Israel Testing Laboratories

ACCREDITED TESTING Cert No.1152.01

DATE: 13 March 2011

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

FCC Radio Test Report

for

Mobile Access Networks

Equipment under test:

VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod

1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
A. Sharabi, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Measurement/Technical Report for

Mobile Access Networks

VE AWS MIMO DAS System Comprising:

1. VE AWS Control Unit 2. VE AWS Access Pod

1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO

FCC ID: OJFVEAWSM

This report concerns:	Original Grant: X Class II change: Class I change:
Equipment type:	Licensed Non-Broadcast Station Transmitter

Limits used:
47CFR Parts 2; 27

Measurement procedure used is ANSI C63.4-2003.
Substitution Method used as in ANSI/TIA-603-D: 2010

Application for Certification prepared by:

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

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

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

TABLE OF CONTENTS

1. General Information

1.1 Administrative Information

Manufacturer:	Mobile Access 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):	VE AWS MIMO DAS System Comprising: 1. VE AWS Control Unit 2. VE AWS Access Pod
Equipment Model No.:	1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Equipment Serial No.:	1. 00105300044 2. 00110100412
Date of Receipt of E.U.T:	13.02.11
Start of Test:	13.02.11
End of Test:	17.02.11
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Parts 2; 27

1.2 List of Accreditations

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

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.

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

1.3 Product Description

The MobileAccess**VE** AWS MIMO solution provides enhanced, cost effective, in-building AWS MIMO coverage for any small-to-large sized enterprise environment. This solution is quickly and easily deployed using the existing Ethernet cabling infrastructure without affecting existing LAN services or performance. The VE solution distributes the supported AWS MIMO service to VE Access Pods (VAPs) installed throughout the enterprise, which distribute the services via external antennas and provide Ethernet connectivity (and PoE pass-through) to LAN terminals. MobileAccess**VE** seamlessly coexists with the Enterprise LAN and does not consume LAN capacity. The VAPs are distributed on each floor and plug into existing standard Ethernet jacks. They are powered via PoE technology and managed via a VE Control Unit (VCU) located in the floor's IDF/Telco closet. For site coverage that requires more than one VCU, several VCUs can be aggregated under a single Master VCU. The Master VCU provides the interface to the carrier's capacity sources and management. This enhanced AWS MIMO coverage solution can be quickly and easily installed with minimal disturbance to the enterprise. In less than a few hours and with no additional cables being required, a scalable and flexible solution is provided at a significantly lower total installation cost. The following figures illustrate single-tier and multi-tier VE installations. In a single-tier installation the VCU is connected to both the service provider's equipment and the Ethernet switch, and distributes Ethernet and mobile services to up to 12 VAPs distributed over one more adjacent floors.

Multi-tier installation includes the Master VCU that supports up to 12 Slave VCUs. In this type of installation the provider's services are fed to the Master VCU through which the Slave VCUs are controlled and managed.

Main Elements - The MobileAccess**VE** solution is based on the following main elements:

VE Control Unit (VCU) – Provides interface to up to 12 VAPs, and the central interface for managing the VE deployment. In Master/Slave mode, it can serve to expand the network coverage with additional VCUs serving as Slaves and a single control point at the Master. Slave mode is automatically detected when a Slave VCU detects that it is connected to the Master VCU.

Master VE Control Unit (Master VCU) – Installed in the main IDF/Telco closet, the Master VCU interfaces with the service provider's RF capacity sources and provides secure, central management to up to twelve VCUs and VAP devices in any combination. The Master and Slave VCUs are connected using dedicated CAT-6/7 cables.

Slave VE Control Unit (Slave VCU) – Installed in the IDF/Telco closet and used to expand coverage to additional floors. Each VCU interfaces the Master VCU and up to 12 VAPs and 12 Ethernet connections.

VCUs distribute wireless service signals to each VAP along with PoE and (where relevant) Ethernet signals from the Ethernet switch, throughout the existing CAT-5e/6 infrastructure.

VE Access Pod (VAP) – VAPs are pluggable antennas distributed at strategic locations on the floor to provide Ethernet connection to an IP device and wireless coverage of the service via external antennas. Power to VAPs is provided via PoE from the VCU.

Up to twelve VAPs can be connected to a single VCU using LAN cables (CAT-5e or higher).

The system supports a single frequency band, 2110-2155 MHz in the Downlink mode and 1710-1755 MHz in the Uplink mode.

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 September 3, 2009).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) 0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.6 dB

Note: See ITL Procedure No. PM 198.

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 5.2 dB

Note: See ITL Procedure No. PM 198.

2. System Test Configuration

2.1 Justification

The EUT consists of the VCU and the VAP.
The test setup was configured to closely resemble the standard installation.
The AWS MIMO source signals are represented in the setup by appropriate signal generators.
An “Exercise” SW on the computer was used to enable / disable transmission of the VAP, while the EUT output was connected to the spectrum analyzer.

Both MIMO channels transmit during the testing

2.2 EUT Exercise Software

The Element Management System EngGUI ver. 2.8 build 05 used for commands delivery.
These commands are used to enable / disable of VAP transmission.
APod Embedded SW version 2.8 build 20
VCU Embedded SW version 2.8 build 20

2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

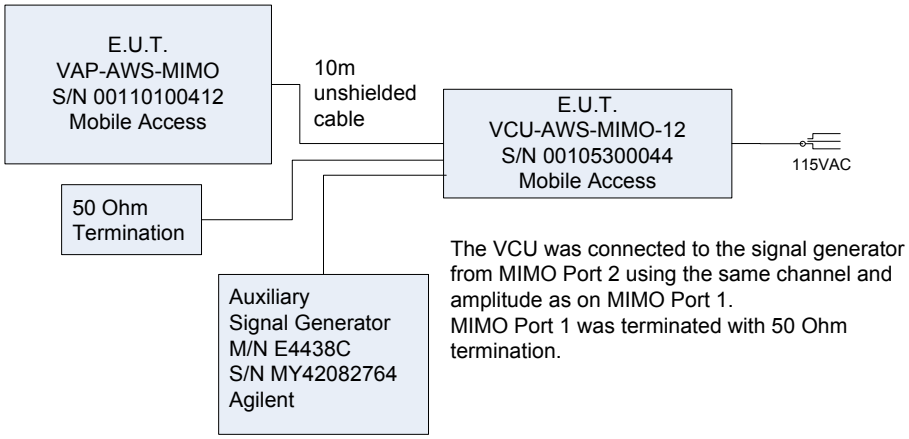

Figure 1. Test Set-up

3. Test Set-up Photos

Figure 2. Conducted Emission From Power Lines Test

Figure 3. Conducted Emission From Antenna Port Tests

Figure 4. Radiated Emission Test

Figure 5. Radiated Emission Test

4. Conducted Emission Data

4.1 Test Specification

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

4.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

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

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

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

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

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

4.3 Results

JUDGEMENT: Passed by 18.2 dB

The margin between the emission levels and the specification limit is, in the worst case, 18.3 dB for the phase line at 0.20 MHz and 18.2 dB at 0.20 MHz for the neutral line.

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

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

TEST PERSONNEL:

Tester Signature: _____ Date: 15.03.11

Typed/Printed Name: A. Sharabi

Conducted Emission

E.U.T Description	VE AWS MIMO DAS System Comprising: 1. VE AWS Control Unit 2. VE AWS Access Pod
Type	1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number:	1. 00105300044 2. 00110100412

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

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.197617	47.8	45.5	-18.3	33.3	-20.5	0.0
2	0.315630	24.7	20.1	-39.8	19.5	-30.3	0.0
3	0.854439	33.1	29.7	-26.3	22.9	-23.1	0.0
4	4.423217	47.6	40.6	-15.4	23.6	-22.4	0.0
5	6.381656	39.1	35.5	-24.5	26.0	-24.0	0.0
6	12.748635	34.5	32.8	-27.2	29.6	-20.4	0.0

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

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

Conducted Emission

E.U.T Description	VE AWS MIMO DAS System Comprising: 1. VE AWS Control Unit 2. VE AWS Access Pod
Type	1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number:	1. 00105300044 2. 00110100412

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

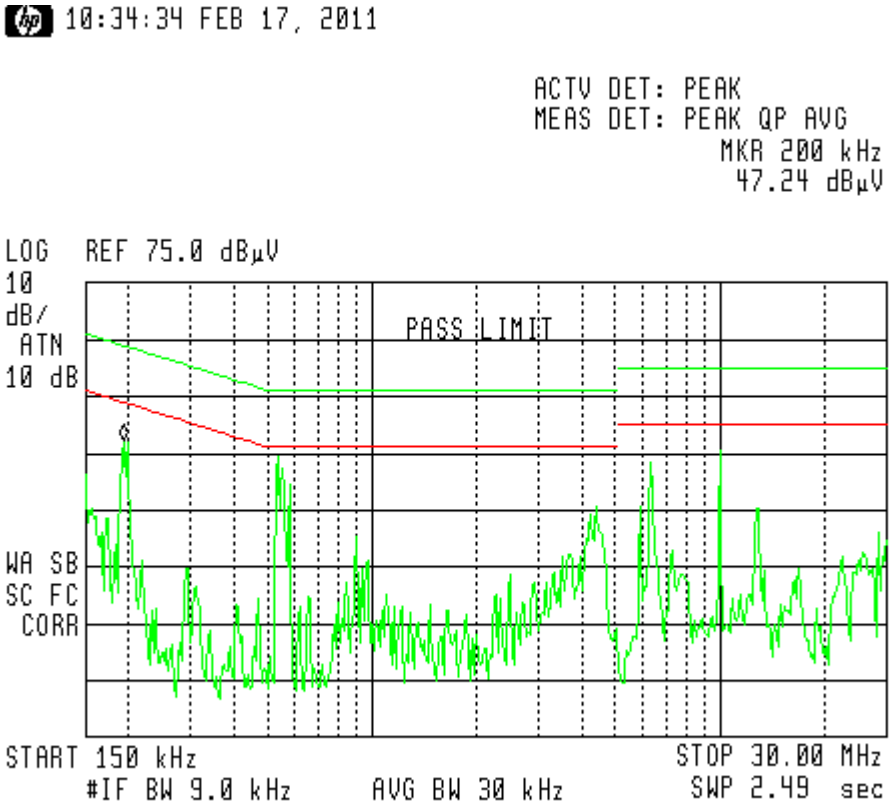

Figure 7. Detectors: Peak, Quasi-peak, Average

Conducted Emission

E.U.T Description	VE AWS MIMO DAS System Comprising: 1. VE AWS Control Unit 2. VE AWS Access Pod
Type	1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number:	1. 00105300044 2. 00110100412

Specification:	F.C.C., Part 15, Subpart C
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.196876	47.9	45.6	-18.2	33.6	-20.2	0.0
2	0.833018	27.1	25.7	-30.3	20.6	-25.4	0.0
3	4.457171	40.3	34.3	-21.7	20.0	-26.0	0.0
4	6.381602	40.6	36.5	-23.5	31.2	-18.8	0.0
5	12.809194	34.5	32.9	-27.1	30.1	-19.9	0.0
6	22.263060	27.0	24.4	-35.6	15.5	-34.5	0.0

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

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

Conducted Emission

E.U.T Description	VE AWS MIMO DAS System Comprising: 1. VE AWS Control Unit 2. VE AWS Access Pod
Type	1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number:	1. 00105300044 2. 00110100412

Specification: F.C.C., Part 15, Subpart C
Lead: Neutral
Detectors: Peak, Quasi-peak, Average

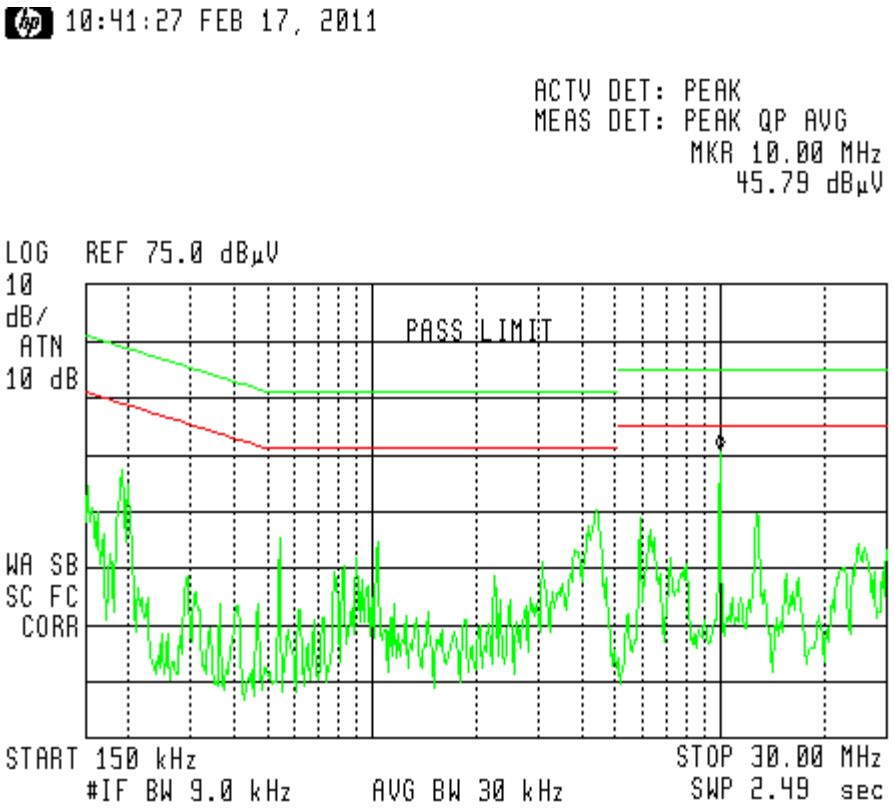

Figure 9 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

4.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 3, 2010	1 Year
LISN	Fischer	FCC-LISN-2A	128	March 3, 2010	1 Year
EMI Receiver	HP	85422E	3906A00276	November 25, 2010	1Year
RF Filter Section	HP	85420E	3705A00248	November 25, 2010	1Year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

5. RF Power Output

5.1 Test Specification

FCC Part 27, Subpart C (27.50(d))

5.2 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 (1 dB). The E.U.T. RF output was modulated as follows:

CDMA at 1.25MHz BW channels (2111.25MHz, 2132.5MHz and 2153.5MHz)
WCDMA at 5MHz BW channels (2112.5MHz, 2132.5MHz and 2152.5MHz)
LTE (QPSK, 16QAM and 64QAM) at 10MHZ BW channels (2115MHz, 2135MHz and 2150MHz)

Special attention was taken to prevent Spectrum Analyzer RF input overload.

Signal generator input level 0dBm.

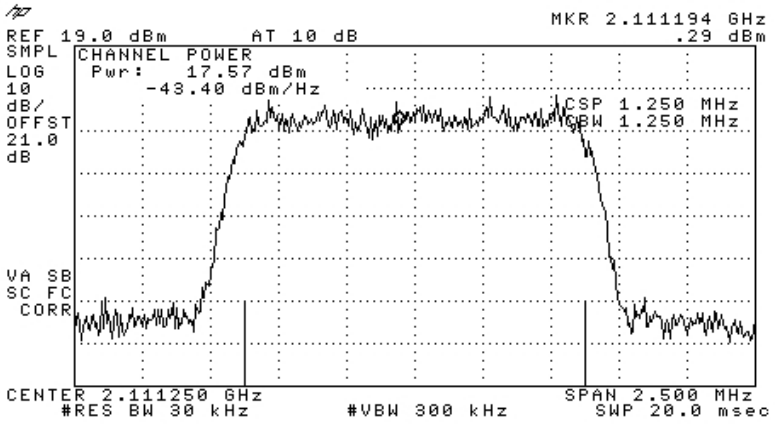

Figure 10.— CDMA (2111.25MHz)

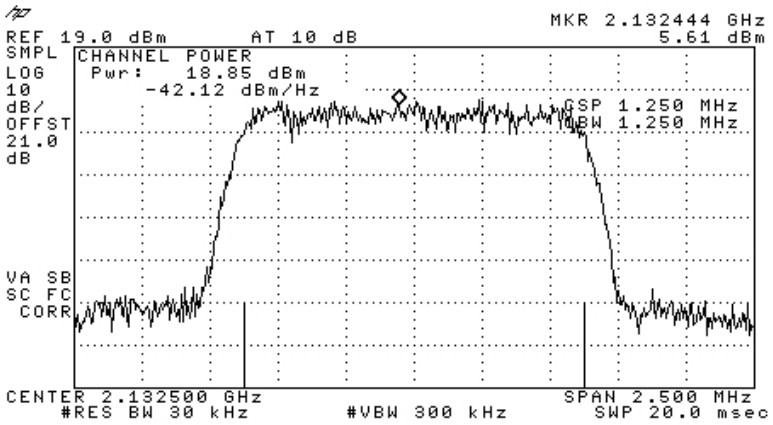

Figure 11.— CDMA (2132.5MHz)

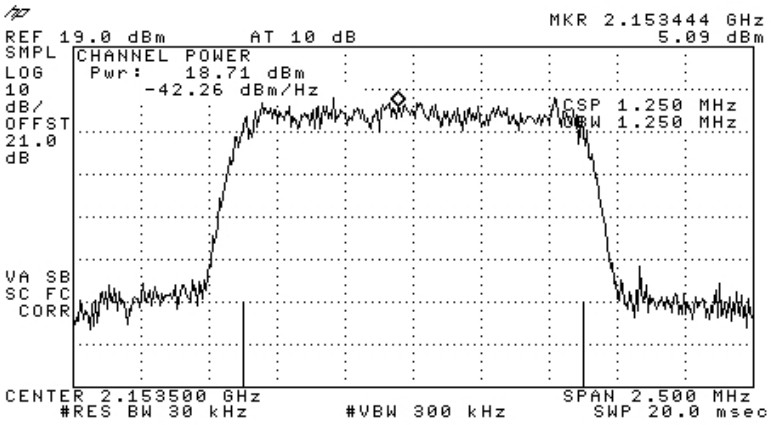

Figure 12.— CDMA (2153.5MHz)

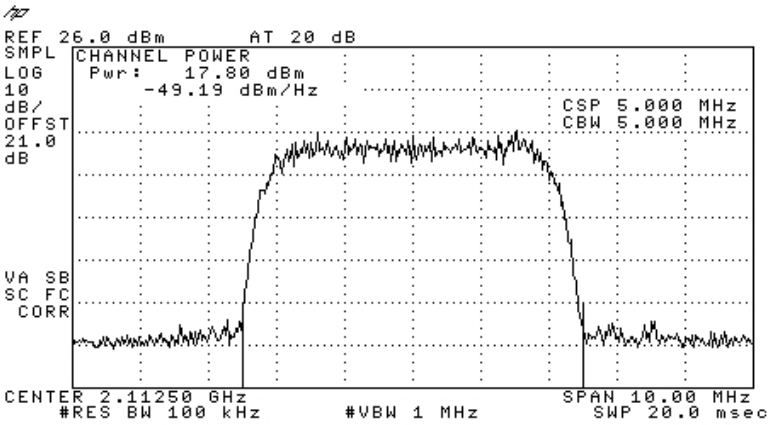

Figure 13.— WCDMA (2112.5MHz)

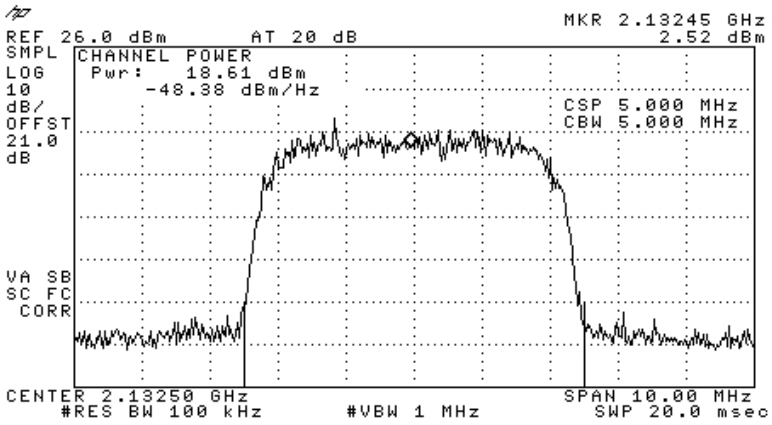

Figure 14.— WCDMA (2132.5MHz)

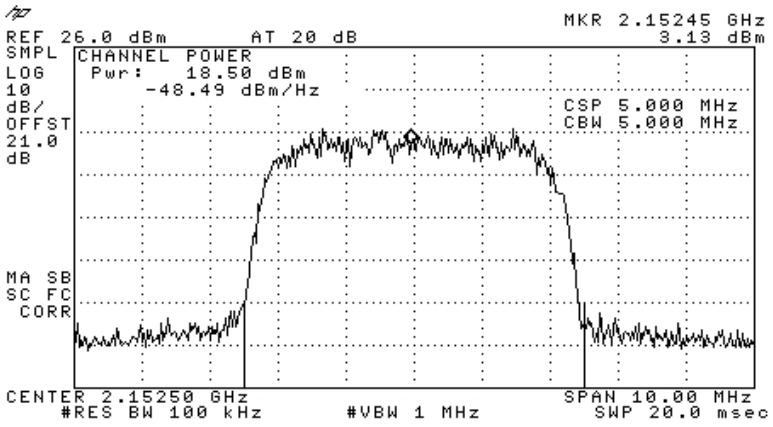

Figure 15.— WCDMA (2152.5MHz)

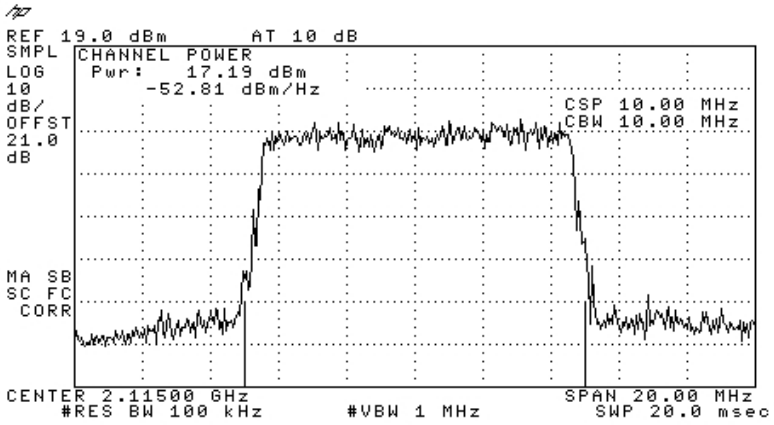

Figure 16.— QPSK (2115.0MHz)

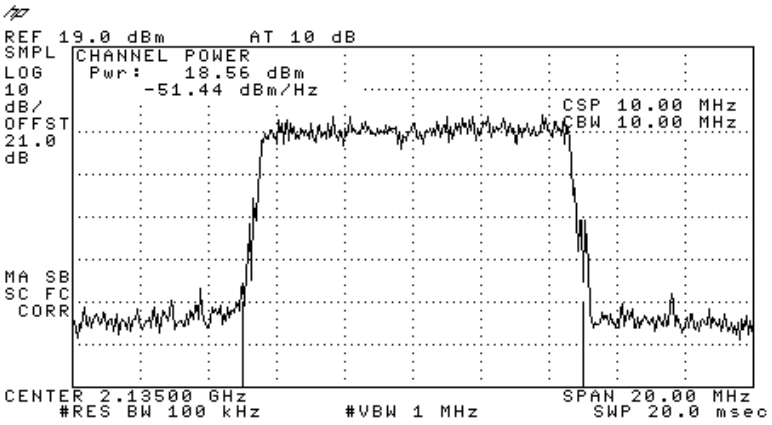

Figure 17.— QPSK (2135.0MHz)

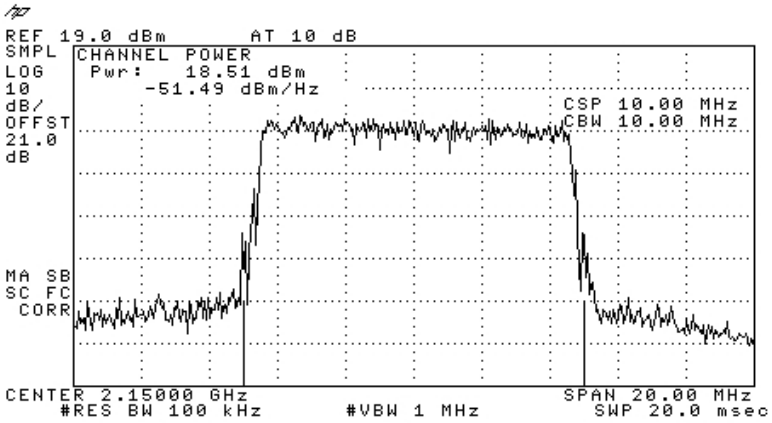

Figure 18.— QPSK (2150.0MHz)

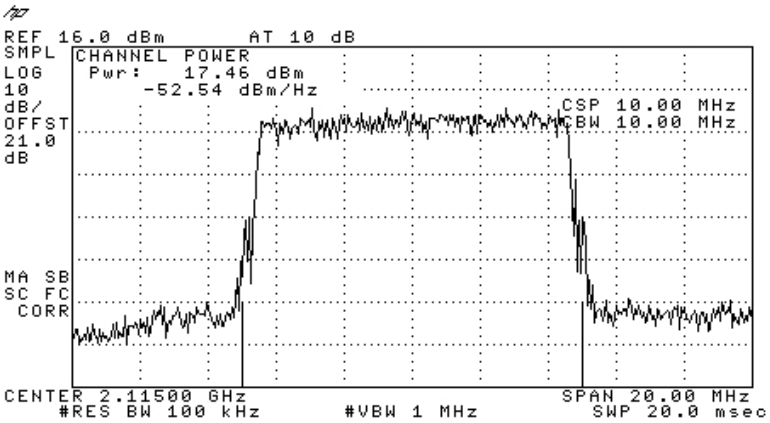

Figure 19.— 16QAM (2115.0MHz)

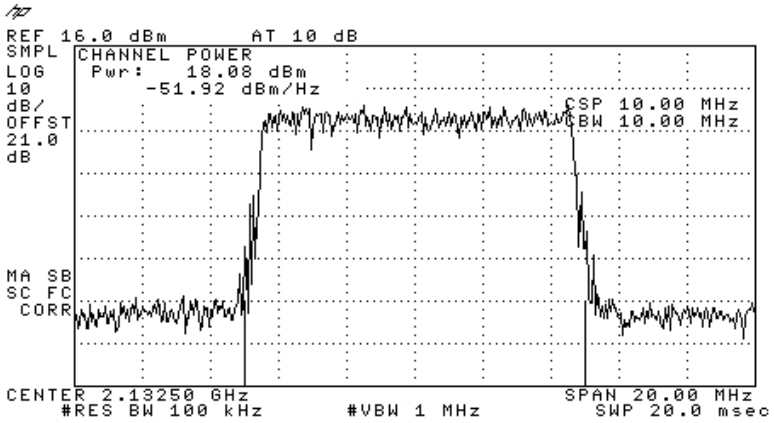

Figure 20.— 16QAM (2135.0MHz)

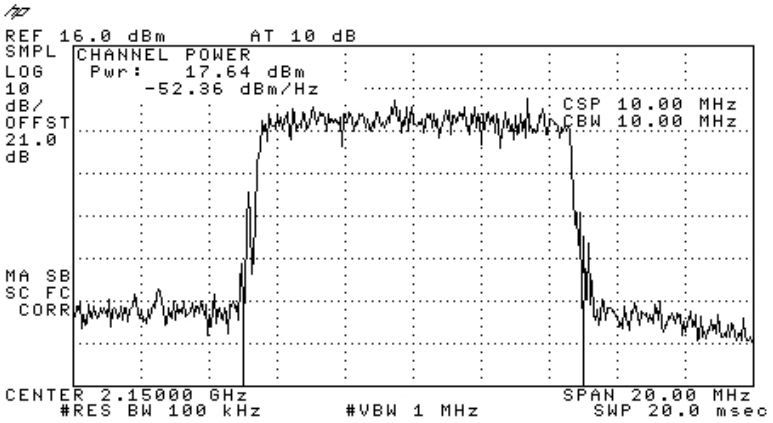

Figure 21.— 16QAM (2150.0MHz)

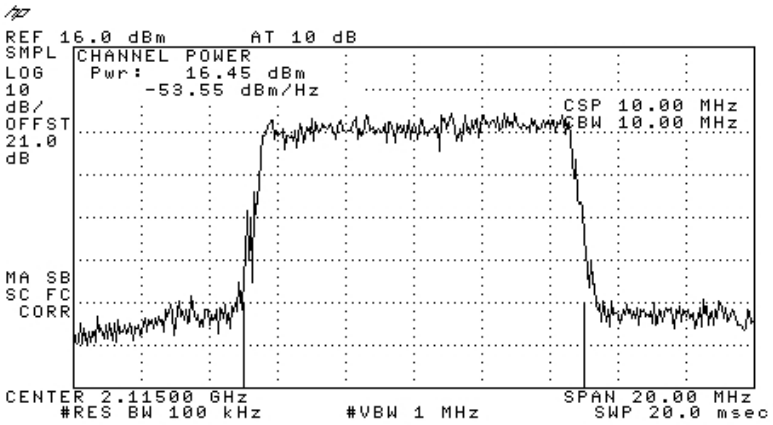

Figure 22.— 64QAM (2115.0MHz)

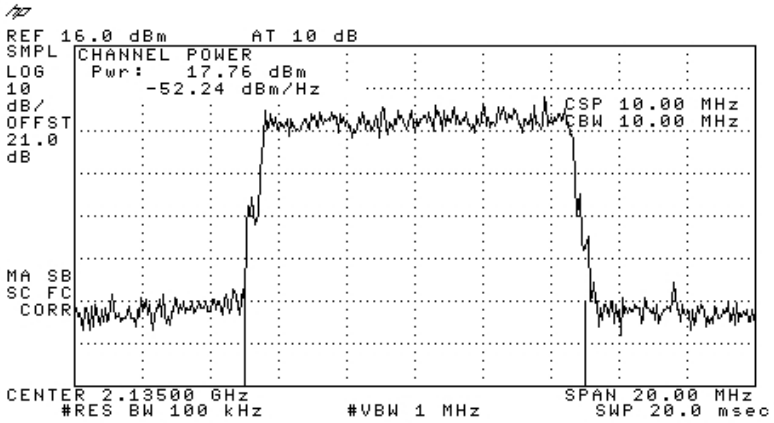

Figure 23.— 64QAM (2135.0MHz)

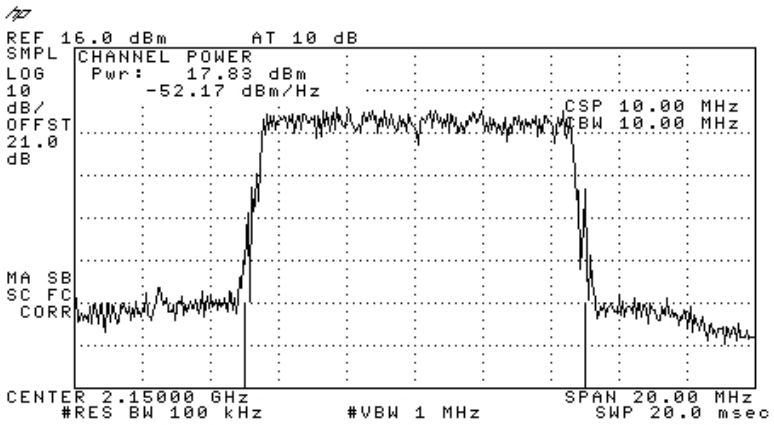

Figure 24.— 64QAM (2150.0MHz)

5.3 Results

E.U.T. Description: VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod
Model No.: 1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number: 1. 00105300044 2. 00110100412
Specification: FCC Part 27, Subpart C, Section 27.50 (d)

Modulation	Operation Frequency (MHz)	Reading (dBm)
CDMA	2111.25	17.57
CDMA	2132.50	18.85
CDMA	2153.50	18.71
WCDMA	2112.25	17.80
WCDMA	2132.50	18.61
WCDMA	2152.50	18.50
QPSK	2115.00	17.19
QPSK	2135.00	18.56
QPSK	2150.00	18.51
16QAM	2115.00	17.46
16QAM	2135.00	18.08
16QAM	2150.00	17.64
64QAM	2115.00	16.45
64QAM	2135.00	17.76
64QAM	2150.00	17.83

Figure 25 RF Power Output

TEST PERSONNEL:

Tester Signature: _____ Date: 15.03.11

Typed/Printed Name: A. Sharabi

5.4 Test Equipment Used.

RF Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	March 14, 2010	1 year
Signal Generator	HP	E4433B ESG	MY42082764	July 27, 2010	1 year
Signal Generator	HP	E4438C ESG-D	GB40050702	July 27, 2010	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	February 10, 2011	1 year
Cable	Minicircuit	30091		February 10, 2011	1 year

Figure 26 Test Equipment Used

6. Occupied Bandwidth

6.1 Test Specification

FCC Part 2, Section 1049

6.2 Test Procedure

The E.U.T. was set to the applicable test frequency and modulation. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (at the output test) and an appropriate coaxial cable. The spectrum analyzer was set to proper resolution B.W.
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limit, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

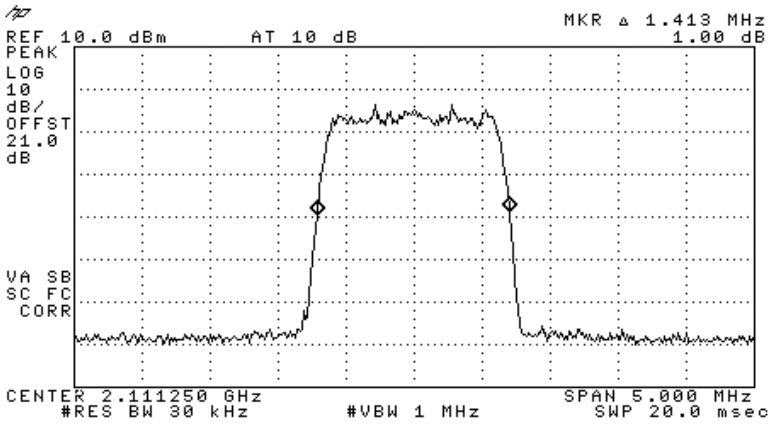

Figure 27.— CDMA (2111.25MHz) IN

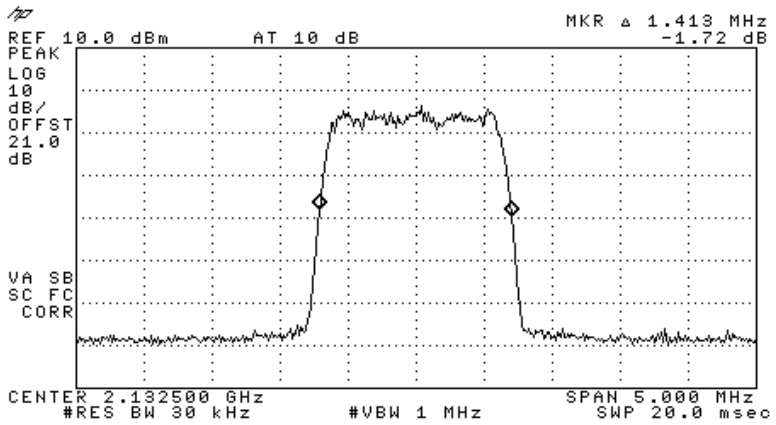

Figure 28.— CDMA (2132.5MHz) IN

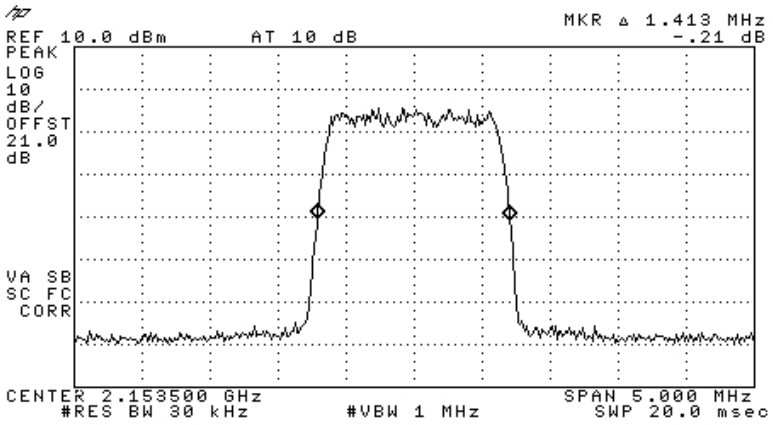

Figure 29.— CDMA (2153.5MHz) IN

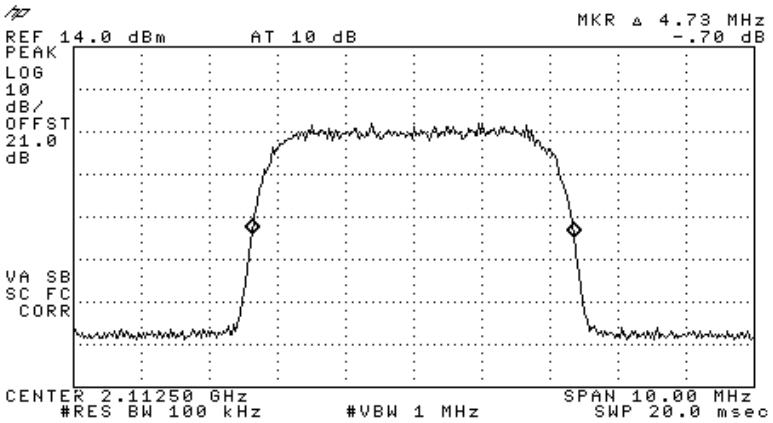

Figure 30.— WCDMA (2112.5MHz) IN

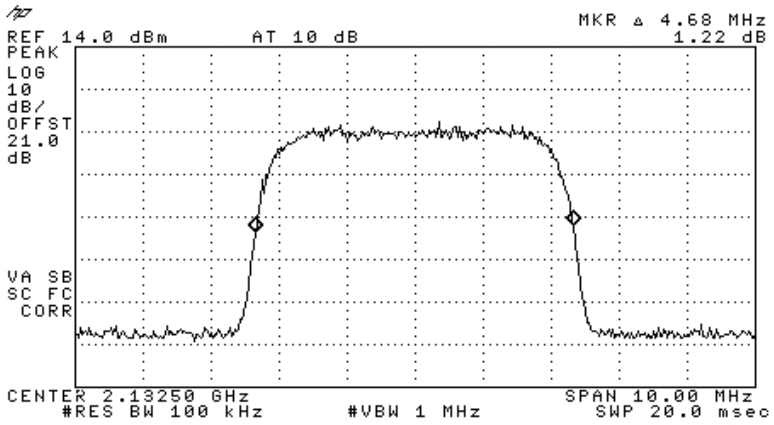

Figure 31.— WCDMA (2132.5MHz) IN

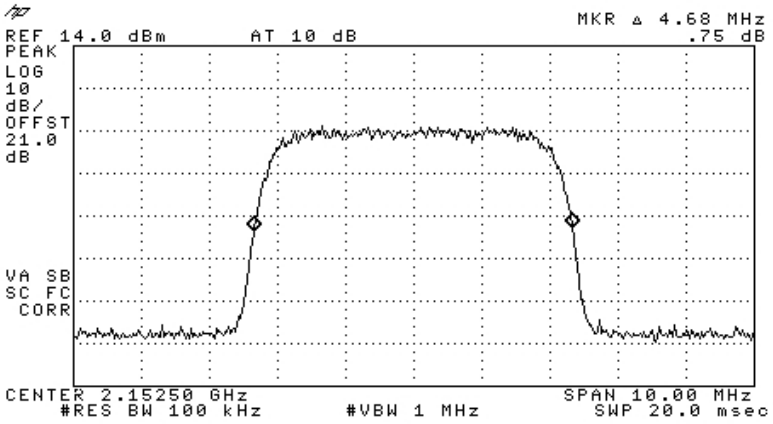

Figure 32.— WCDMA (2152.5MHz) IN

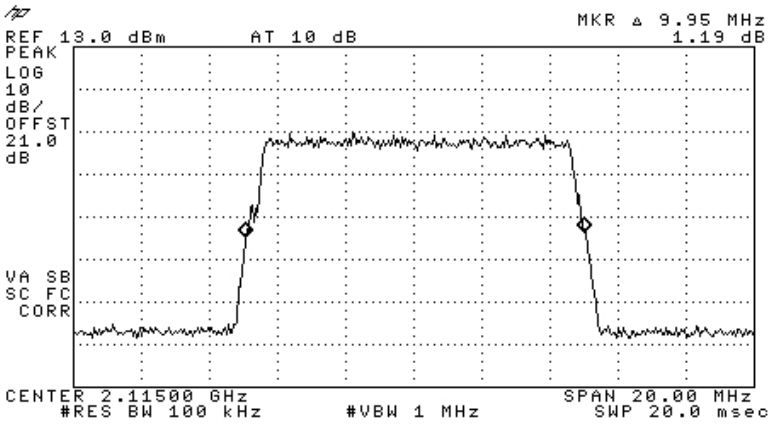

Figure 33.— QPSK (2115.0MHz) IN

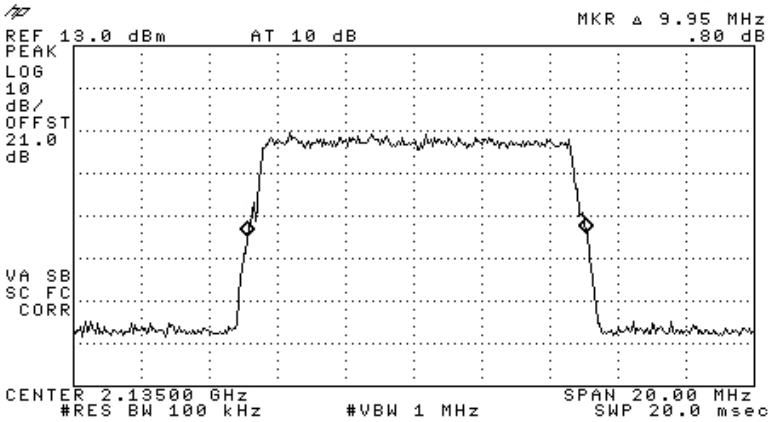

Figure 34.— QPSK (2135.0MHz) IN

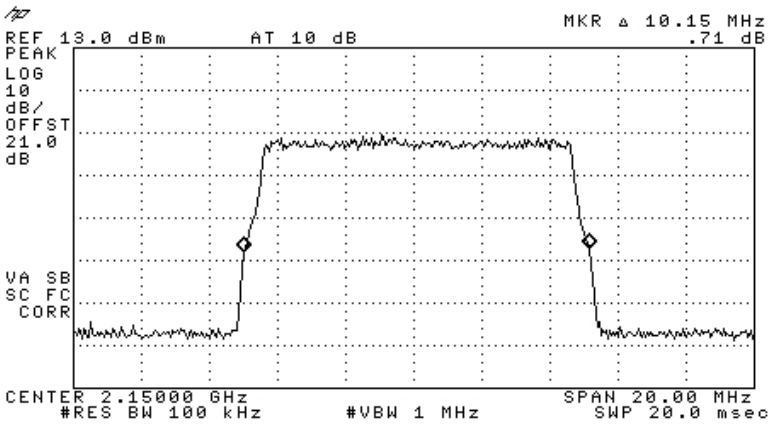

Figure 35.— QPSK (2150.0MHz) IN

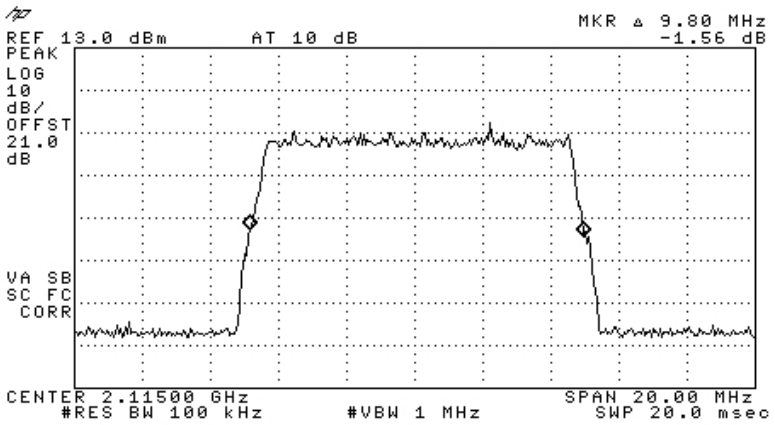

Figure 36.— 16QAM (2115.0MHz) IN

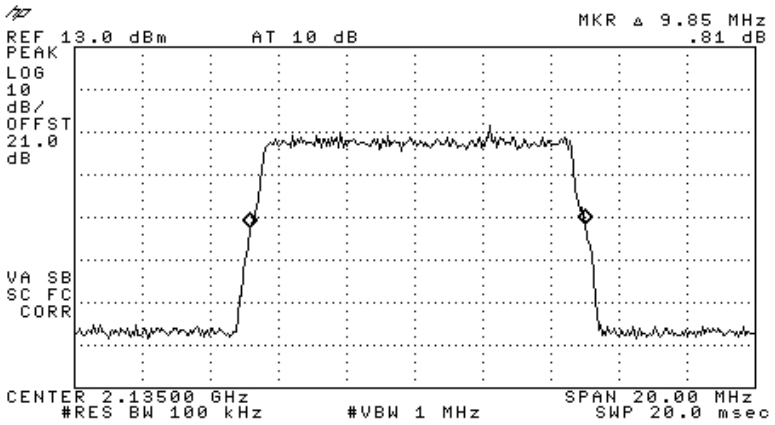

Figure 37.— 16QAM (2135.0MHz) IN

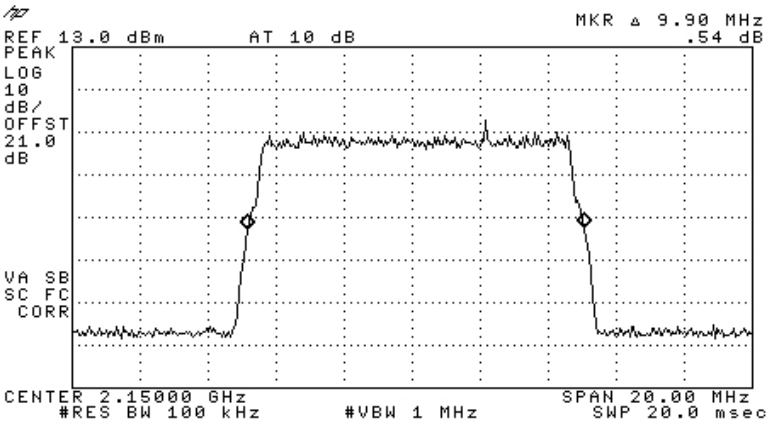

Figure 38.— 16QAM (2150.0MHz) IN

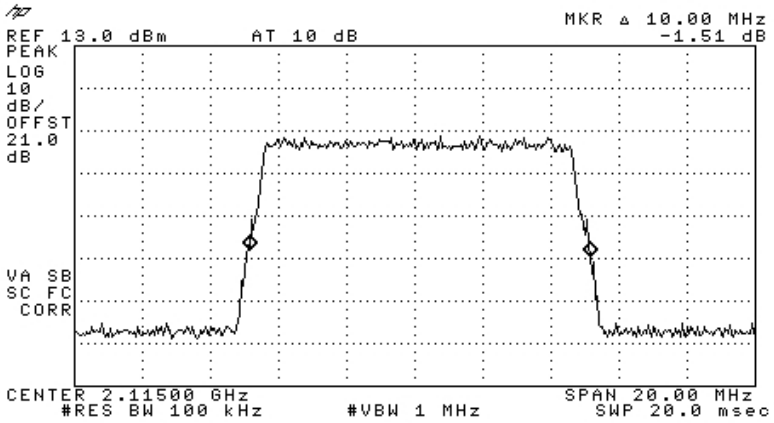

Figure 39.— 64QAM (2115.0MHz) IN

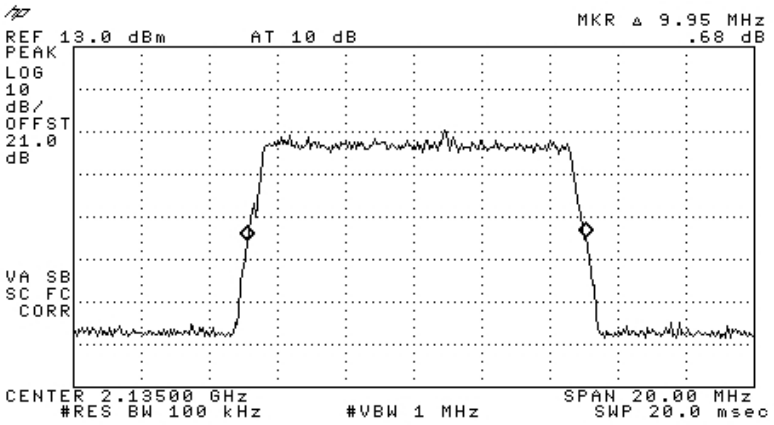

Figure 40.— 64QAM (2135.0MHz) IN

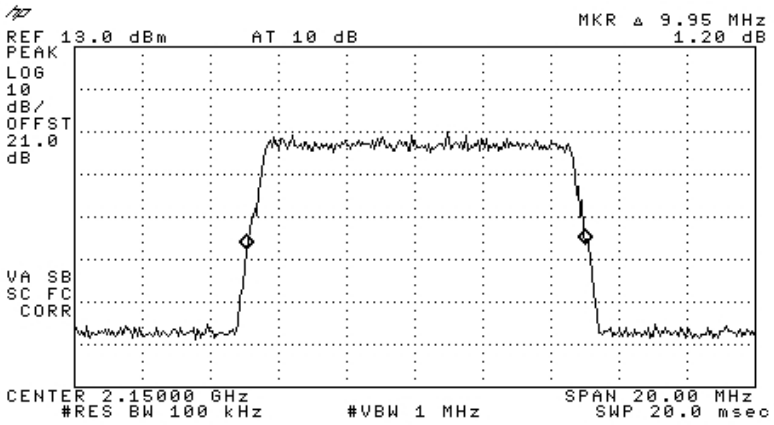

Figure 41.— 64QAM (2150.0MHz) IN

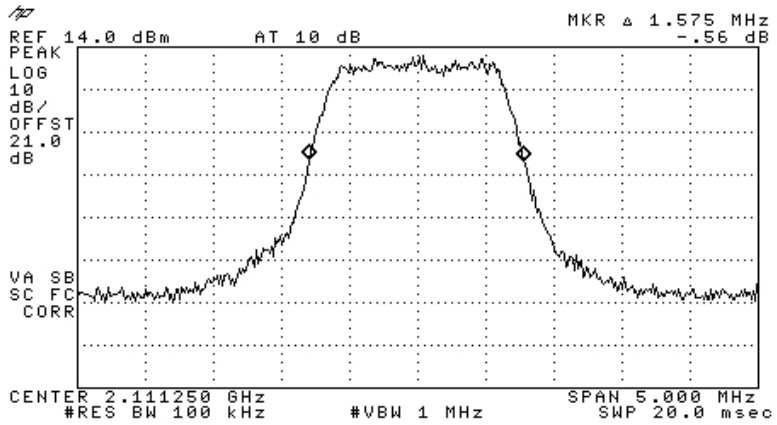

Figure 42.— CDMA (2111.25MHz) OUT

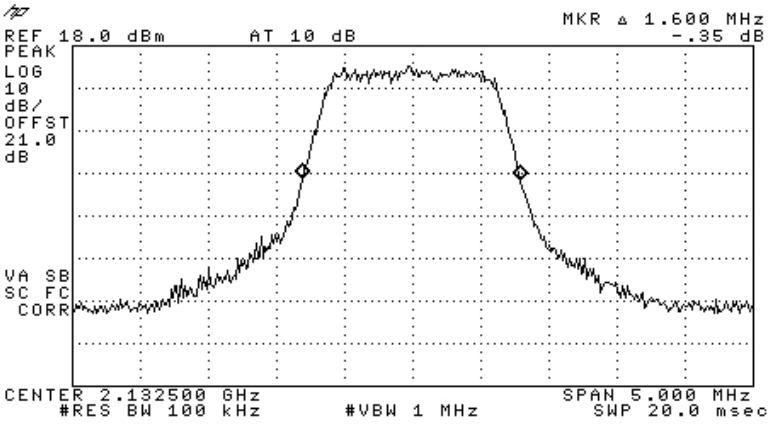

Figure 43.— CDMA (2132.5MHz) OUT

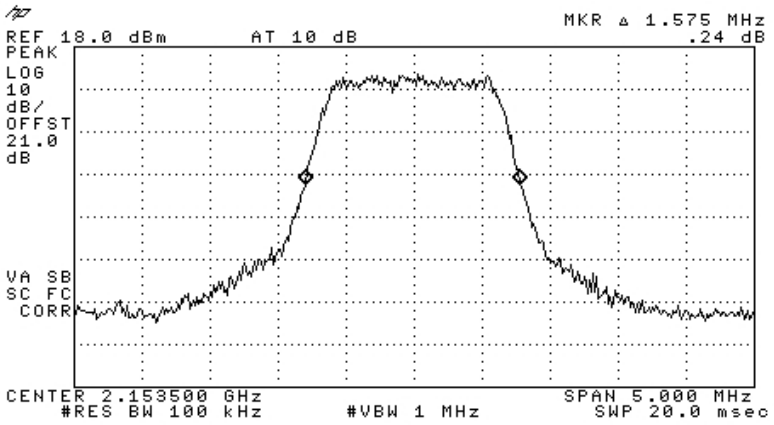

Figure 44.— CDMA (2153.5MHz) OUT

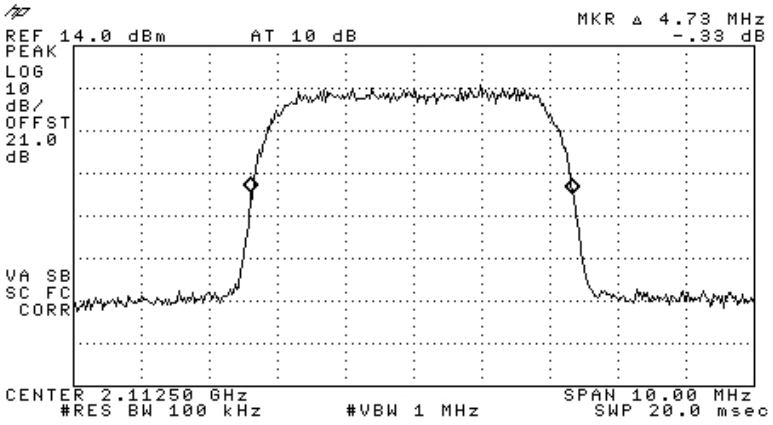

Figure 45.— WCDMA (2112.5MHz) OUT

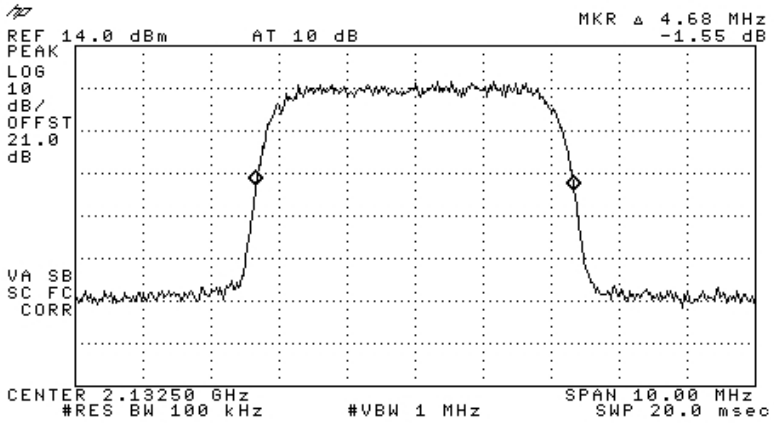

Figure 46.— WCDMA (2132.5MHz) OUT

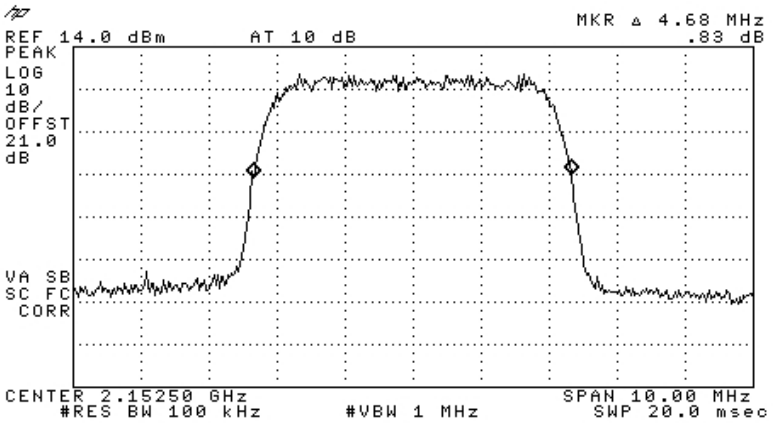

Figure 47.— WCDMA (2152.5MHz) OUT

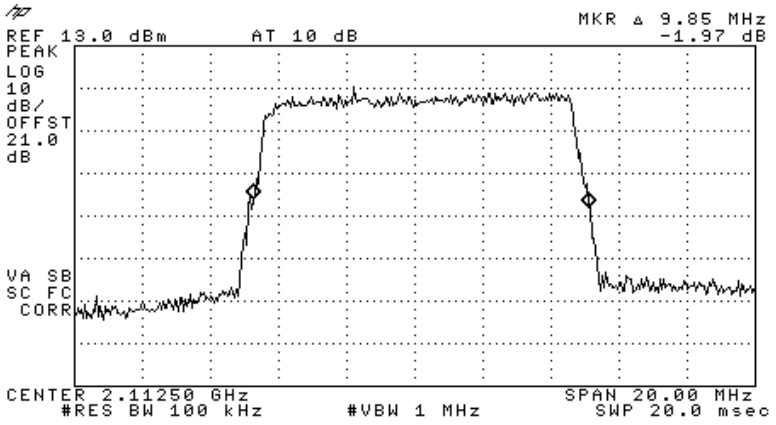

Figure 48.— QPSK (2115.0MHz) OUT

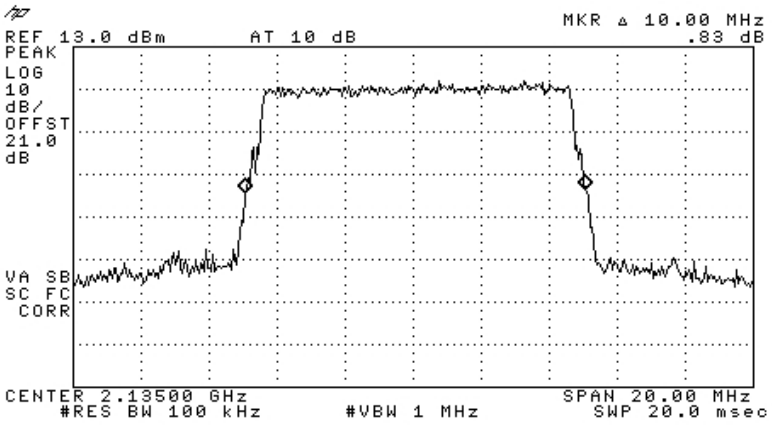

Figure 49.— QPSK (2135.0MHz) OUT

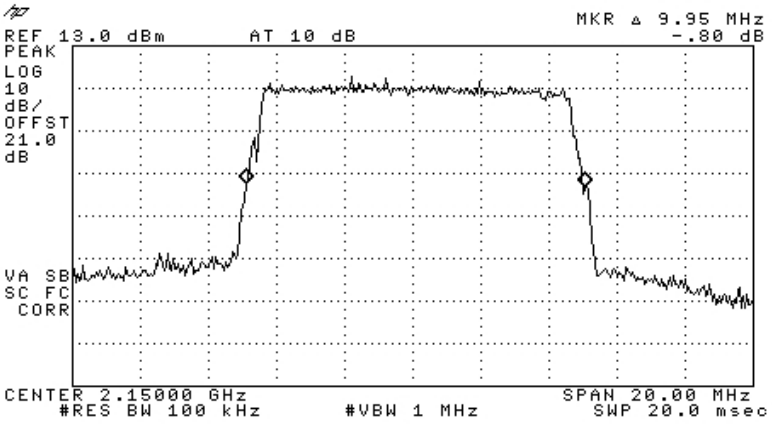

Figure 50.— QPSK (2150.0MHz) OUT

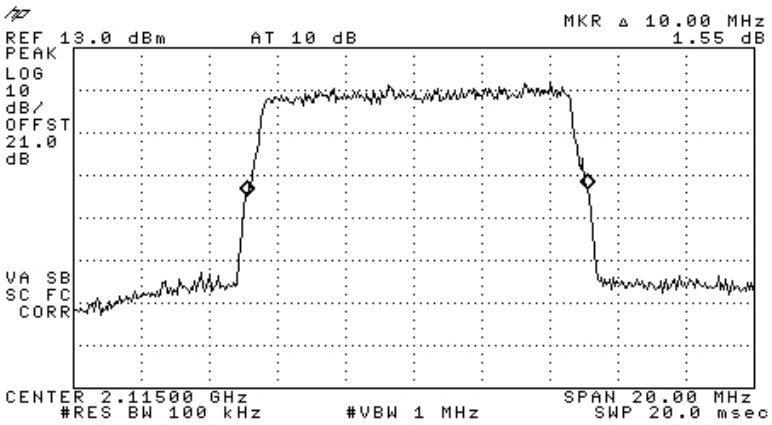

Figure 51.— 16QAM (2115.0MHz) OUT

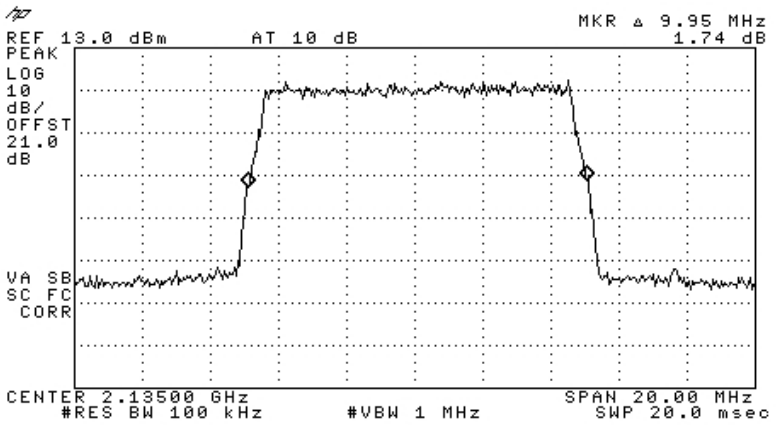

Figure 52.— 16QAM (2135.0MHz) OUT

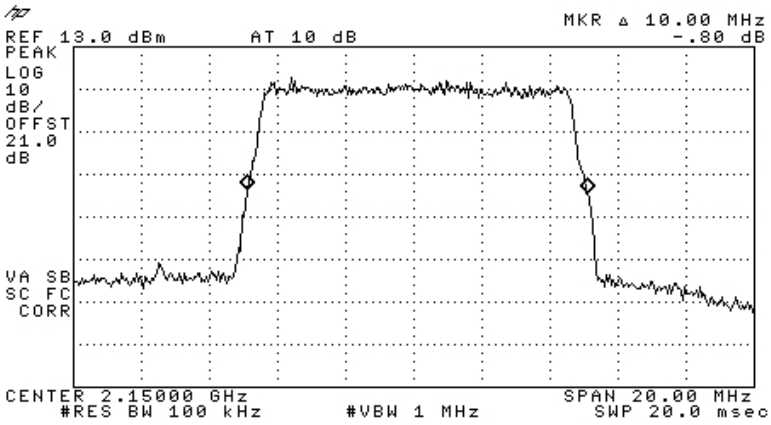

Figure 53.— 16QAM (2150.0MHz) OUT

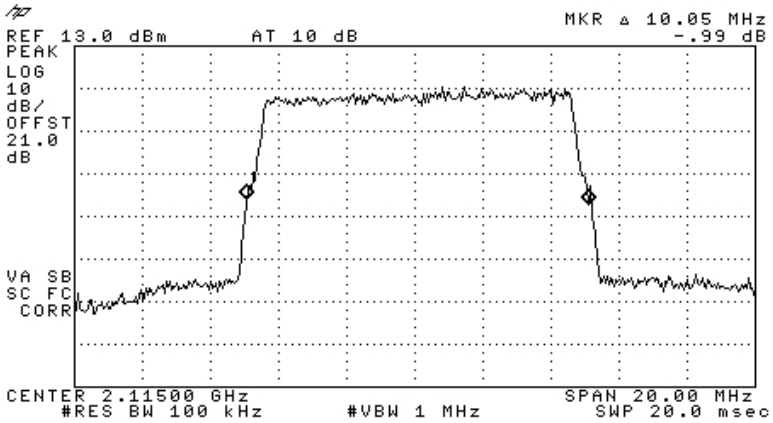

Figure 54.— 64QAM (2115.0MHz) OUT

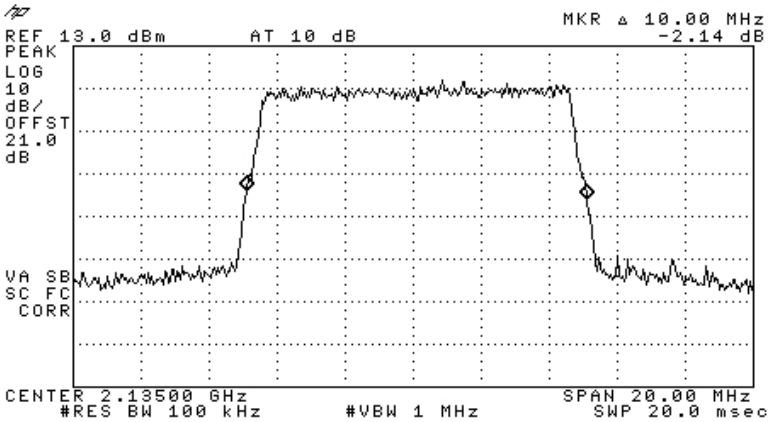

Figure 55.— 64QAM (2135.0MHz) OUT

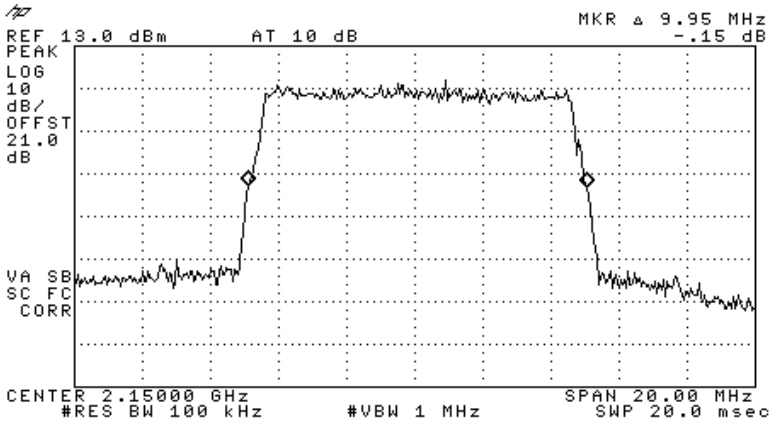

Figure 56.— 64QAM (2150.0MHz) OUT

6.3 Results

E.U.T. Description: VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod
Model No.: 1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number: 1. 00105300044 2. 00110100412
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (26dBc) (MHz)
CDMA	Input	2111.25	1.413
	Output	2111.25	1.575
	Input	2132.50	1.413
	Output	2132.50	1.600
	Input	2153.50	1.413
	Output	2153.50	1.575
WCDMA	Input	2112.50	4.73
	Output	2112.50	4.73
	Input	2132.50	4.68
	Output	2132.50	4.68
	Input	2152.50	4.68
	Output	2152.50	4.68
QPSK	Input	2115.00	9.95
	Output	2115.00	9.85
	Input	2135.00	9.95
	Output	2135.00	10.00
	Input	2150.00	10.15
	Output	2150.00	9.95

Modulation		Operating Frequency (MHz)	Reading (26dBc) (MHz)
16QAM	Input	2115.00	9.80
	Output	2115.00	10.00
	Input	2135.00	9.85
	Output	2135.00	9.95
	Input	2150.00	9.90
	Output	2150.00	10.00
64QAM	Input	2115.00	10.00
	Output	2115.00	10.05
	Input	2135.00	9.95
	Output	2135.00	10.00
	Input	2150.00	9.95
	Output	2150.00	9.95

Figure 57 Occupied Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 15.03.11

Typed/Printed Name: A. Sharabi

6.4 Test Equipment Used.

Occupied Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	March 14, 2010	1 year
Signal Generator	HP	E4433B ESG	MY42082764	July 27, 2010	1 year
Signal Generator	HP	E4438C ESG-D	GB40050702	July 27, 2010	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	February 10, 2011	1 year
Cable	Minicircuit	30091		February 10, 2011	1 year

Figure 58 Test Equipment Used

7. Spurious Emissions at Antenna Terminals

7.1 Test Specification

FCC Part 27, Subpart C, Section 27.53 (g)

7.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (21.0 dB).

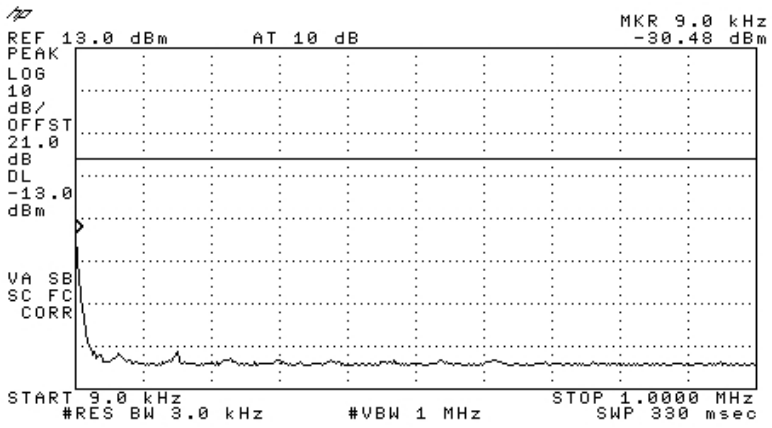

Figure 59.— 2111.25 MHz CDMA

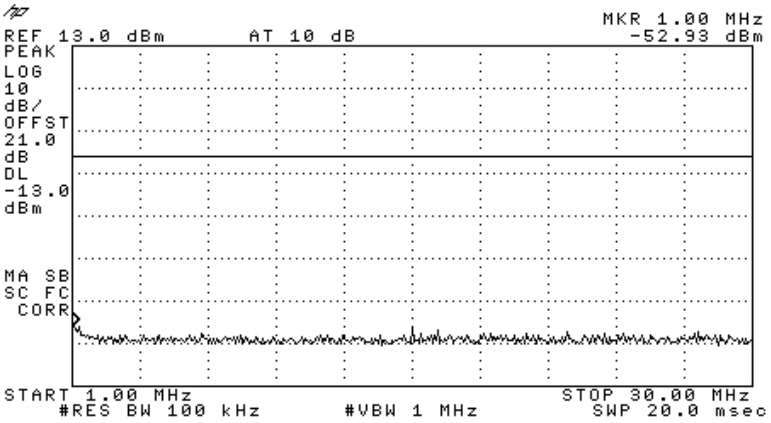

Figure 60.— 2111.25 MHz CDMA

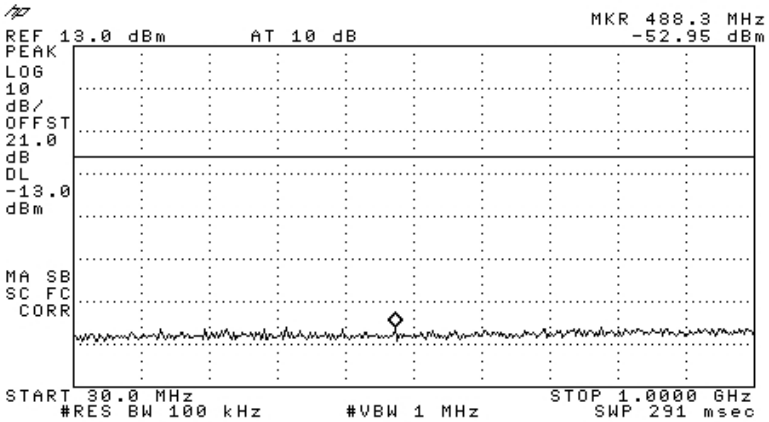

Figure 61.— 2111.25 MHz CDMA

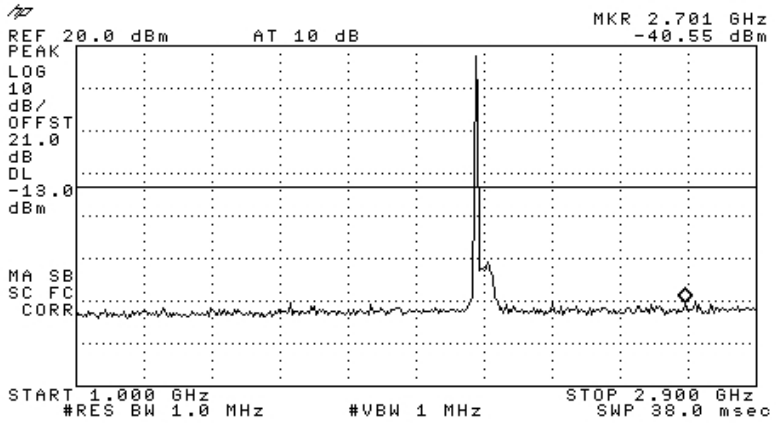

Figure 62.— 2111.25 MHz CDMA

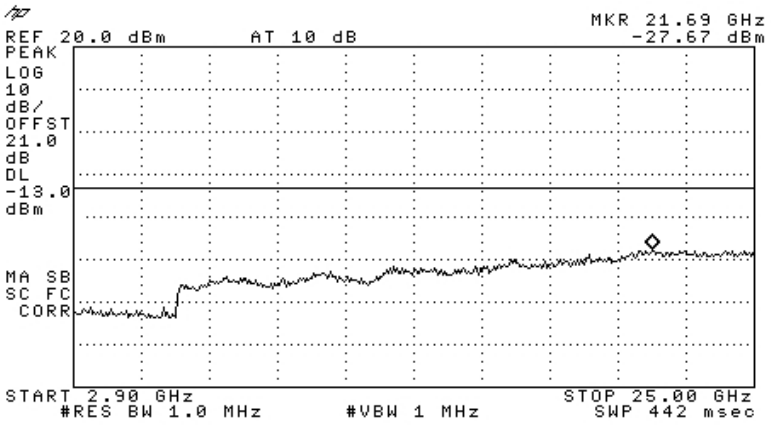

Figure 63.— 2111.25 MHz CDMA

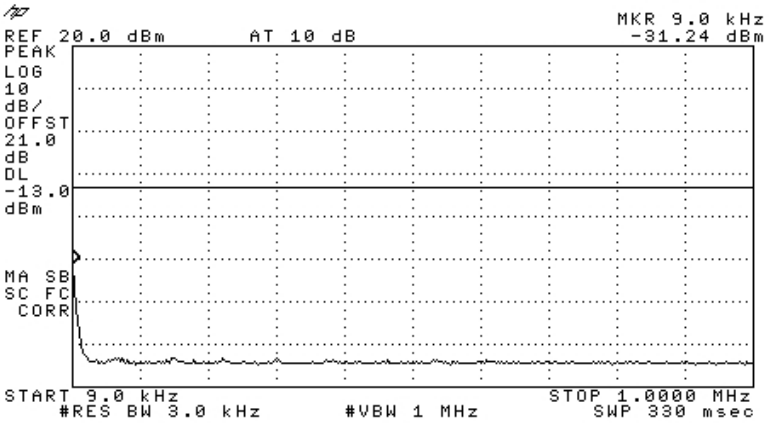

Figure 64.— 2132.50 MHz CDMA

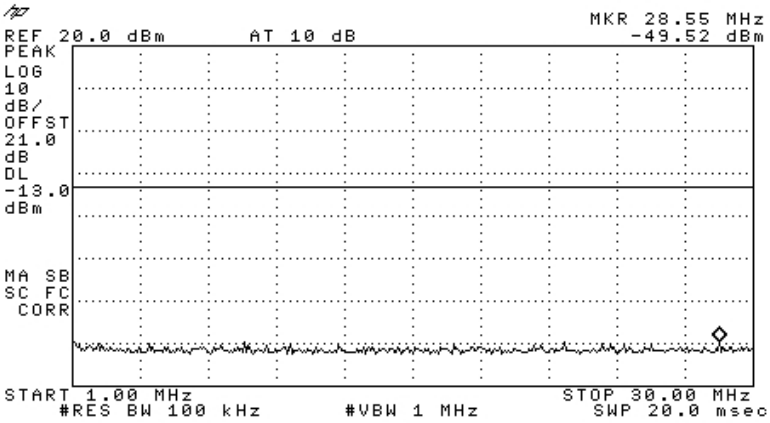

Figure 65.— 2132.50 MHz CDMA

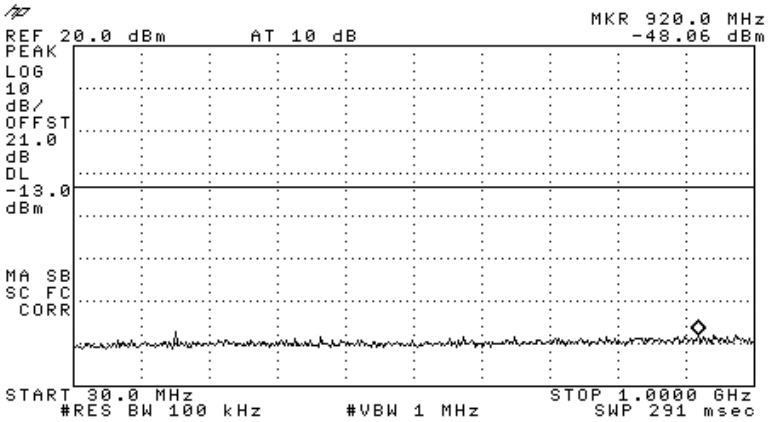

Figure 66.— 2132.50 MHz CDMA

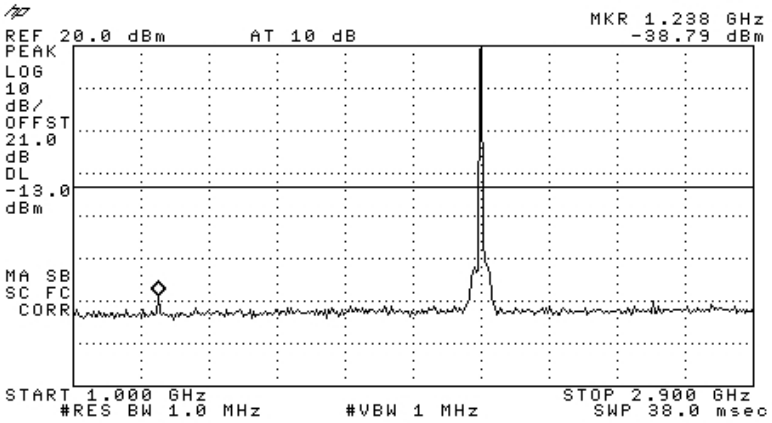

Figure 67.— 2132.50 MHz CDMA

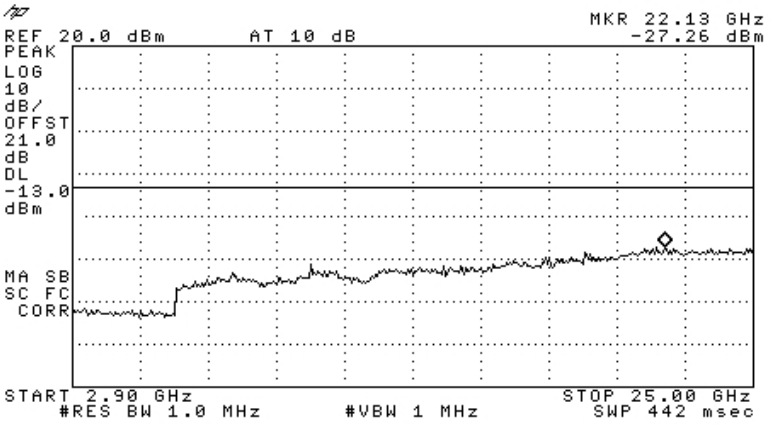

Figure 68.— 2132.50 MHz CDMA

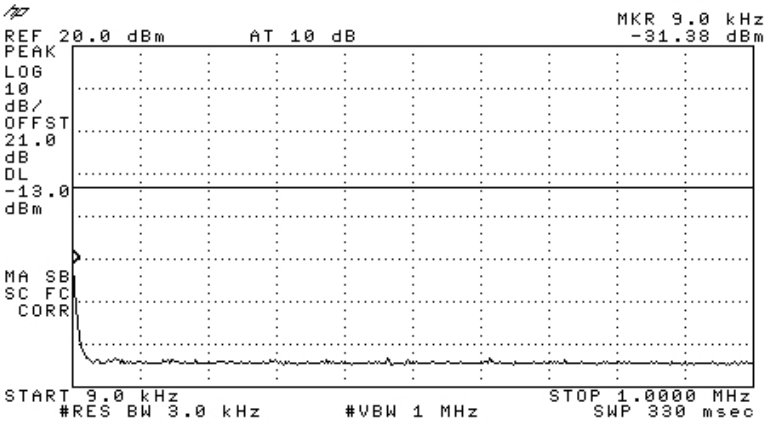

Figure 69.— 2153. 5 MHz CDMA

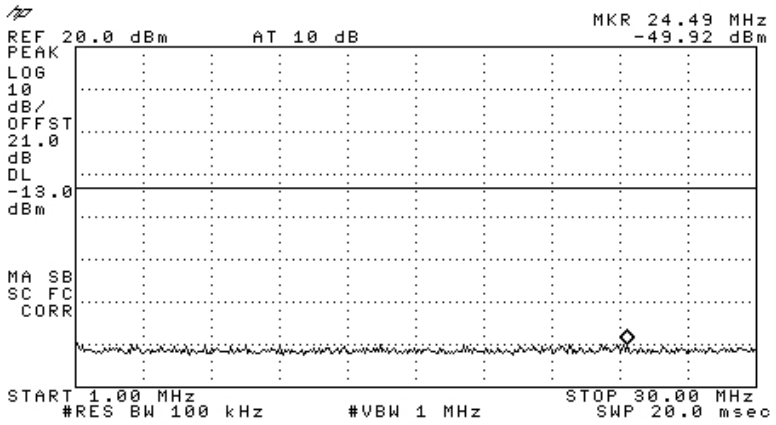

Figure 70.— 2153. 5 MHz CDMA

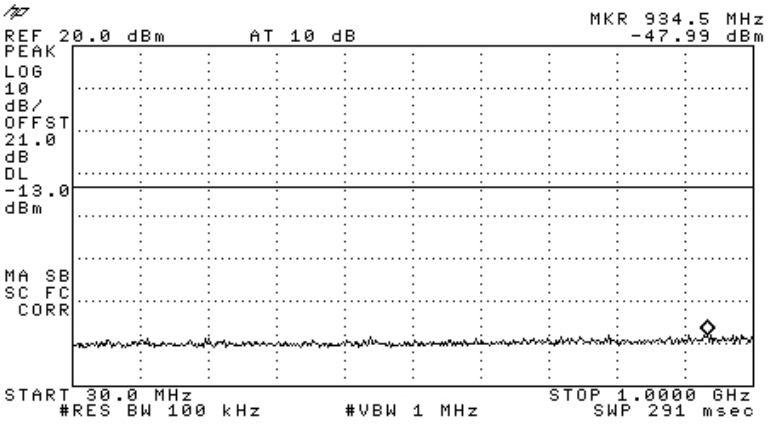

Figure 71.— 2153. 5 MHz CDMA

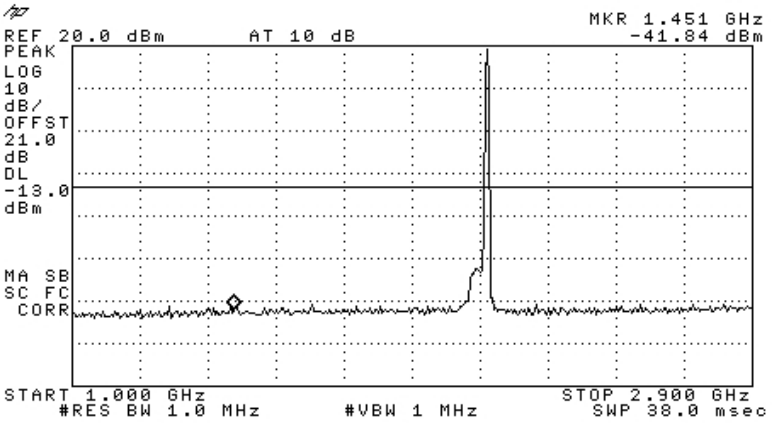

Figure 72.— 2153.5 MHz CDMA

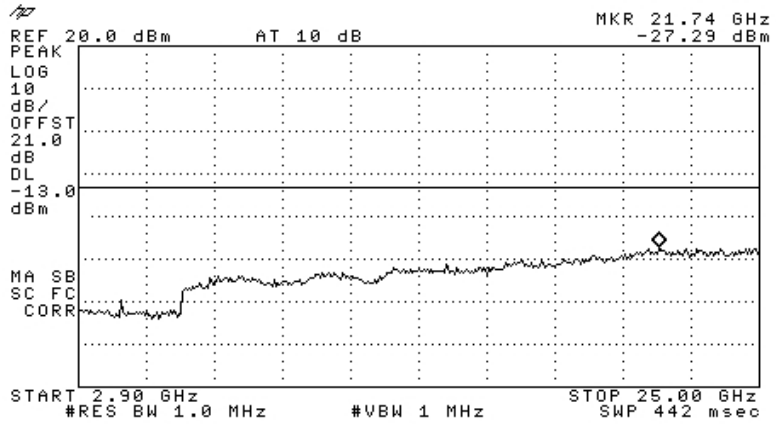

Figure 73.— 2153. 5 MHz CDMA

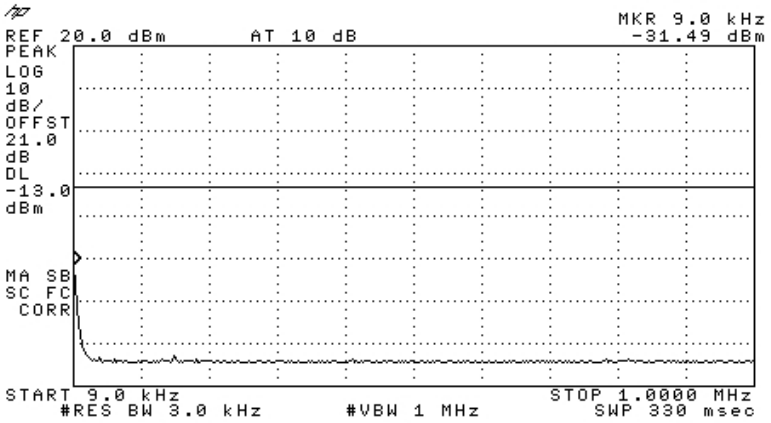

Figure 74.— 2112.50 MHz WCDMA

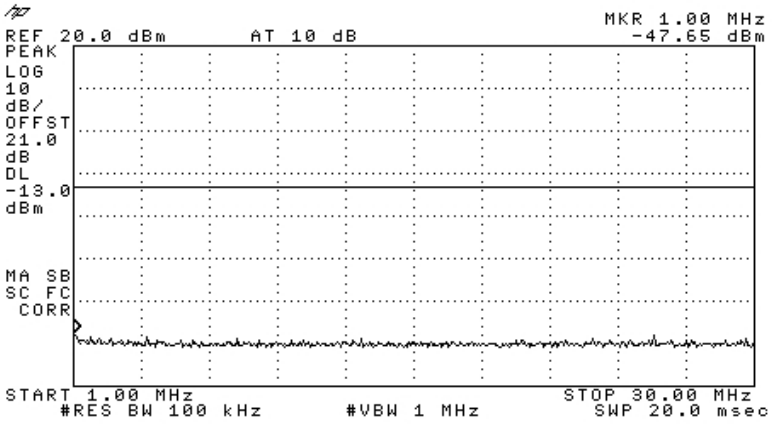

Figure 75.— 2112.50 MHz WCDMA

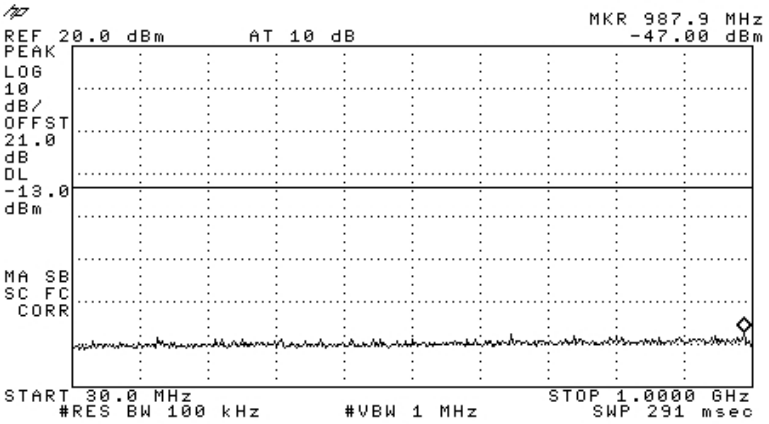

Figure 76.— 2112.50 MHz WCDMA

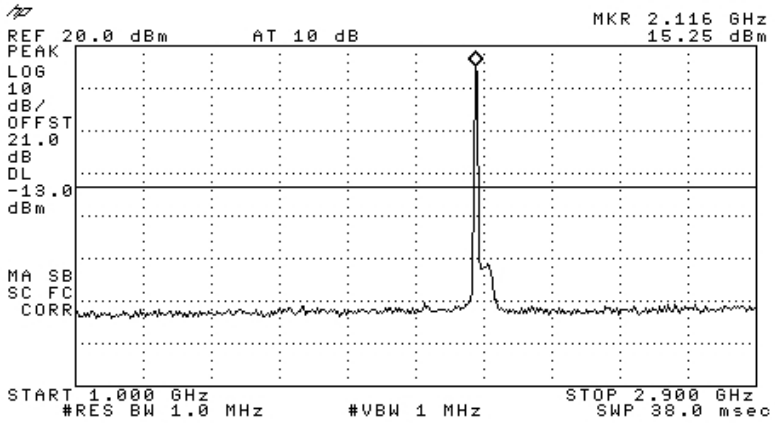

Figure 77.— 2112.50 MHz WCDMA

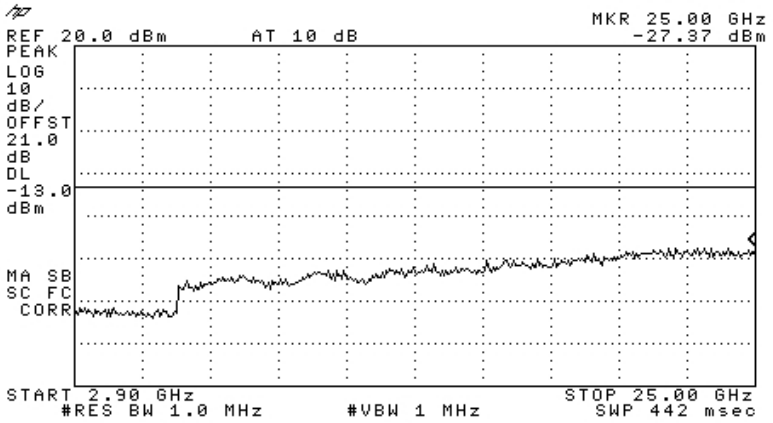

Figure 78.— 2112.50 MHz WCDMA

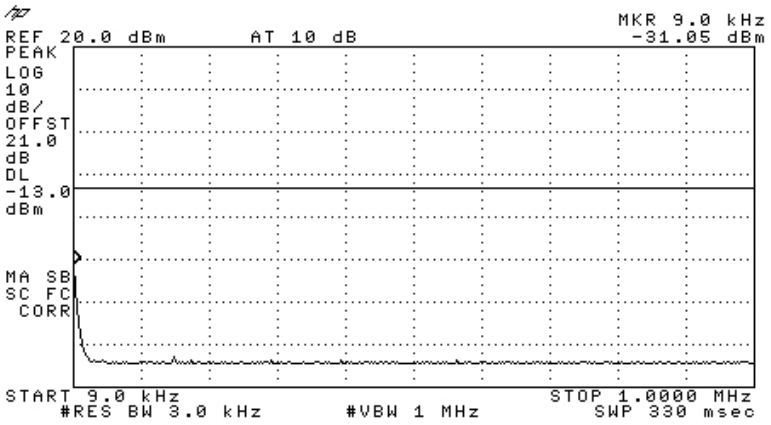

Figure 79.— 2132.50 MHz WCDMA

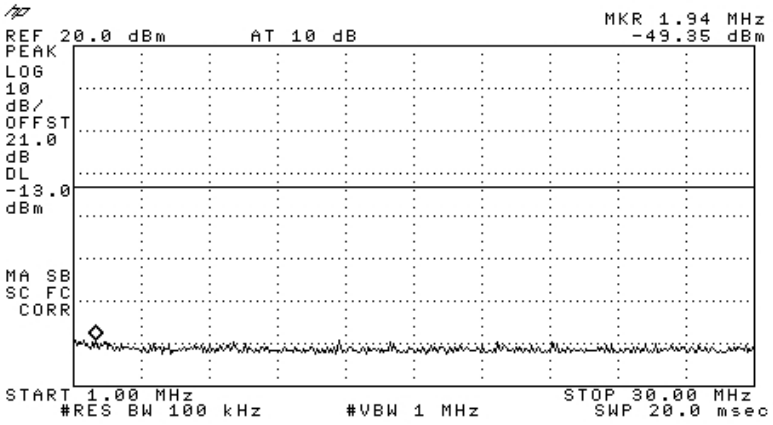

Figure 80.— 2132.50 MHz WCDMA

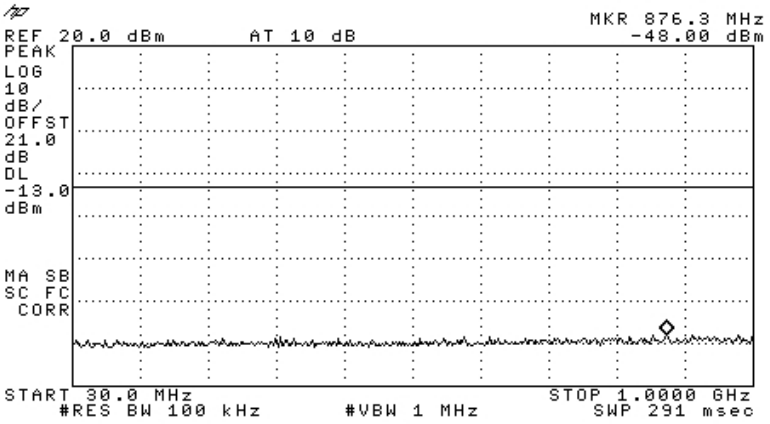

Figure 81.— 2132.50 MHz WCDMA

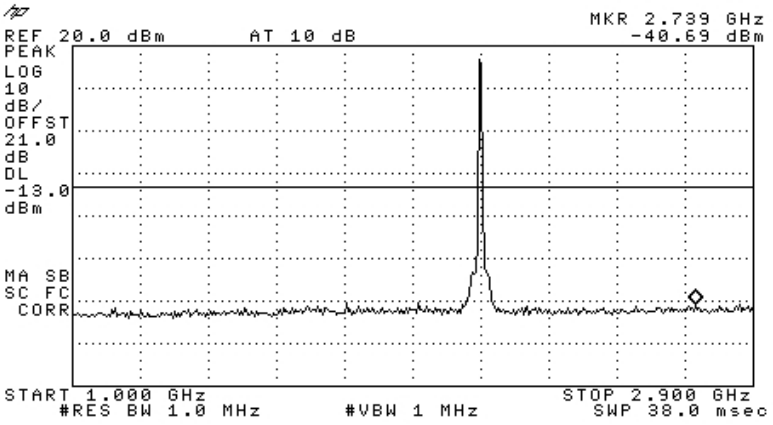

Figure 82.— 2132.50 MHz WCDMA

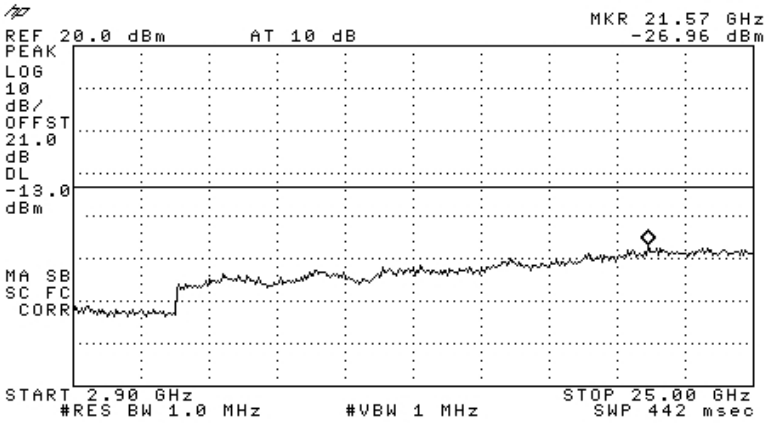

Figure 83.— 2132.50 MHz WCDMA

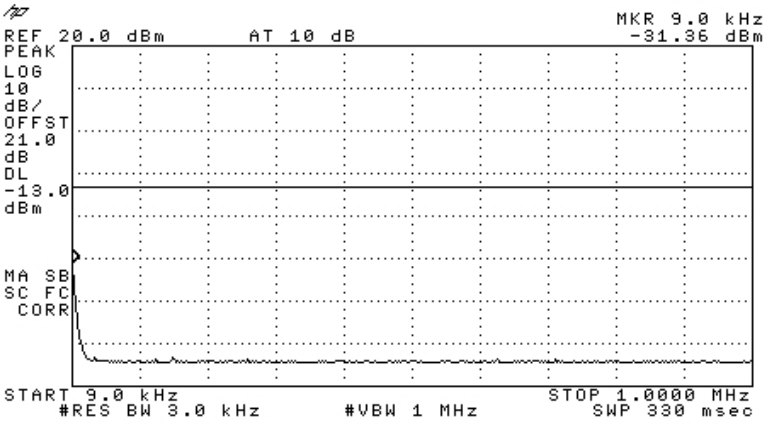

Figure 84.— 2152.50 MHz WCDMA

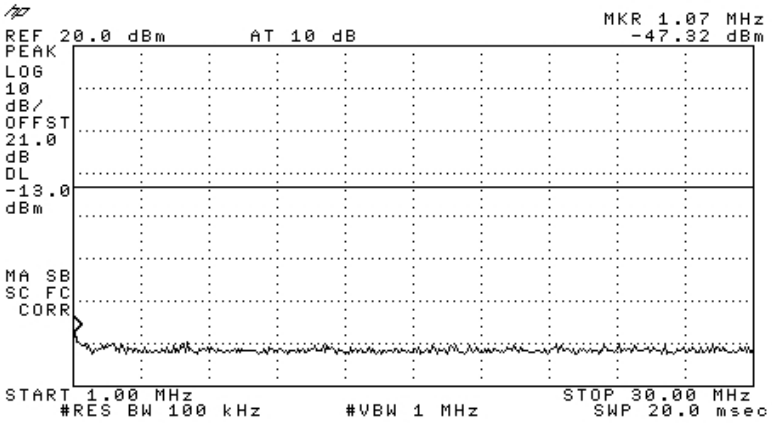

Figure 85.— 2152.50 MHz WCDMA

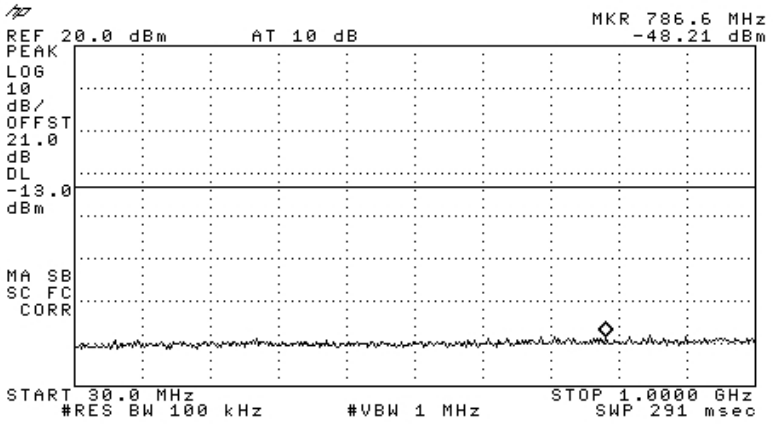

Figure 86.— 2152.50 MHz WCDMA

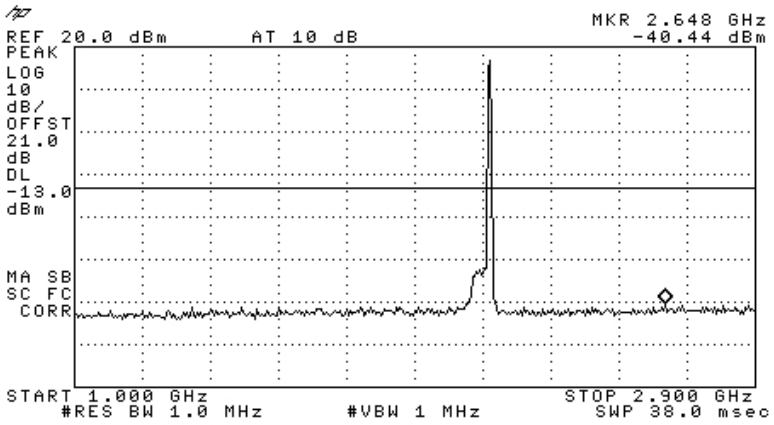

Figure 87.— 2152.50 MHz WCDMA

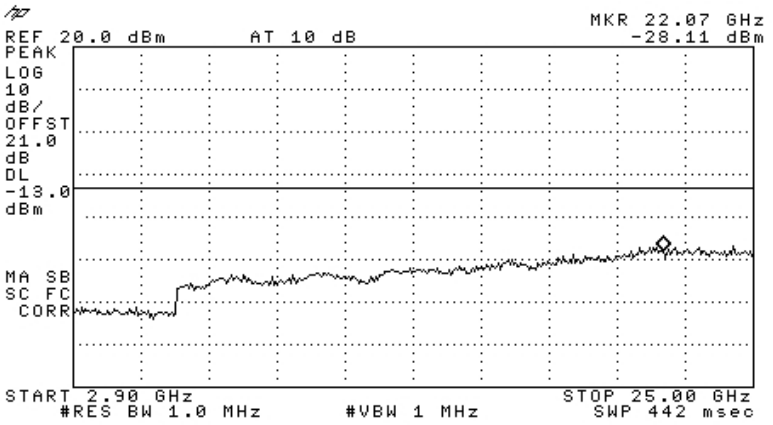

Figure 88.— 2152.50 MHz WCDMA

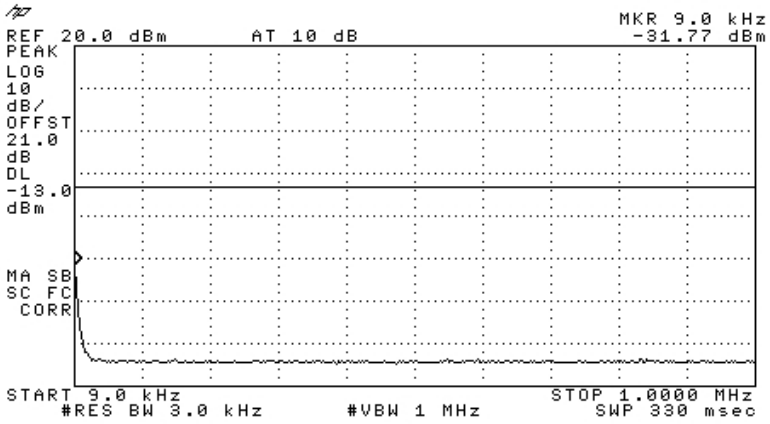

Figure 89.— 2115.0 MHz QPSK

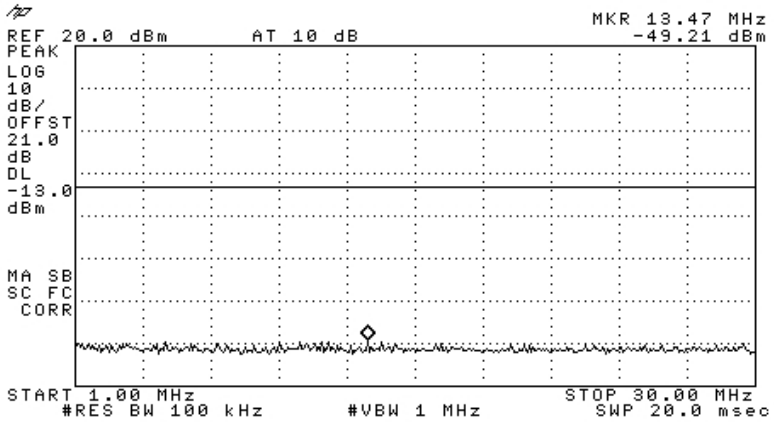

Figure 90.— 2115.0 MHz QPSK

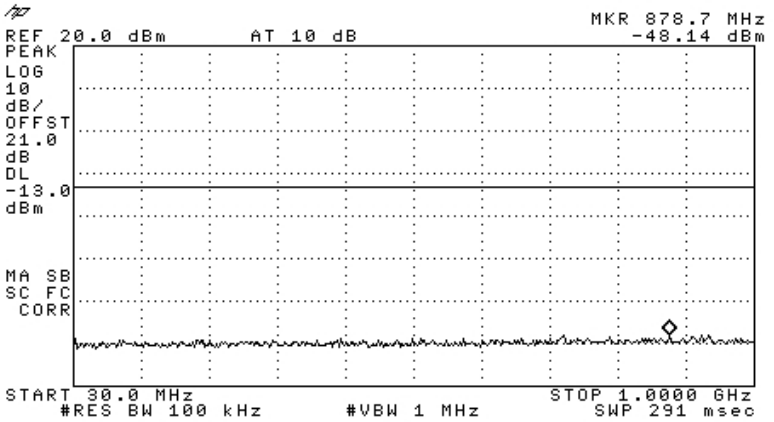

Figure 91.— 2115.0 MHz QPSK

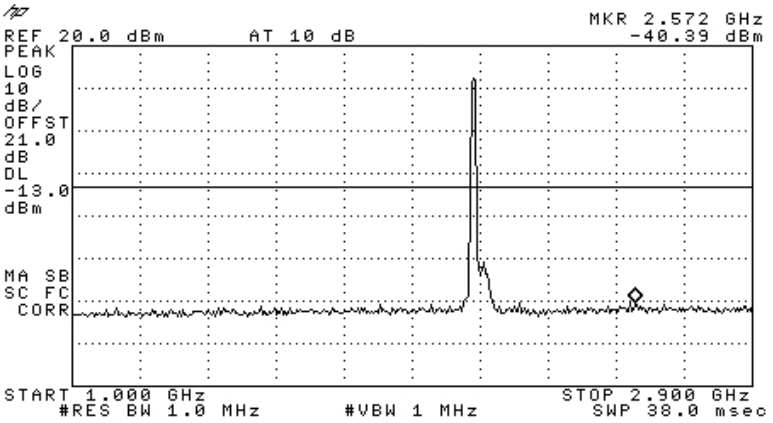

Figure 92.— 2115.0 MHz QPSK

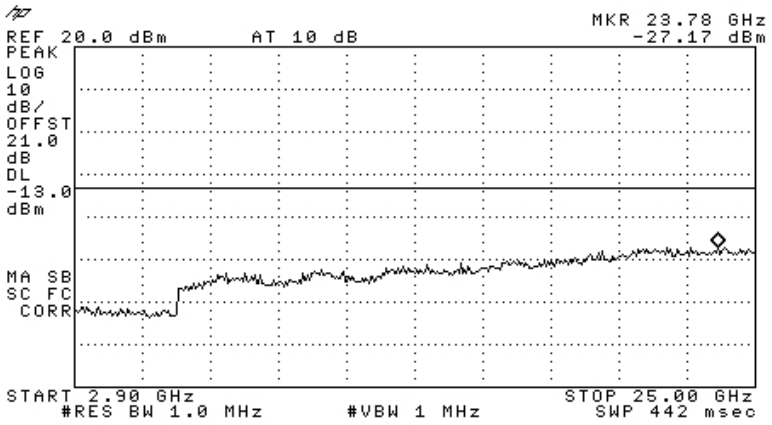

Figure 93.— 2115.0 MHz QPSK

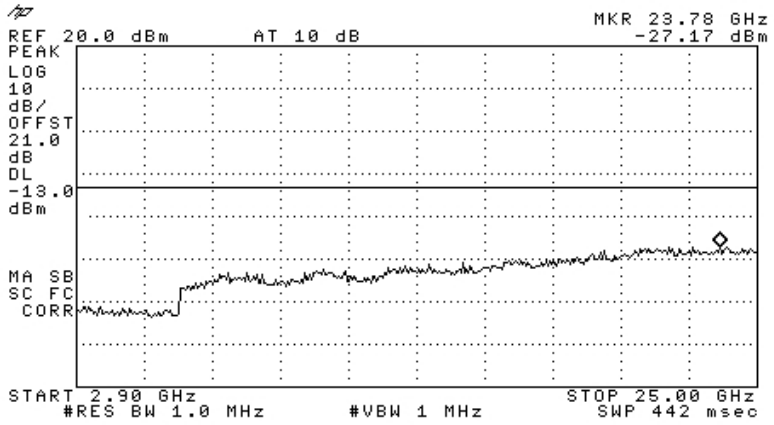

Figure 94.— 2135.0 MHz QPSK

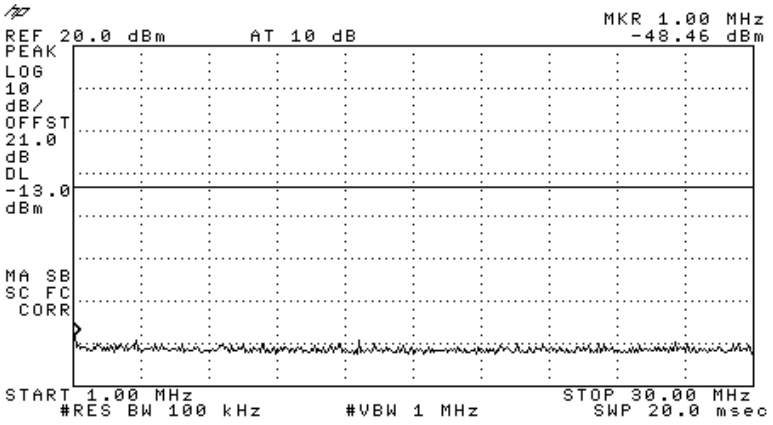

Figure 95.— 2135.0 MHz QPSK

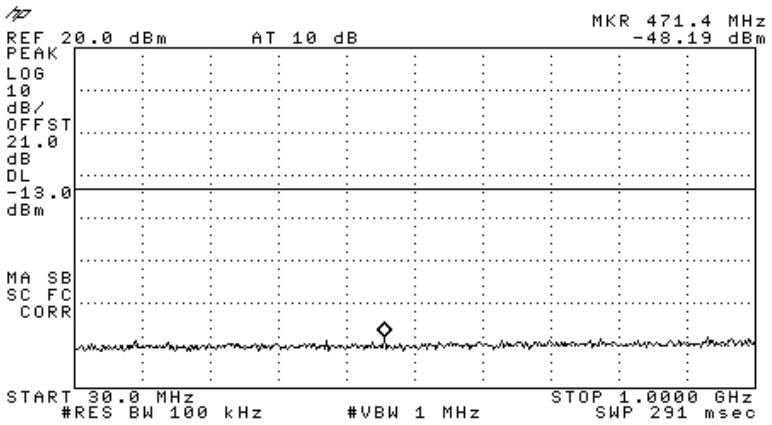

Figure 96.— 2135.0 MHz QPSK

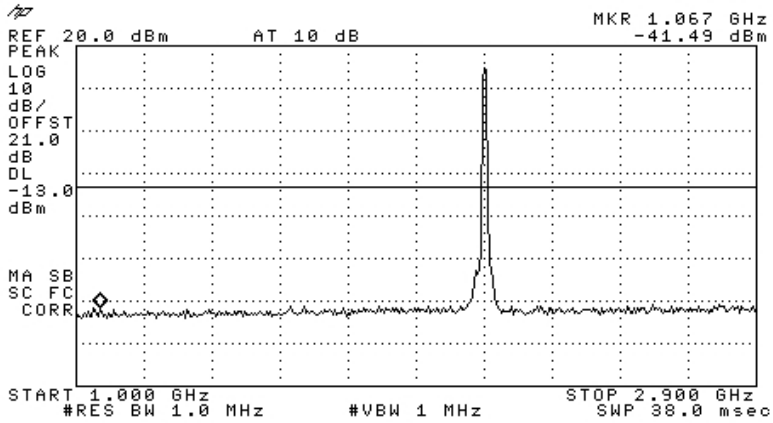

Figure 97.— 2135.0 MHz QPSK

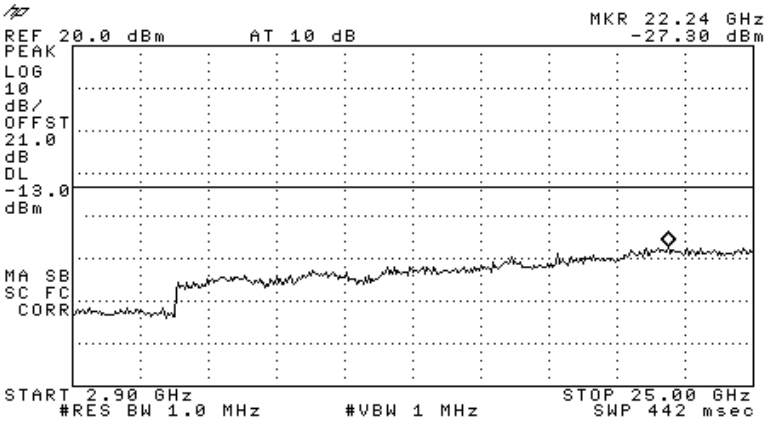

Figure 98.— 2135.0 MHz QPSK

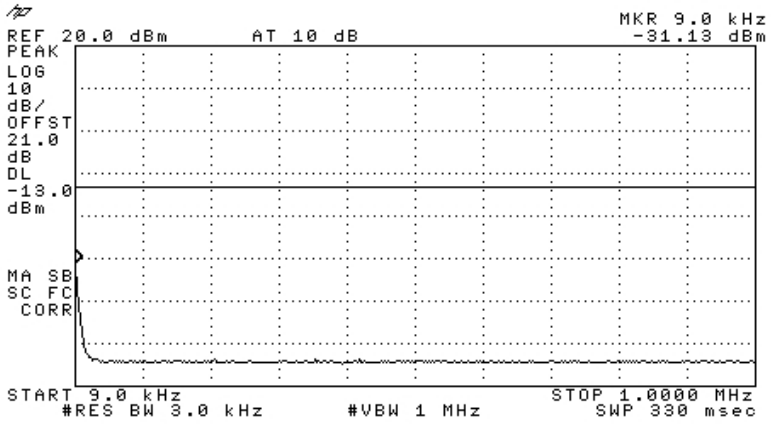

Figure 99.— 2150.0 MHz QPSK

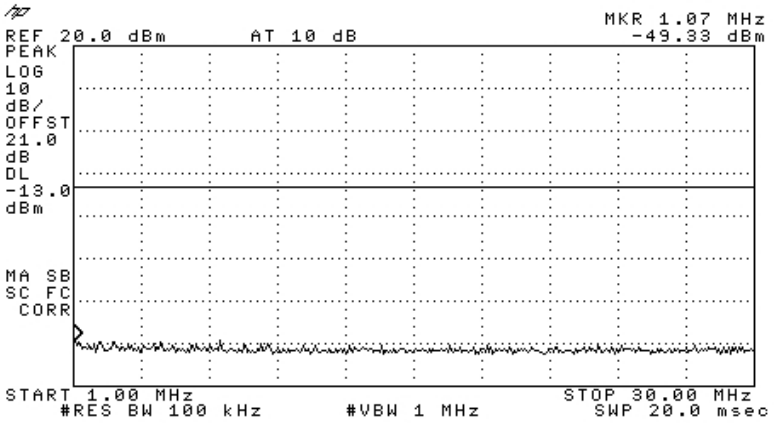

Figure 100.— 2150.0 MHz QPSK

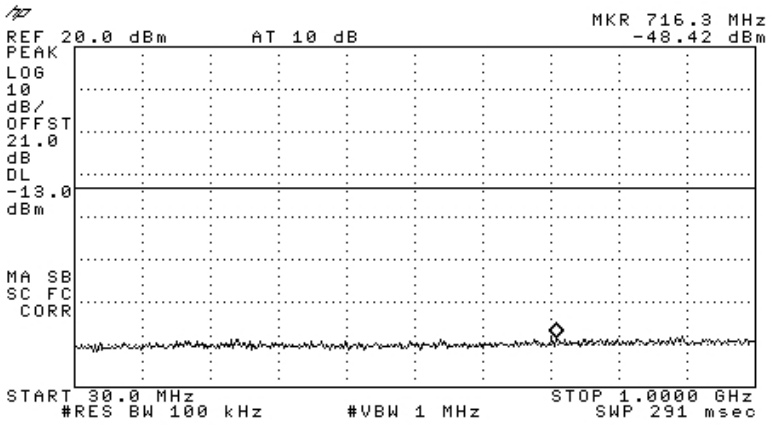

Figure 101.— 2150.0 MHz QPSK

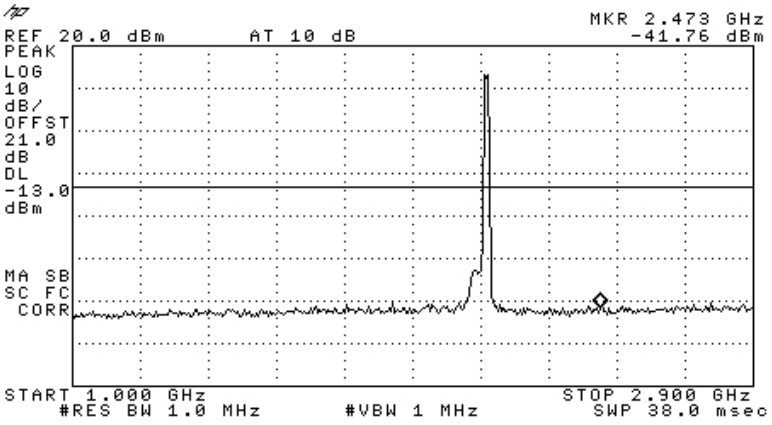

Figure 102.— 2150.0 MHz QPSK

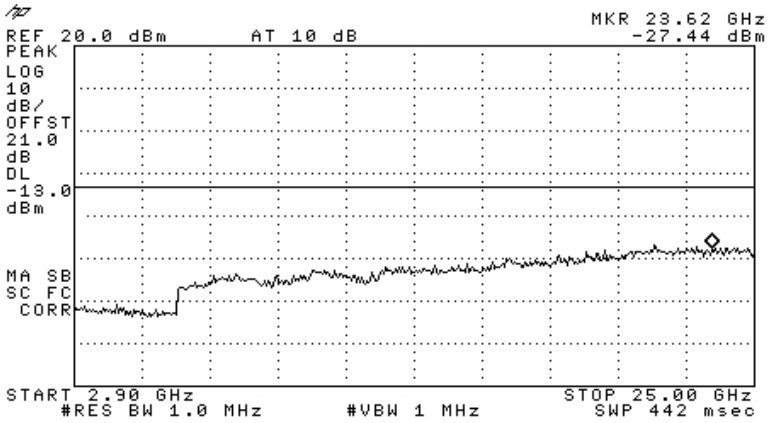

Figure 103.— 2150.0 MHz QPSK

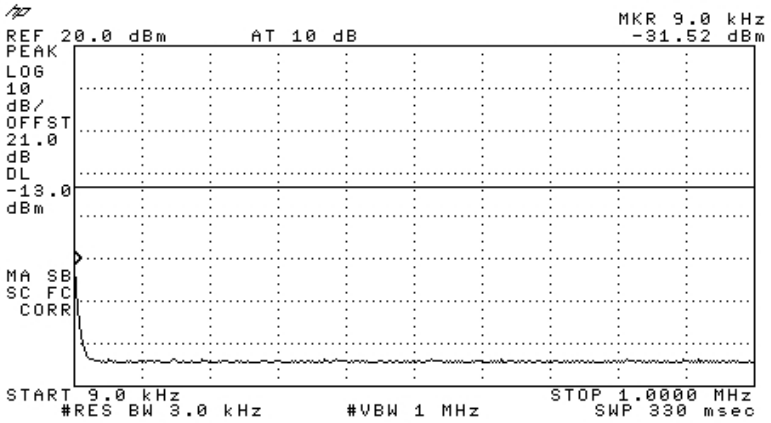

Figure 104.— 2115.0 MHz 16QAM

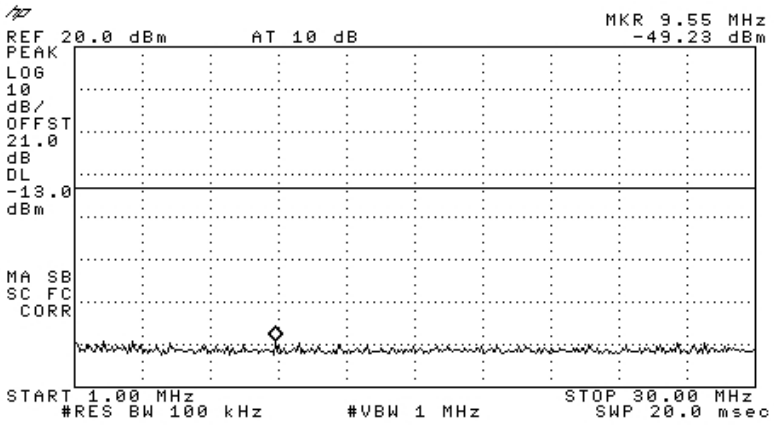

Figure 105.— 2115.0 MHz 16QAM

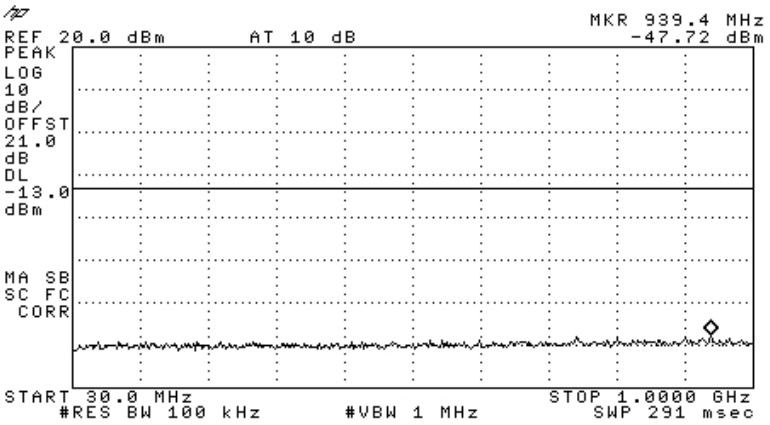

Figure 106.— 2115.0 MHz 16QAM

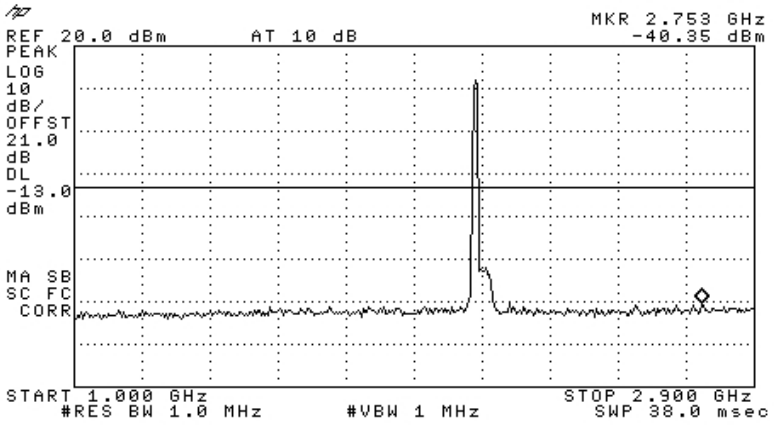

Figure 107.— 2115.0 MHz 16QAM

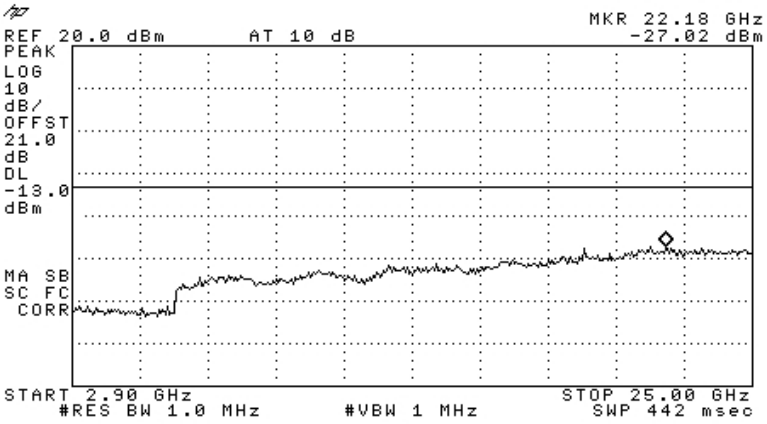

Figure 108.— 2115.0 MHz 16QAM

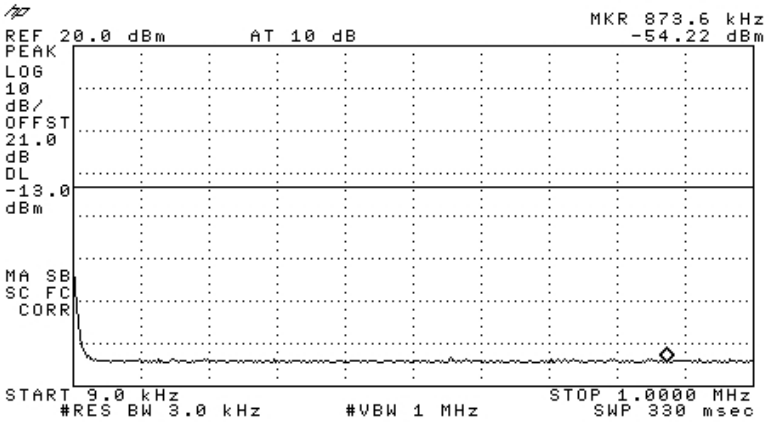

Figure 109.— 2135.0 MHz 16QAM

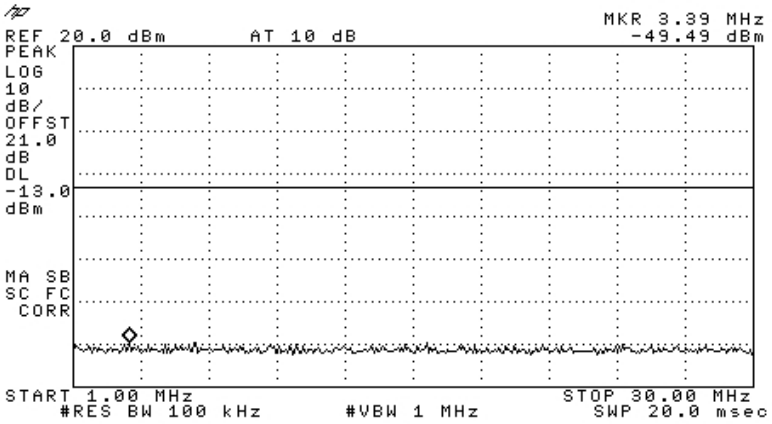

Figure 110.— 2135.0 MHz 16QAM

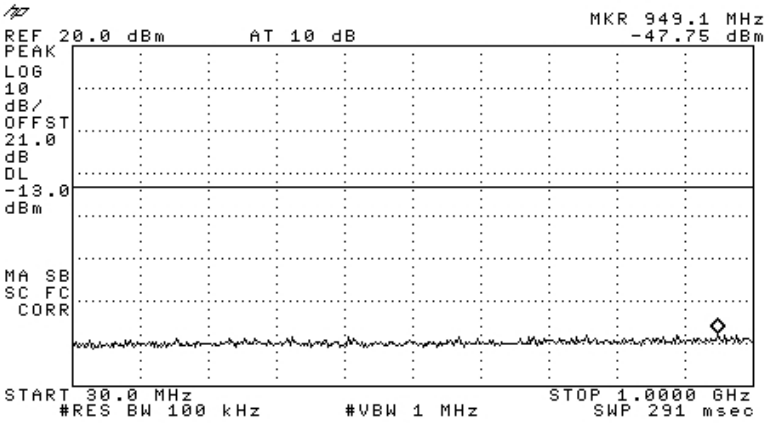

Figure 111.— 2135.0 MHz 16QAM

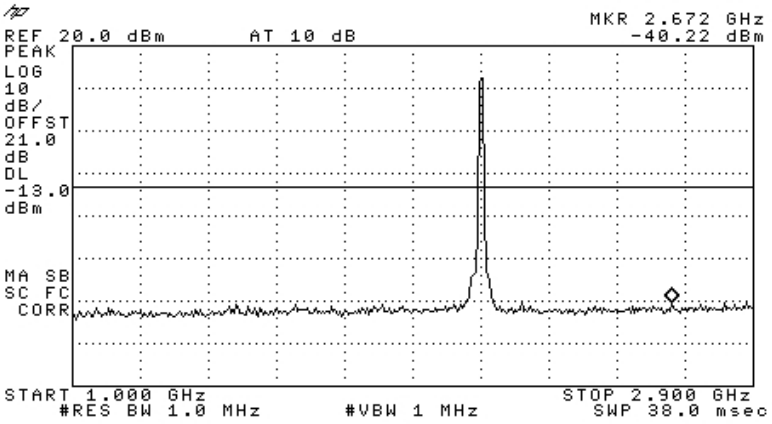

Figure 112.— 2135.0 MHz 16QAM

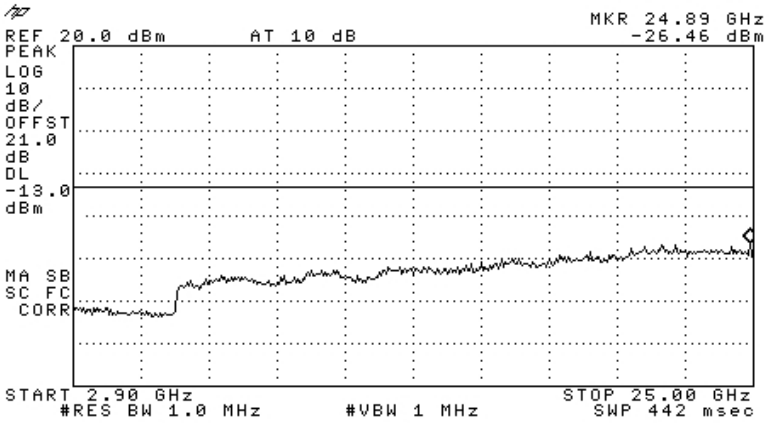

Figure 113.— 2135.0 MHz 16QAM

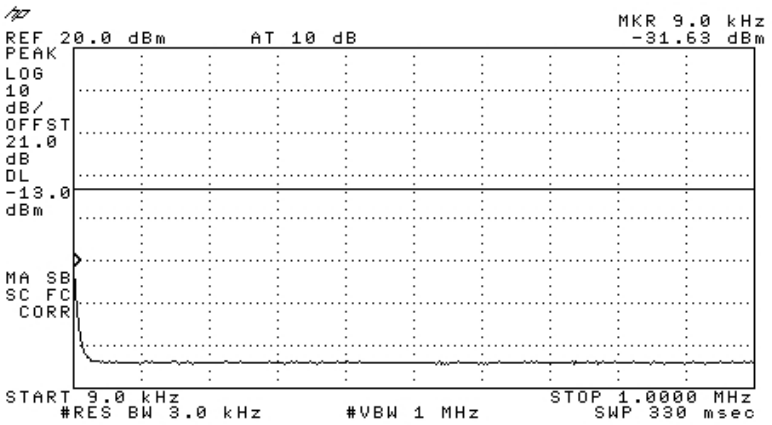

Figure 114.— 2150.0 MHz 16QAM

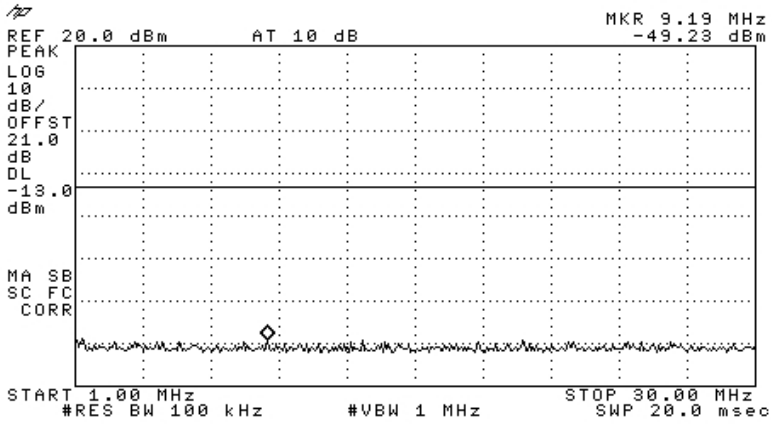

Figure 115.— 2150.0 MHz 16QAM

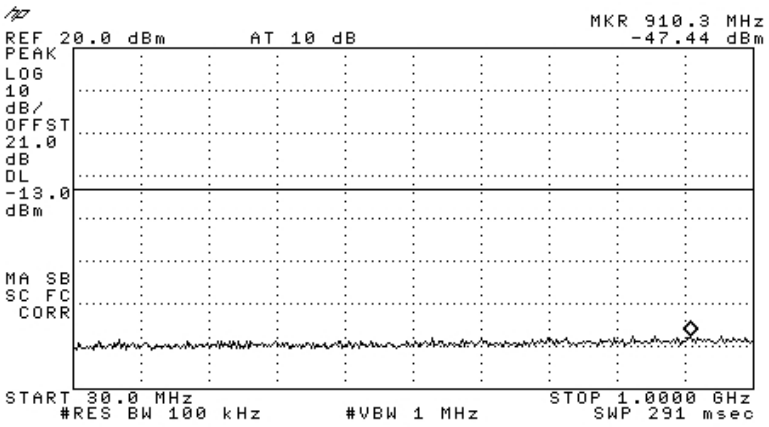

Figure 116.— 2150.0 MHz 16QAM

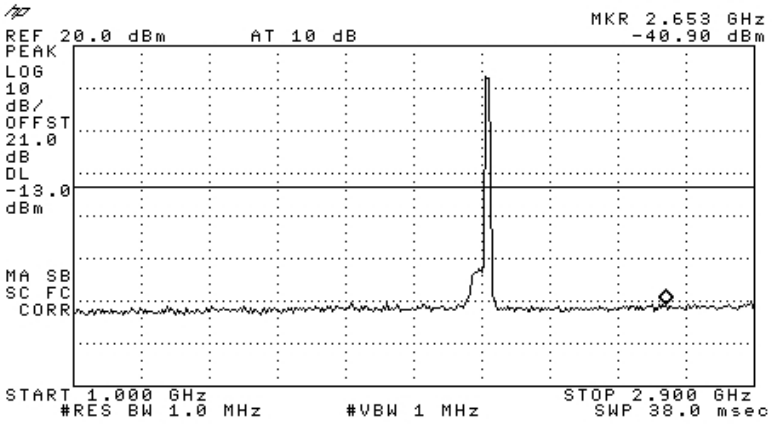

Figure 117.— 2150.0 MHz 16QAM

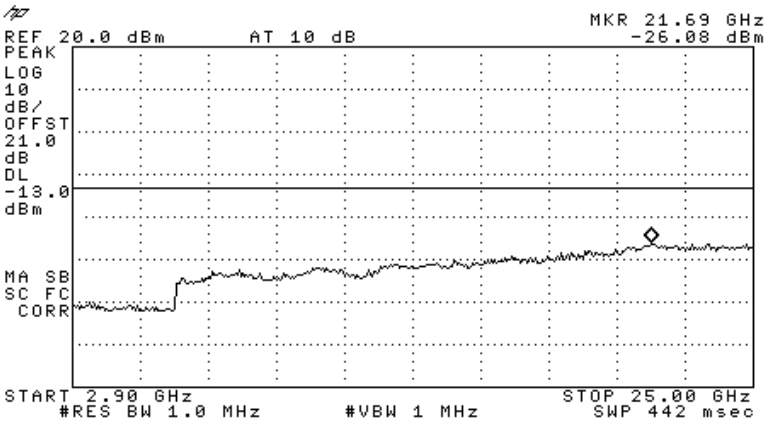

Figure 118.— 2150.0 MHz 16QAM

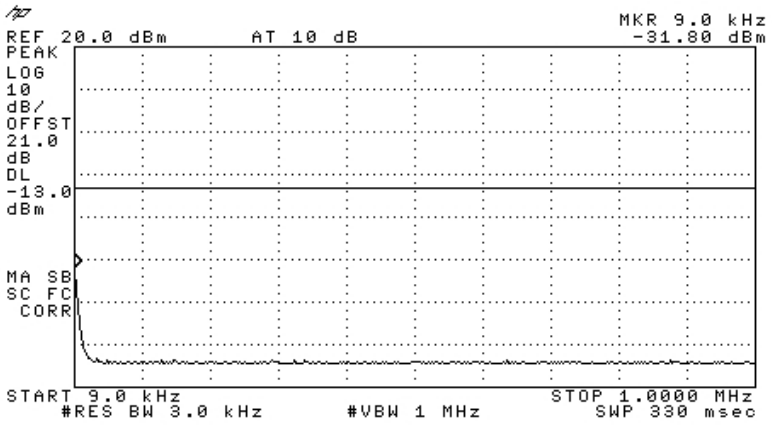

Figure 119.— 2115.0 MHz 64QAM

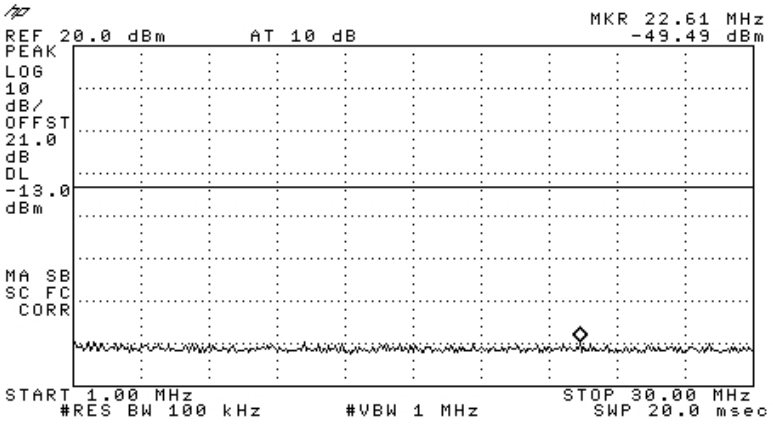

Figure 120.— 2115.0 MHz 64QAM

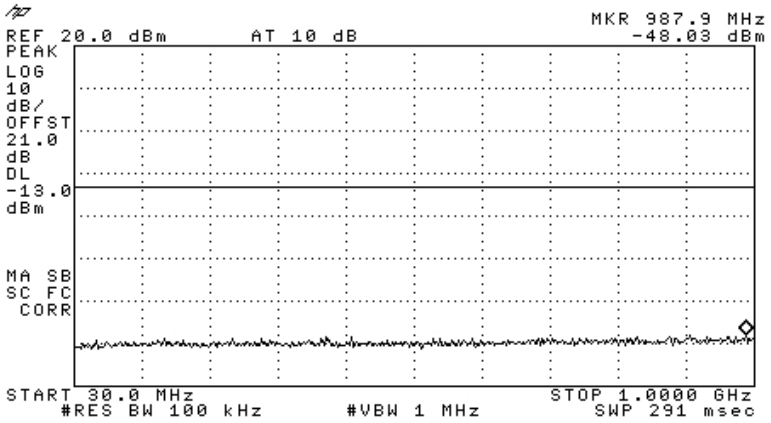

Figure 121.— 2115.0 MHz 64QAM

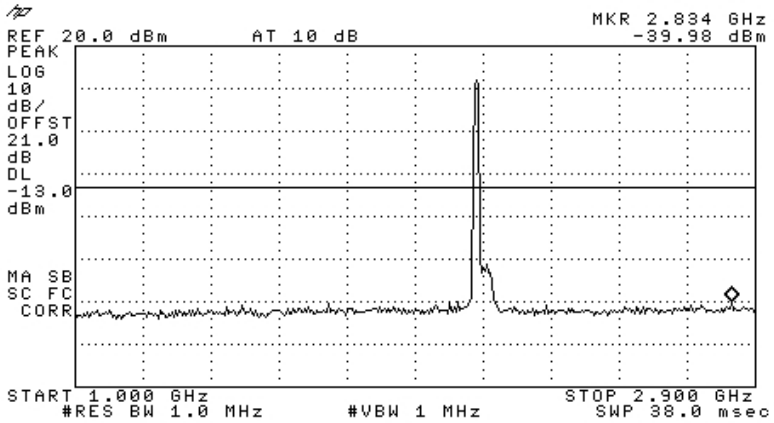

Figure 122.— 2115.0 MHz 64QAM

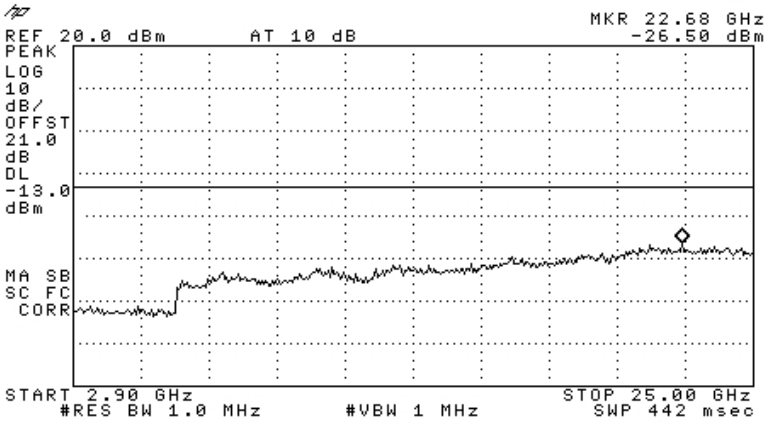

Figure 123.— 2115.0 MHz 64QAM

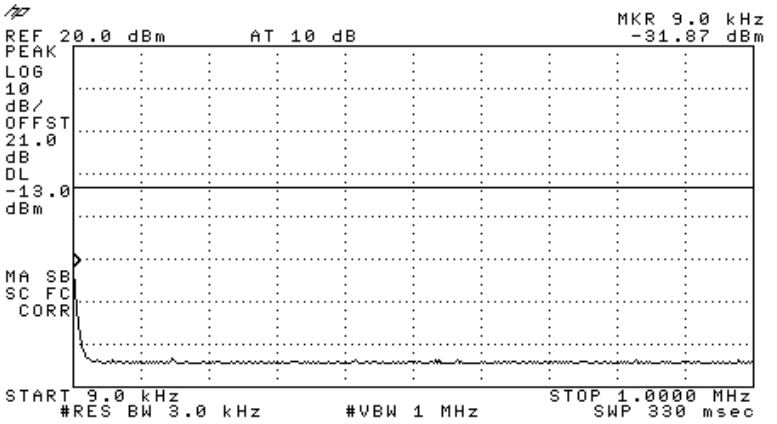

Figure 124.— 2135.0 MHz 64QAM

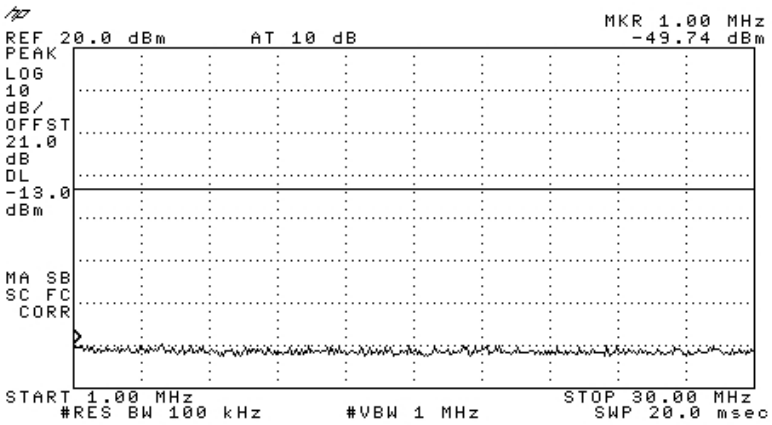

Figure 125.— 2135.0 MHz 64QAM

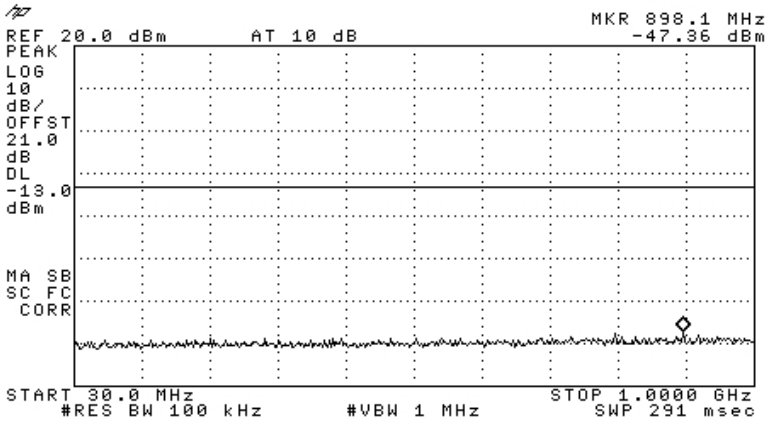

Figure 126.— 2135.0 MHz 64QAM

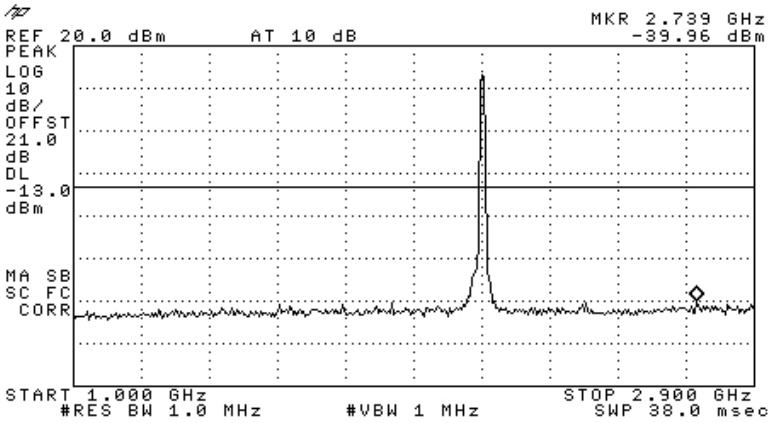

Figure 127.— 2135.0 MHz 64QAM

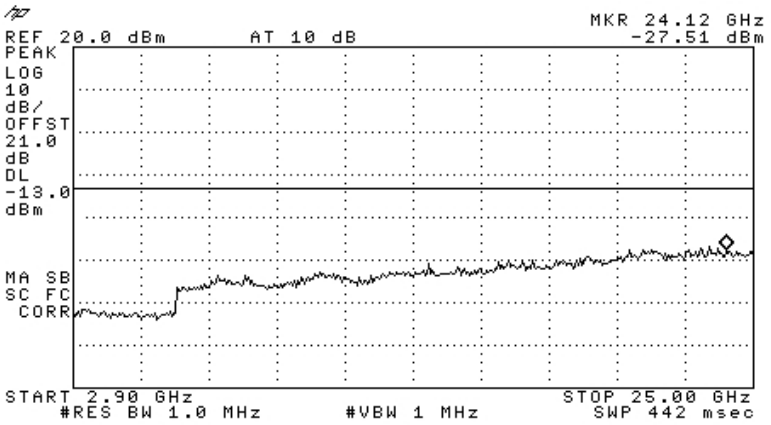

Figure 128.— 2135.0 MHz 64QAM

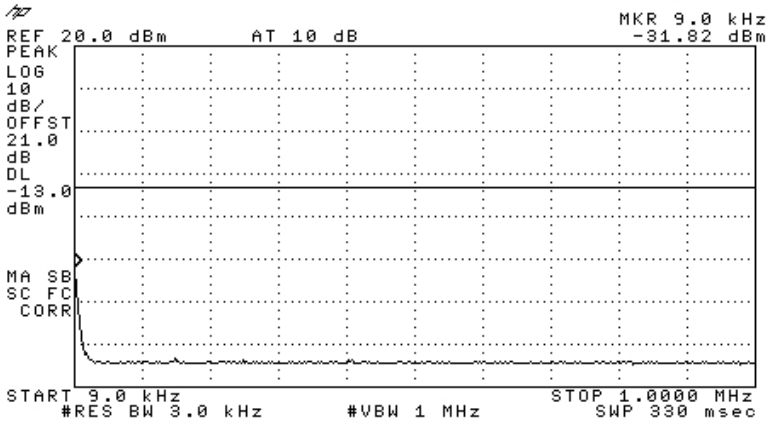

Figure 129.— 2150.0 MHz 64QAM

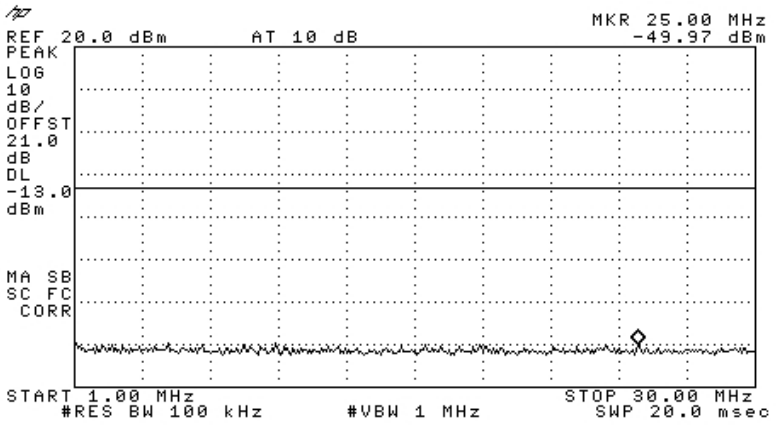

Figure 130.— 2150.0 MHz 64QAM

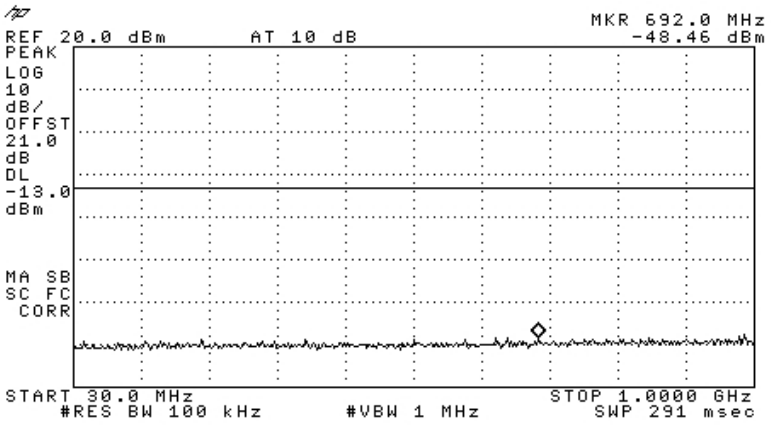

Figure 131.— 2150.0 MHz 64QAM

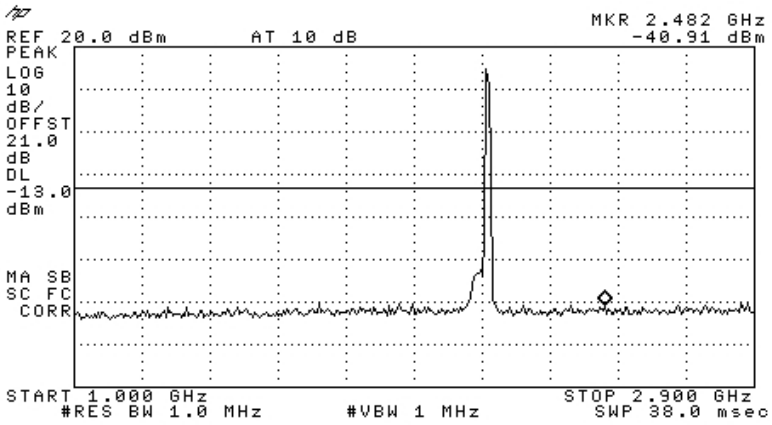

Figure 132.— 2150.0 MHz 64QAM

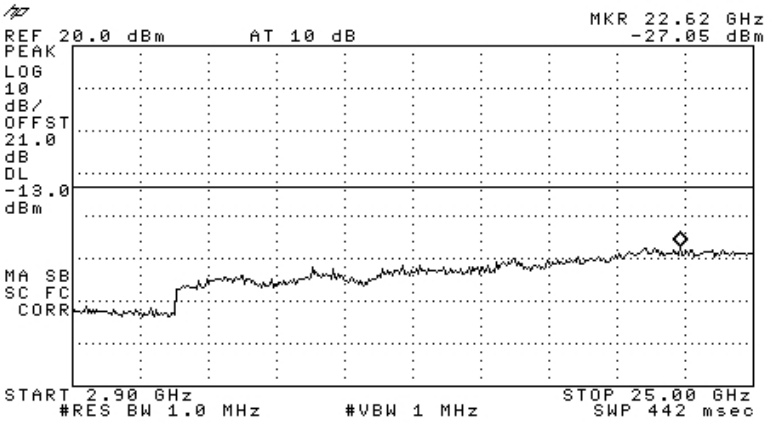

Figure 133.— 2150.0 MHz 64QAM

7.3 Results

E.U.T. Description: VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod
Model No.: 1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number: 1. 00105300044 2. 00110100412
Specification: FCC Part 27, Subpart C, Section 27.53 (g)

	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	2111.25	-27.67	-13.0	-14.67
	2132.50	-27.26	-13.0	-14.26
	2153.50	-27.29	-13.0	-14.29
WCDMA	2112.50	-27.37	-13.0	-14.37
	2132.50	-26.96	-13.0	-13.96
	2152.50	-28.11	-13.0	-15.11
QPSK	2115.00	-27.17	-13.0	-14.17
	2135.00	-27.30	-13.0	-14.30
	2150.00	-27.44	-13.0	-14.44
16QAM	2115.00	-27.02	-13.0	-14.02
	2135.00	-26.46	-13.0	-13.46
	2150.00	-26.08	-13.0	-13.08
64QAM	2115.00	-26.50	-13.0	-13.50
	2135.00	-27.51	-13.0	-14.51
	2150.00	-27.05	-13.0	-14.05

Figure 134 Spurious Emissions at Antenna Terminals Results

JUDGEMENT: Passed by 13.08 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 15.03.11

Typed/Printed Name: A. Sharabi

7.4 Test Equipment Used.

Spurious Emissions at Antenna Terminals

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	March 14, 2010	1 year
Signal Generator	HP	E4433B ESG	MY42082764	July 27, 2010	1 year
Signal Generator	HP	E4438C ESG-D	GB40050702	July 27, 2010	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	February 10, 2011	1 year
Cable	Minicircuit	30091		February 10, 2011	1 year

Figure 135 Test Equipment Used

8. Band Edge Spectrum

8.1 Test Specification

FCC Part 27, Subpart C, Section 27.53 (m 4-6)

8.2 Test procedure

Enclosed are spectrum analyzer plots for the lowest operation frequency and the highest operation frequency in which the E.U.T. is planned to be used.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (21.0 dB).

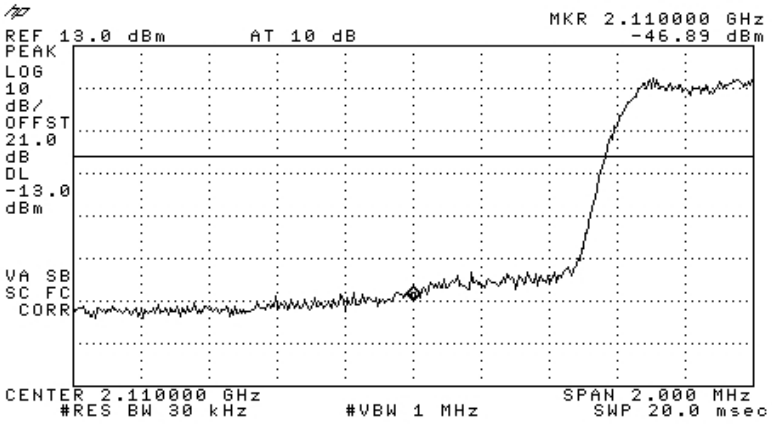

Figure 136.— CDMA

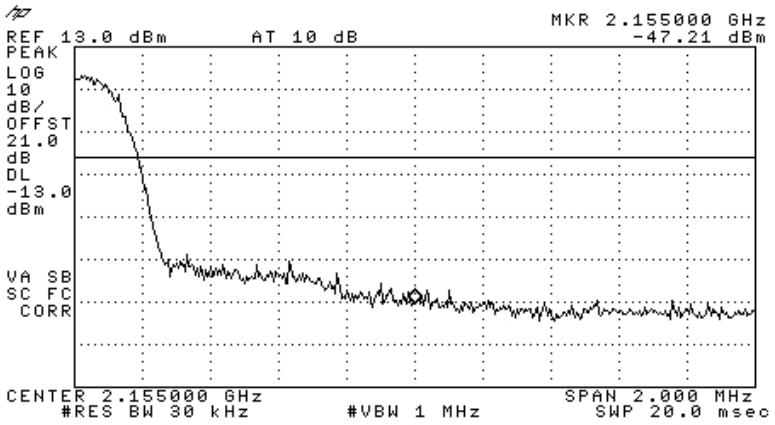

Figure 137.— CDMA

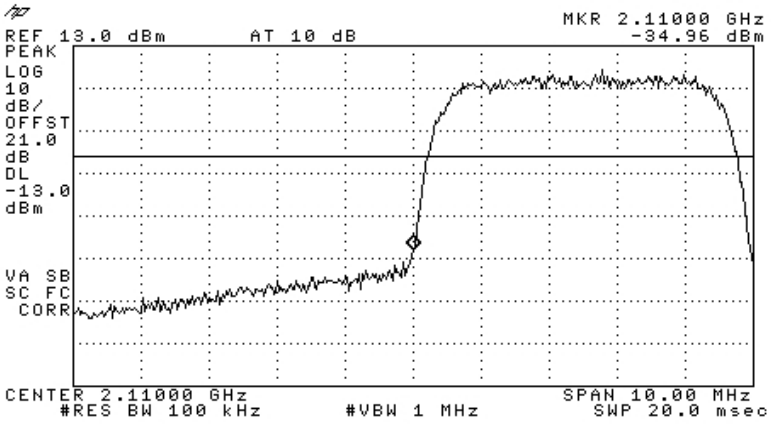

Figure 138.— WCDMA

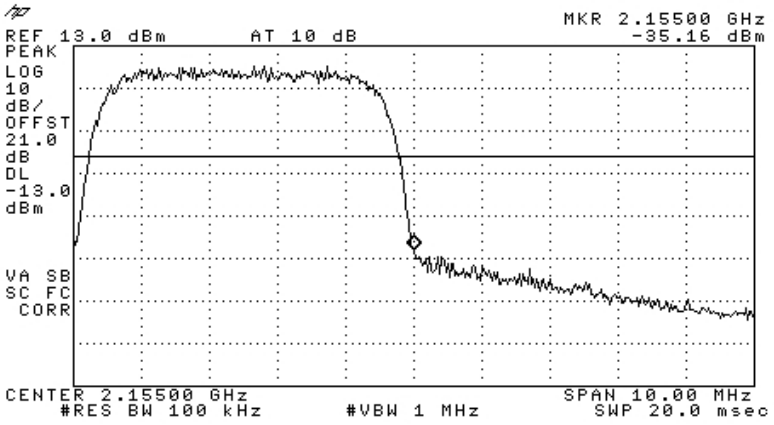

Figure 139.— WCDMA

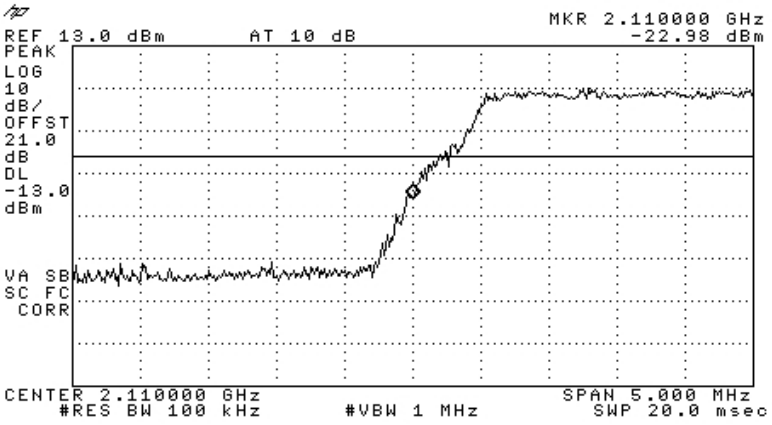

Figure 140.— LTE QPSK

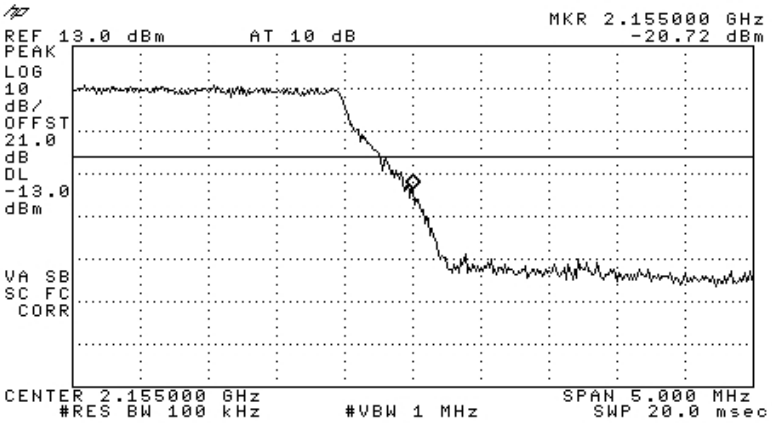

Figure 141.— LTE QPSK

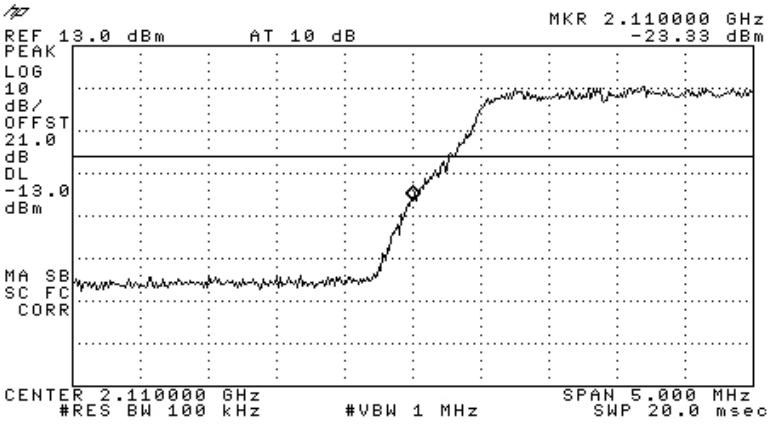

Figure 142.— LTE 16QAM

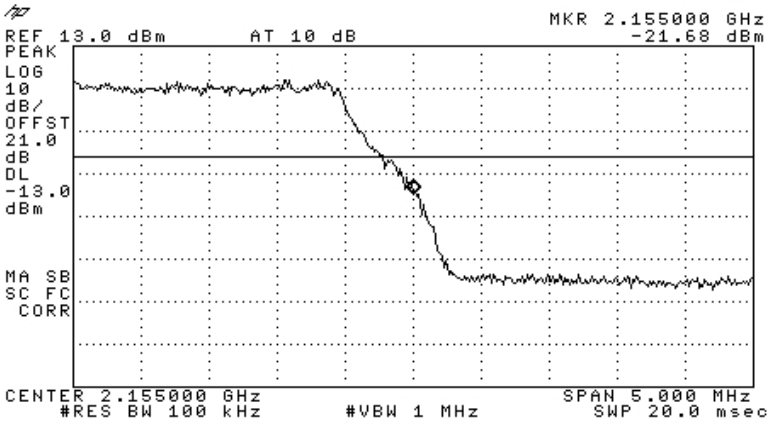

Figure 143.— LTE 16QAM

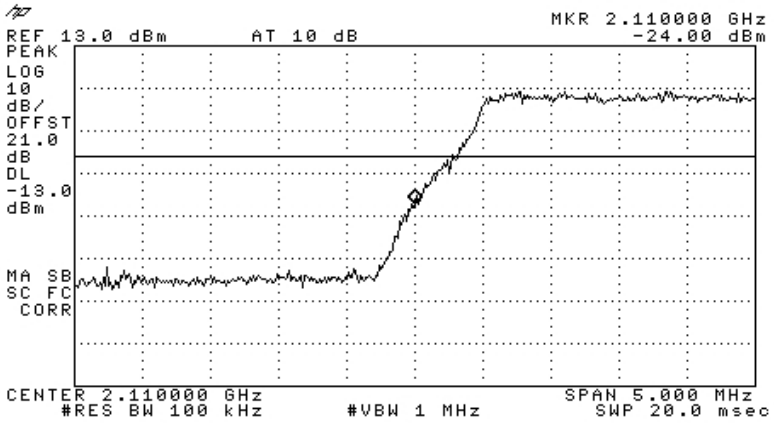

Figure 144.— LTE 64QAM

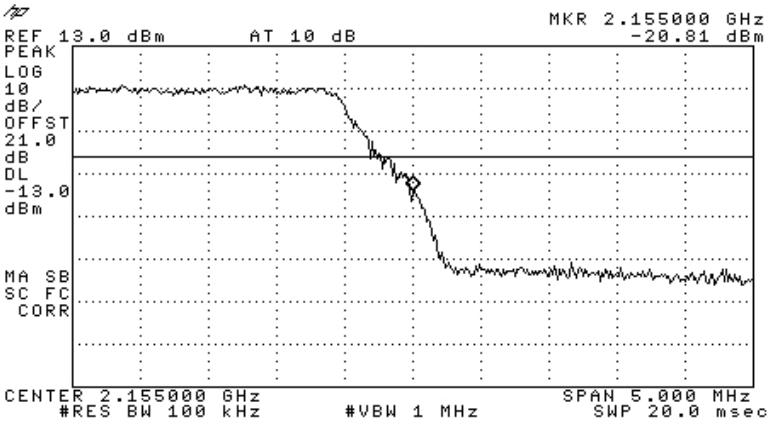

Figure 145.— LTE 64QAM

8.3 Results

E.U.T. Description: VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod
Model No.: 1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO
Serial Number: 1. 00105300044 2. 00110100412
Specification: FCC Part 27, Subpart C, Section 27.53 (m 4-6)

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)
CDMA	2110.00	2110.00	-46.89	-13.0
CDMA	2155.00	2155.00	-47.21	-13.0
WCDMA	2110.00	2110.00	-34.96	-13.0
WCDMA	2155.00	2155.00	-35.16	-13.0
LTE QPSK	2110.00	2110.00	-22.98	-13.0
LTE QPSK	2155.00	2155.00	-20.72	-13.0
LTE 16QAM	2110.00	2110.00	-23.33	-13.0
LTE 16QAM	2155.00	2155.00	-21.68	-13.0
LTE 64QAM	2110.00	2110.00	-24.00	-13.0
LTE 64QAM	2155.00	2155.00	-20.81	-13.0

Figure 146 Band Edge Spectrum Results

JUDGEMENT: Passed

TEST PERSONNEL:
Tester Signature: _____ Date: 15.03.11
Typed/Printed Name: A. Sharabi

8.4 Test Equipment Used.

Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	March 14, 2010	1 year
Signal Generator	HP	E4433B ESG	MY42082764	July 27, 2010	1 year
Signal Generator	HP	E4438C ESG-D	GB40050702	July 27, 2010	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	February 10, 2011	1 year
Cable	Minicircuit	30091		February 10, 2011	1 year

Figure 147 Test Equipment Used

9. Spurious Radiated Emission

9.1 Test Specification

FCC, Part 27, Subpart C Section 27.53 (g)

9.2 Test Procedure

The test method was based on ANSI/TIA-603-D: 2010, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (2110-2155 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, yielding –13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 3. A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.
The frequency range 9 kHz-20 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
$P_d(dBm) = P_g(dBm) – Cable\ Loss\ (dB) + Substitution\ Antenna\ Gain\ (dB)$
P_d = Dipole equivalent power (result).
P_g = Signal generator output level.

9.3 Test Results

JUDGEMENT: Passed by 22.18 dB

The E.U.T met the requirements of the FCC, Part 27, Subpart C, Section 27.53 (g) specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 15.03.11

Typed/Printed Name: A. Sharabi

CDMA:

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
2111.25	4222.5	V	51.3	-52.09	4.45	9.12	-47.42	-13.0	-34.42
2111.25	4222.5	H	53.2	-49.95	4.45	9.12	-45.28	-13.0	-32.28
2132.50	4265.0	V	51.5	-52.57	4.45	9.38	-47.64	-13.0	-34.64
2132.50	4265.0	H	53.3	-50.31	4.45	9.38	-45.38	-13.0	-32.38
2153.50	4307.0	V	52.4	-51.67	4.45	9.38	-46.74	-13.0	-33.74
2153.50	4307.0	H	54.5	-49.11	4.45	9.38	-44.18	-13.0	-31.18

WCDMA

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
2112.50	4225.0	V	47.9	-55.49	4.45	9.12	-50.82	-13	-37.82
2112.50	4225.0	H	49.8	-53.35	4.45	9.12	-48.68	-13	-35.68
2132.50	4265.0	V	49.3	-54.77	4.45	9.38	-49.84	-13	-36.84
2132.50	4265.0	H	50.5	-53.11	4.45	9.38	-48.18	-13	-35.18
2152.50	4305.0	V	46.4	-57.67	4.45	9.38	-52.74	-13	-39.74
2152.50	4305.0	H	47.8	-55.81	4.45	9.38	-50.88	-13	-37.88

LTE: (QPSK as worst case)

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
2115.0	4230.0	V	47.4	-55.99	4.45	9.12	-51.32	-13	-38.32
2115.0	42030.	H	49.0	-54.15	4.45	9.12	-49.48	-13	-36.48
2135.0	4270.0	V	49.0	-55.07	4.45	9.38	-50.14	-13	-37.14
2135.0	4270.0	H	50.2	-53.41	4.45	9.38	-48.48	-13	-35.48
2150.0	4300.0	V	45.9	-58.17	4.45	9.38	-53.24	-13	-40.24
2150.0	4300.0	H	47.4	-56.21	4.45	9.38	-51.28	-13	-38.28

IF CDMA – MIMO Port 1(as worst case)

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
2111.25	257.5	V	58.21	-39.6	1.9	1.47	-40.03	-13	-27.03
2111.25	257.5	H	63.44	-35.27	1.9	1.47	-35.7	-13	-22.70
2132.50	277.5	V	60.40	-36.77	2.1	1.35	-37.52	-13	-24.52
2132.50	277.5	H	65.27	-34.46	2.1	1.35	-35.21	-13	-22.21
2153.50	295.8	V	62.67	-34.5	2.1	1.35	-35.25	-13	-22.25
2153.50	295.8	H	65.31	-34.43	2.1	1.35	-35.18	-13	-22.18

IF CDMA – MIMO Port 2(as worst case)

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
2111.25	308.4	V	58.35	-38.87	2.1	1.35	-39.62	-13	-26.62
2111.25	308.4	H	61.95	-37.78	2.1	1.35	-38.53	-13	-25.53
2132.50	330.8	V	60.06	-37.17	2.1	1.35	-37.92	-13	-24.92
2132.50	330.8	H	64.58	-35.23	2.1	1.35	-35.98	-13	-22.98
2153.50	350.4	V	59.63	-37.52	2.1	1.35	-38.27	-13	-25.27
2153.50	350.4	H	64.57	-34.93	2.1	1.35	-35.68	-13	-22.68

9.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	November 25, 2010	1 year
RF Section	HP	85420E	3427A00103	November 25, 2010	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2010	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 4, 2011	1 year
Signal Generator	HP	E4433B ESG	MY42082764	July 27, 2010	1 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	2984	March 14, 2010	2 year

10. Frequency Stability

10.1 Test Specification

Part 27 Section 27.54

10.2 Test Procedure

The E.U.T operation mode and test setup are as described in Section 2. The E.U.T. was operated with a CW signal in the downlink path.

The E.U.T. was placed inside a temperature chamber. The E.U.T. was operated from 115 VAC at normal temperature and the chamber temperature was set to +20°C.

The spectrum analyzer was set to 50.0 kHz span and 1.0 kHz resolution B.W.

The carrier frequency was measured and recorded (reference frequency reading).

The carrier frequency measurement was repeated for:

(a). +20°C and 97.5 VAC

(b). +20°C and 132.5 VAC

(c). -30°C and 97.5 VAC

(d). -30°C and 115 VAC

(e). -30°C and 132.5 VAC

(f). +50°C and 97.5 VAC

(g). +50°C and 115 VAC

(h). +50°C and 132.5 VAC

The carrier frequency was measured and recorded after at least 20 minutes of exposing the E.U.T. to the temperature.

The E.U.T. was operated at 2110 to 2155MHz band.

Frequency Stability

E.U.T Description VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod

Type 1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO

Serial Number: 1. 00105300044 2. 00110100412

Specification: Part 27 Section 27.54

Operation Frequency (MHz)				Δ f(max) (kHz)
	Temp	Volt	Readings	
2115.00	+20°C	97.5	2115.00020	0.0
	+20°C	115	2115.00020	-
	+20°C	132.5	2115.00020	0.0
	-30°C	97.5	2115.00013	-0.07
	-30°C	115	2115.00013	-0.07
	-30°C	132.5	2115.00013	-0.07
	+50°C	97.5	2115.00018	-0.02
	+50°C	115	2115.00018	-0.02
	+50°C	132.5	2115.00018	-0.02

Figure 148. Frequency Stability

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm

JUDGEMENT: Passed

The E.U.T met the requirements of the FCC, Part 27, Section 27.54 specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 15.03.11

Typed/Printed Name: A. Sharabi

Frequency Stability

E.U.T Description VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod

Type 1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO

Serial Number: 1. 00105300044 2. 00110100412

Specification: Part 27 Section 27.54

Operation Frequency (MHz)				Δ f(max) (kHz)
	Temp	Volt	Readings	
2135.00	+20°C	97.5	2135.00015	0.0
	+20°C	115	2135.00015	-
	+20°C	132.5	2135.00015	0.0
	-30°C	97.5	2135.00018	+0.03
	-30°C	115	2135.00018	+0.03
	-30°C	132.5	2135.00018	+0.03
	+50°C	97.5	2135.00013	-0.02
	+50°C	115	2135.00013	-0.02
	+50°C	132.5	2135.00018	-0.02

Figure 149. Frequency Stability

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm

JUDGEMENT: Passed

The E.U.T met the requirements of the FCC, Part 27, Section 27.54 specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 15.03.11

Typed/Printed Name: A. Sharabi

Frequency Stability

E.U.T Description VE AWS MIMO DAS System Comprising:
1. VE AWS Control Unit 2. VE AWS Access Pod

Type 1. VCU-AWS-MIMO-12 2. VAP-AWS-MIMO

Serial Number: 1. 00105300044 2. 00110100412

Specification: Part 27 Section 27.54

Operation Frequency (MHz)				Δ f(max) (kHz)
	Temp	Volt	Readings	
2150.00	+20°C	97.5	2150.00020	0.0
	+20°C	115	2150.00020	-
	+20°C	132.5	2150.00020	0.0
	-30°C	97.5	2150.00018	-0.02
	-30°C	115	2150.00018	-0.02
	-30°C	132.5	2150.00018	-0.02
	+50°C	97.5	2150.00015	-0.05
	+50°C	115	2150.00015	-0.05
	+50°C	132.5	2150.00015	-0.05

Figure 150. Frequency Stability

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm

JUDGEMENT: Passed

The E.U.T met the requirements of the FCC, Part 27, Section 27.54 specifications.

TEST PERSONNEL:

Tester Signature:  Date: 15.03.11

Typed/Printed Name: A. Sharabi

10.3 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Environmental Chamber	THERMOTRON CORP	SM 32C Mini Max	25-1030	March 4, 2009	2 Years
Digital Voltage Meter	Escort	EDM1111A	10313121	December 07, 2010	2 Years
Variable Voltage Transformer	Variac Voltage Co.	-	-	N/A	N/A
Spectrum Analyzer	HP	8594E	3809U03785	March 8, 2010	1 Year

11. APPENDIX A - CORRECTION FACTORS

11.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

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

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

NOTES:

1. The cable type is RG-214.

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

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

11.2 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.

11.3 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.

11.4 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

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

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

NOTES:

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

11.5 Correction factors forDouble-Ridged Waveguide Horn

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

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