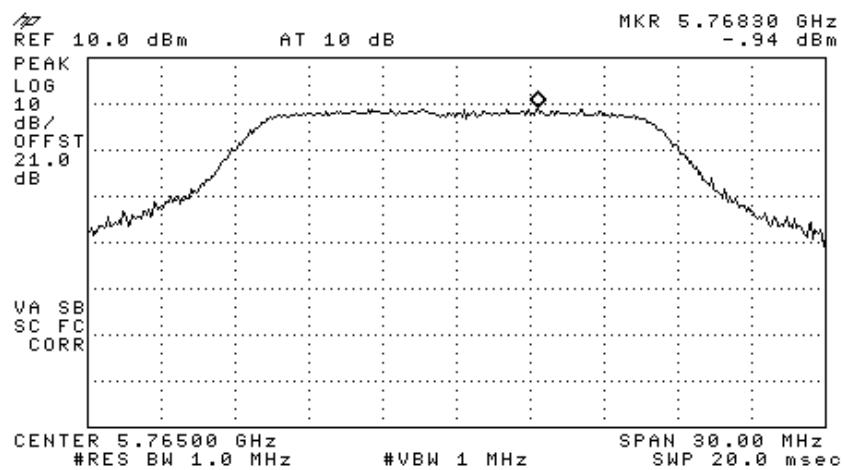


Figure 269 —5765 MHz BPSK

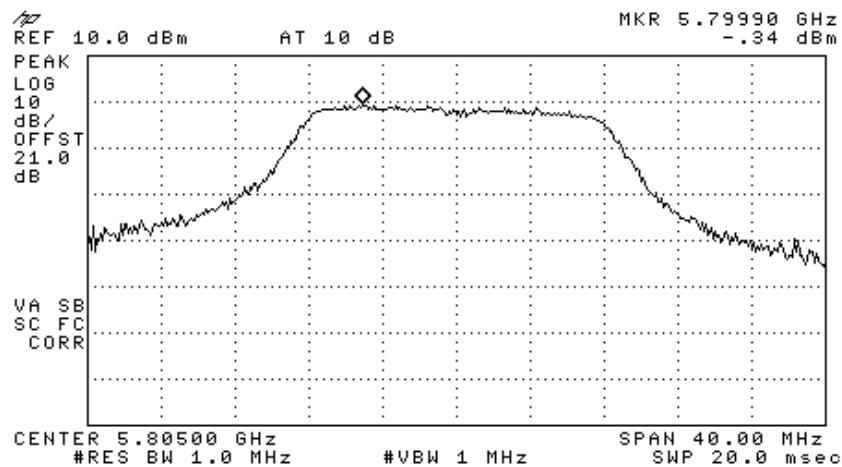


Figure 270 —5805 MHz BPSK

18.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Model No.: 860M With WCE
 Serial Number: 1. 860M: 73903D 2. WCE: 739038
 Specification: F.C.C. Part 15, Subpart E (15.407(a))

Operation Frequency (MHz)	Modulation	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	0.93	3	-2.07
	BPSK	1.51	3	-1.49
5200	64QAM	0.2	3	-2.80
	BPSK	0.32	3	-2.68
5240	64QAM	1.35	3	-1.65
	BPSK	0.22	3	-2.78
5745	64QAM	2.66	16	-13.34
	BPSK	2.64	16	-13.36
5765	64QAM	0.8	16	-15.20
	BPSK	0.94	16	-15.06
5805	64QAM	0.52	16	-15.48
	BPSK	0.34	16	-15.66

Figure 271 Test Results



JUDGEMENT: Passed by 1.49 dB

TEST PERSONNEL:

Tester Signature: Date: 21.02.08

Typed/Printed Name: E. Pitt

18.3 Test Equipment Used.

Peak Power Spectral Density

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

Figure 272 Test Equipment Used

19. Ratio of Peak Excursion of Modulation Envelope to Maximum Conducted Output Power 5GHz Transmitter

802.11b/g+802.11a + CELL + PCS Signals

[In accordance with section 15.407(a)(6)]

19.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20dB) and an appropriate coaxial cable (Cable Loss = 1 dB). The spectrum analyzer was set to 1 MHz resolution BW. and 1 MHz video BW.

Trace A: Sample Detector

Trace B: Peak Detector

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

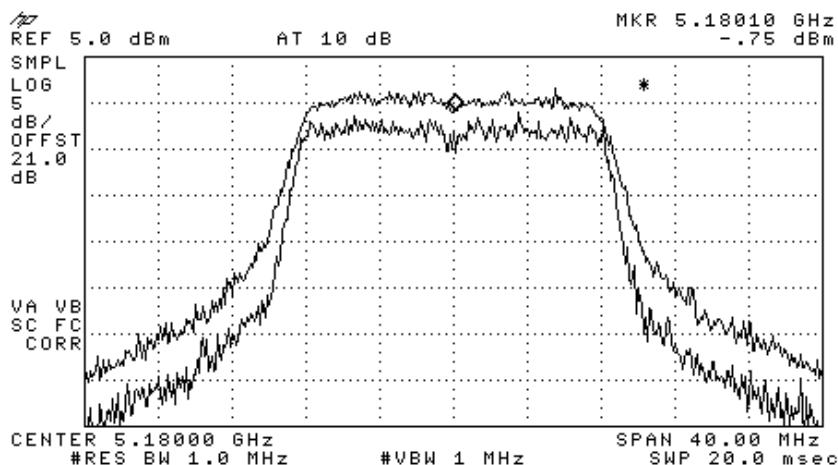


Figure 273 — 5180 MHz 64QAM

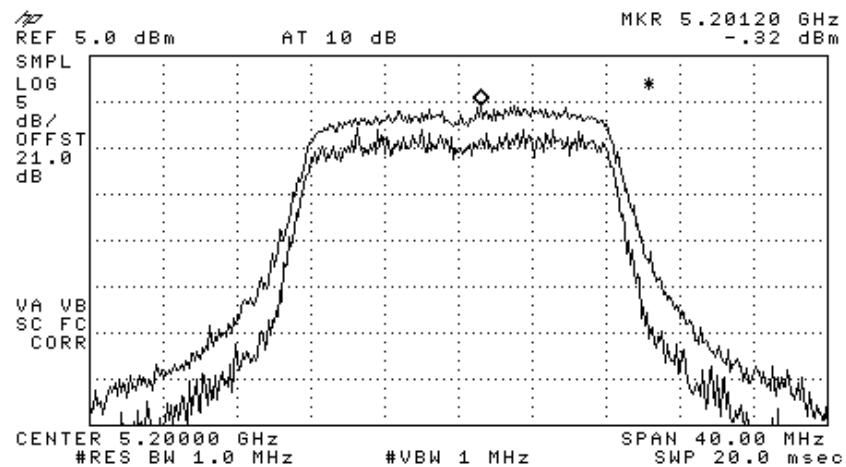


Figure 274 —5200 MHz 64QAM

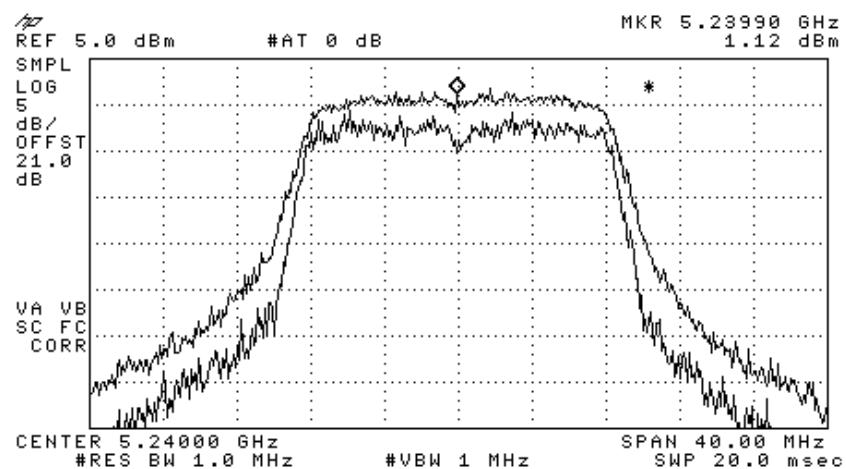


Figure 275 —5240 MHz 64QAM

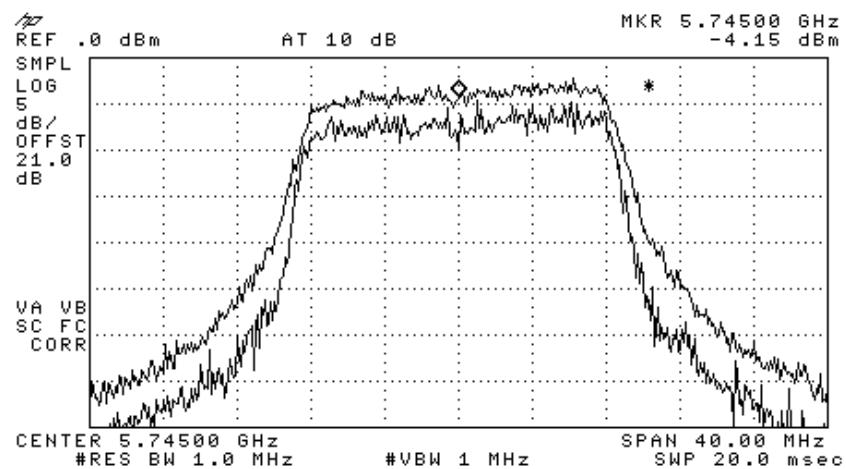


Figure 276 —5745 MHz 64QAM

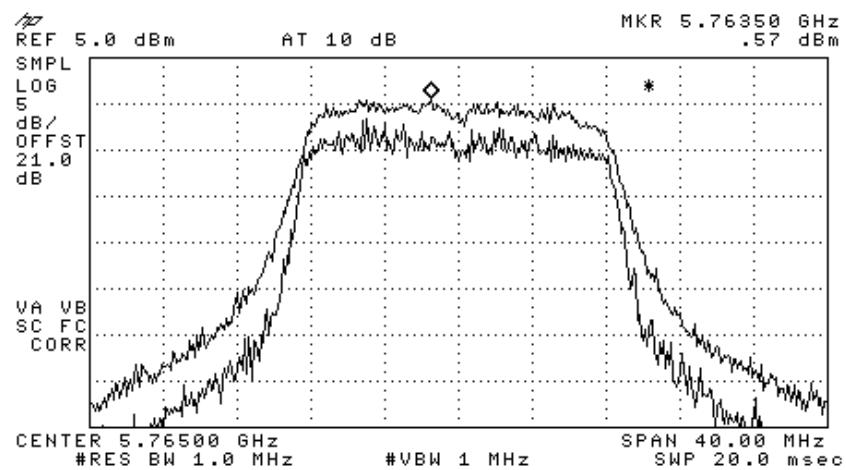


Figure 277 —5765 MHz 64QAM

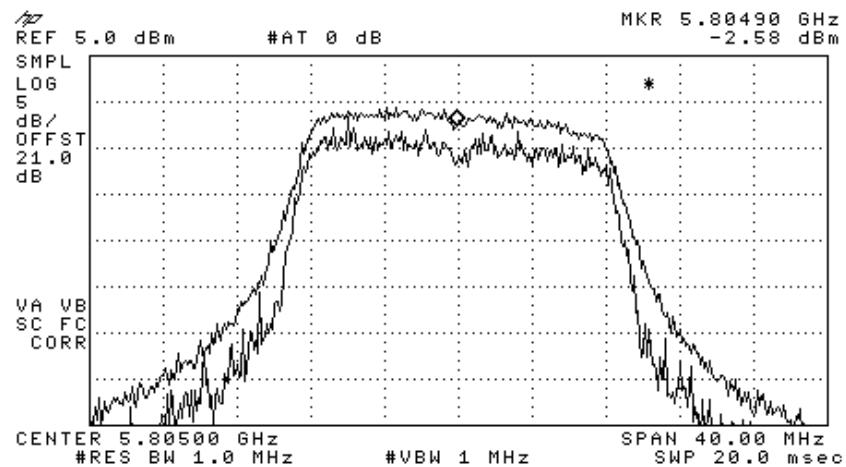


Figure 278 —5805 MHz 64QAM

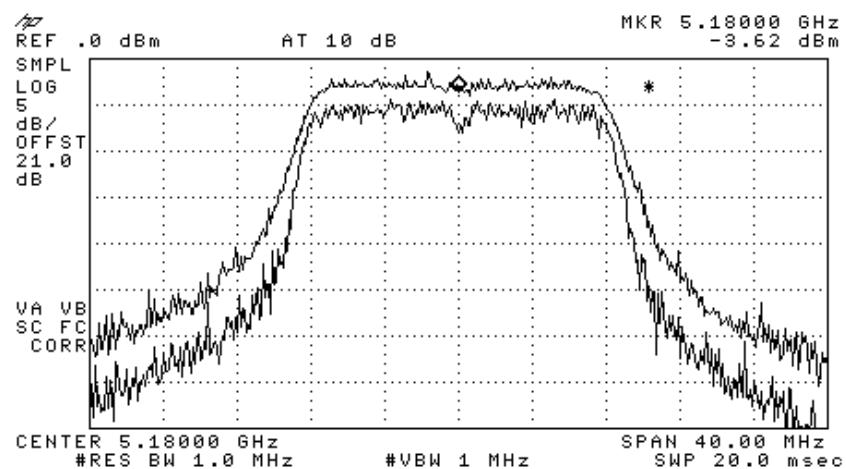


Figure 279 —5180 MHz BPSK

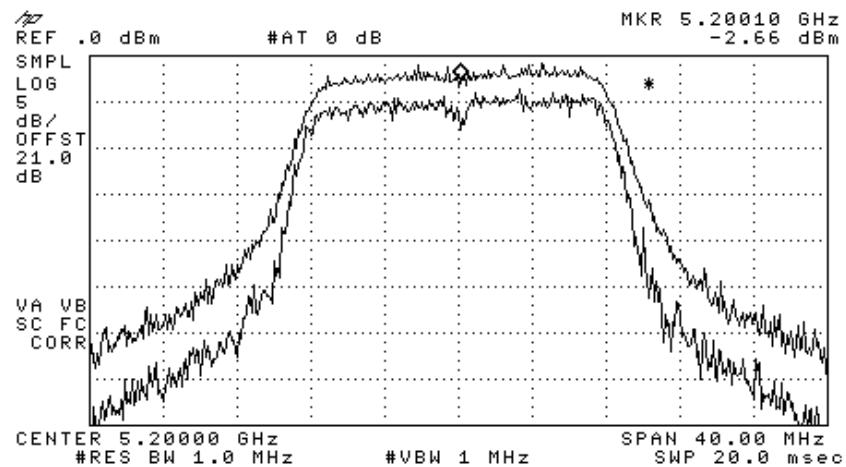


Figure 280 —5200 MHz BPSK

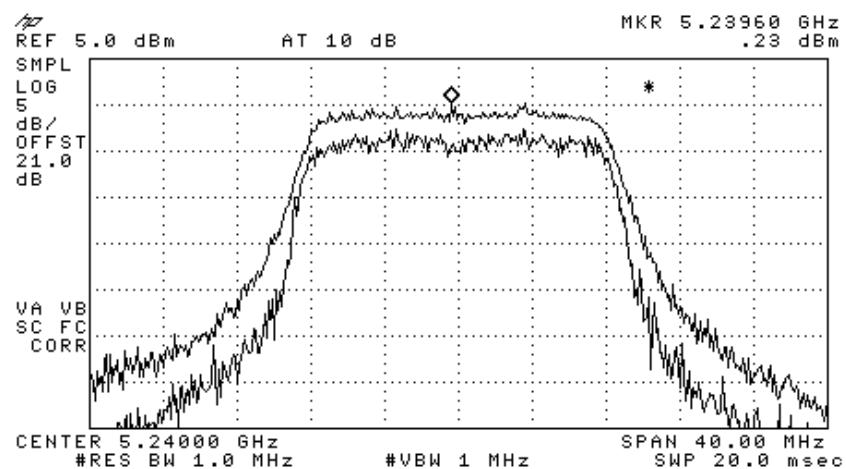


Figure 281 —5240 MHz BPSK

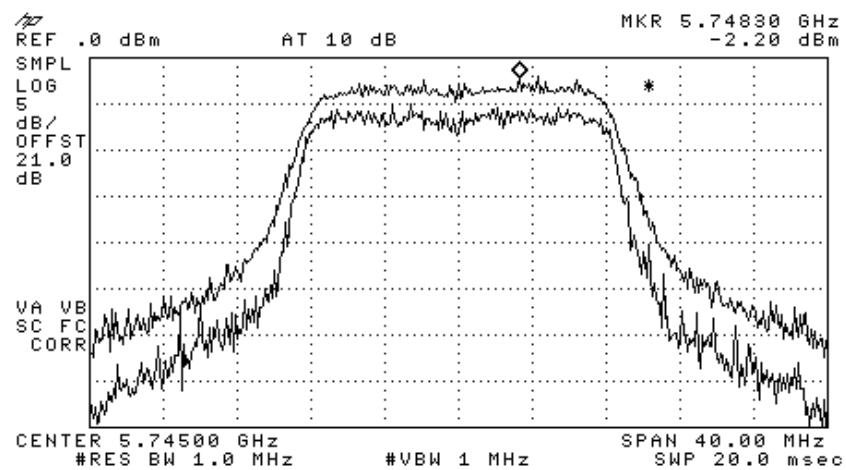


Figure 282 —5745 MHz BPSK

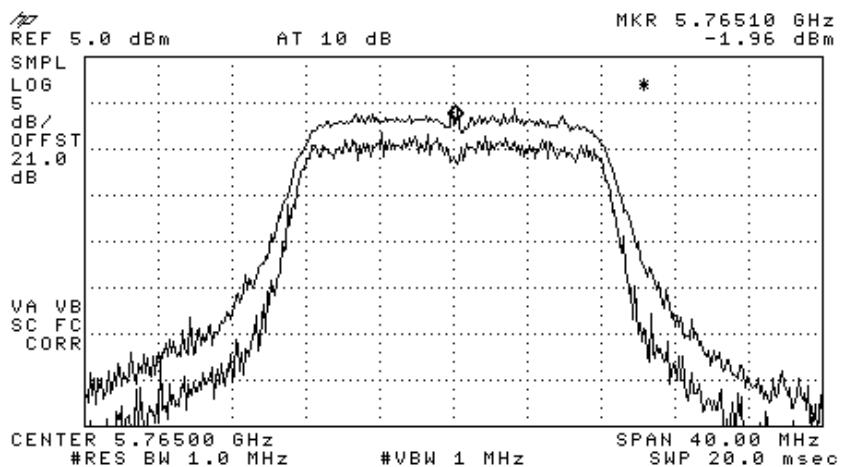


Figure 283 —5765 MHz BPSK

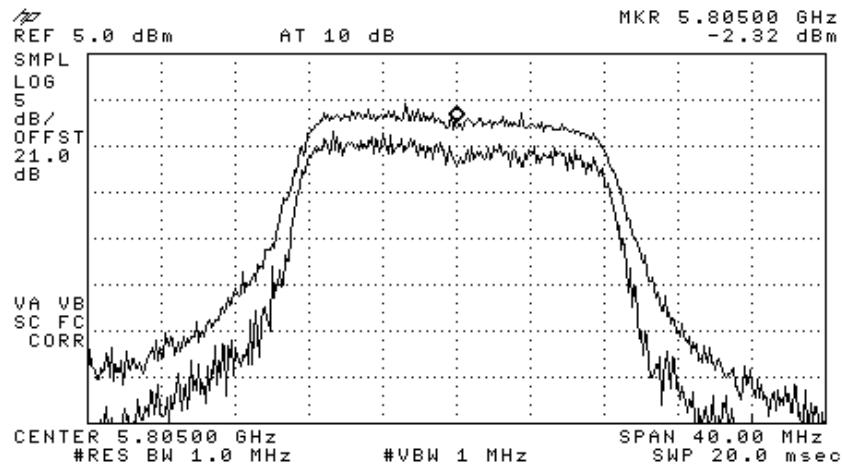


Figure 284 —5805 MHz BPSK

19.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Model No.: 860M With WCE
 Serial Number: 1. 860M: 73903D 2. WCE: 739038
 Specification: F.C.C. Part 15, Subpart E (15.407(a)(6))

Operation Frequency (MHz)	Modulation	Delta (dB)	Specification (dB)	Margin (dB)
5180	64QAM	4.7	13	-8.3
	BPSK	4.5	13	-8.5
5200	64QAM	3.9	13	-9.1
	BPSK	5.3	13	-7.7
5240	64QAM	6.3	13	-6.7
	BPSK	4.6	13	-8.4
5745	64QAM	5.6	13	-7.4
	BPSK	4.7	13	-8.3
5765	64QAM	4.1	13	-8.9
	BPSK	4.7	13	-8.3
5805	64QAM	4.2	13	-8.8
	BPSK	5.1	13	-7.9

Figure 285 Test Results



JUDGEMENT: Passed by 6.7 dB

TEST PERSONNEL:

Tester Signature: Date: 21.02.08

Typed/Printed Name: E. Pitt

19.3 *Test Equipment Used.*

Peak Power Spectral Density

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

Figure 286 Test Equipment Used

20. Peak Power Output Out of 5150-5250; 5725-5825 MHz Bands 5 GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

20.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an appropriate coaxial cable. The spectrum analyzer was set to 1 MHz resolution BW except for the frequency range 9 kHz-150 kHz where the RBW was set to 1kHz and the frequency range 150 kHz-10.0 MHz where the RBW was set to 10kHz. The frequency range from 9 kHz to 40 GHz was scanned. Level of spectrum components out of the 5150-5250; 5725-5825 MHz bands was measured at the selected operation frequencies.

The E.U.T. was tested at 5180, 5200, 5240, 5745, 5765, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

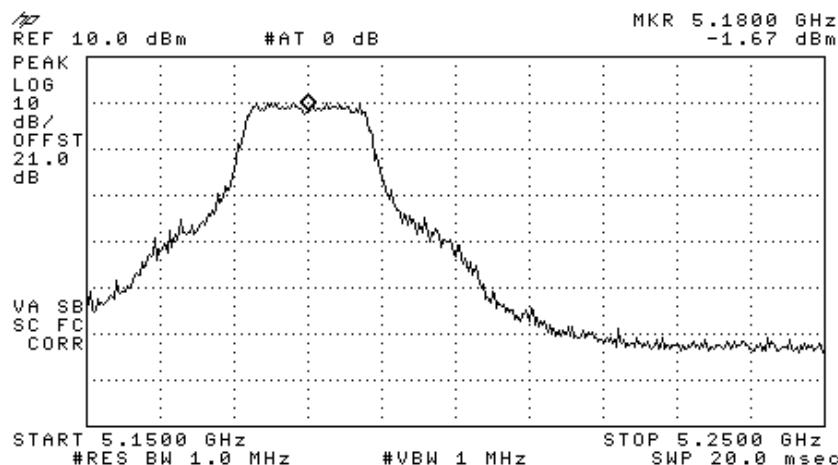


Figure 287 —5180 MHz 64QAM

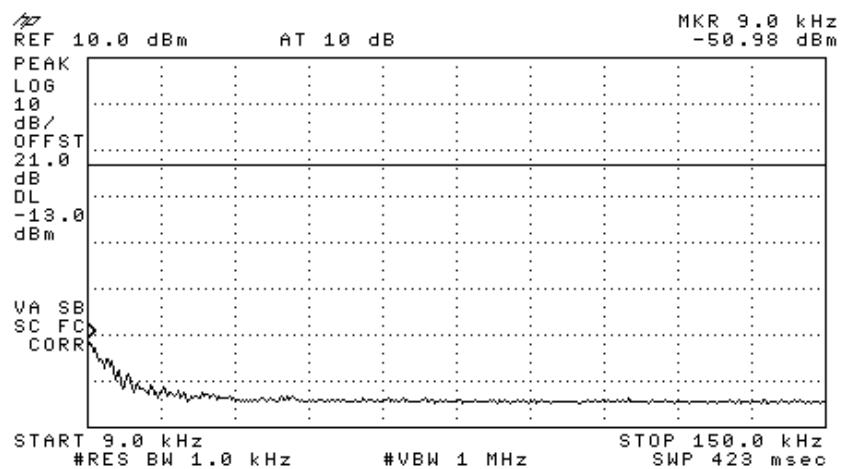


Figure 288 —5180 MHz 64QAM

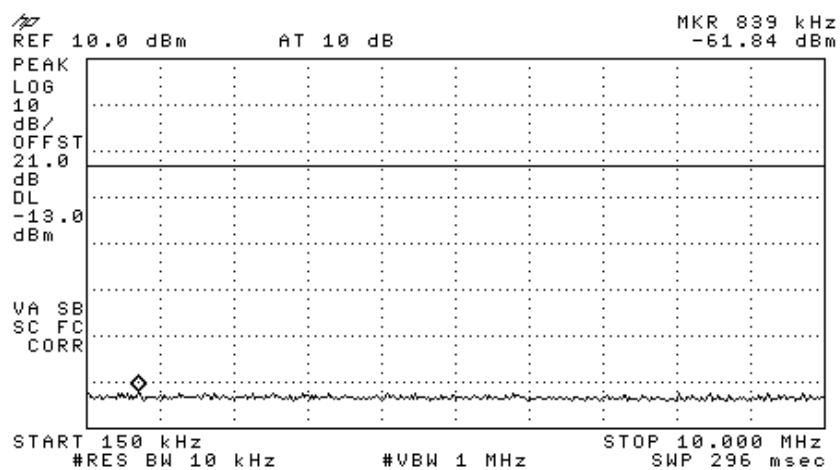


Figure 289 —5180 MHz 64QAM

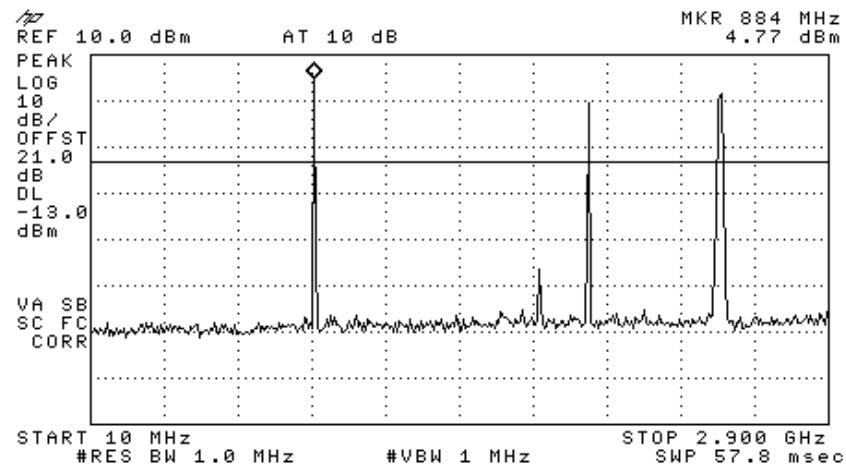


Figure 290 — 5180 MHz 64QAM

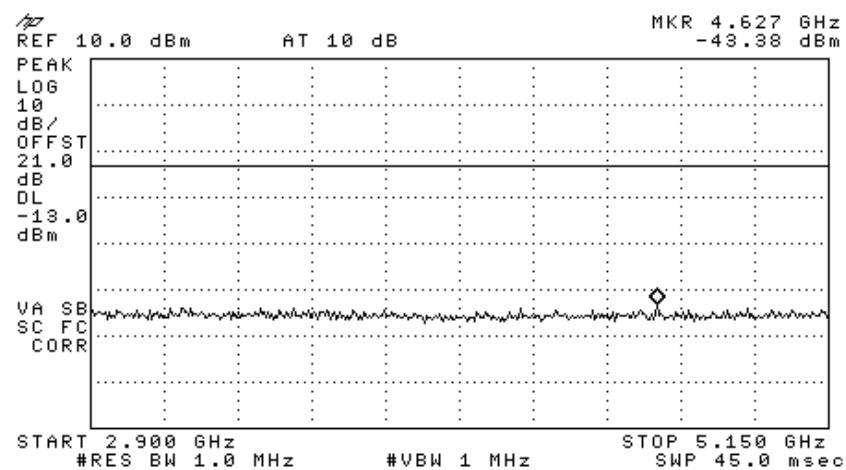


Figure 291 — 5180 MHz 64QAM

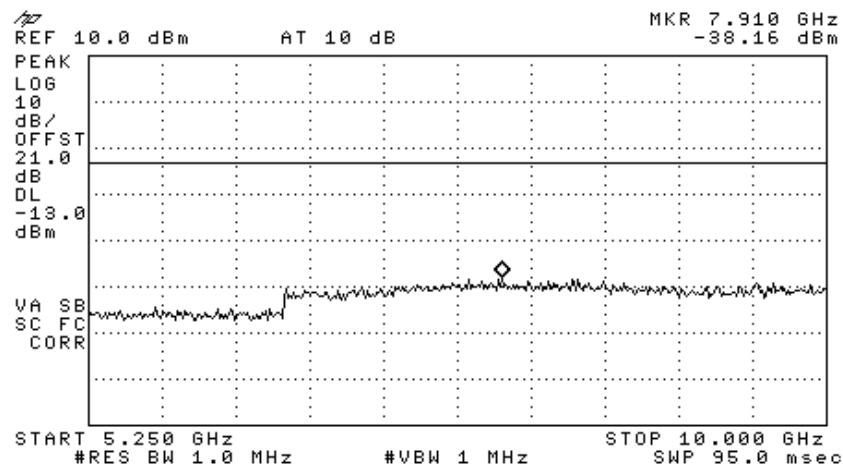


Figure 292 — 5180 MHz 64QAM

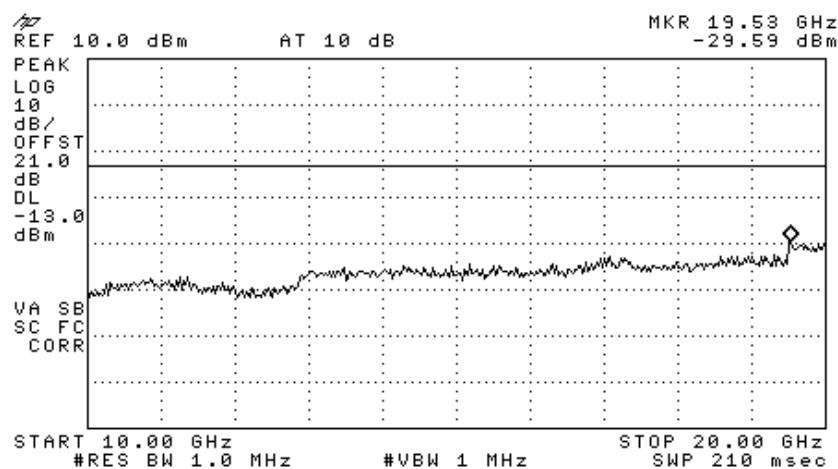


Figure 293 — 5180 MHz 64QAM

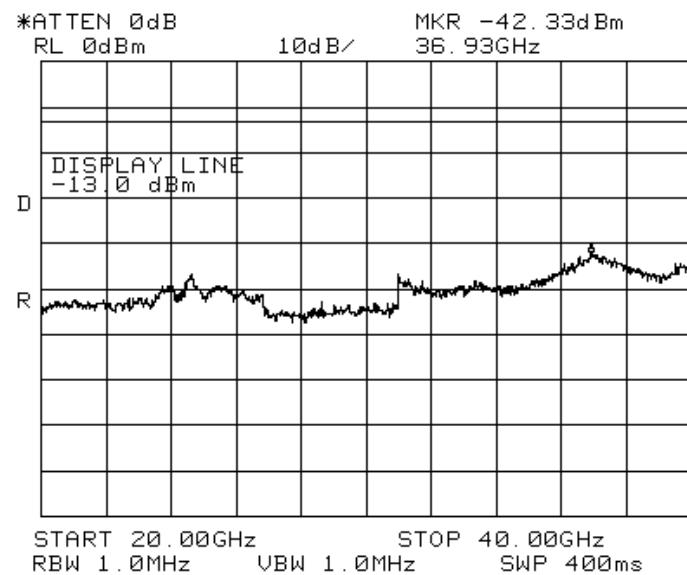


Figure 294 — 5180 MHz 64QAM

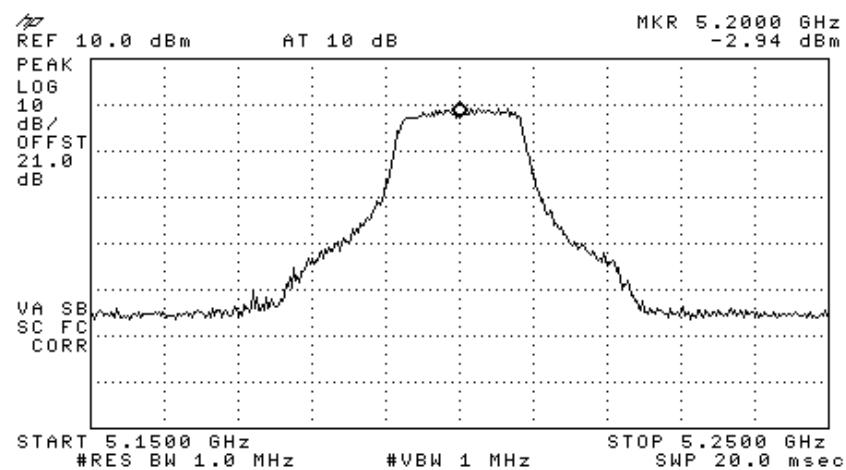


Figure 295 — 5200 MHz 64QAM

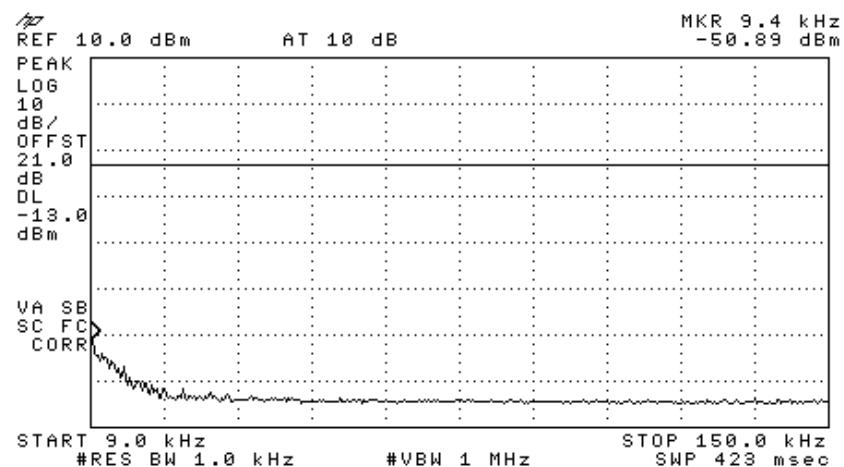


Figure 296 —5200 MHz 64QAM

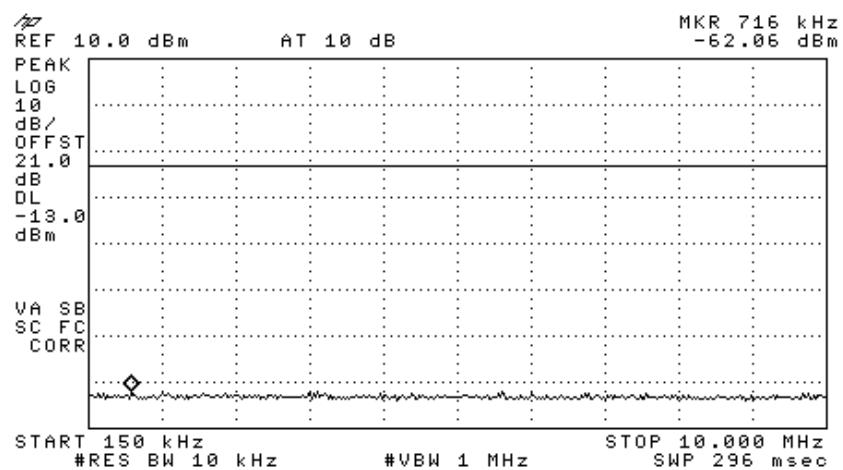


Figure 297 —5200 MHz 64QAM

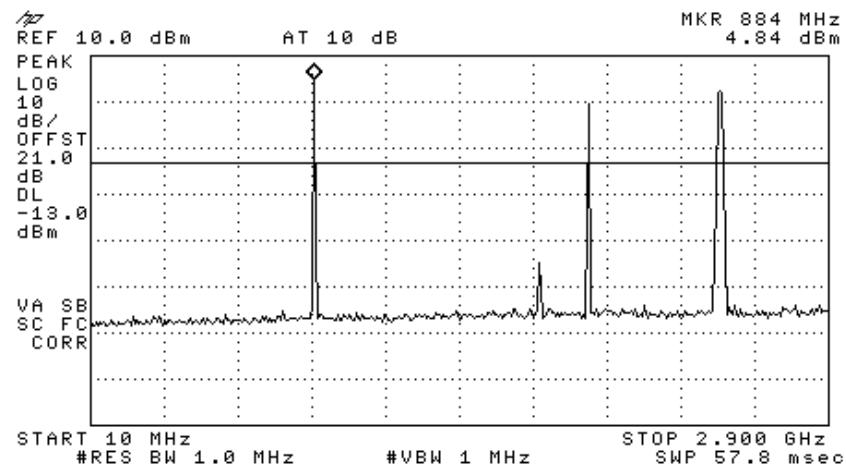


Figure 298 —5200 MHz 64QAM

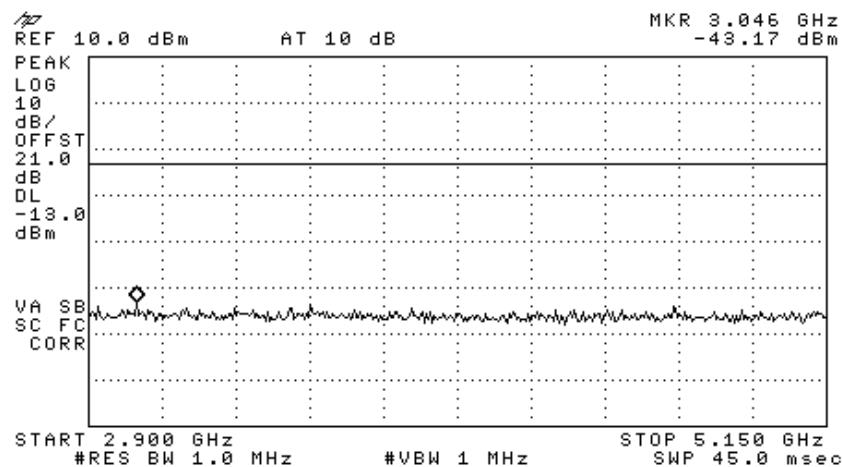


Figure 299 —5200 MHz 64QAM

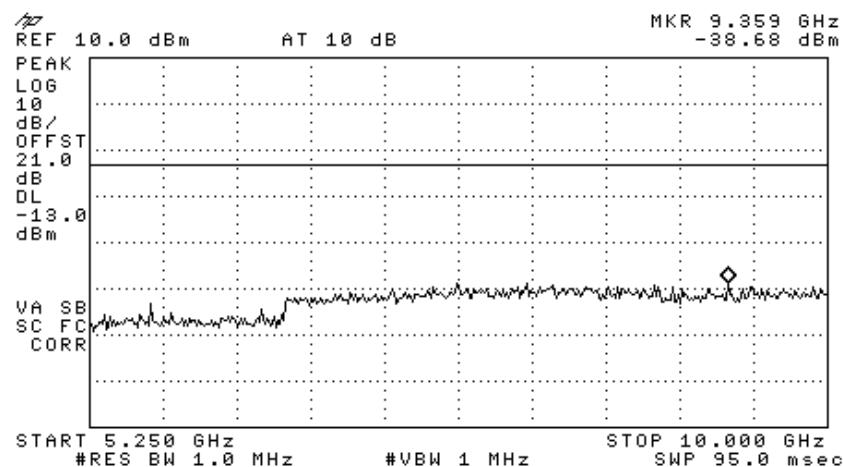


Figure 300 — 5200 MHz 64QAM

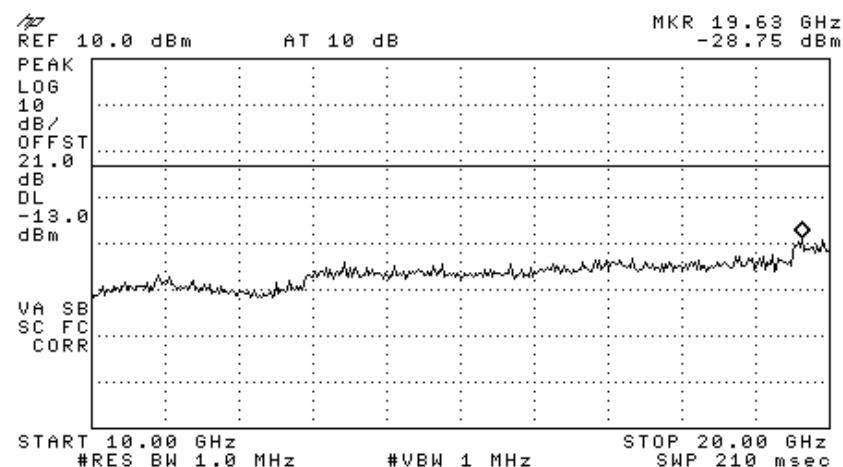


Figure 301 — 5200 MHz 64QAM

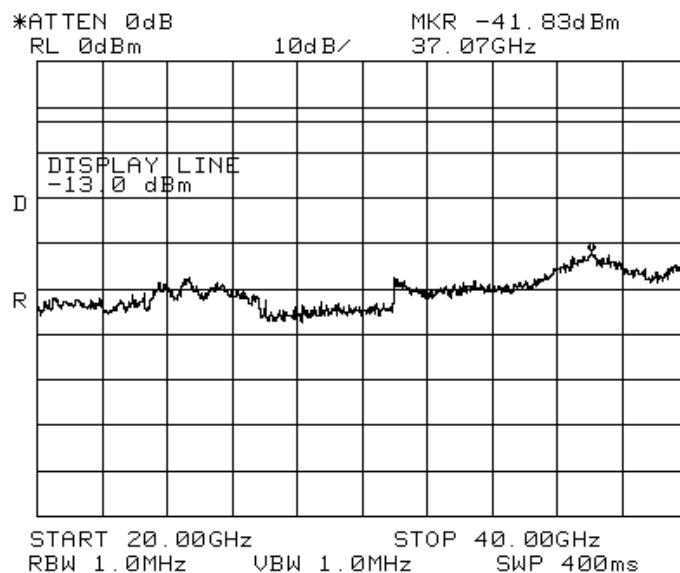


Figure 302 —5200 MHz 64QAM

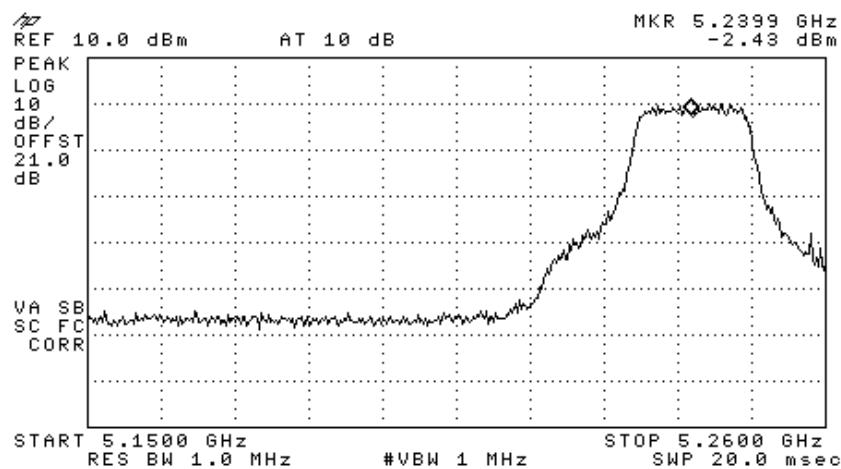


Figure 303 —5240 MHz 64QAM

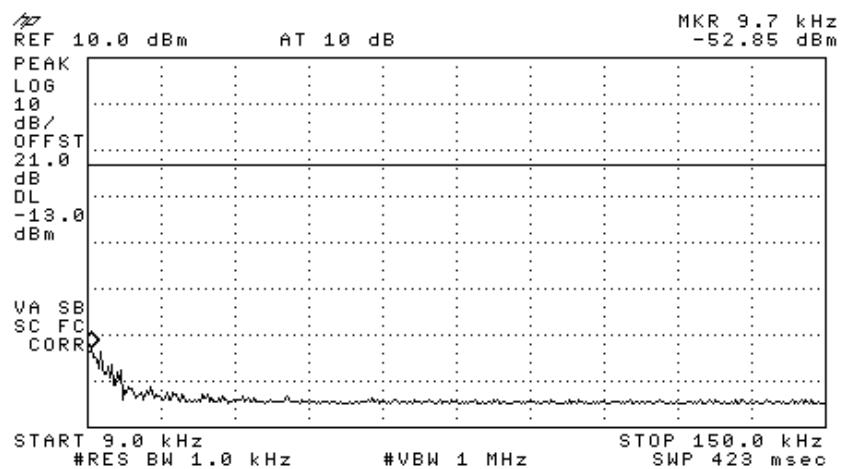


Figure 304 —5240 MHz 64QAM

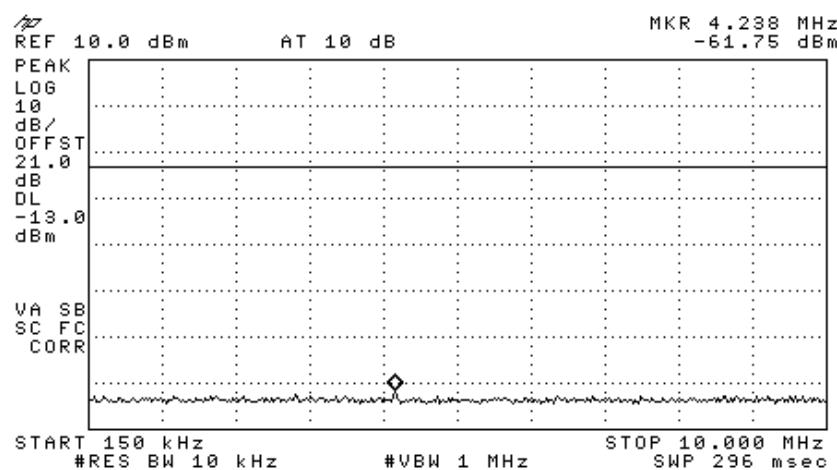


Figure 305 —5240 MHz 64QAM

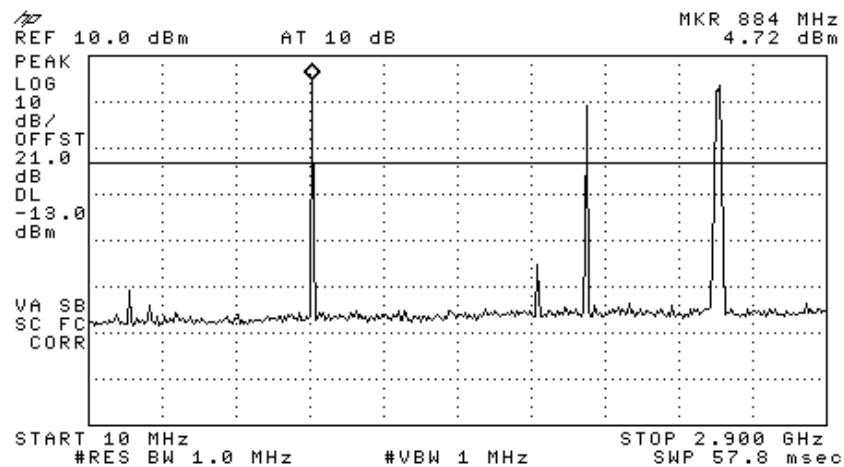


Figure 306 —5240 MHz 64QAM

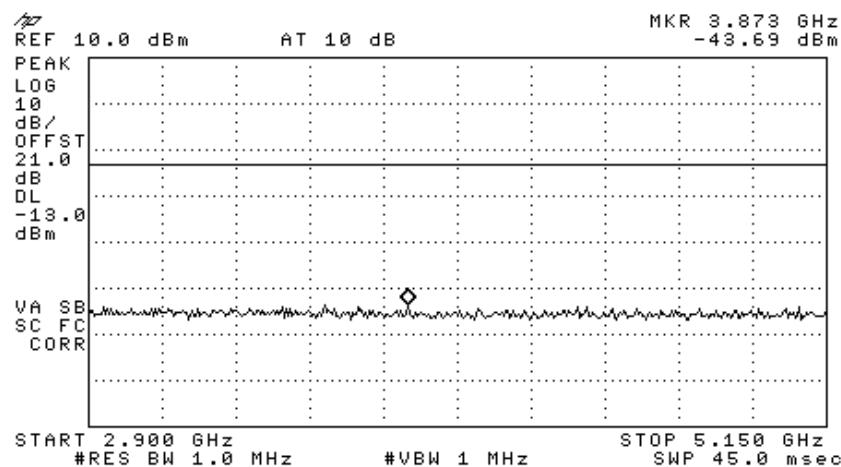


Figure 307 —5240 MHz 64QAM

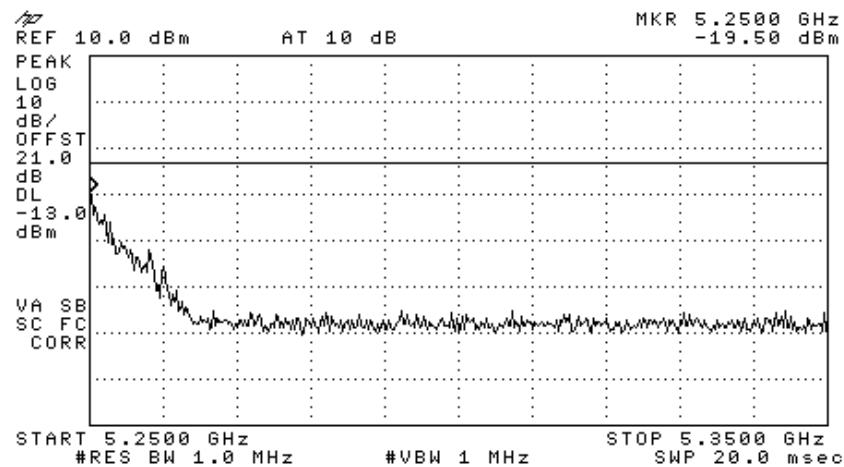


Figure 308 —5240 MHz 64QAM

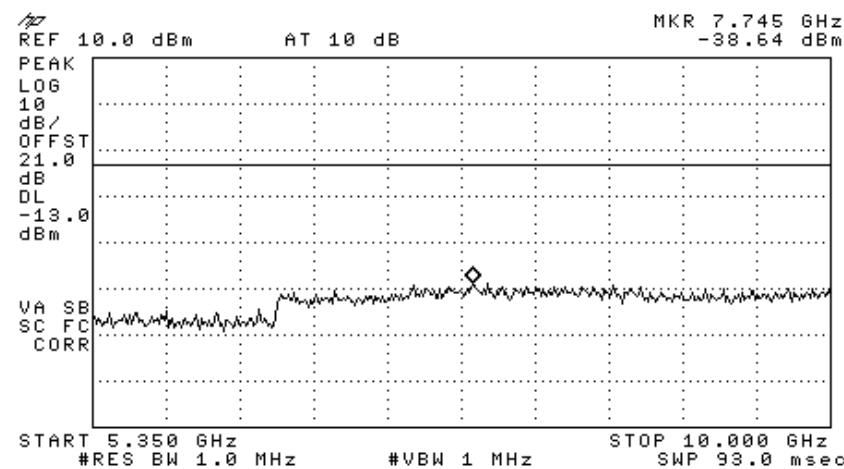


Figure 309 —5240 MHz 64QAM

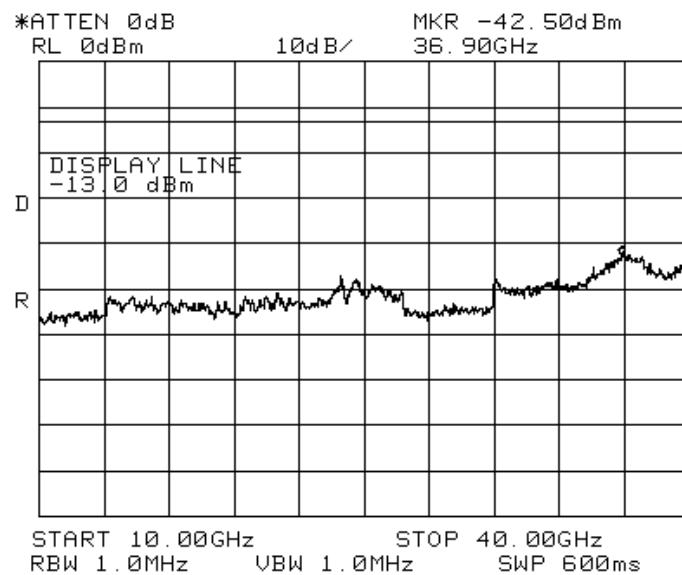


Figure 310 —5240 MHz 64QAM

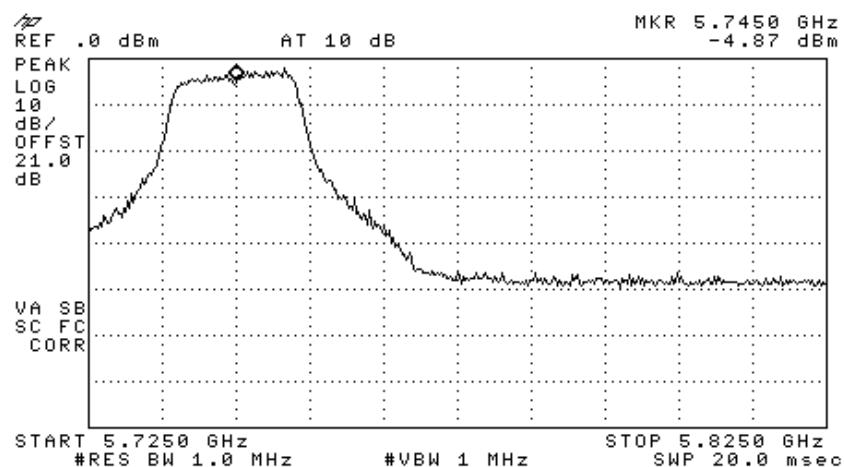


Figure 311 —5745 MHz 64QAM

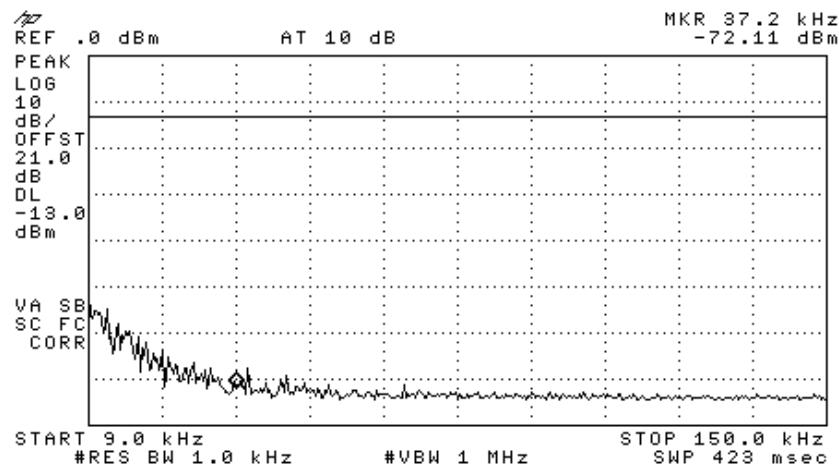


Figure 312 — 5745 MHz 64QAM

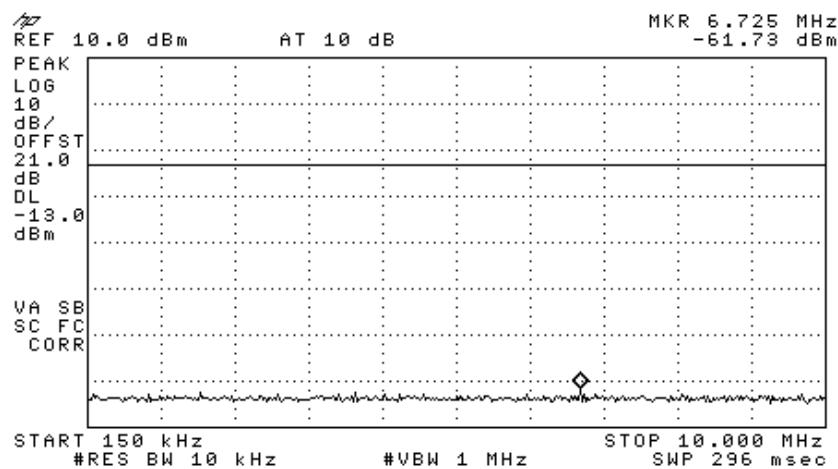


Figure 313 — 5745 MHz 64QAM

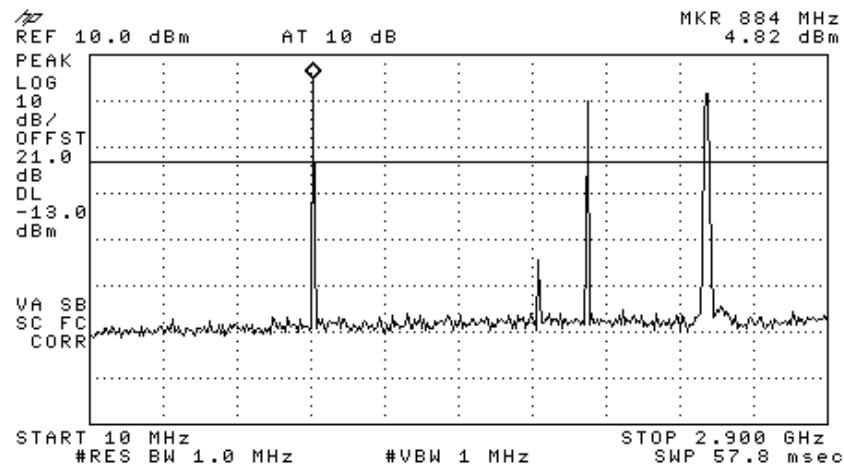


Figure 314 — 5745 MHz 64QAM

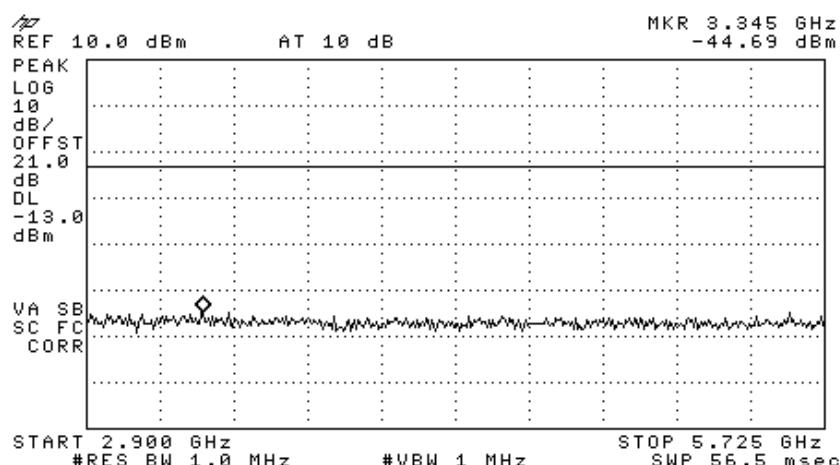


Figure 315 — 5745 MHz 64QAM

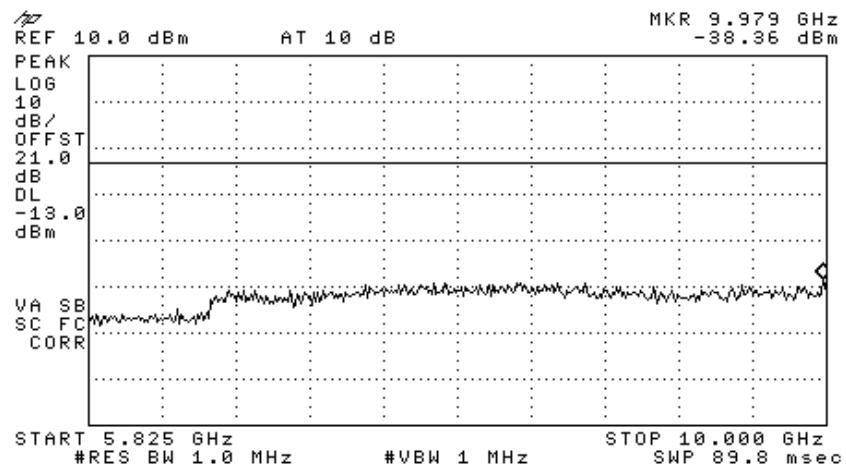


Figure 316 — 5745 MHz 64QAM

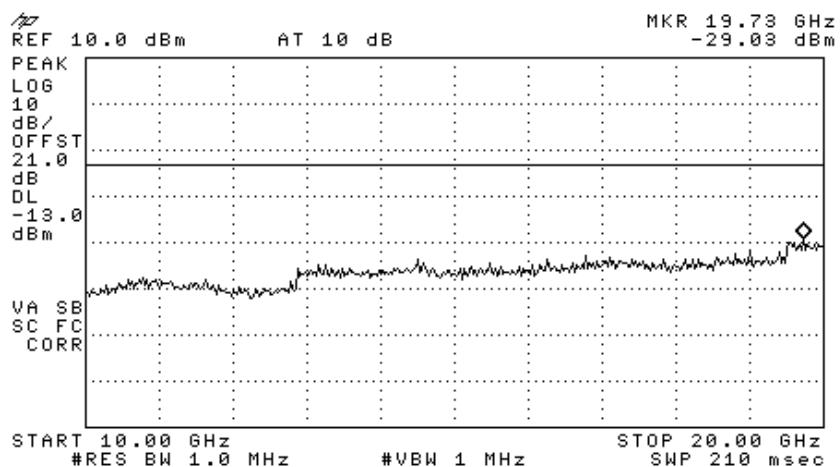


Figure 317 — 5745 MHz 64QAM

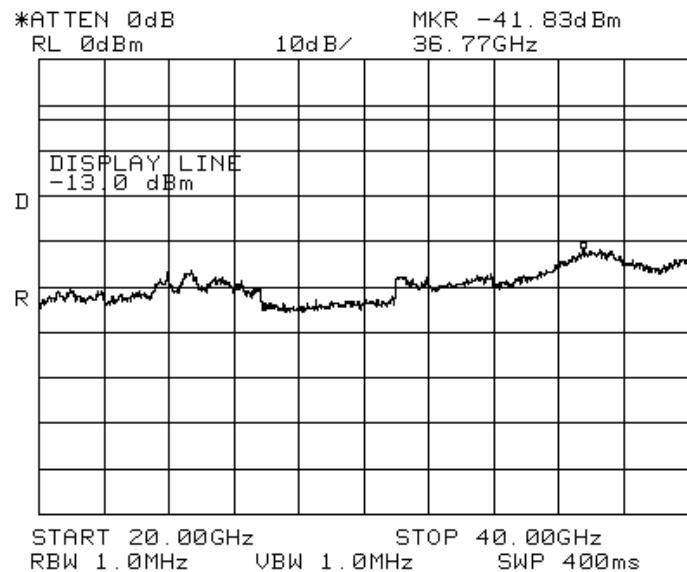


Figure 318 — 5745 MHz 64QAM

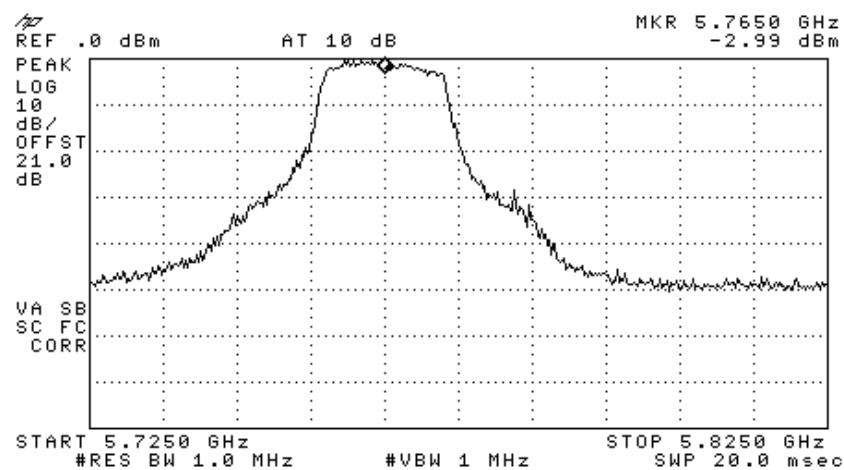


Figure 319 — 5765 MHz 64QAM

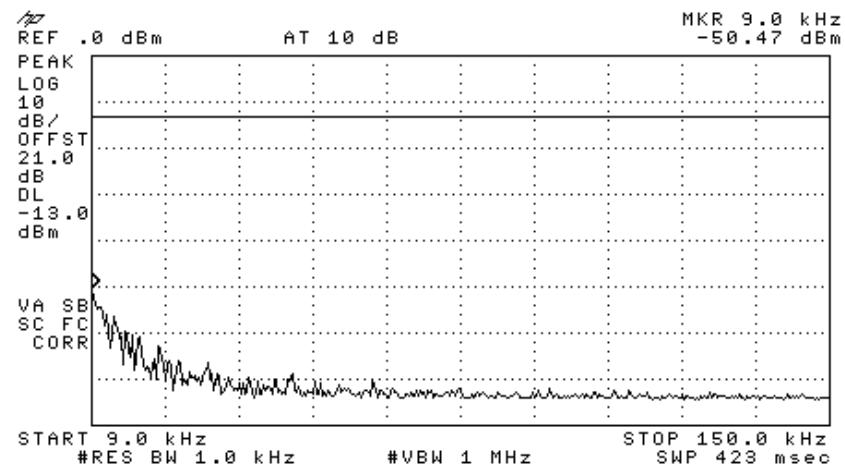


Figure 320 — 5765 MHz 64QAM

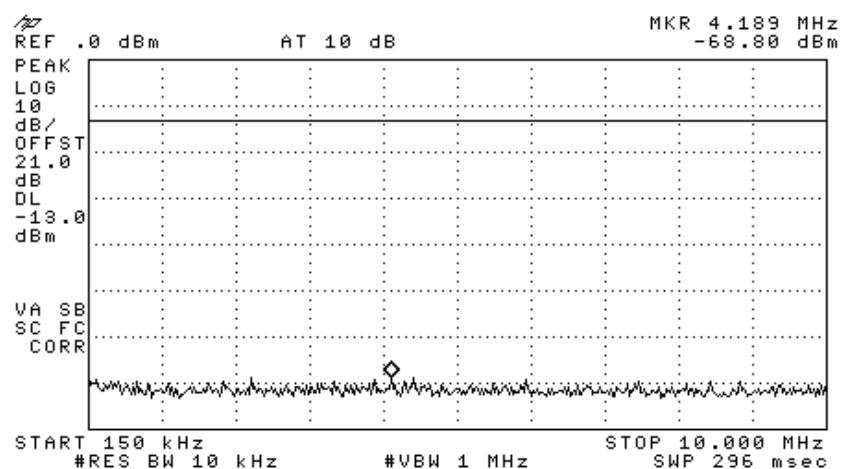


Figure 321 — 5765 MHz 64QAM

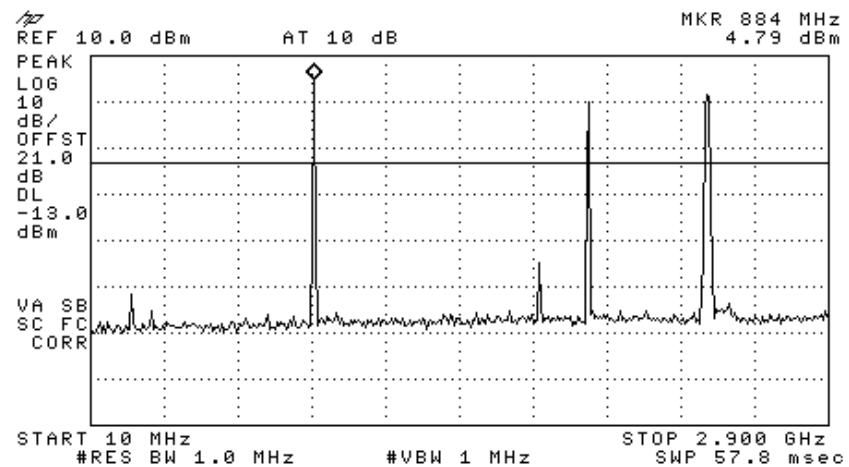


Figure 322 —5765 MHz 64QAM

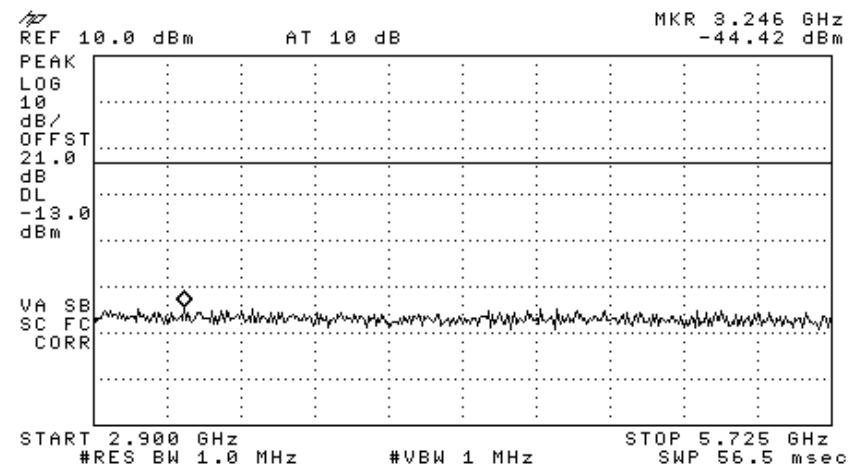


Figure 323 —5765 MHz 64QAM

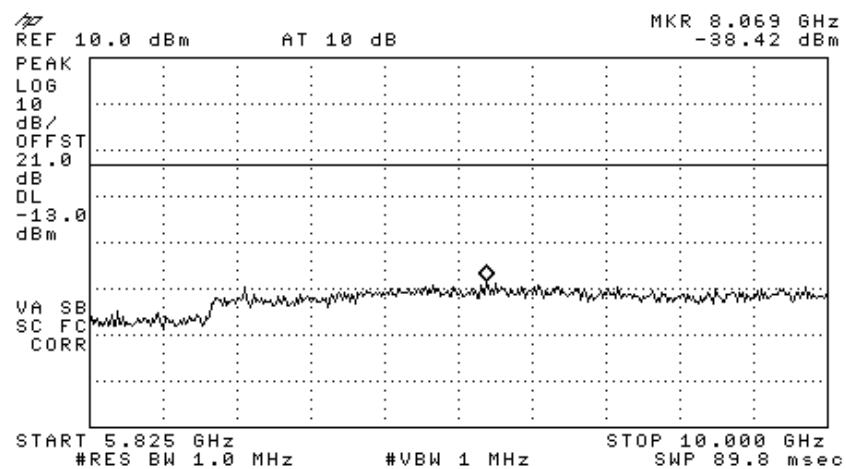


Figure 324 —5765 MHz 64QAM

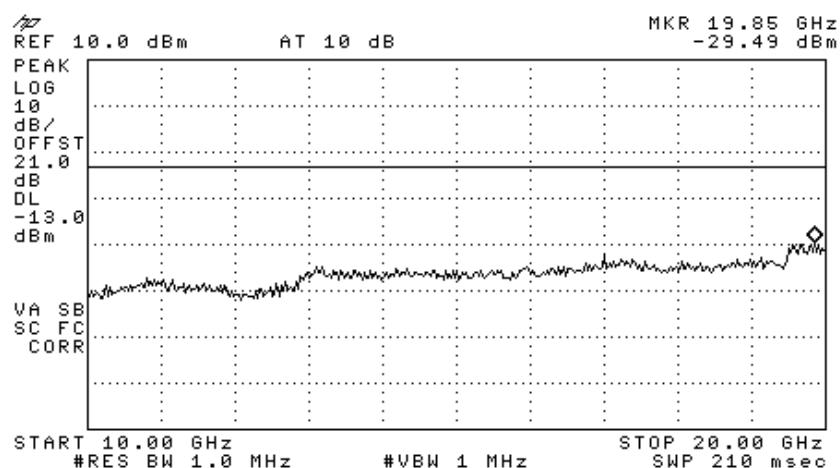


Figure 325 —5765 MHz 64QAM

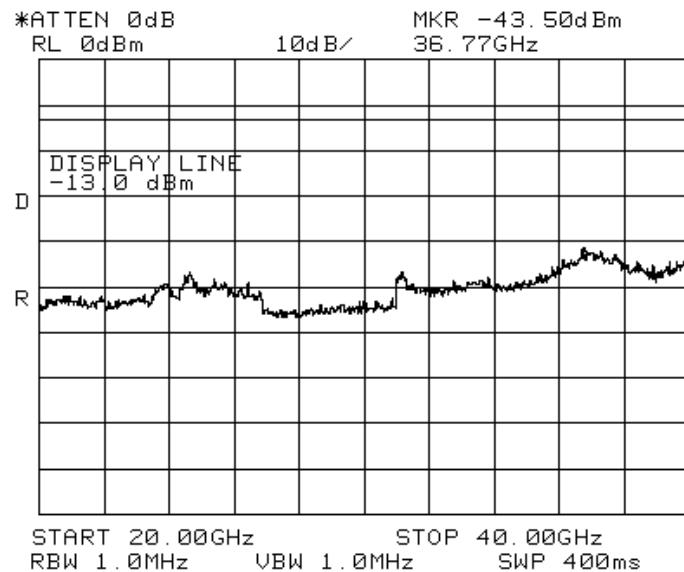


Figure 326 — 5765 MHz 64QAM

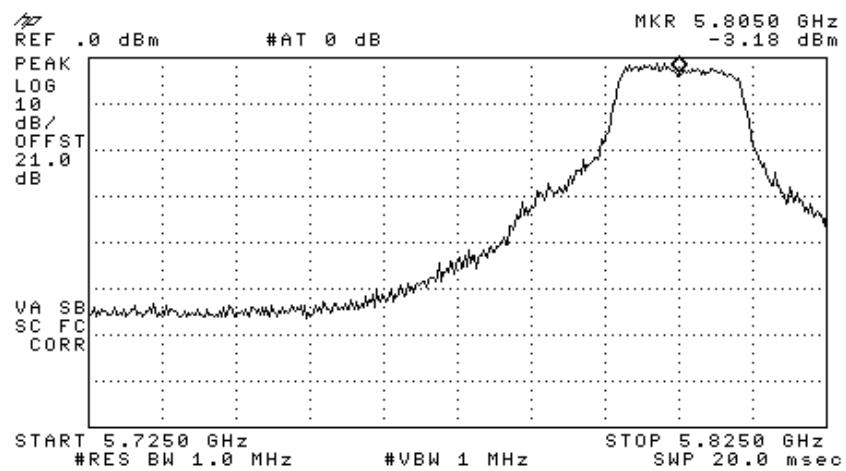


Figure 327 — 5805 MHz 64QAM

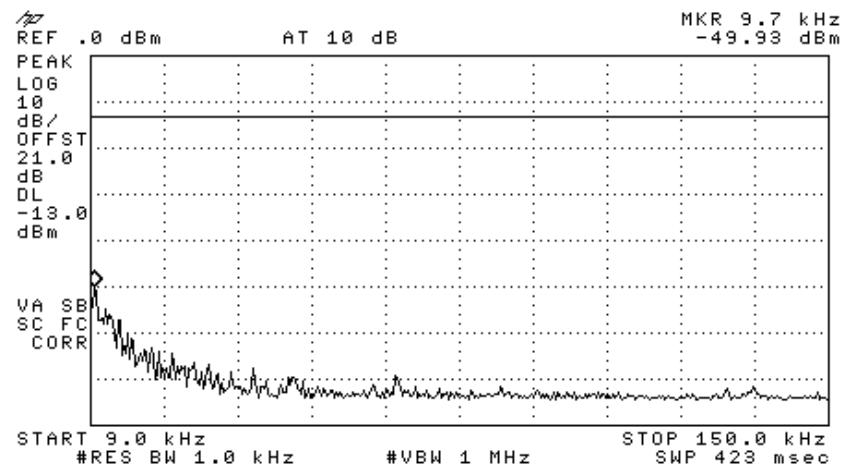


Figure 328 —5805 MHz 64QAM

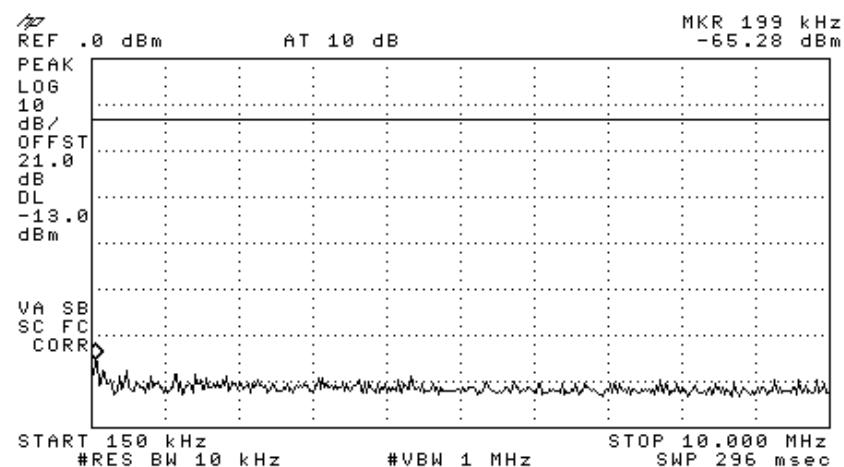


Figure 329 —5805 MHz 64QAM

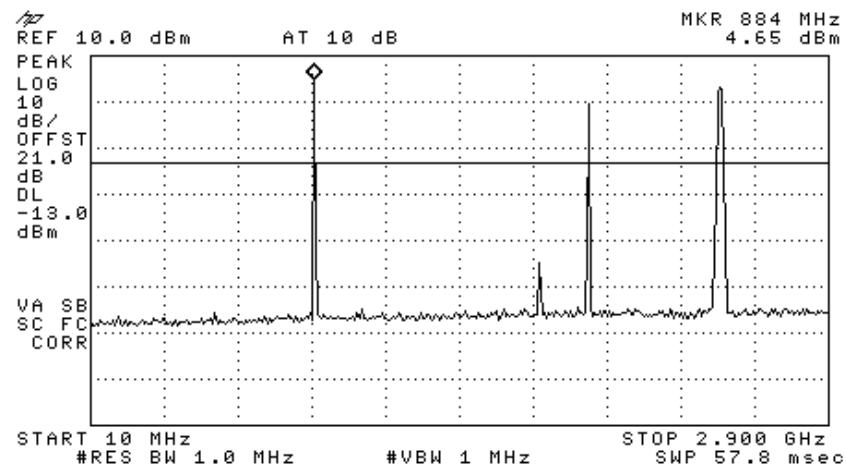


Figure 330 — 5805 MHz 64QAM

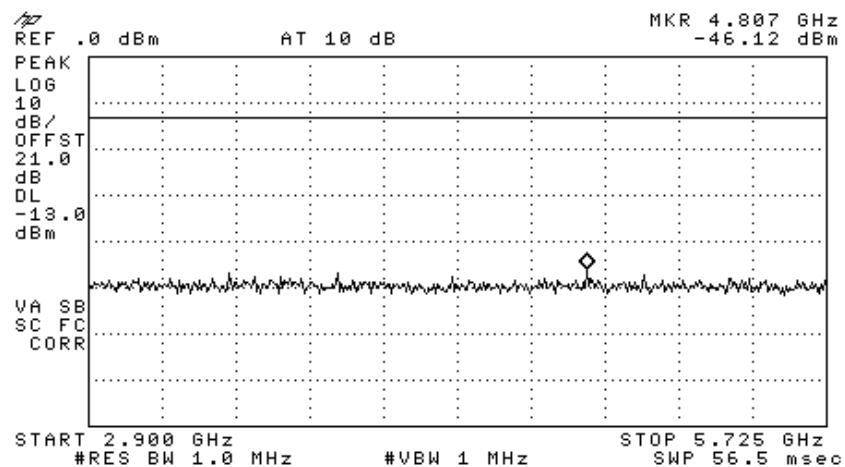


Figure 331 — 5805 MHz 64QAM

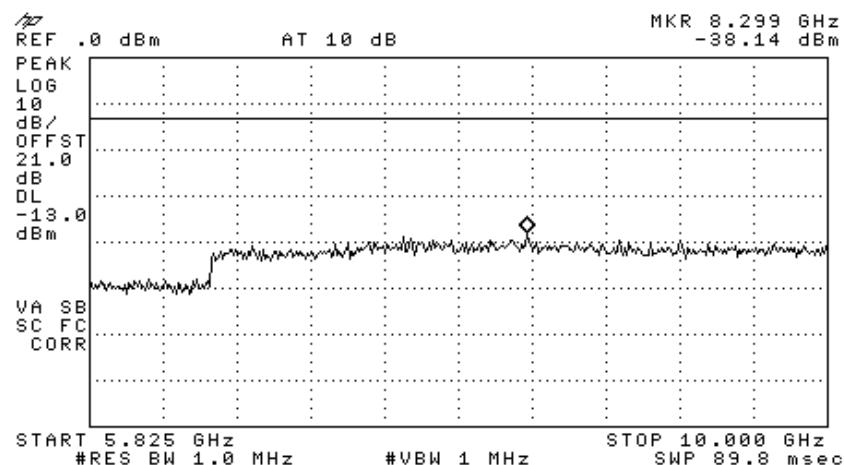


Figure 332 —5805 MHz 64QAM

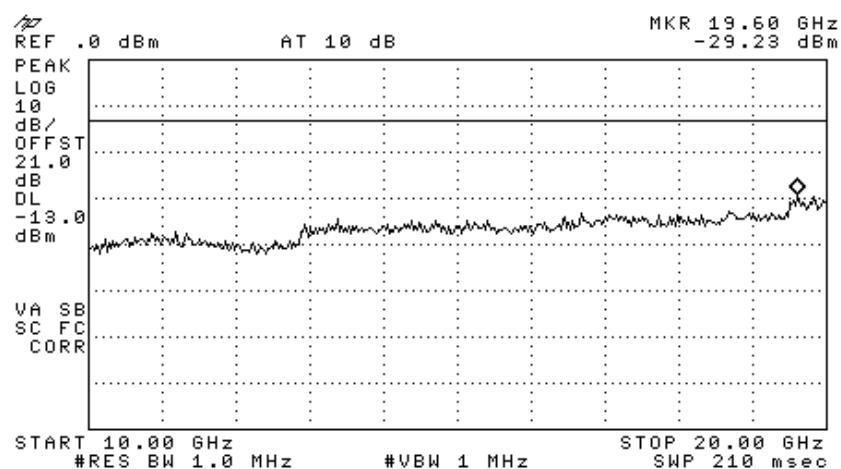


Figure 333 —5805 MHz 64QAM

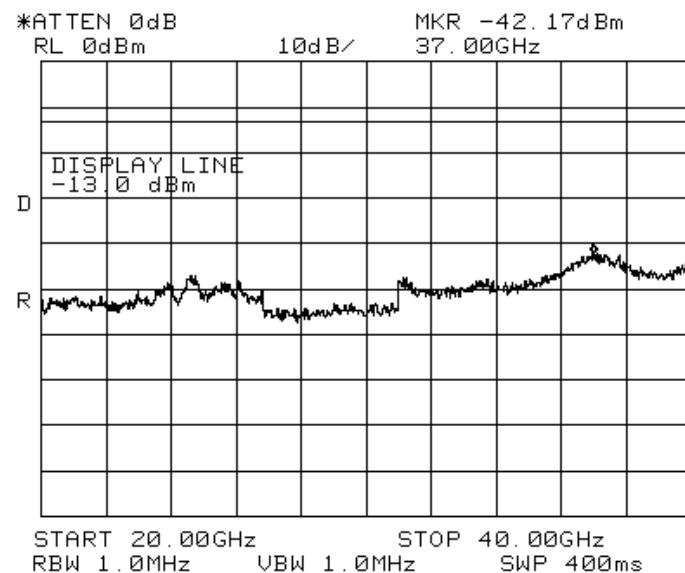


Figure 334 —5805 MHz 64QAM

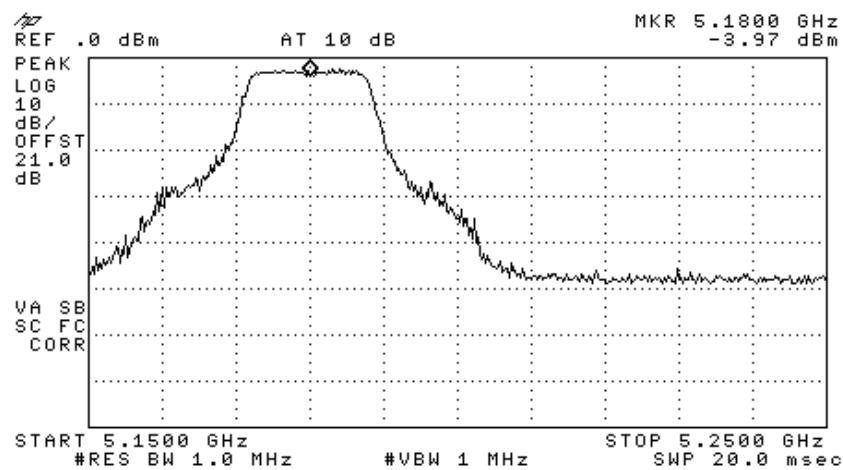


Figure 335 —5180 MHz BPSK

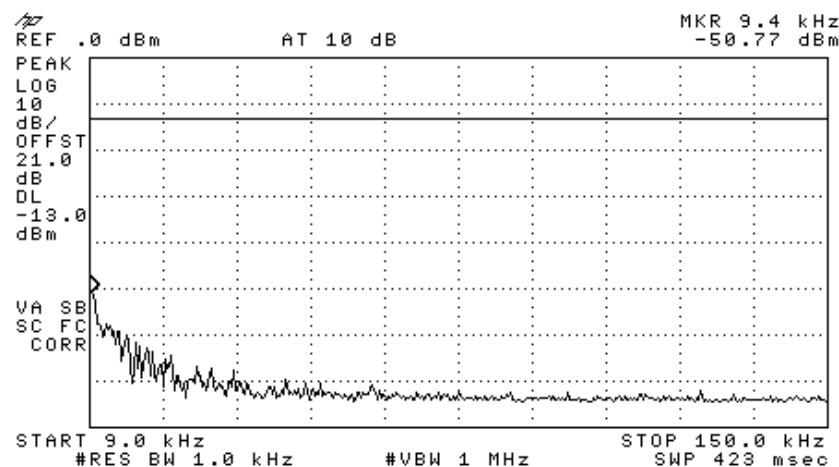


Figure 336 —5180 MHz BPSK

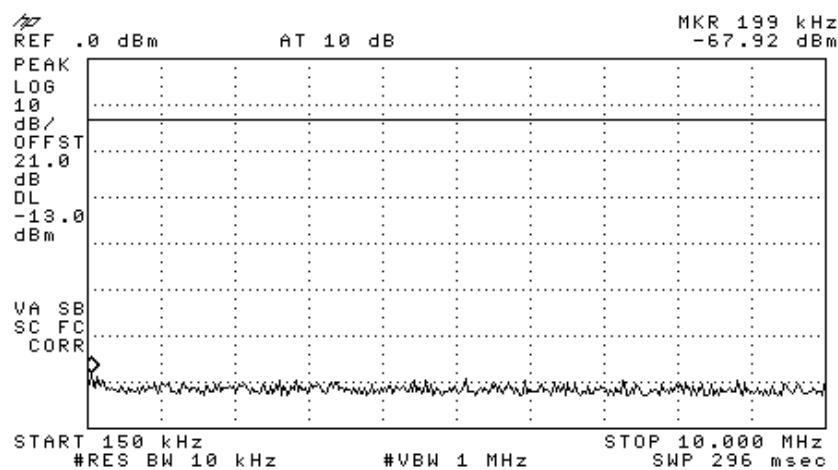


Figure 337 —5180 MHz BPSK

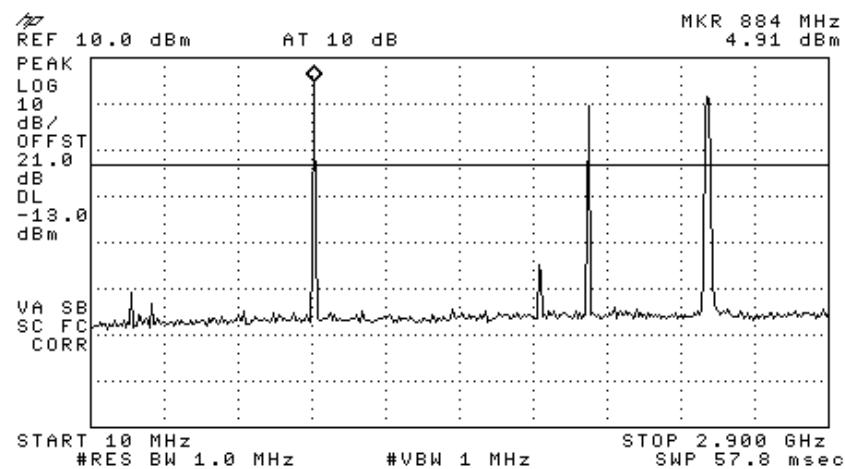


Figure 338 —5180 MHz BPSK

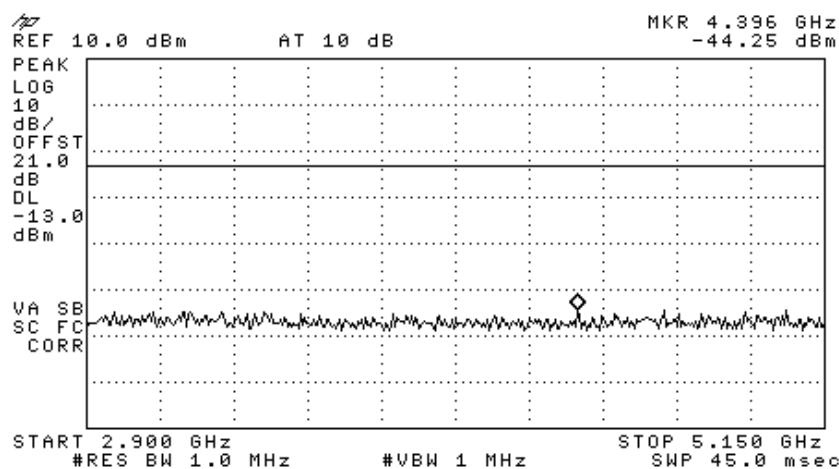


Figure 339 —5180 MHz BPSK

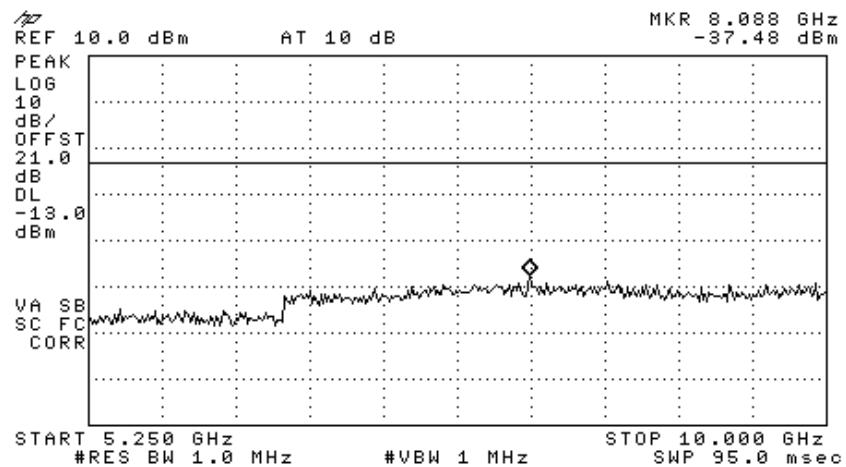


Figure 340 —5180 MHz BPSK

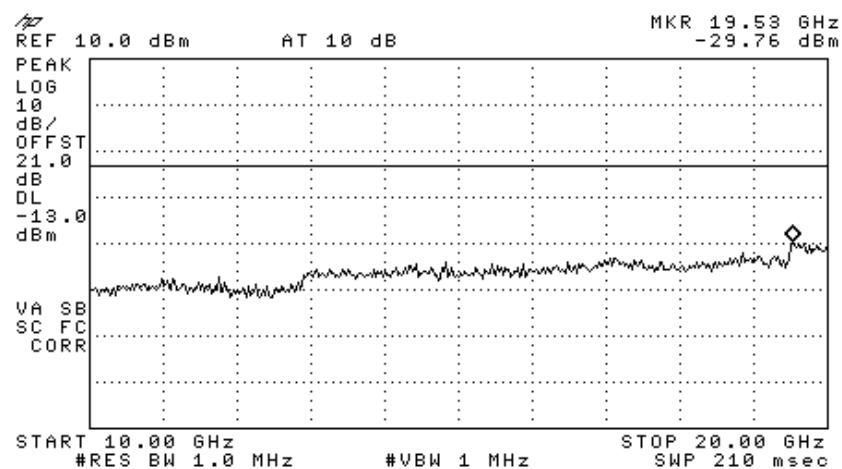


Figure 341 —5180 MHz BPSK

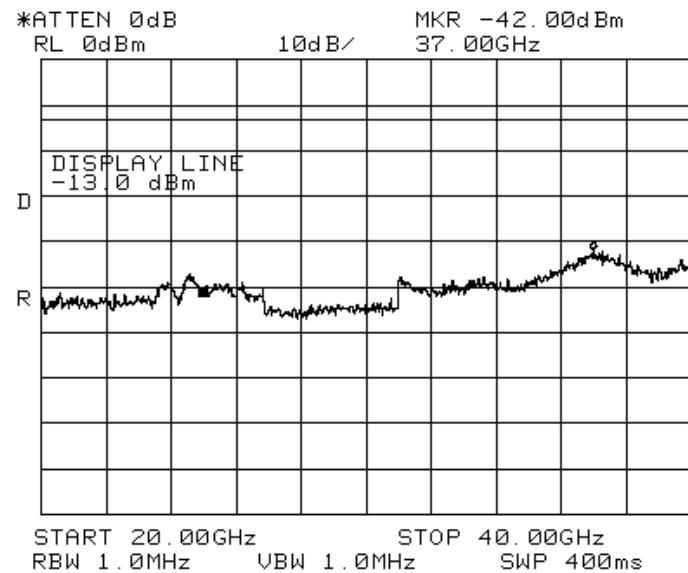


Figure 342 —5180 MHz BPSK

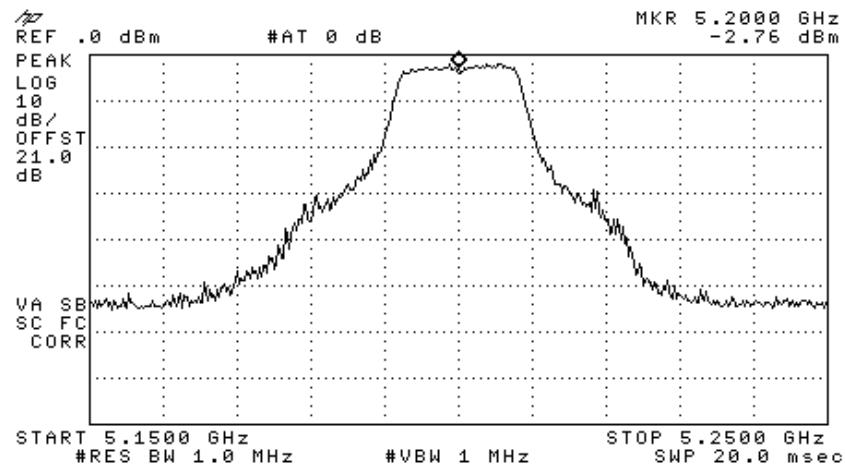


Figure 343 —5200 MHz BPSK

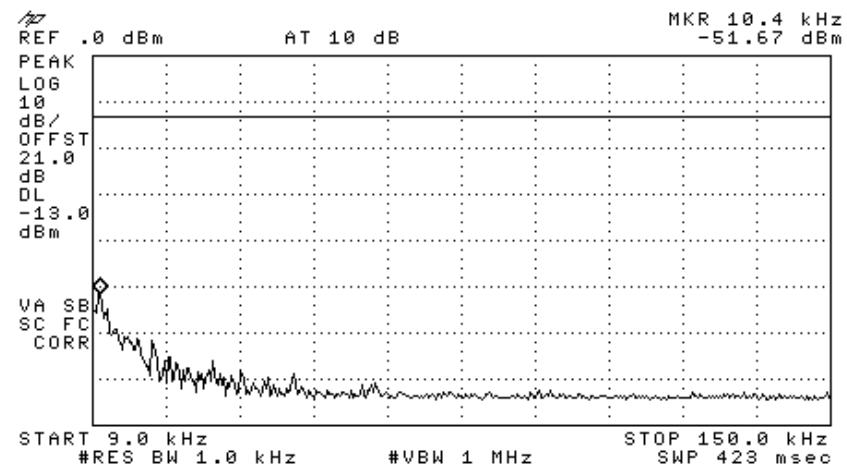


Figure 344 —5200 MHz BPSK

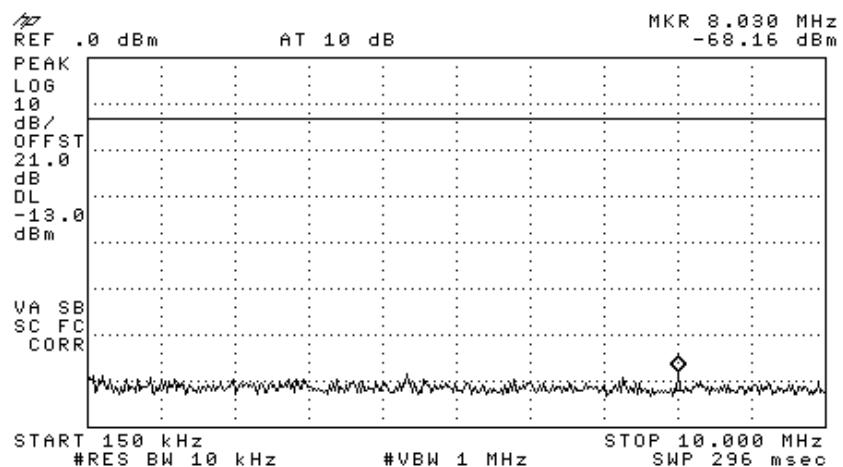


Figure 345 —5200 MHz BPSK

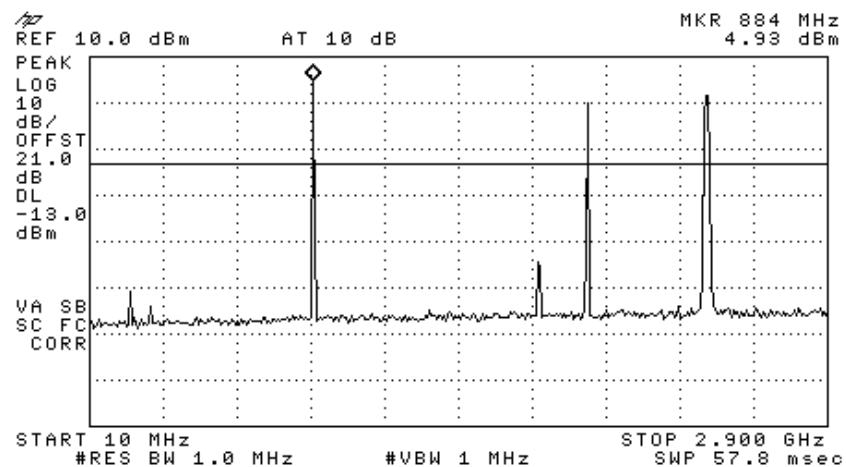


Figure 346 —5200 MHz BPSK

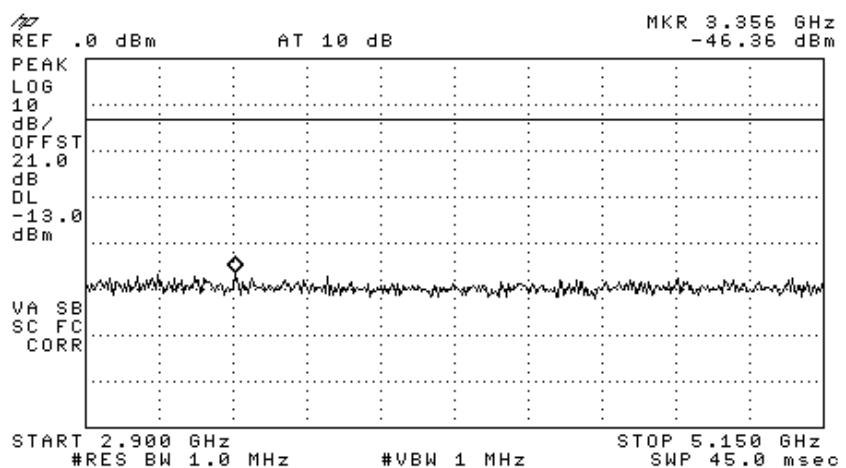


Figure 347 —5200 MHz BPSK

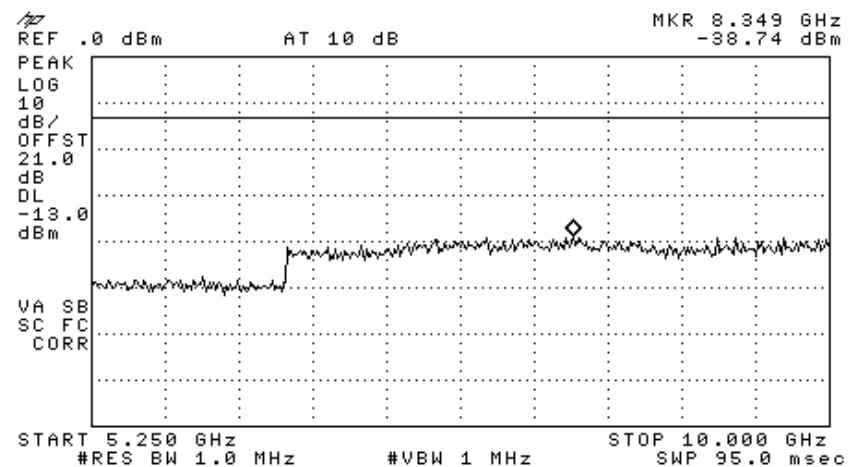


Figure 348 —5200 MHz BPSK

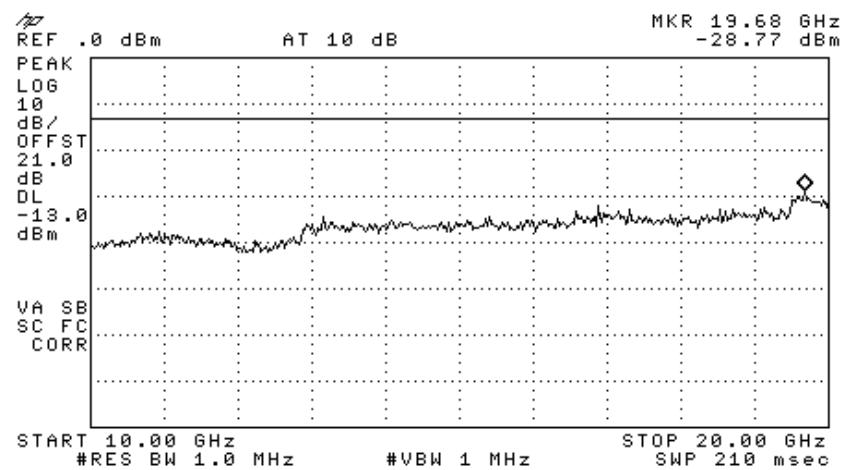


Figure 349 —5200 MHz BPSK

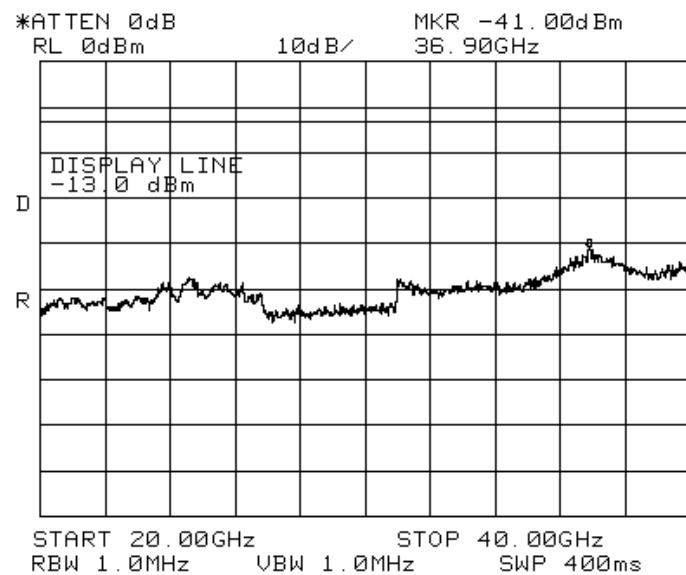


Figure 350 — 5200 MHz BPSK

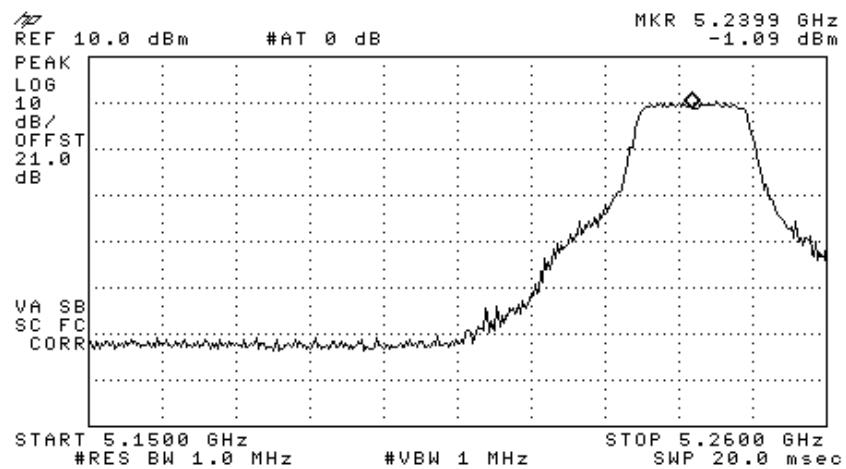


Figure 351 — 5240 MHz BPSK

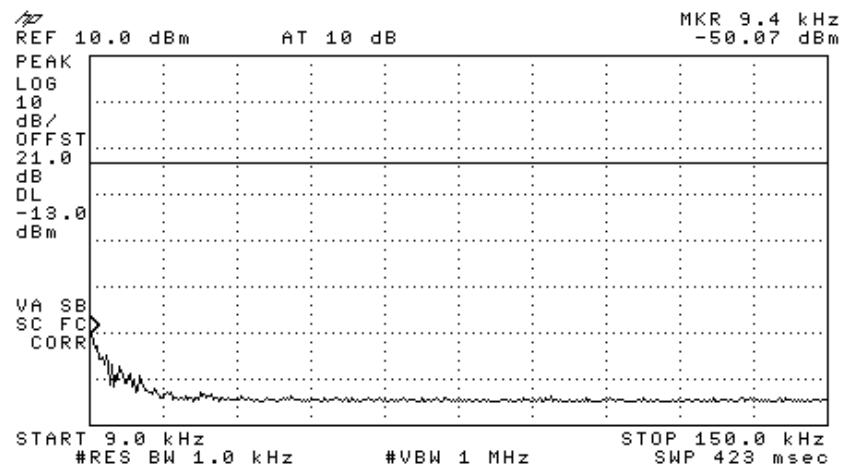


Figure 352 —5240 MHz BPSK

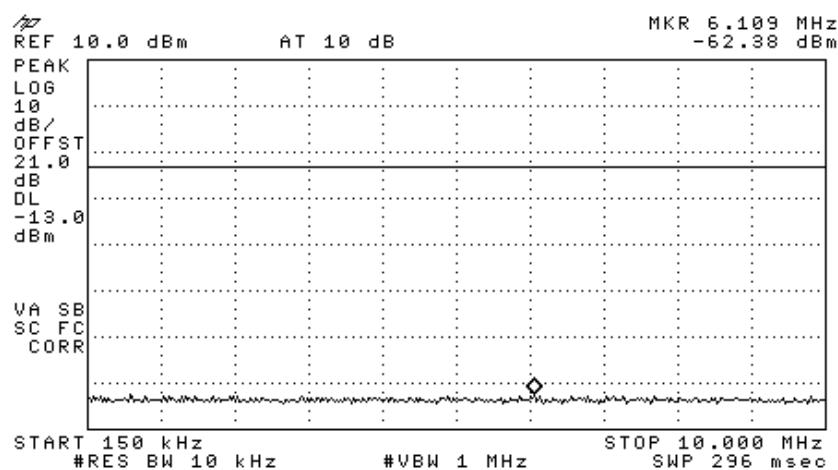


Figure 353 —5240 MHz BPSK

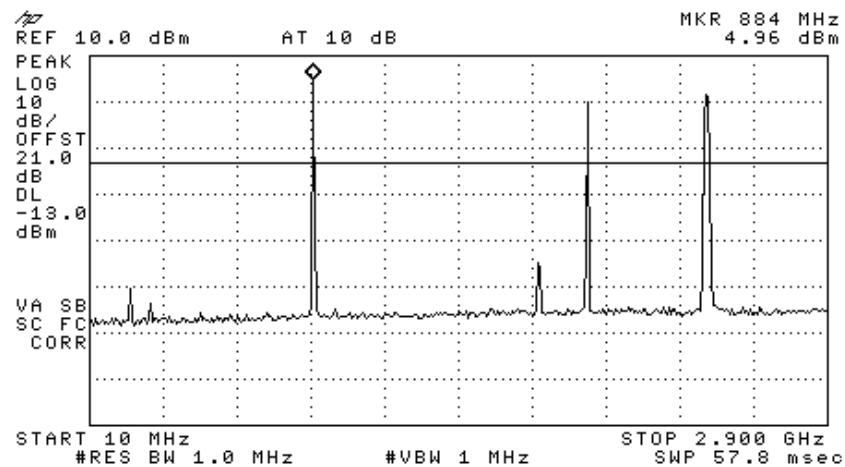


Figure 354 —5240 MHz BPSK

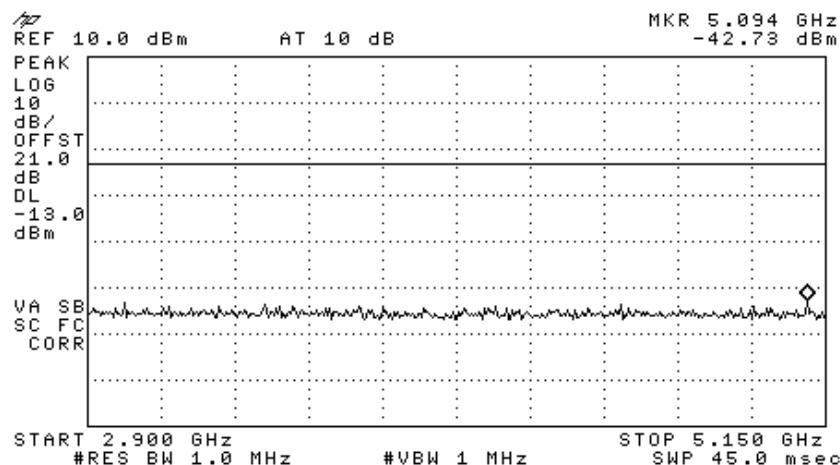


Figure 355 —5240 MHz BPSK

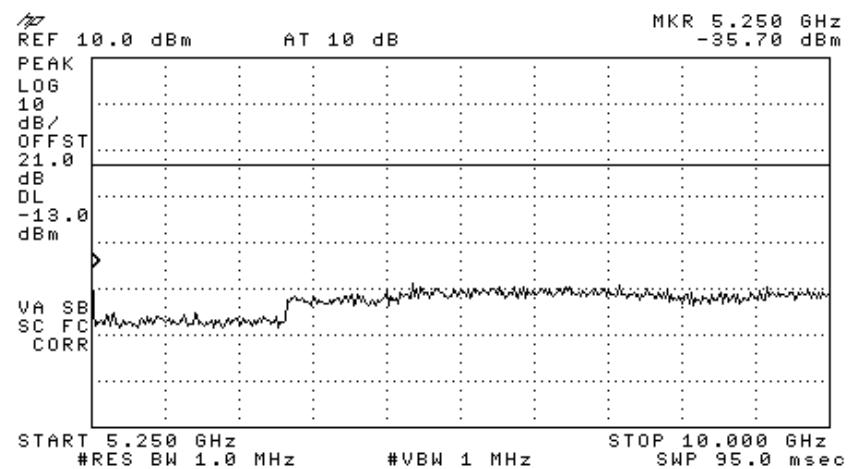


Figure 356 —5240 MHz BPSK

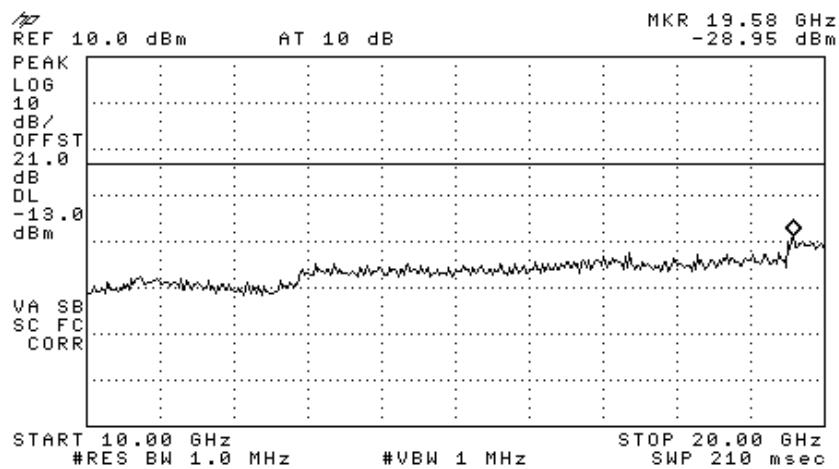


Figure 357 —5240 MHz BPSK

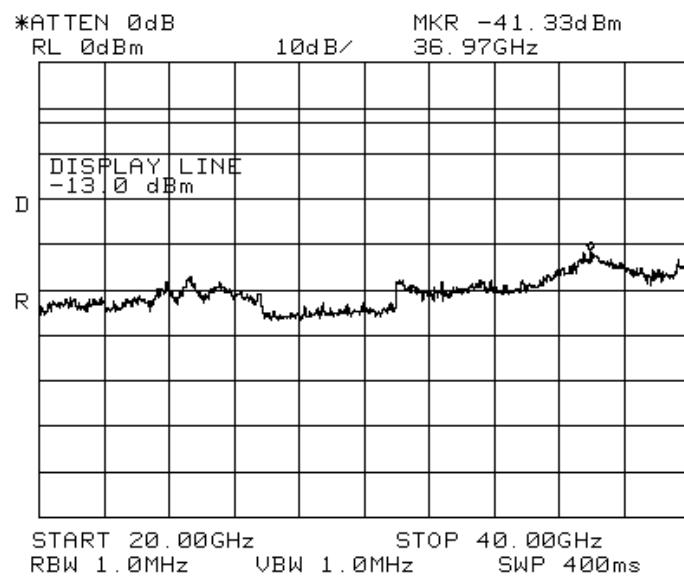


Figure 358 —5240 MHz BPSK

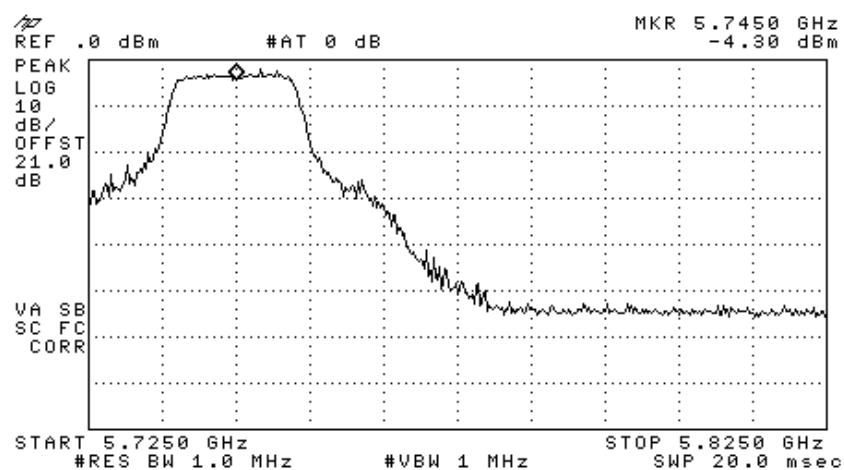


Figure 359 —5745 MHz BPSK

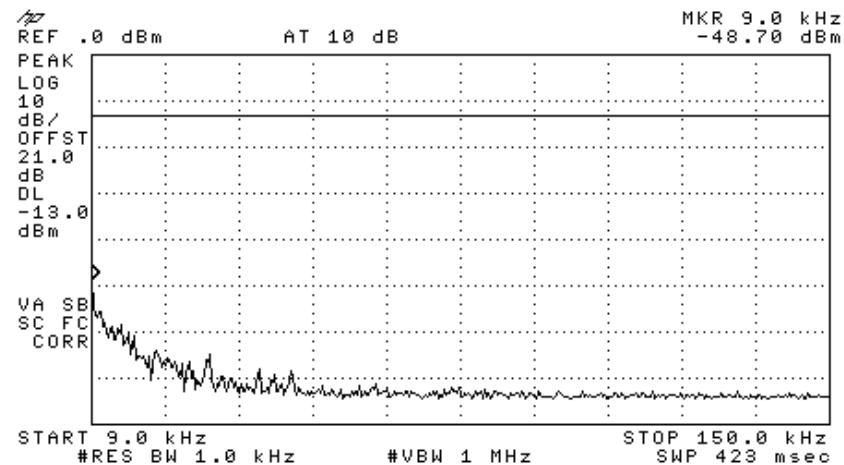


Figure 360 —5745 MHz BPSK

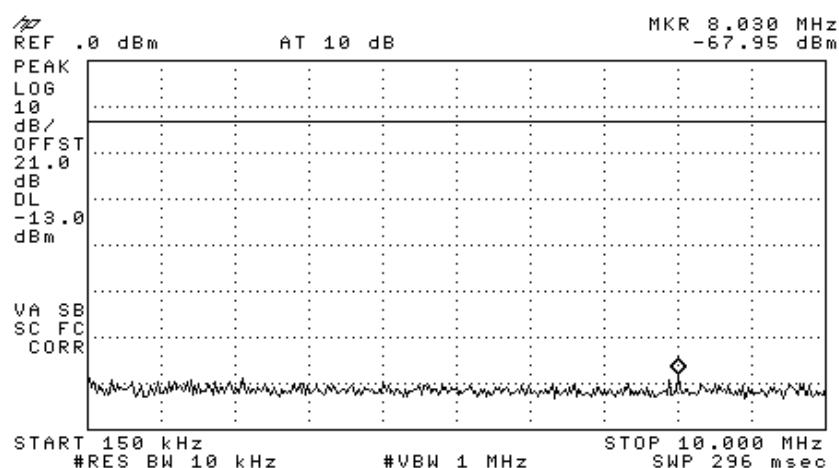


Figure 361 —5745 MHz BPSK

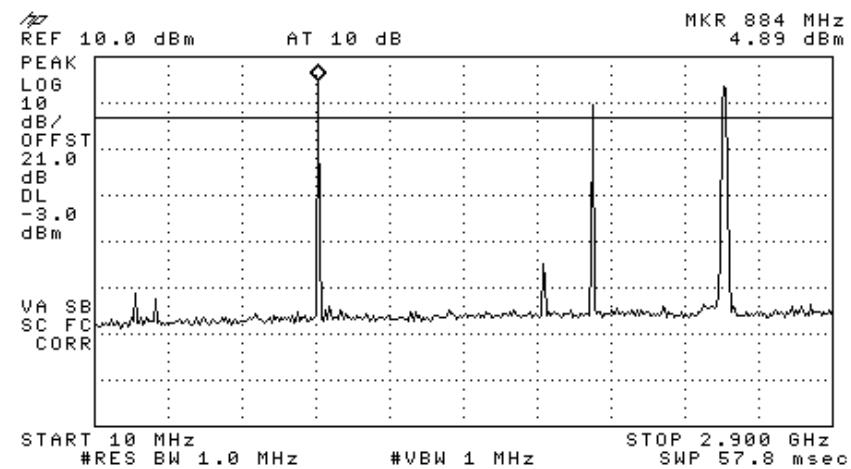


Figure 362 —5745 MHz BPSK

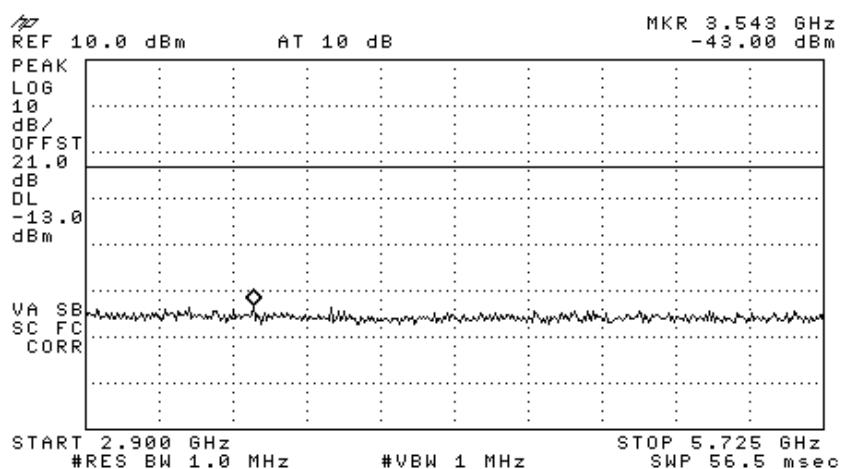


Figure 363 —5745 MHz BPSK

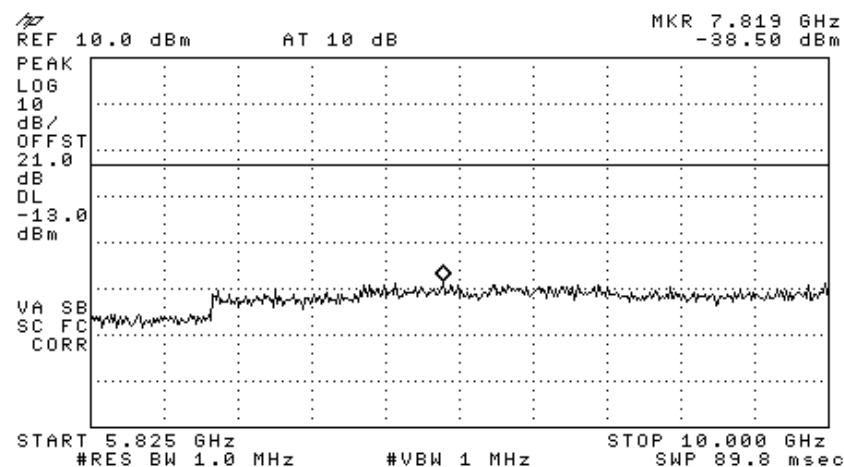


Figure 364 —5745 MHz BPSK

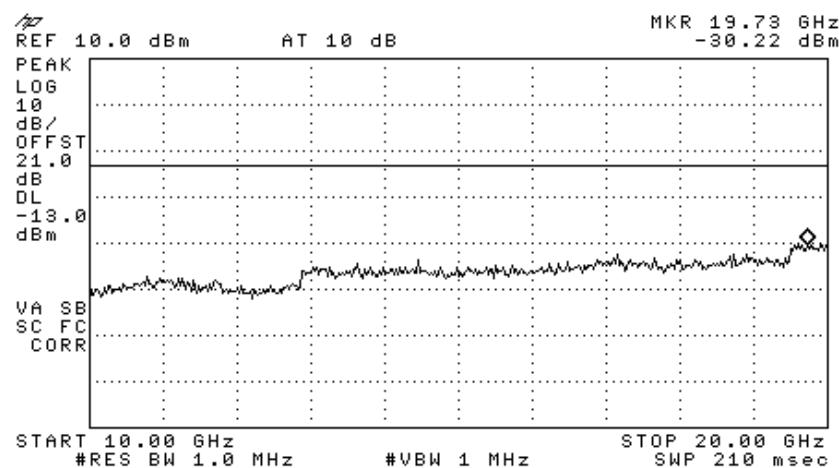


Figure 365 —5745 MHz BPSK

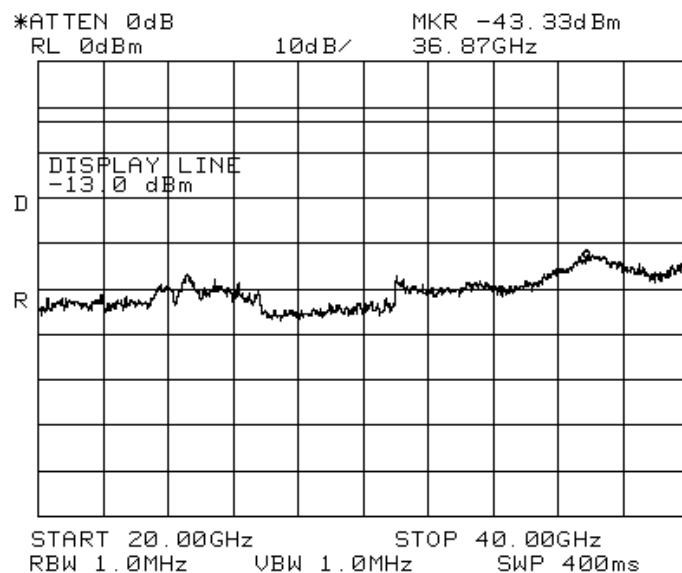


Figure 366 —5745 MHz BPSK

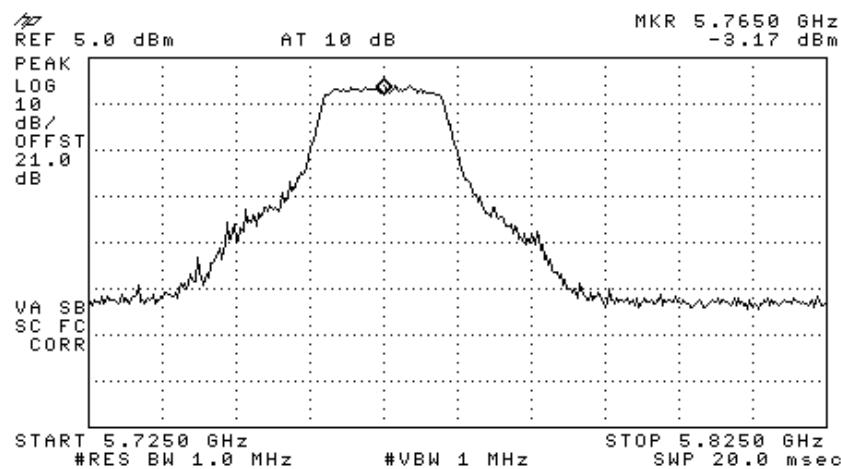


Figure 367 —5765 MHz BPSK

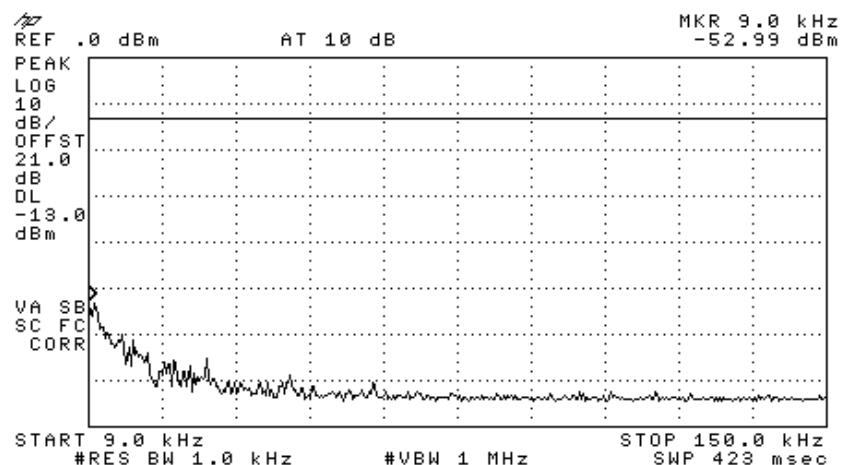


Figure 368 —5765 MHz BPSK

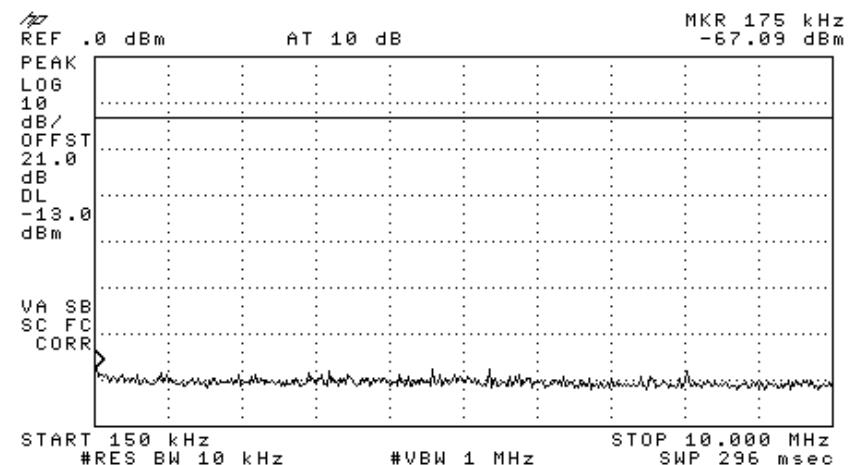


Figure 369 —5765 MHz BPSK

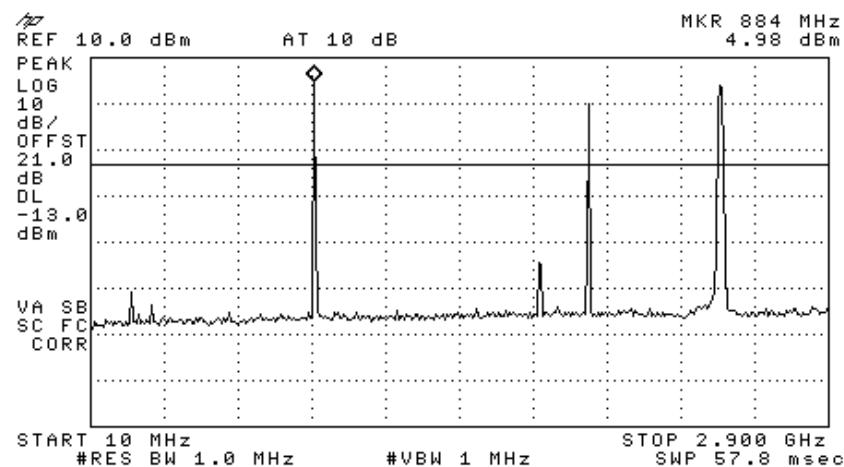


Figure 370 —5765 MHz BPSK

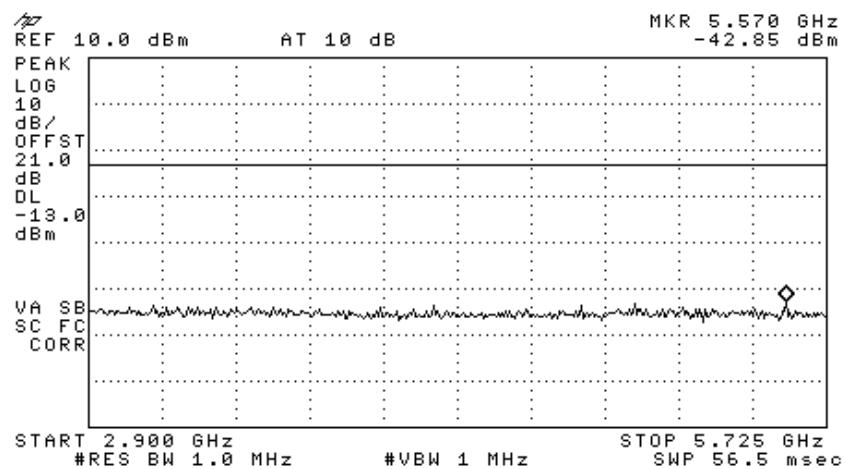


Figure 371 —5765 MHz BPSK

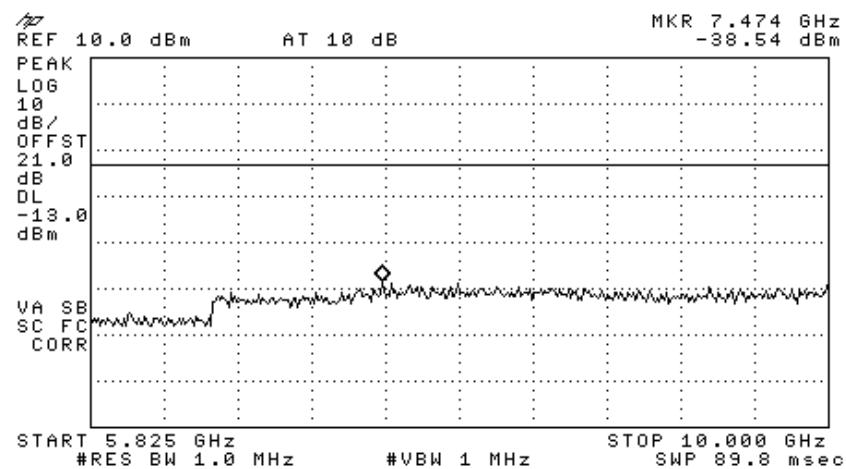


Figure 372 —5765 MHz BPSK

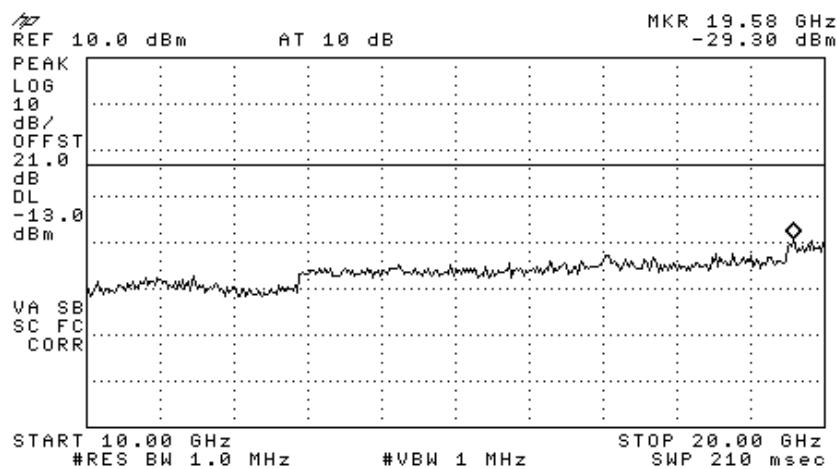


Figure 373 —5765 MHz BPSK

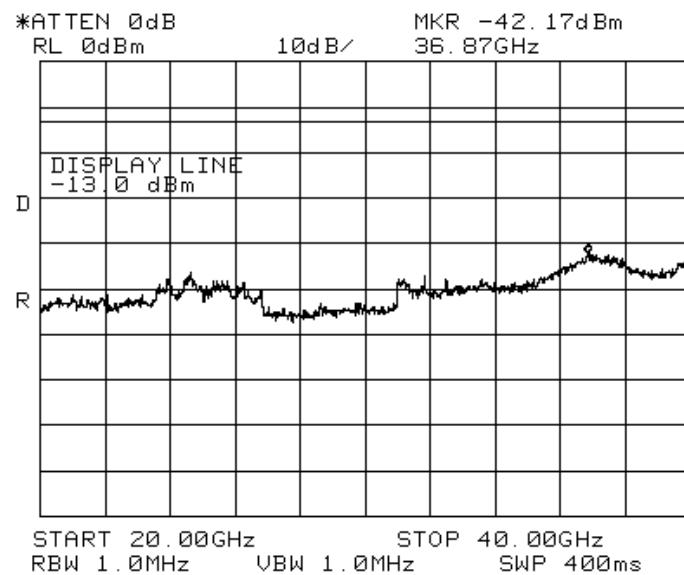


Figure 374 —5765 MHz BPSK

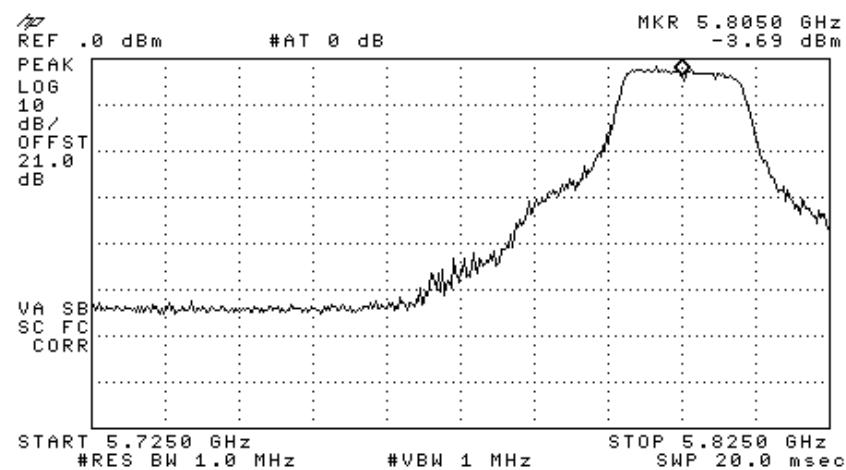


Figure 375 —5805 MHz BPSK

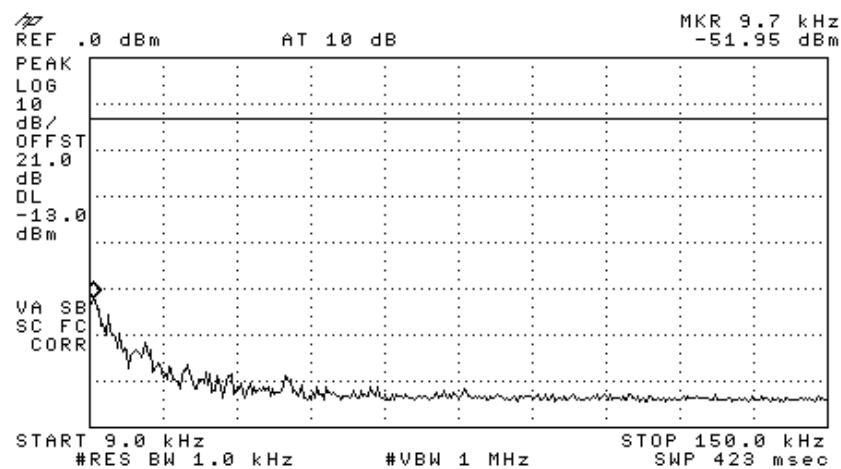


Figure 376 —5805 MHz BPSK

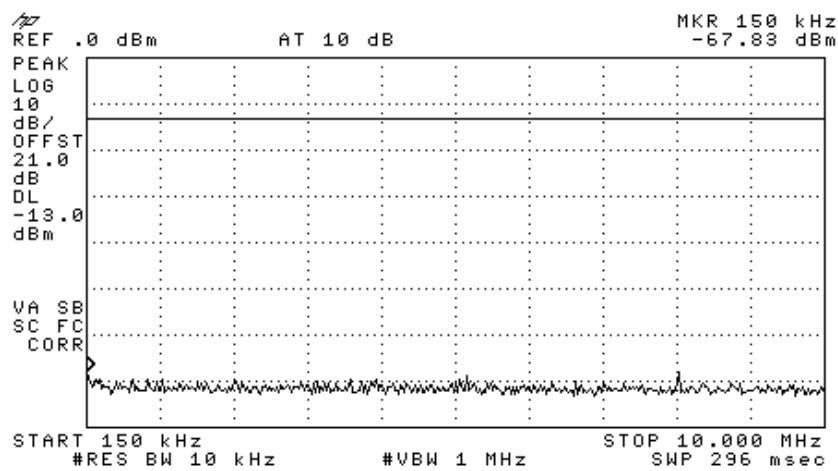


Figure 377 —5805 MHz BPSK

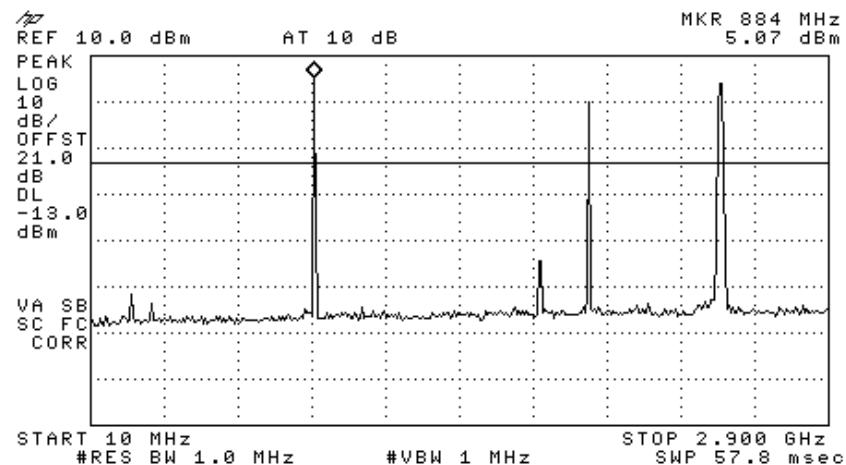


Figure 378 —5805 MHz BPSK

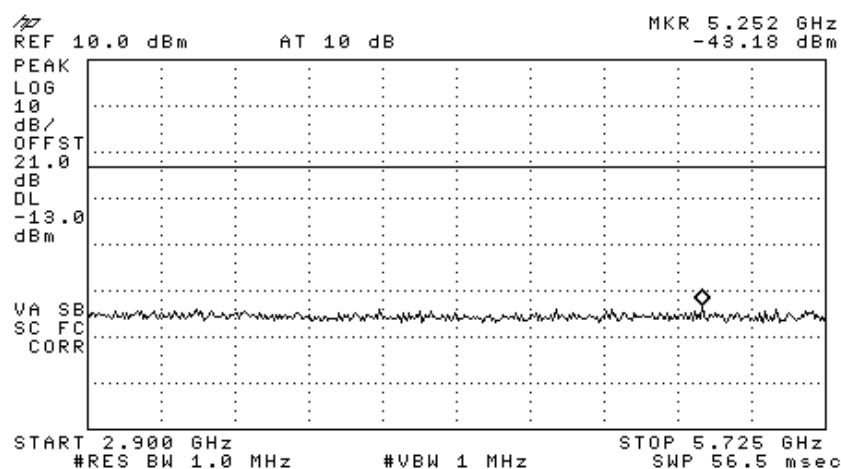


Figure 379 —5805 MHz BPSK

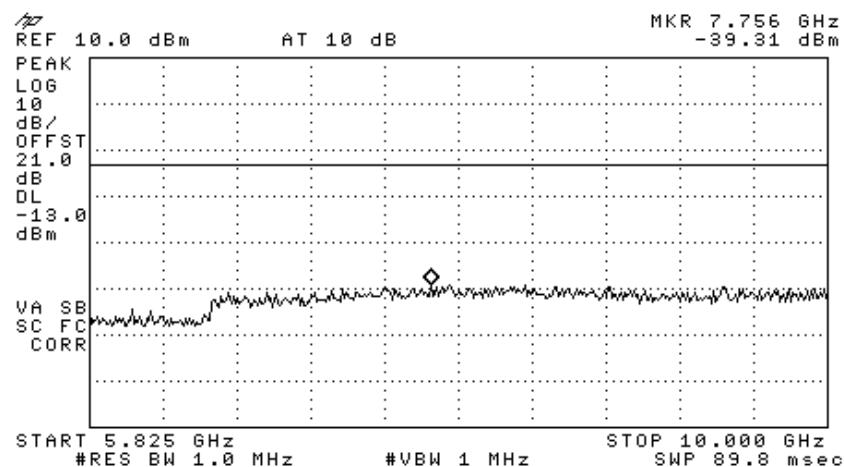


Figure 380 —5805 MHz BPSK

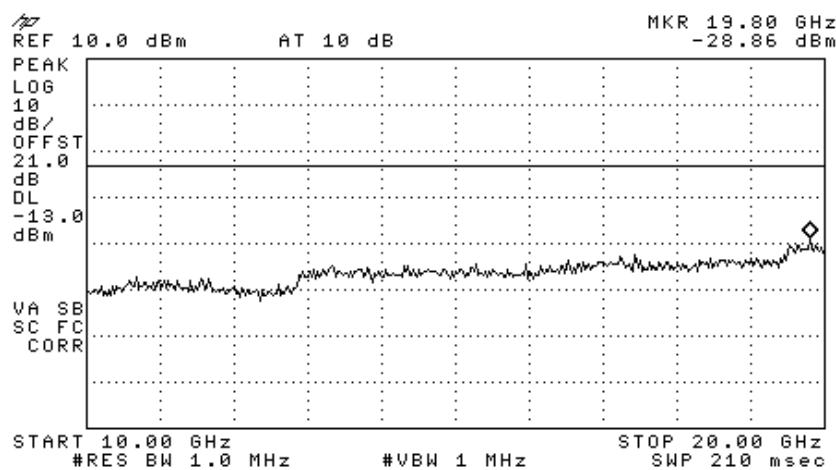


Figure 381 —5805 MHz BPSK

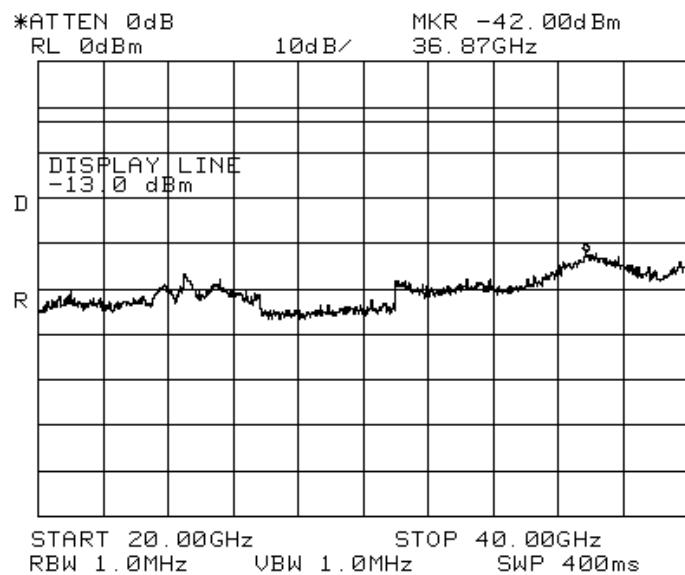


Figure 382 —5805 MHz BPSK

20.2 Results table

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

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

Operation Frequency (MHz)	Modulation	Reading (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	-29.59	-13.0	-16.59
	BPSK	-29.76	-13.0	-16.76
5200	64QAM	-28.75	-13.0	-15.75
	BPSK	-28.77	-13.0	-15.77
5240	64QAM	-19.50	-13.0	-6.50
	BPSK	-28.95	-13.0	-15.95
5745	64QAM	-29.03	-13.0	-16.06
	BPSK	-30.22	-13.0	-17.22
5765	64QAM	-29.49	-13.0	-16.49
	BPSK	-29.30	-13.0	-16.30
5805	64QAM	-29.23	-13.0	-16.23
	BPSK	-28.86	-13.0	-15.86

Figure 383 Peak Power Output of 5150-5250; 5725-5825 MHz Bands

JUDGEMENT: Passed by 6.50 dB

TEST PERSONNEL:

Tester Signature: E. Pitt Date: 21.02.08

Typed/Printed Name: E. Pitt

20.3 Test Equipment Used.

Peak Power Output of 5150-5825 MHz Band

Instrument	Manufacturer	Model	Serial/Part Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 year
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	May 9, 2007	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	February 8, 2008	1 year

Figure 384 Test Equipment Used

21. Band Edge Spectrum 5GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

[In Accordance with section 15.407)

21.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (cable loss = 1 dB). The spectrum analyzer was set to 1 MHz resolution BW. Maximum power level below 5150 MHz and above 5350 MHz was measured at 5180 MHz and 5240MHz correspondingly. Maximum power level below 5725 MHz and above 5825 MHz was measured at 5745 MHz and 5805 MHz correspondingly.

The E.U.T. was tested at 5180, 5240, 5745, and 5805 MHz with the following modulations: 64QAM (54Mbit/sec) and BPSK (6Mbit/sec).

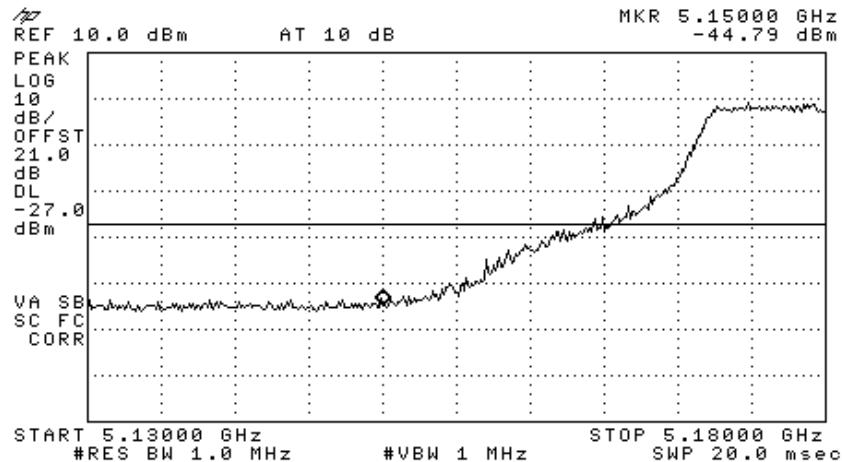


Figure 385 — 5180 MHz 64QAM

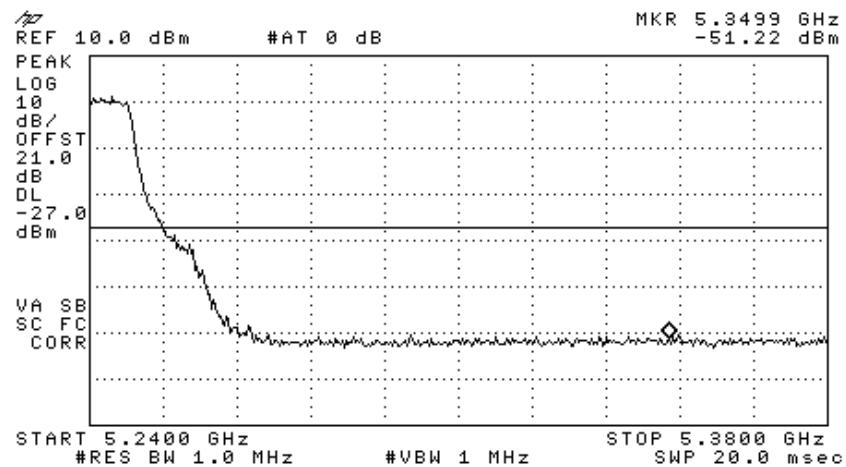


Figure 386 —5240 MHz 64QAM

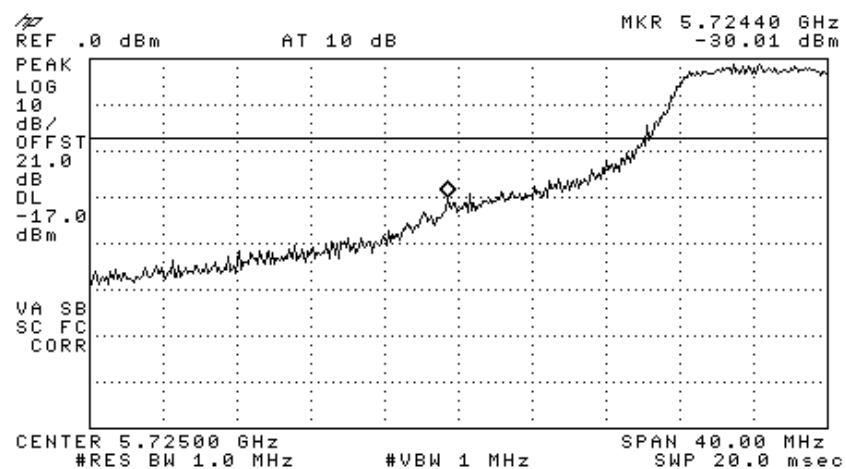


Figure 387 —5745 MHz 64QAM

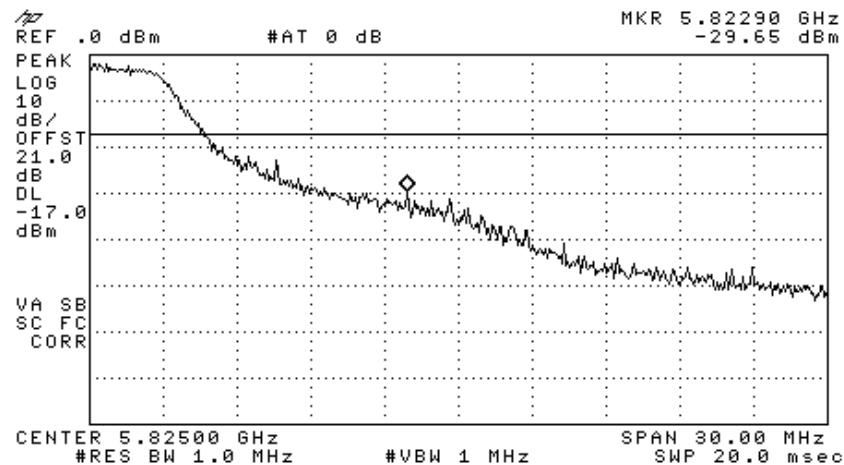


Figure 388 —5805 MHz 64QAM

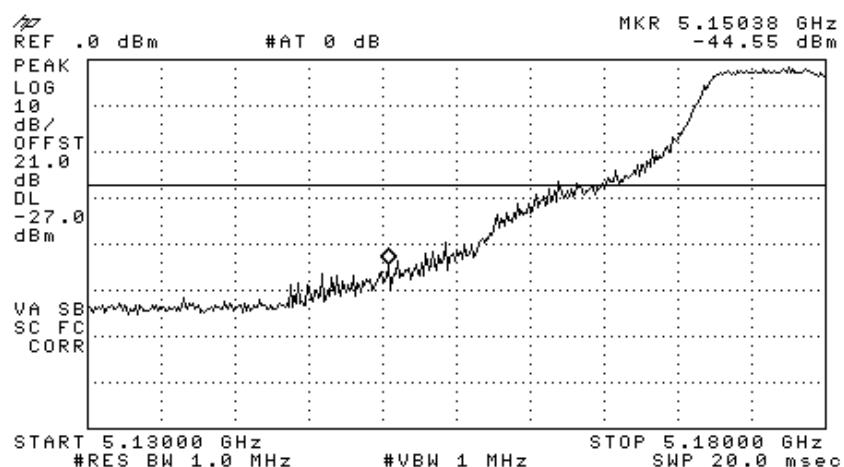


Figure 389 —5180 MHz BPSK

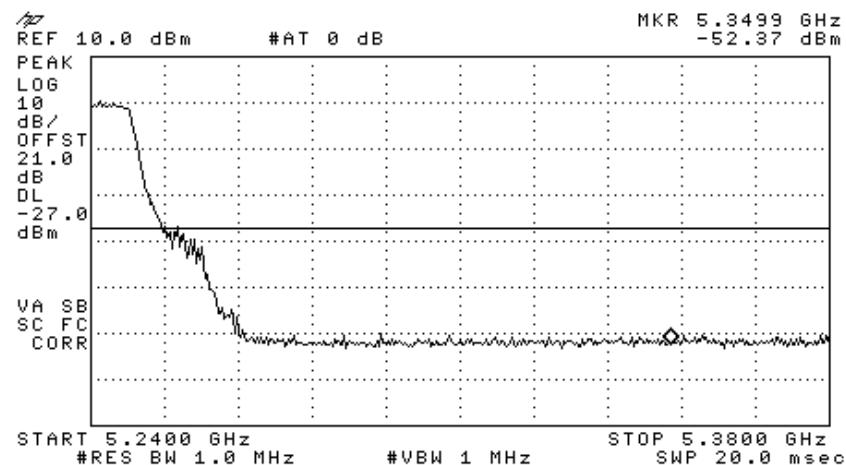


Figure 390 —5240 MHz BPSK

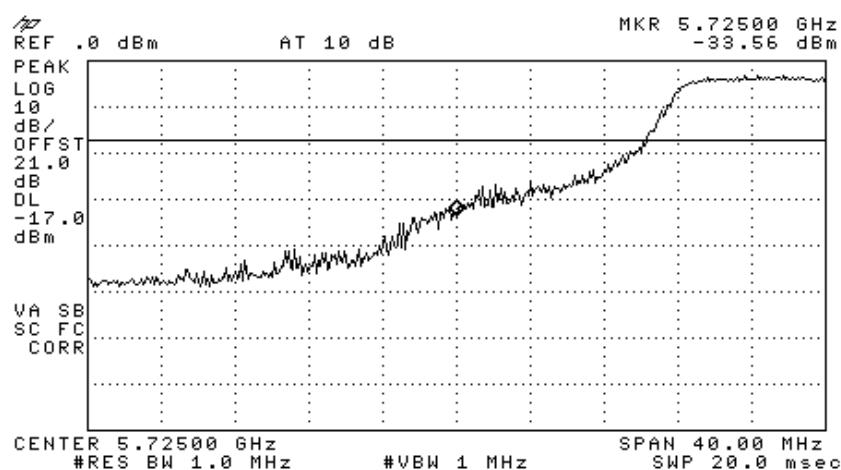


Figure 391 —5745 MHz BPSK

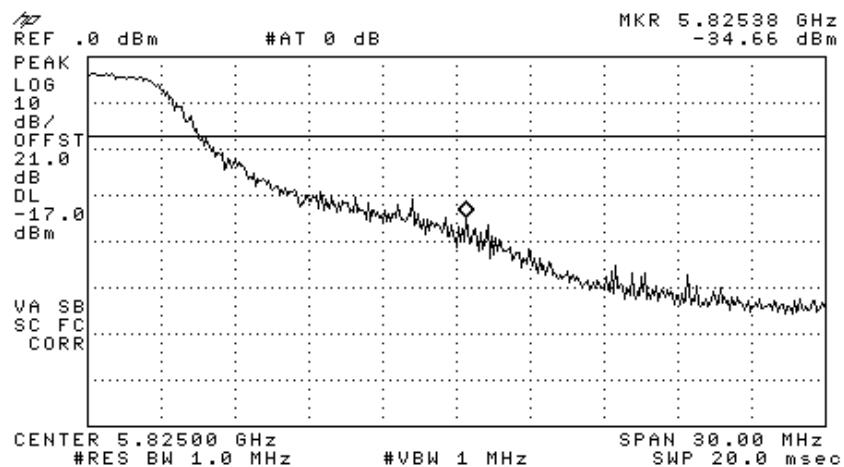


Figure 392 —5805 MHz BPSK

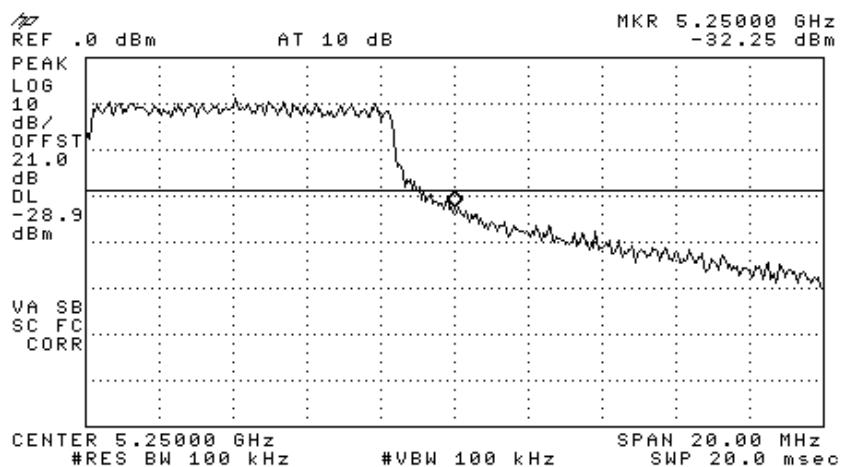


Figure 393 —Band Edge at 5.25 GHz Operation at 5.24 GHz 64QAM (Section 15.215(c))

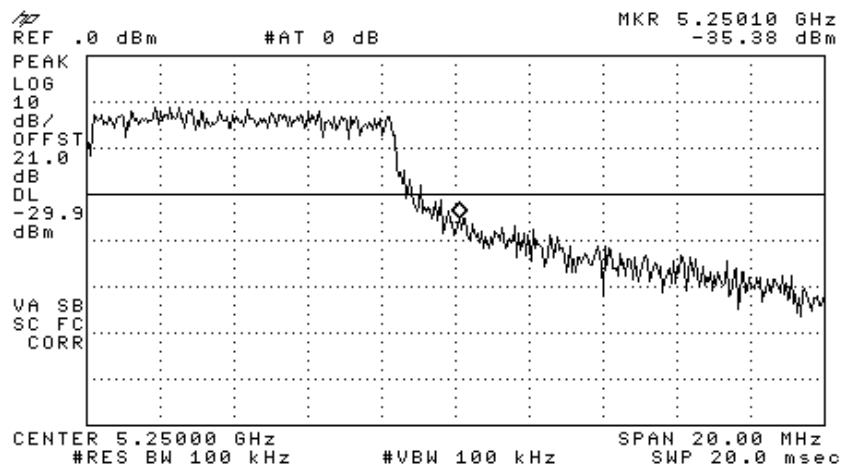


Figure 394 —Band Edge at 5.25 GHz Operation at 5.24 GHz BPSK (Section 15.215(c))

21.2 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

Specification: F.C.C. Part 15, Subpart C (15.215(c))

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Result (dBc)	Specification (dBc)	Margin (dB)
5240	64QAM	5252	23.55	20.0	-3.55
	BPSK	5252	25.48	20.0	-5.48

Figure 395 Band Edge at 5.25 GHz operation at 5.24 GHz

JUDGEMENT: Passed by 3.55 dB

TEST PERSONNEL:

Tester Signature: _____

Date:

Typed/Printed Name: E. Pitt

21.3 Results table

E.U.T. Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS
With 4 Aruba AP70 Access Points

Model No.: 860M With WCE

Serial Number: 1. 860M: 73903D 2. WCE: 739038

Specification: F.C.C. Part 15, Subpart C (15.407)

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Result (dBm)	Specification (dBm)	Margin (dB)
5180	64QAM	5150	-44.79	-27.0	-17.79
	BPSK	5150	-44.55	-27.0	-17.55
5240	64QAM	5350	-51.22	-27.0	-24.22
	BPSK	5250	-35.38	-27.0	-8.38
5725	64QAM	5744	-30.01	-17.0	-13.01
	BPSK	5725	-33.56	-17.0	-16.56
5825	64QAM	5823	-29.65	-17.0	-12.65
	BPSK	5825	-34.66	-17.0	-17.66

Figure 396 Band Edge Spectrum

JUDGEMENT: Passed by 8.38 dB

TEST PERSONNEL:

Tester Signature: E. Pitt Date: 21.02.08

Typed/Printed Name: E. Pitt

21.4 **Test Equipment Used.**

Band edge Spectrum

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

Figure 397 Test Equipment Used



22. Antenna Gain 5GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

The antenna gain is 7 dBi.

23. R.F Exposure/Safety 5GHz Transmitter 802.11b/g+802.11a + CELL + PCS Signals

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

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(f) FCC limits at 5745 MHz is: $1 \frac{mW}{cm^2}$

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

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

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

P_t - Transmitted Power (Peak) 21.3 mW= 13.28 dBm

G_t - Antenna Gain, 7 dBi = 5

R- Distance from Transmitter using 1 m worst case

(h) The peak power density is :

$$S_p = \frac{21.3 \times 5}{4\pi(100)^2} = 0.85 \times 10^{-3} \frac{mW}{cm^2}$$

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

The average power source is:

10.65mW

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

$$S_{AV} = 0.425 \times 10^{-3} \frac{mW}{cm^2}$$

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

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

24.1 ***Test Specification***

30-40000 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 frequency range 30-40000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

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

In the frequency range 2.9 - 40 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz.

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

The emissions were measured at a distance of 3 meters.

The E.U.T. was tested in both Rx and Tx modes.

The E.U.T. was tested at the operating frequencies of, 5180, 5200, 5240, 5745, 5765, and 5805 MHz using the following modulations: 64QAM, and BPSK.

24.3 Test Data

JUDGEMENT: Passed by 1.5 dB.

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

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

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

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

TEST PERSONNEL:

Tester Signature:  Date: 21.02.08

Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description: WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type: 860M With WCE
 Serial Number:
 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
 Antenna: 3 meters distance

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

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

Figure 398. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

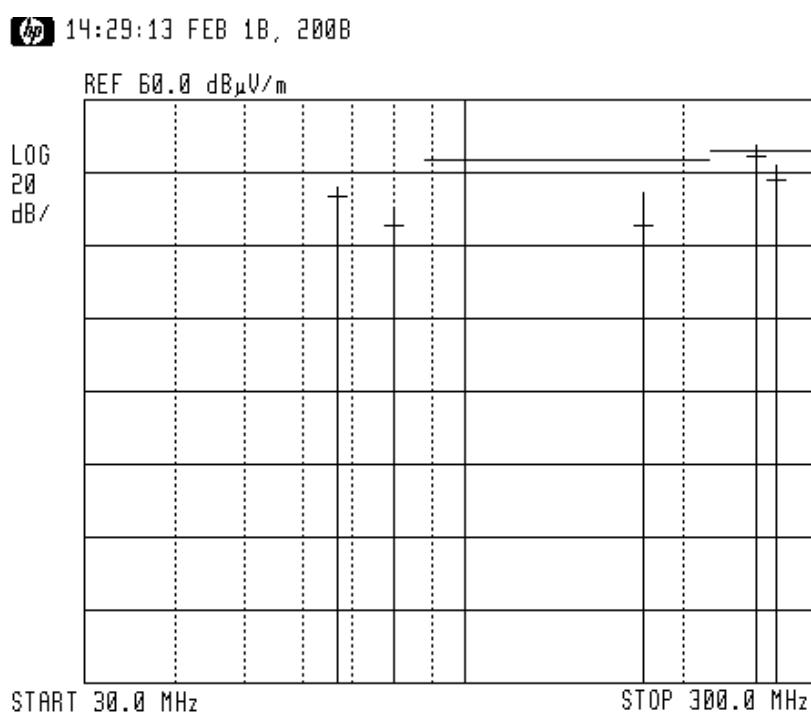
Note: QP Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

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



**Figure 399. 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	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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

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

Figure 400. Radiated Emission. Antenna Polarization: HORIZONTAL. Detectors: Peak, Quasi-peak

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

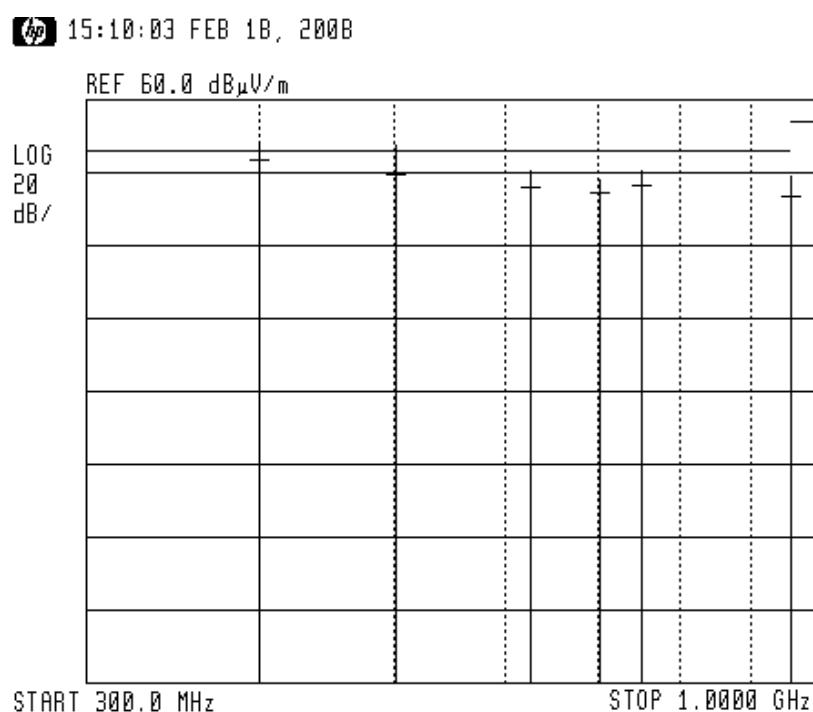
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Horizontal
Antenna: 3 meters distance

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



**Figure 401. 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 WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

Figure 402. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

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

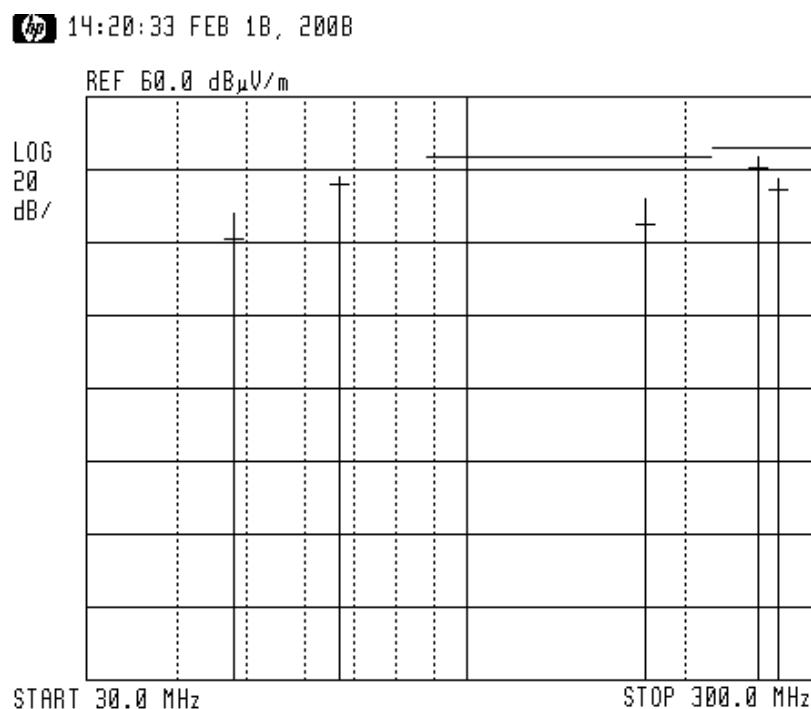
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



**Figure 403. 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.

Radiated Emission

E.U.T Description WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
 Type 860M With WCE
 Serial Number: 1. 860M: 73903D
 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
 Antenna: 3 meters distance

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

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

Figure 404. Radiated Emission. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak

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

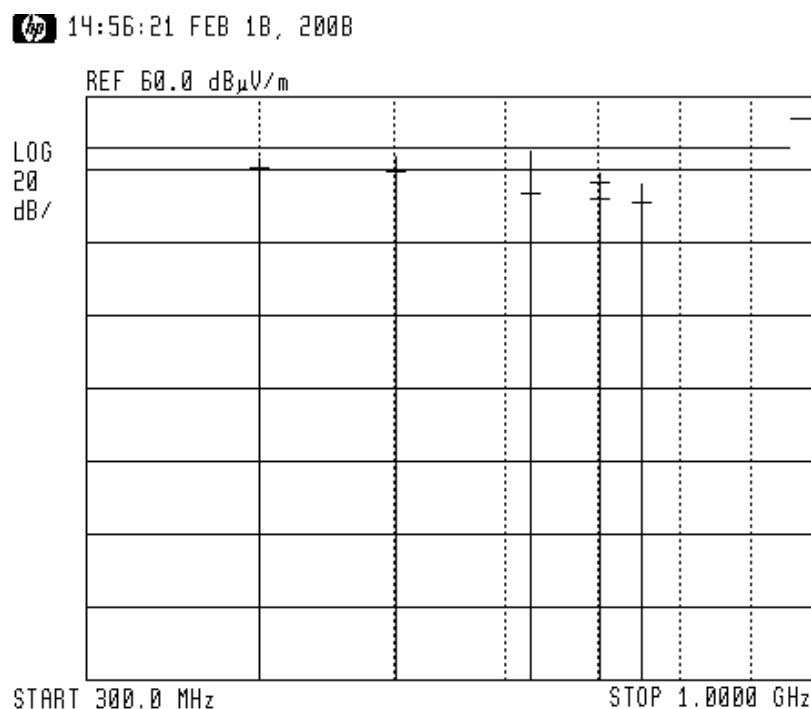
Radiated Emission

E.U.T Description	WLAN Module With WCE (WiFi Coverage Extender) for DAS With 4 Aruba AP70 Access Points
Type	860M With WCE
Serial Number:	1. 860M: 73903D 2. WCE: 739038

Specification: FCC Part 15, Subpart B, Class B

Antenna Polarization: Vertical
Antenna: 3 meters distance

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



**Figure 405. 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 No.	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 Year
RF Filter Section	HP	85420E	3705A00248	November 12, 2007	1 Year
Antenna Biconical	ARA	BCD 235/B	1041	March 22, 2007	1 Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	February 4, 2007	2 Years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 15, 2006	2 Years
Horn Antenna	ARA	SWH-28	1008	December 8, 2006	2 Years
Horn Antenna	Narda	V637	0410	December 8, 2006	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 2, 2007	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2008	1 Year
Low Noise Amplifier	MK Milliwave	MKT6-3000 4000-30-13P	399	January 9, 2008	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 22, 2007	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	November 14, 2007	1 Year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A



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. Intermodulation Tests

25.1 *Test procedure*

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

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

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

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

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

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

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

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

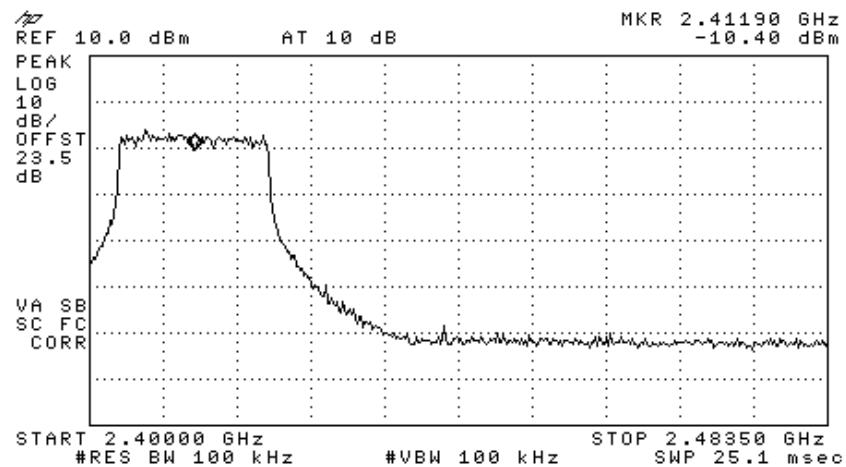


Figure 406 —2412MHz 64QAM

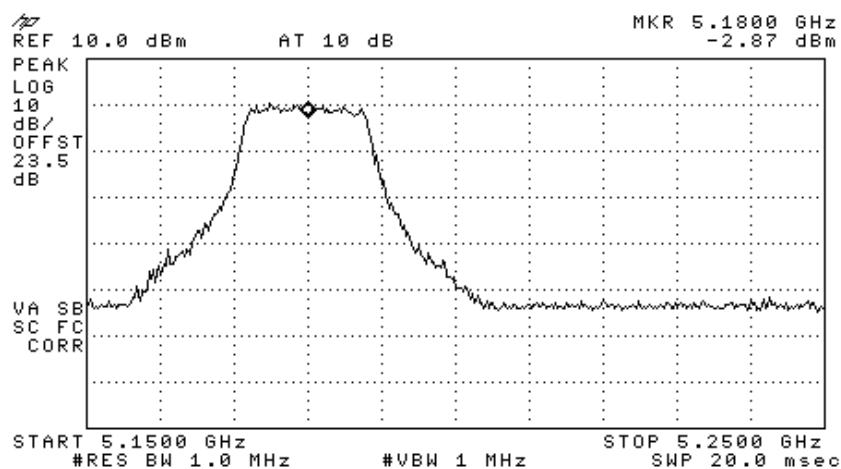


Figure 407 —5180MHz BPSK

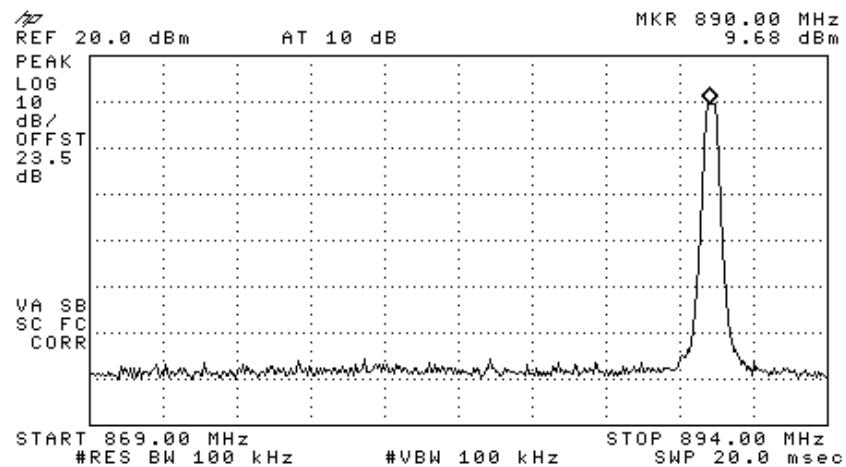


Figure 408 —890MHz FM

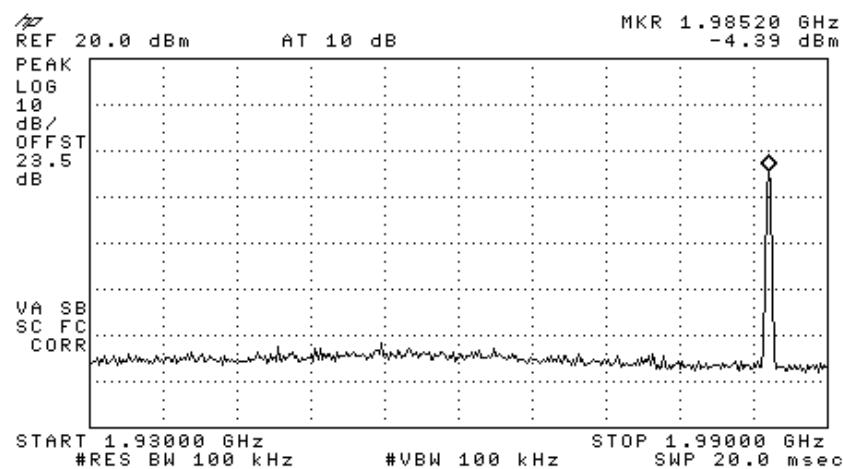


Figure 409 —1985MHz CDMA

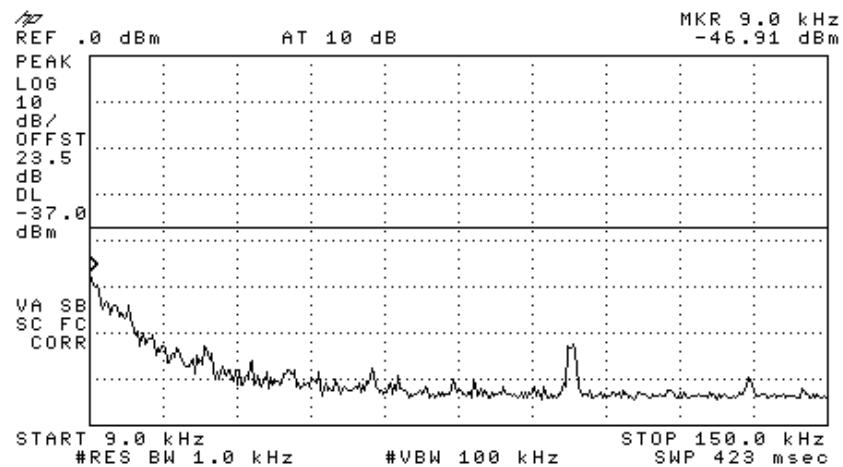


Figure 410

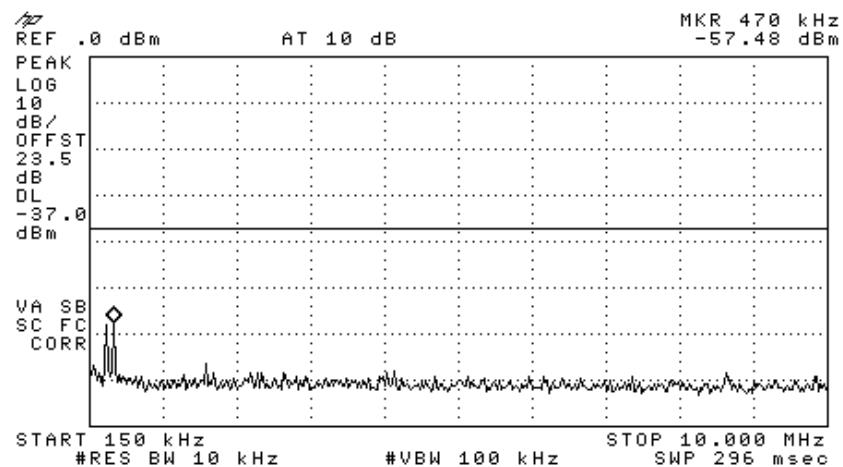


Figure 411

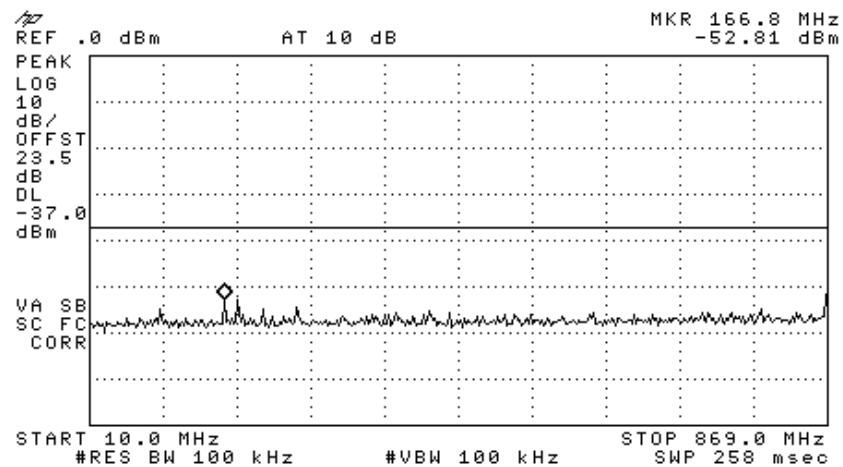


Figure 412

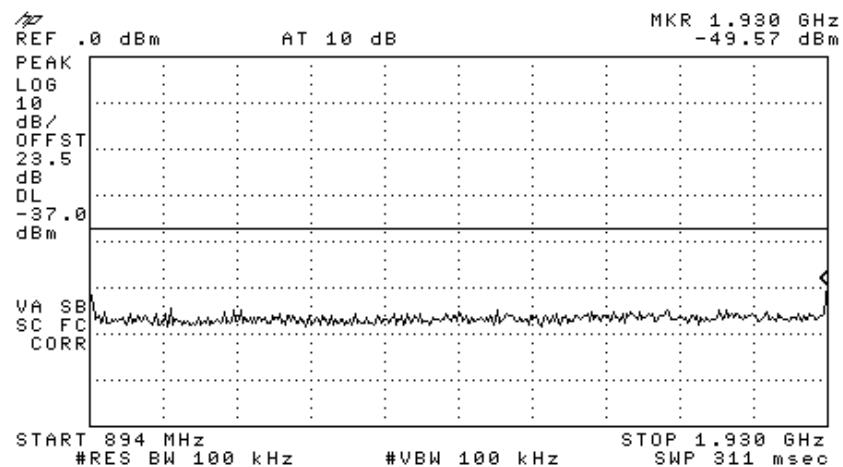


Figure 413

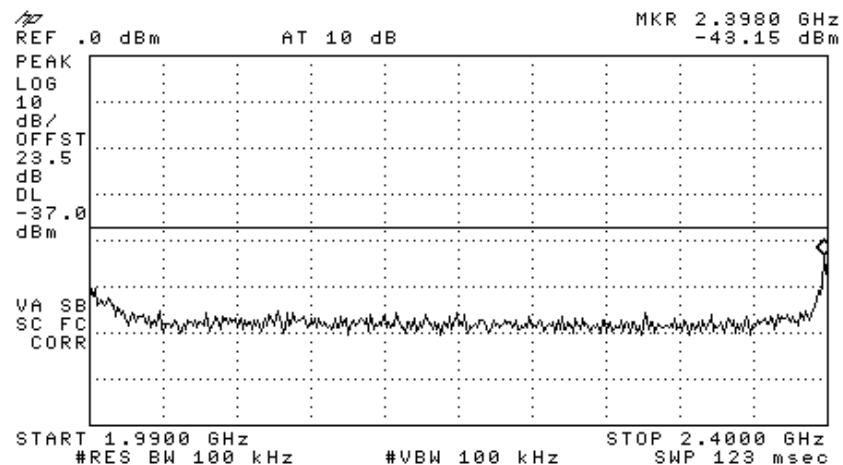


Figure 414

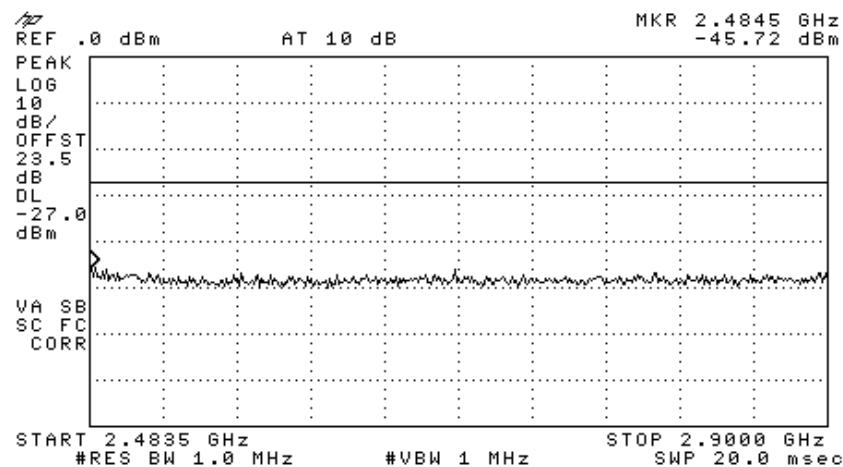


Figure 415

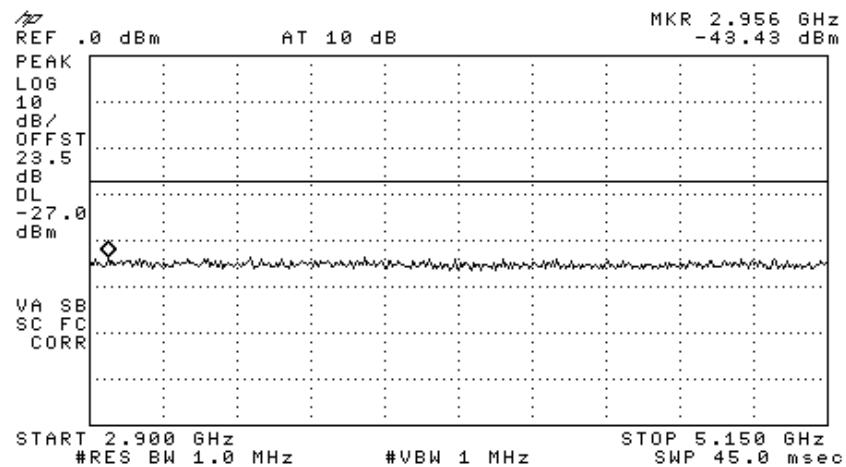


Figure 416

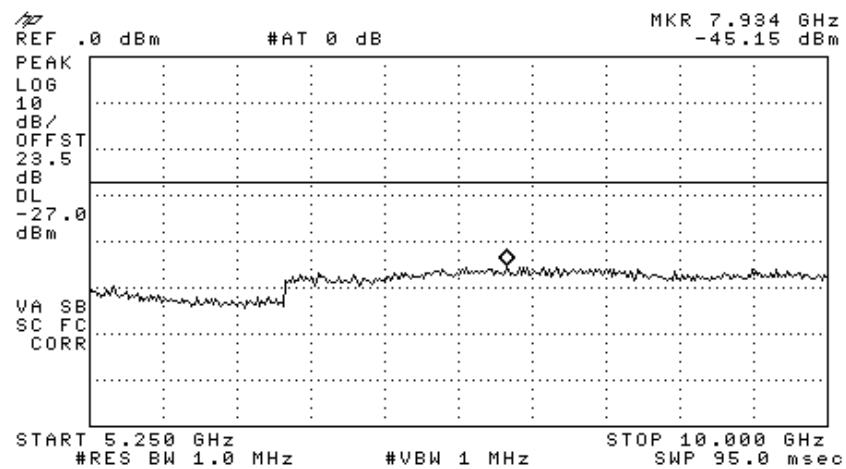


Figure 417

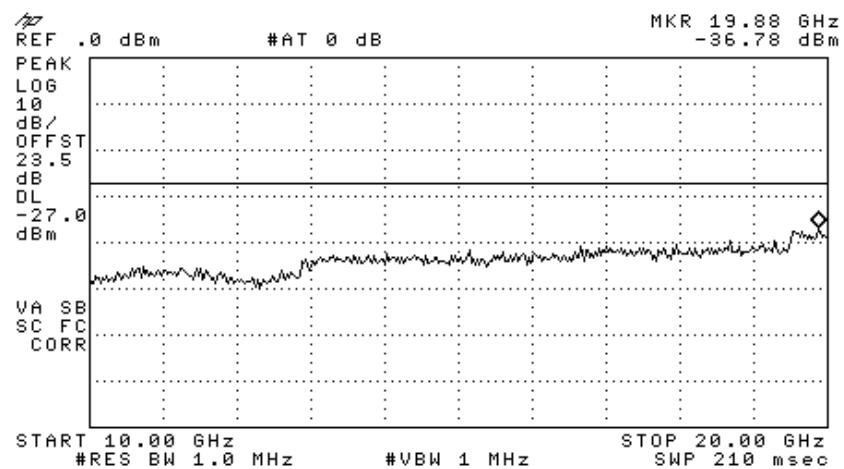


Figure 418

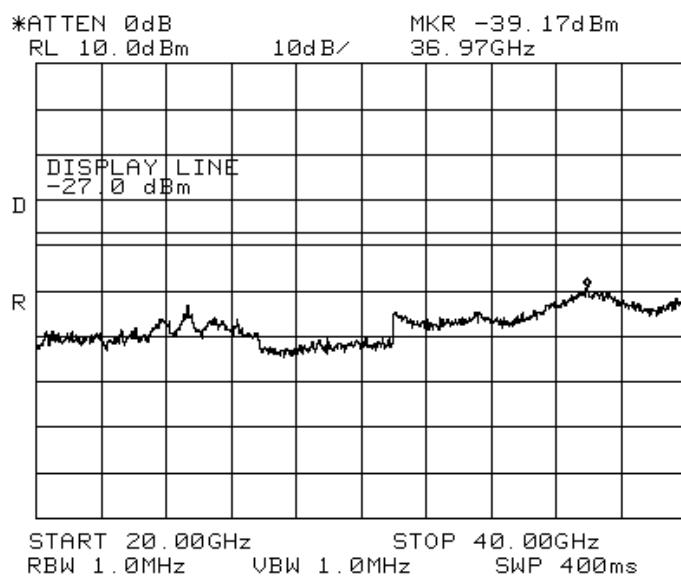


Figure 419

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: *E. Pitt* Date: 21.02.08

Typed/Printed Name: E. Pitt

25.2 Test Equipment Used.

Intermodulation

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

Figure 420 Test Equipment Used

26. APPENDIX A - CORRECTION FACTORS

26.1 *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".

26.2 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.

26.3 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.

26.4 Correction factors for

CABLE from EMI receiver to test antenna at 10 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	9.8
20.0	0.8	1400.0	10.0
30.0	0.9	1600.0	11.3
40.0	1.2	1800.0	12.2
50.0	1.4	2000.0	13.1
60.0	1.6	2300.0	14.5
70.0	1.8	2600.0	15.9
80.0	1.9	2900.0	16.4
90.0	2.0		
100.0	2.1		
150.0	2.6		
200.0	3.2		
250.0	3.8		
300.0	4.2		
350.0	4.6		
400.0	5.1		
450.0	5.3		
500.0	5.6		
600.0	6.3		
700.0	7.0		
800.0	7.6		
900.0	8.0		
1000.0	8.7		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 34 meters.
3. The above data is located in file 34M10MO.CBL on the disk marked "Radiated Emissions Tests EMI Receiver".

12.6 Correction factors for LOG PERIODIC ANTENNA
Type LPD 2010/A
at 3 and 10 meter ranges.

Distance of 3 meters

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

Distance of 10 meters

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

NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 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".

26.5 Correction factors for

LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

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

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

NOTES:

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

26.6 Correction factors for
BICONICAL ANTENNA
**Type BCD-235/B,
at 3 meter range**

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

NOTES:

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

**26.7 Correction factors for BICONICAL ANTENNA
Type BCD-235/B,
10 meter range**

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

NOTES:

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



26.8 Correction factors for Double-Ridged Waveguide Horn

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

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENN A 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			



26.9 Correction factors for

Horn Antenna

**Model: SWH-28
at 1 meter range.**

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

26.10 Correction factors for

Horn Antenna Model: V637

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

26.11 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (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