DATE: 19 May 2011

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

FCC Radio Test Report

for

Mobile Access Networks

Equipment under test:

Mobile AccessHX High-Power DAS Remote Unit

HX-A17L70-AC-A
(A17=AWS; L70=LTE)

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

Mobile AccessHX High-Power DAS Remote Unit

HX-A17L70-AC-A

(A17=AWS; L70=LTE)

FCC ID: OJFHXA17L70

This report concerns:	Original Grant: X
	Class II change:
	Class I change:
Equipment type:	PCS Licensed Transmitter

Limits used:
47CFR Parts 2; 27

Measurement procedure used is ANSI C63.4-2003.
Substitution Method used as in ANSI/TIA-603-C: 2004

Application for Certification prepared by:

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

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e-mail: sblum@mobileaccess.com

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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):	Mobile AccessHX High-Power DAS Remote Unit
Equipment Model No.:	HX-A17L70-AC-A (A17=AWS; L70=LTE)
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	08.05.11
Start of Test:	08.05.11
End of Test:	16.05.11
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**HX** is a high power, Distributed Antenna System (DAS) solution for indoors or outdoors (model dependent). It is a fiber-fed, compact and scalable multi-service platform designed to provide complete RF open space coverage for large scale public venues, such as campuses, stadiums, convention centers, hotels, airports, and train stations.
HX supports multiple wireless technologies and operator services over a single broadband infrastructure. Using low loss fiber optic cabling remote units can cover distances of up to 2Km from the BTS signal sources at the head-end.
The solution can be deployed in new sites or alongside existing MobileAccess**1000** (MA1000) and/or MobileAccess**2000** (MA2000) systems, sharing a common head-end and element management system (EMS).
Alongside MA1000/MA2000 deployments, MobileAccess**HX** provides a comprehensive indoor and outdoor coverage solution for varying site requirements, supporting everything from high-rise buildings and campus topologies to stadiums and airports.

Features & Benefits:

Multi-Service Platform: Accommodates virtually any mix of wireless voice and data services, eliminating the need for separate overlay networks. Supported services and technologies include: GSM, UMTS, HSPA, LTE, EDGE, EV-DO, AWS, and more.

Cost-Effective High Power: Optimizes and reduces the number of antennas required to cover open areas by offering 33dBm (2W) composite power per frequency band.

Available in both Indoor and outdoor models – outdoor models are ingress protected whereas indoor models are field-upgradable. The combination of both provides maximum flexibility to match any deployment.

Pay-As-You-Grow Design: Can initially be deployed in dual-band, where tri-band or quad-band configurations can be enabled as needed.

Carrier-Grade Operation: Advanced signal handling and management ensures carrier-grade performance in multi-operator deployments.

Design and Deployment Flexibility:

Remote unit supports both SM and MM fiber connections.
Supports two to four wireless frequencies.

Compatible with Existing MA1000/MA2000 Deployment: Shares a common head-end and EMS in a single deployment.

System Architecture

MobileAccess**HX** provides a complete solution consisting of HX remote units at the remote locations and head-end elements that are shared with any existing MA1000/MA2000 system that is either installed or being installed at the site. In the downlink, at the head-end, the BTS or BDA signal is conditioned by the **RIU**, ensuring a constant RF level. The conditioned signal is then converted by the Base Unit to an optical signal for transport over single or multi-mode fiber to the HX remote units, which are located at the remote locations. In the uplink, the process is reversed. The **SC-450 Controller** enables local and remote management, as well as controls all MA1000, MA2000, and HX elements from a single, centralized location.

The **MobileAccessHX Remote Unit** (indoor and outdoor models) consists of a compact enclosure that houses the RF module, power elements, and the required interfaces. The RF module supports up to four services, where two services can be enabled initially and additional services can be enabled as needed. All mobile services are combined and distributed through a single antenna port over antennas installed at the remote locations.

1.4 Test Methodology

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

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 3, 2009).

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

1.6 Measurement Uncertainty

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):

± 4.96 dB

2. System Test Configuration

2.1 Justification

The test setup was configured to closely resemble the standard installation.
The EUT consists of the HX (High Power Remote Module) which is connected with the head-end DAS equipment using fiber optic cable.
The RF source signals (AWS and LTE) are represented in the setup by appropriate signal generators.
An “Exercise” SW on the computer was used to enable / disable transmission of the EUT, while the EUT output was connected to the spectrum analyzer.

The E.U.T. is available powered from AC or DC

The E.U.T. is a hardware de-populated version of the full configuration model FCC ID: OJFHXC85P19L70A17. Based on the exploratory radiated emission tests performed on the full configuration, the AC powered version of the E.U.T. was selected for full testing. Following is a description of the exploratory radiated emission tests performed on the full configuration.

To select the worst case host to be fully tested, an exploratory radiated emission test was performed inside the shielded room.

The units were placed on a 0.8 meter high wooden table, 1meter from the tests antenna, which was 1 m high.

The results of the exploratory radiated emission tests are shown in the table below.

Frequency (MHz)	AC Configuration (dBµV/m)	DC Configuration (dBµV/m)
3920.00	40.0	39.5
4270.00	53.5	51.5
5880.00	34.5	34.5

Based on the above exploratory radiated emission test, the AC powered configuration was selected as the “worst case” host.

2.2 EUT Exercise Software

The Element Management System EngGUI ver. 1.00 build 10 used for commands delivery.
These commands are used to enable / disable of EUT transmission.
EUT Embedded SW version 01.00 build 14

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

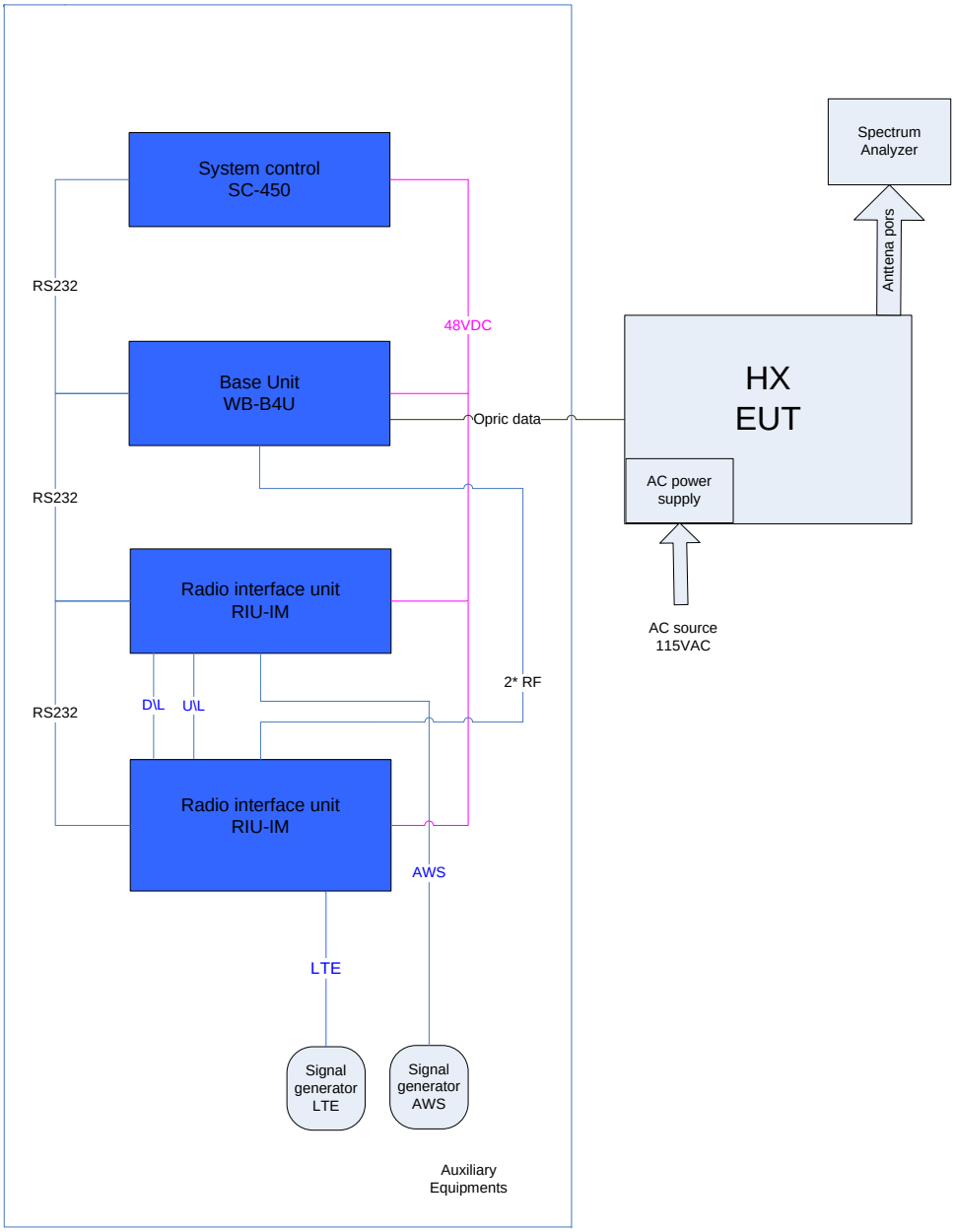

Figure 1. Test Set-up

3. Test Set-up Photos

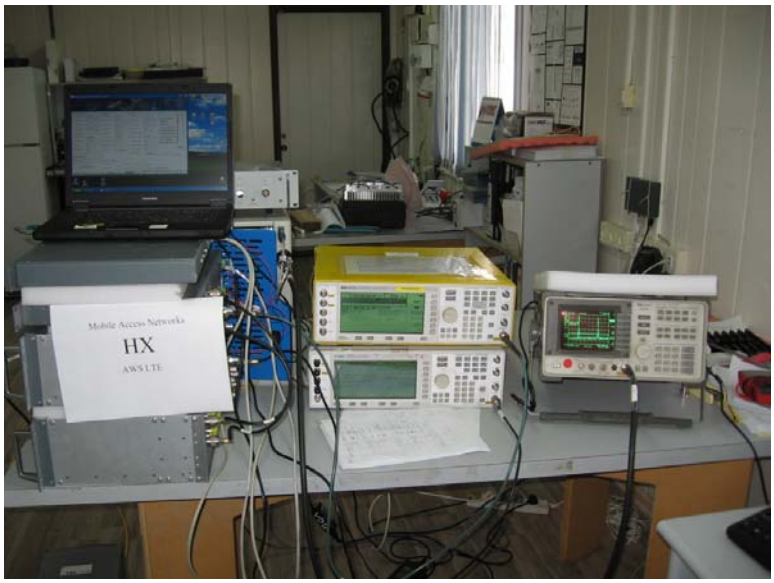

Figure 2. Conducted Emission From Antenna Port Tests

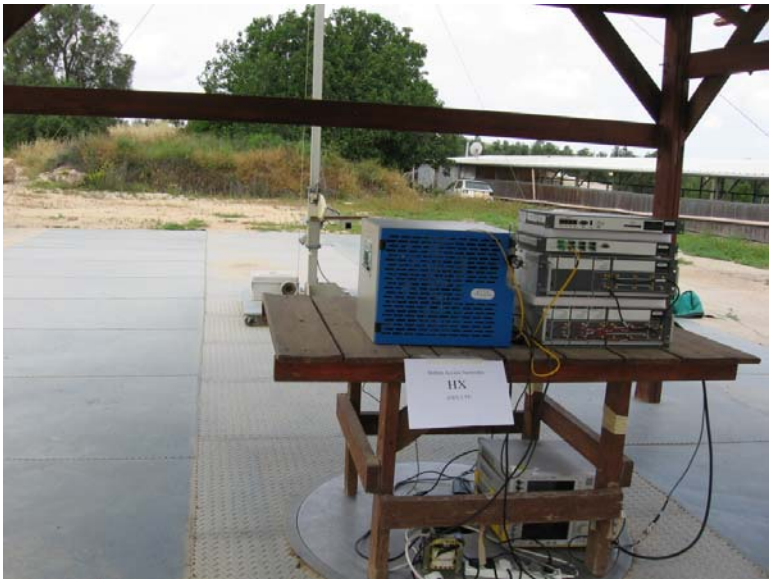

Figure 3. Radiated Emission Test

4. RF Power Output LTE

4.1 Test Specification

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

4.2 Test procedure

Peak Power Output must not exceed 1000W. The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (41 dB) and an appropriate coaxial cable. The E.U.T. RF output was W-CDMA, QPSK, 16QAM, and 16QAM at 5 MHz bandwidth at the 728-758 MHz bands. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz RBW.

Signal generator output power was 0dBm.

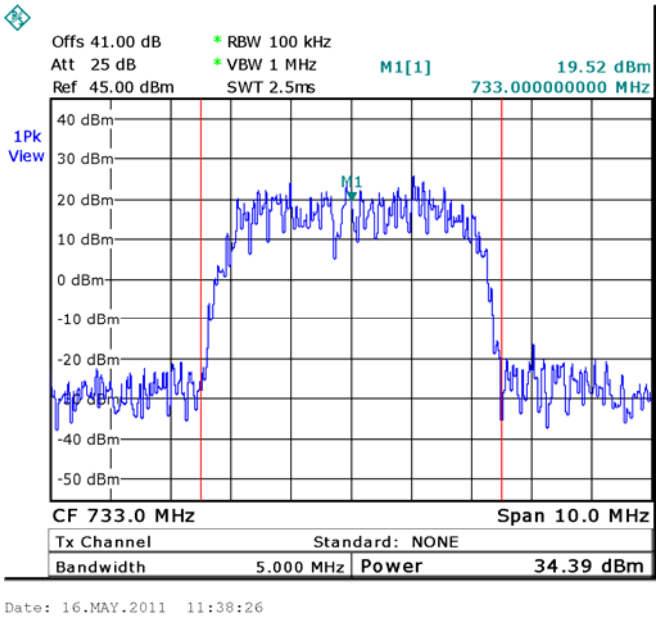

Figure 4.— W-CDMA (733 MHz)

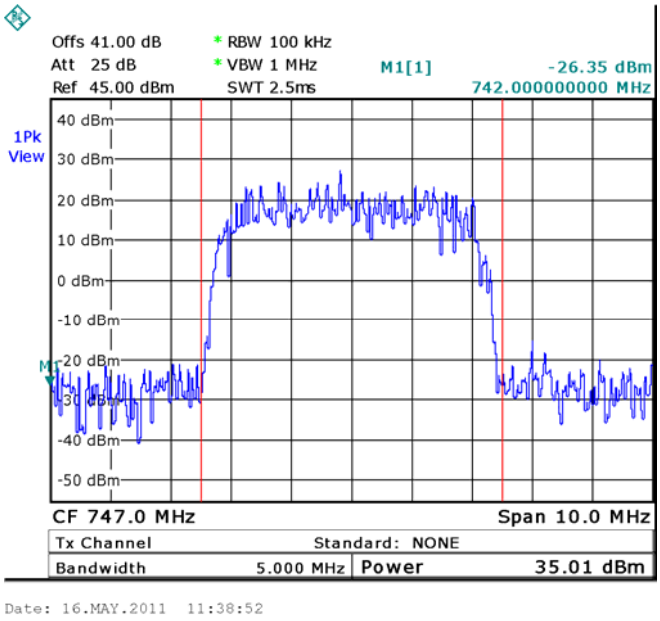

Figure 5.— W-CDMA (747 MHz)

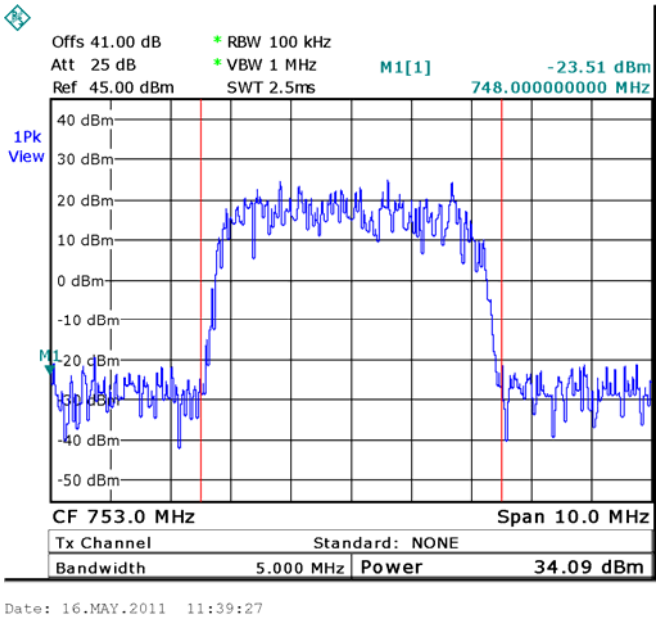

Figure 6.— W-CDMA (753 MHz)

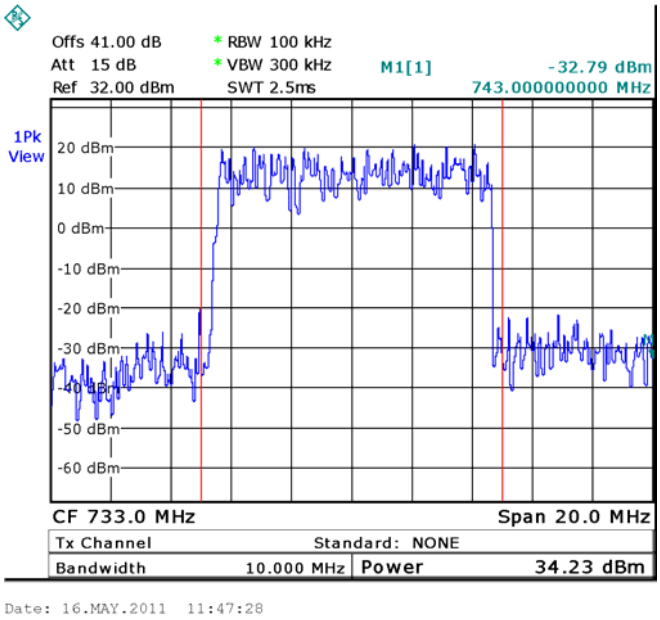

Figure 7.— QPSK (733 MHz)

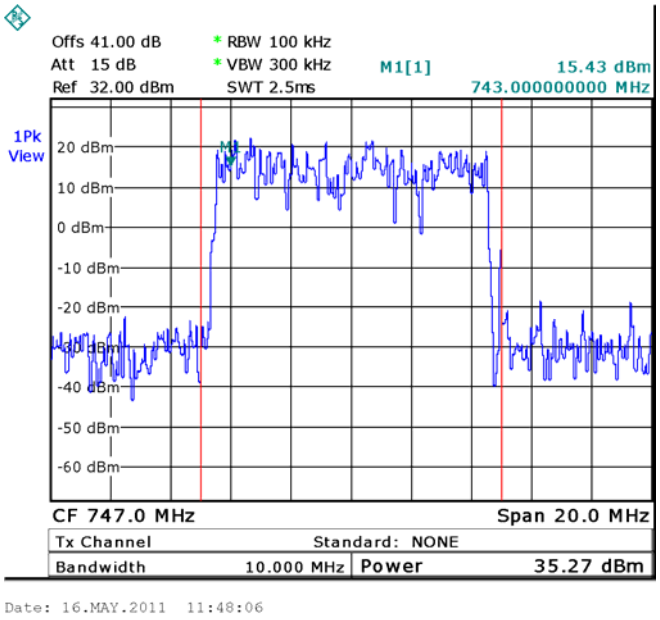

Figure 8.— QPSK (747 MHz)

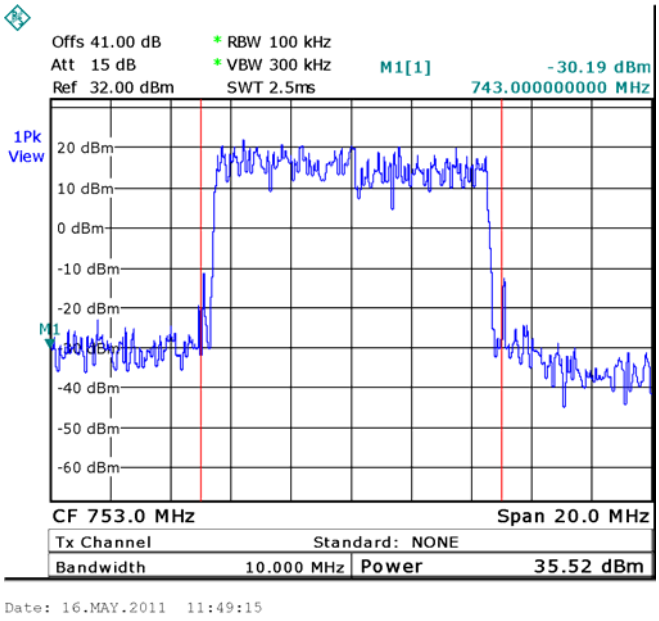

Figure 9.— QPSK (753 MHz)

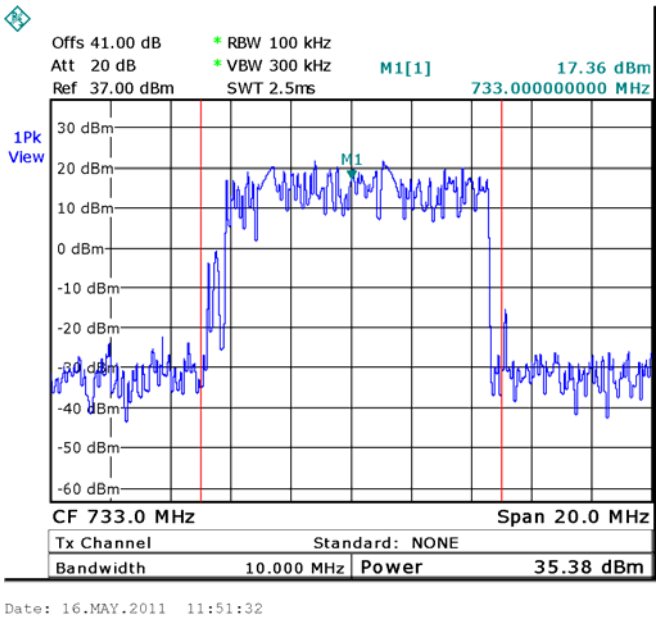

Figure 10.— 16QAM (733 MHz)

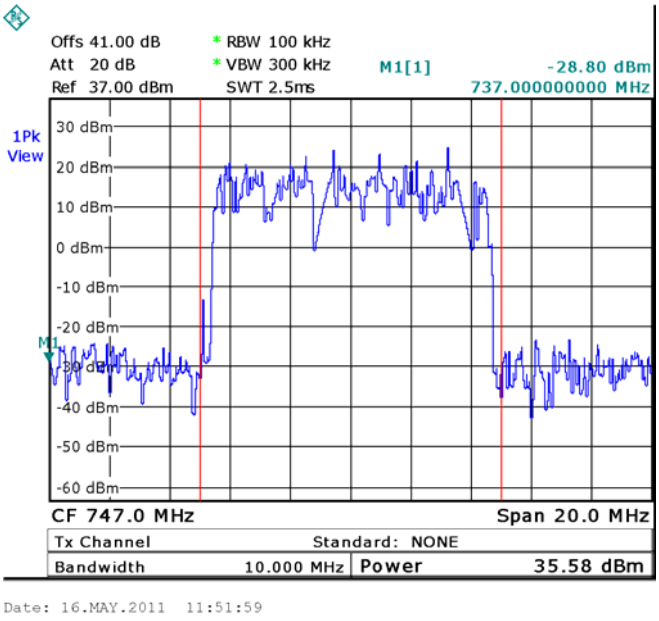

Figure 11.— 16QAM (747 MHz)

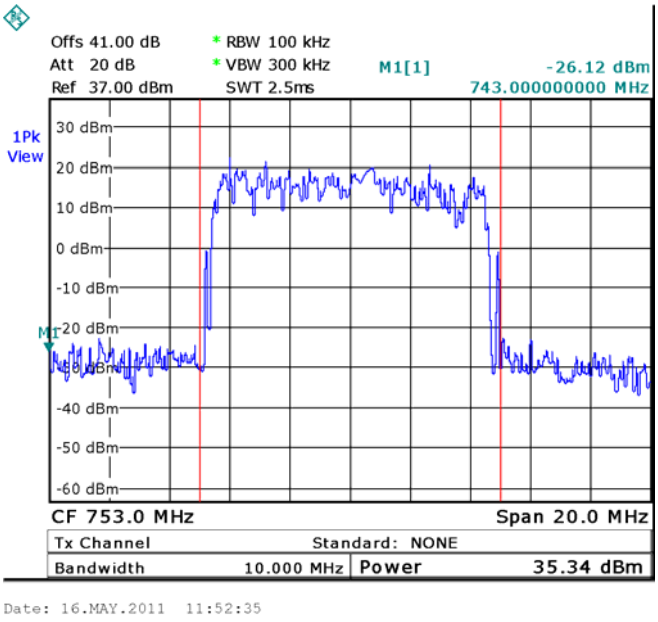

Figure 12.— 16QAM (753 MHz)

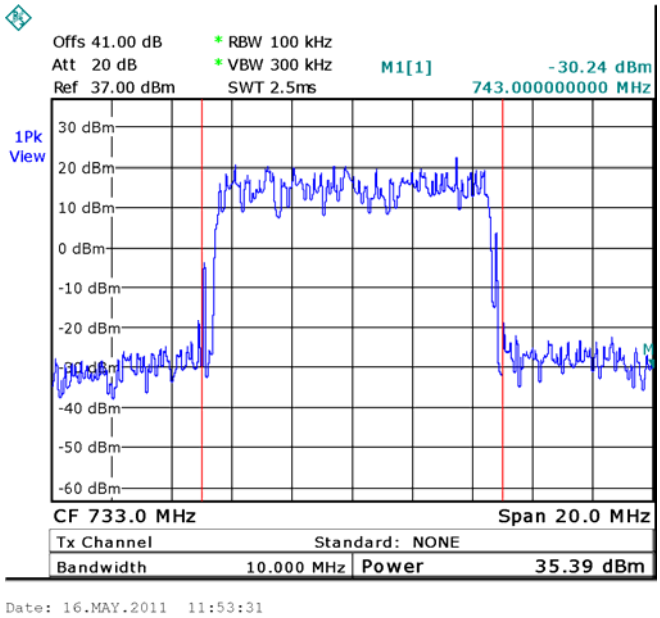

Figure 13.— 64QAM (733 MHz)

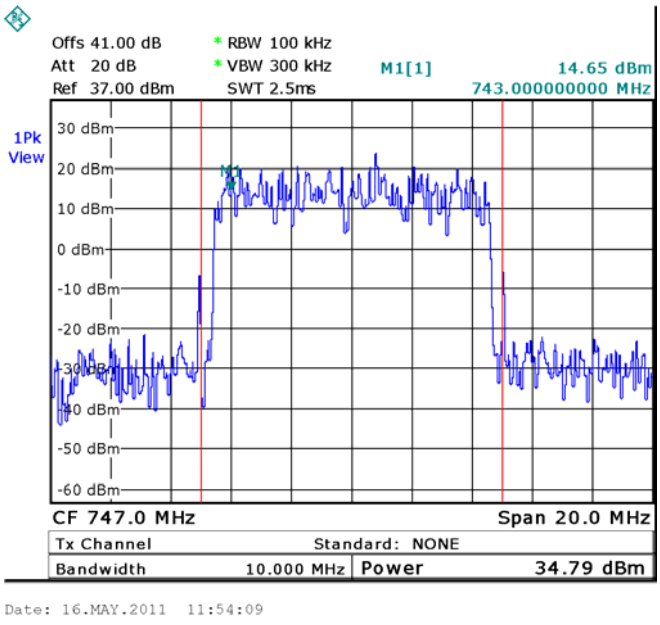

Figure 14.— 64QAM (747 MHz)

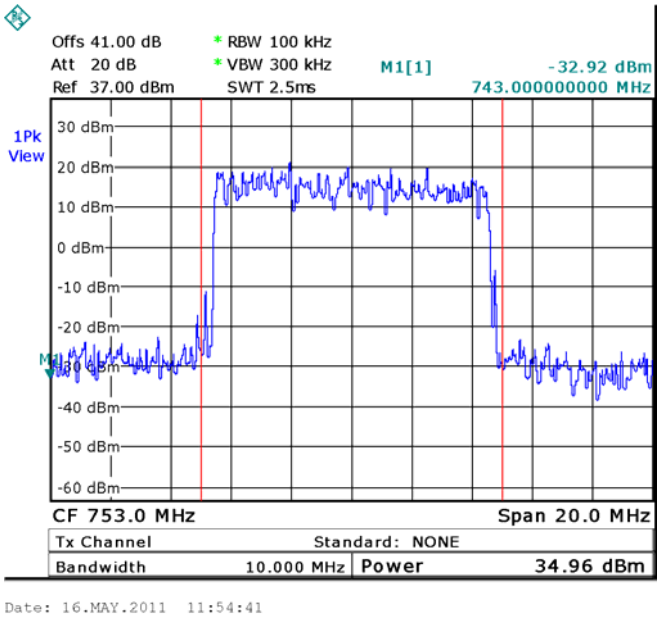

Figure 15.— 64QAM (753 MHz)

4.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-A17L70-AC-A (A17=AWS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Section 27.50 (d)

Modulation	Operation Frequency (MHz)	Reading (dBm)
WCDMA	733	34.39
WCDMA	747	35.01
WCDMA	753	34.09
QPSK	733	34.23
QPSK	747	35.27
QPSK	753	35.52
16QAM	733	35.38
16QAM	747	35.58
16QAM	753	35.34
64QAM	733	35.39
64QAM	747	34.79
64QAM	753	34.96

Figure 16 RF Power Output LTE

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

4.4 Test Equipment Used.

RF Power Output LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE&SCHWARZ	FSL6	100194	July 22, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C	MY42082734	July 21, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 17 Test Equipment Used

5. Occupied Bandwidth LTE

5.1 Test Specification

FCC Part 2, Section 1049

5.2 Test Procedure

The E.U.T. was set to the applicable test frequency with QPSK, WCDMA, 16QAM and 64QAM 10MHZ modulation in the 728-758MHz band.
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 (41.0dB).
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.

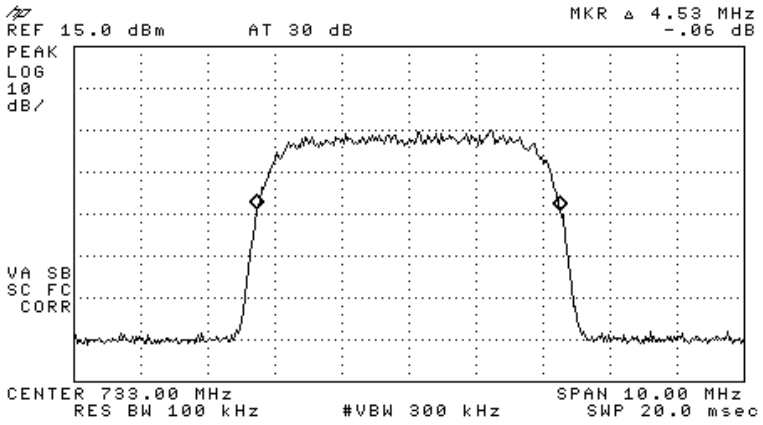

Figure 18.— W-CDMA (733 MHz) IN

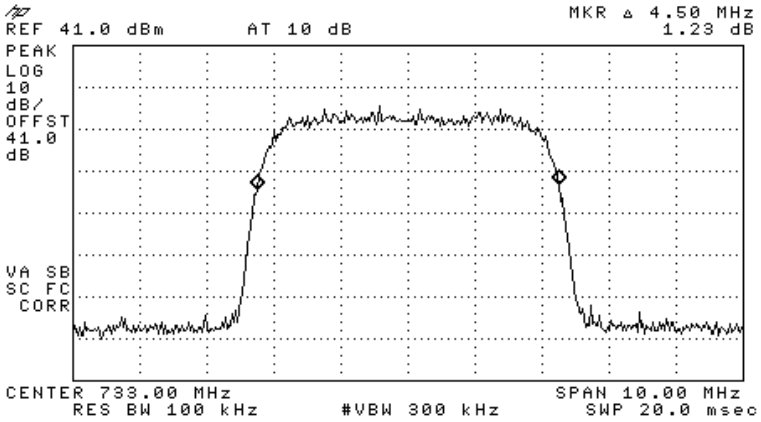

Figure 19.— W-CDMA (733 MHz) OUT

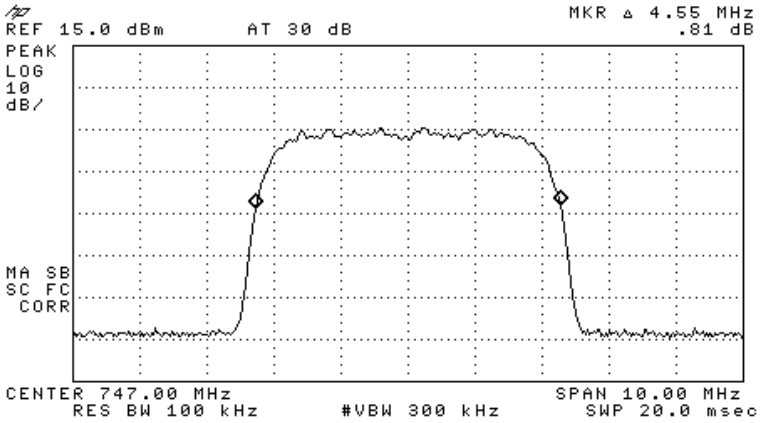

Figure 20.— W-CDMA (747 MHz) IN

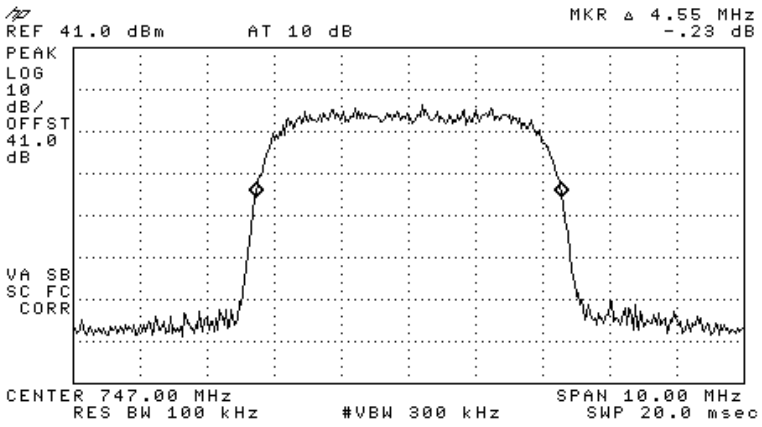

Figure 21.— W-CDMA (747 MHz) OUT

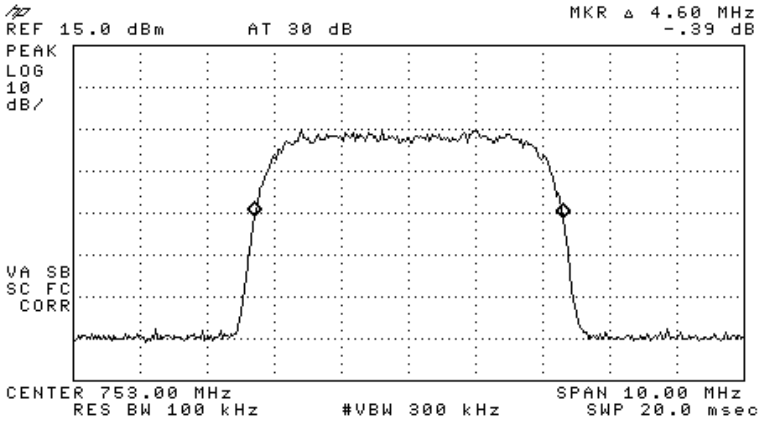

Figure 22.— W-CDMA (753 MHz) IN

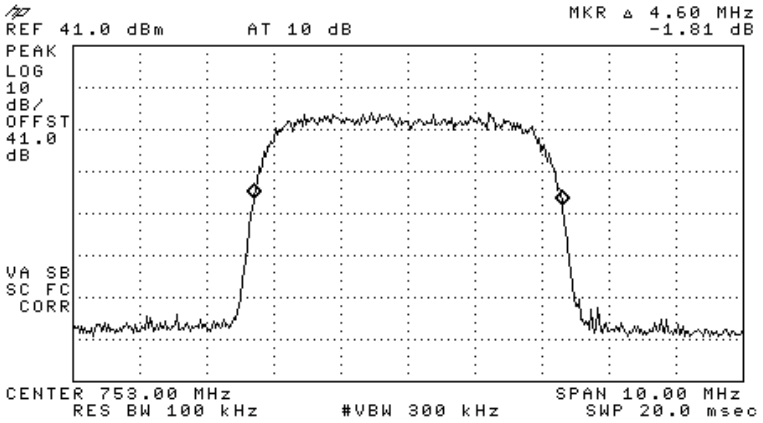

Figure 23.— W-CDMA (753 MHz) OUT

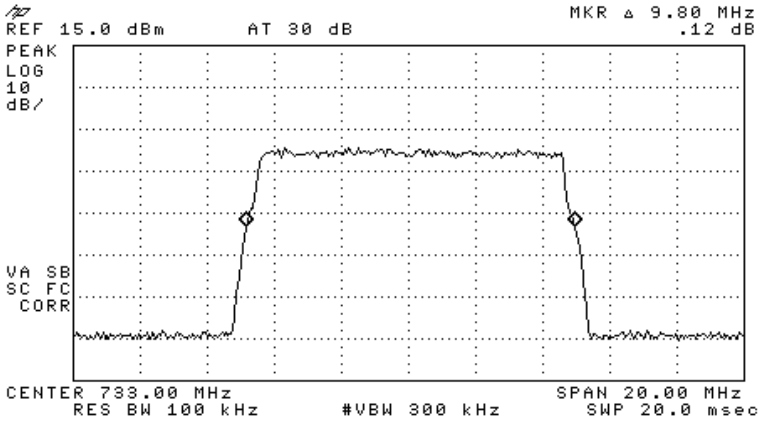

Figure 24.— QPSK (733 MHz) IN

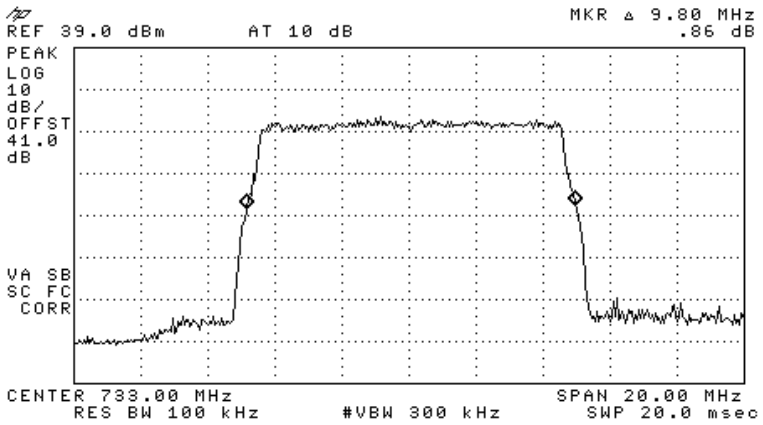

Figure 25.— QPSK (733 MHz) OUT

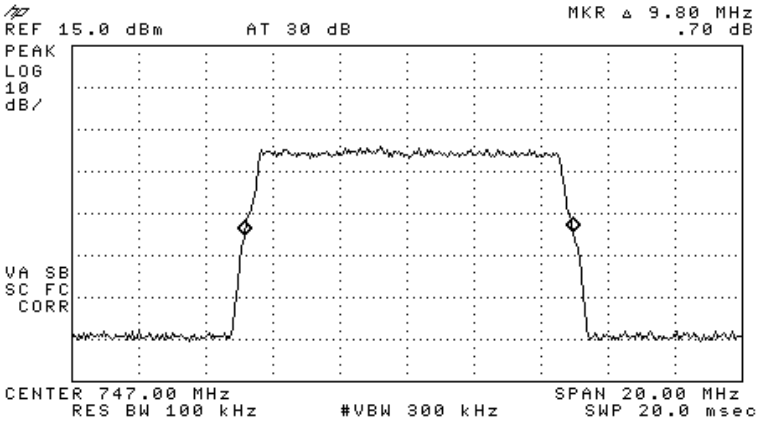

Figure 26.— QPSK (747 MHz) IN

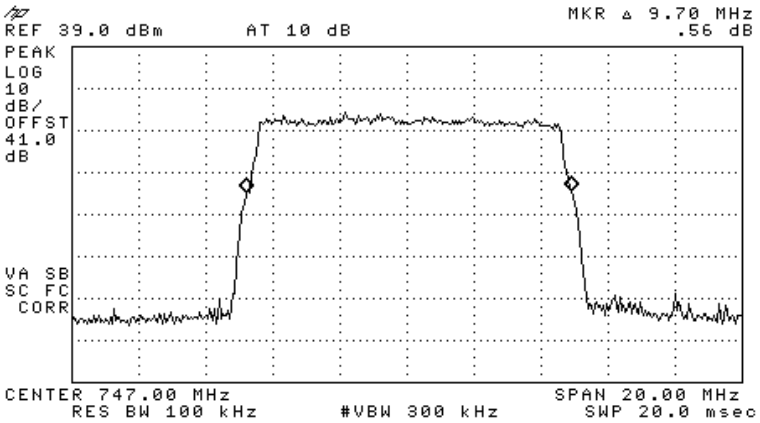

Figure 27.— QPSK (747 MHz) OUT

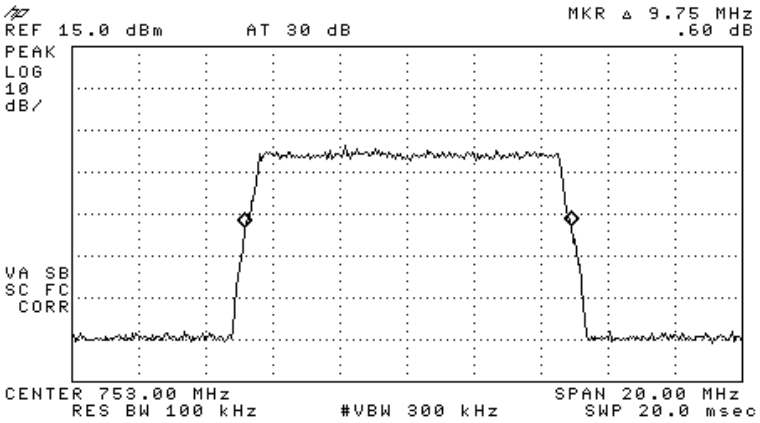

Figure 28.— QPSK (753 MHz) IN

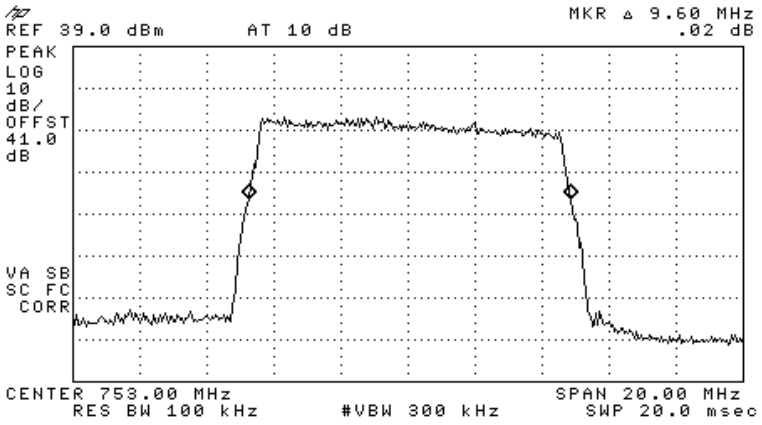

Figure 29.— QPSK (753 MHz) OUT

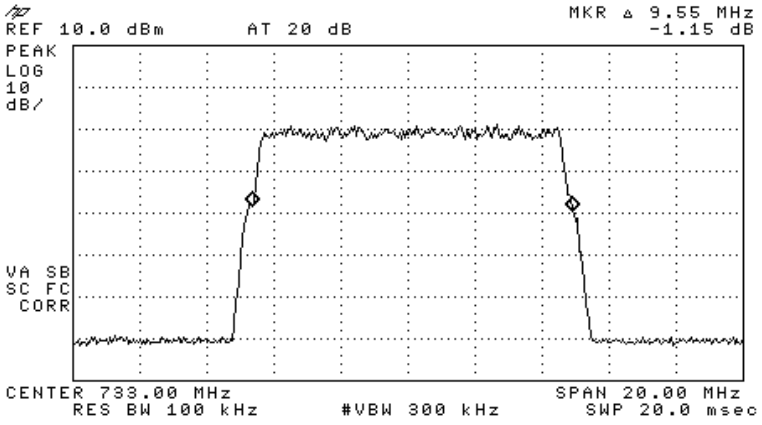

Figure 30.— 16QAM (733 MHz) IN

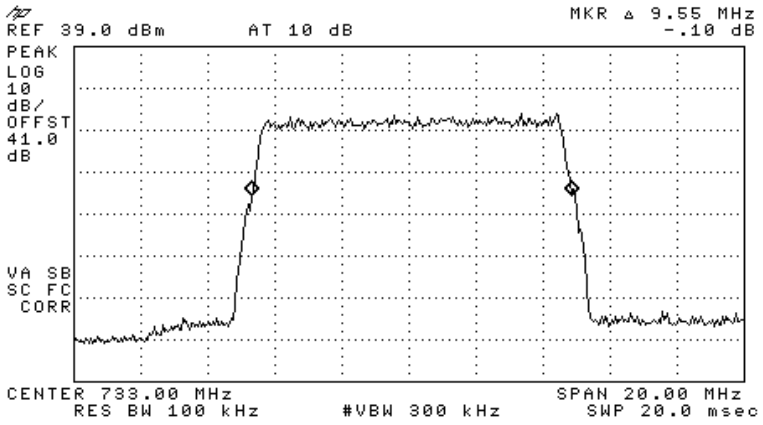

Figure 31.— 16QAM (733 MHz) OUT

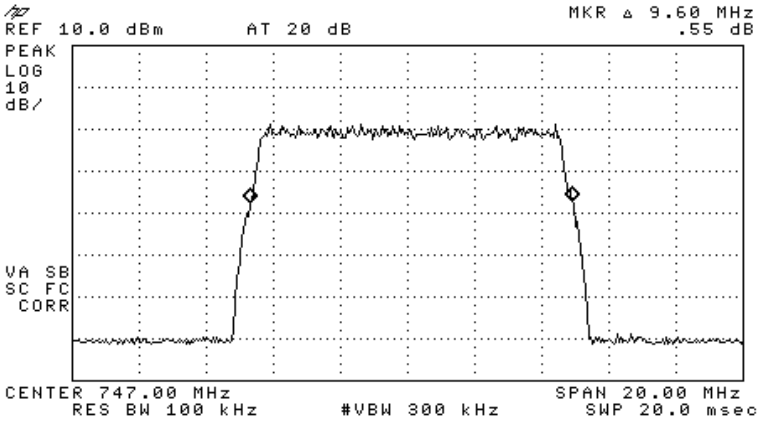

Figure 32.— 16QAM (747 MHz) IN

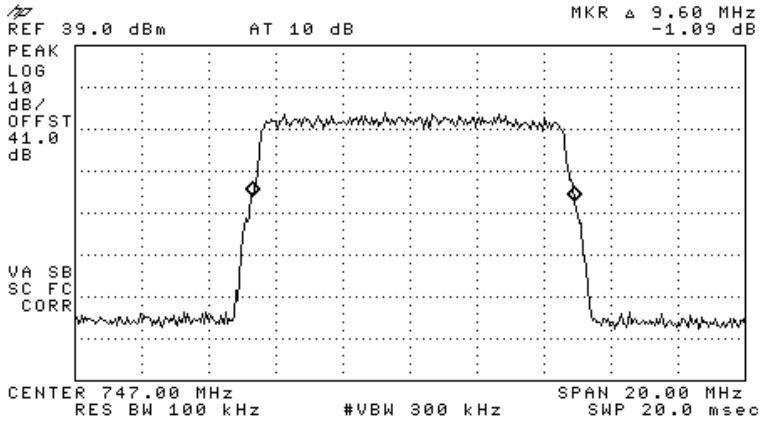

Figure 33.— 16QAM (747 MHz) OUT

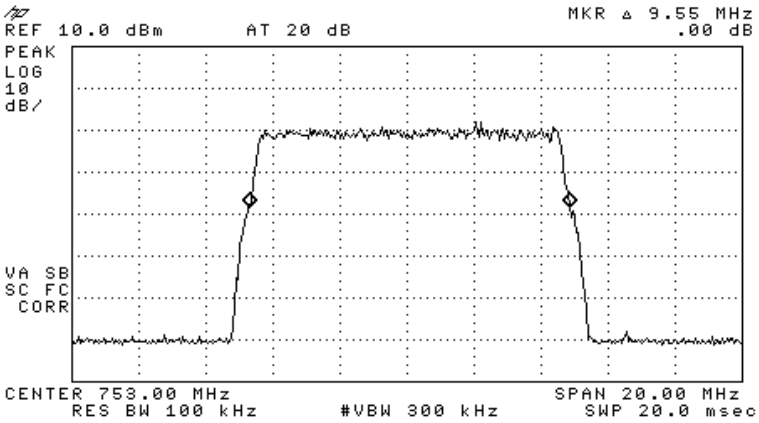

Figure 34.— 16QAM (753 MHz) IN

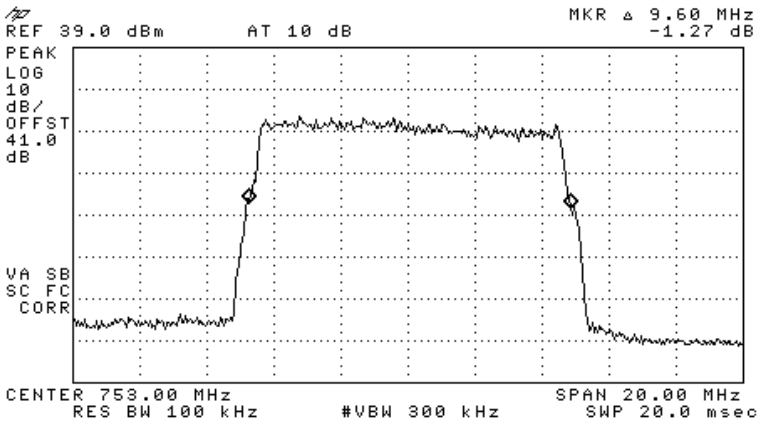

Figure 35.— 16QAM (753 MHz) OUT

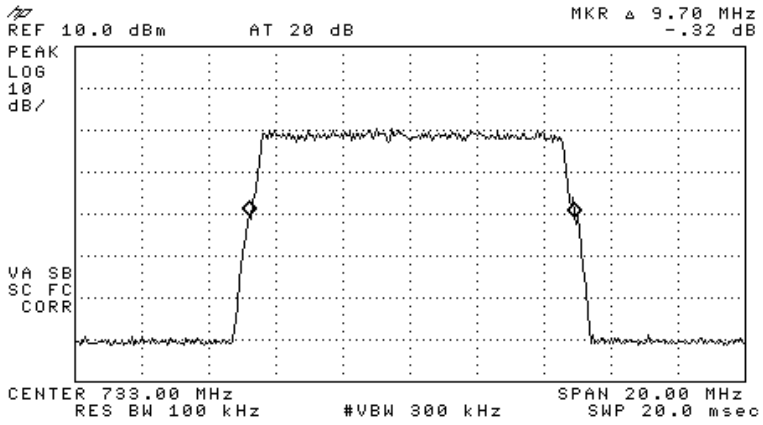

Figure 36.— 64QAM (733 MHz) IN

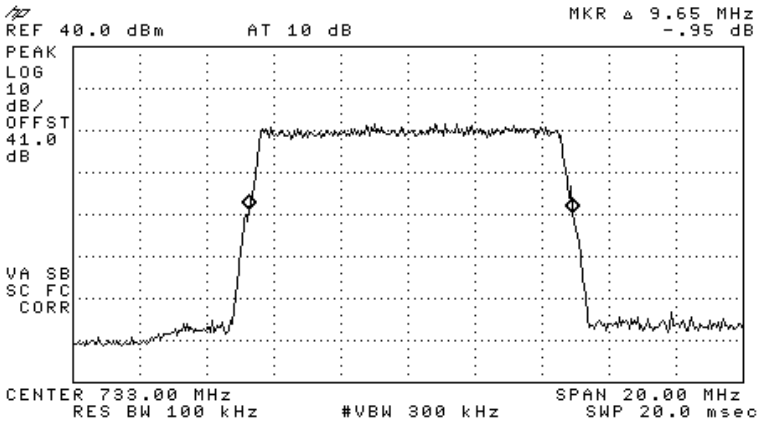

Figure 37.— 64QAM (733 MHz) OUT

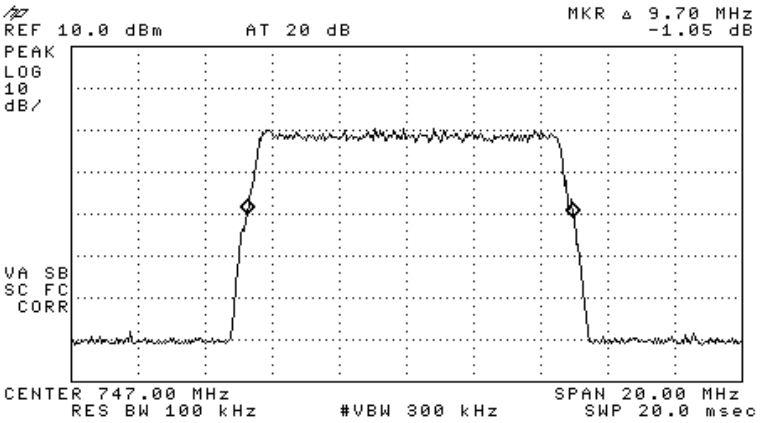

Figure 38.— 64QAM (747 MHz) IN

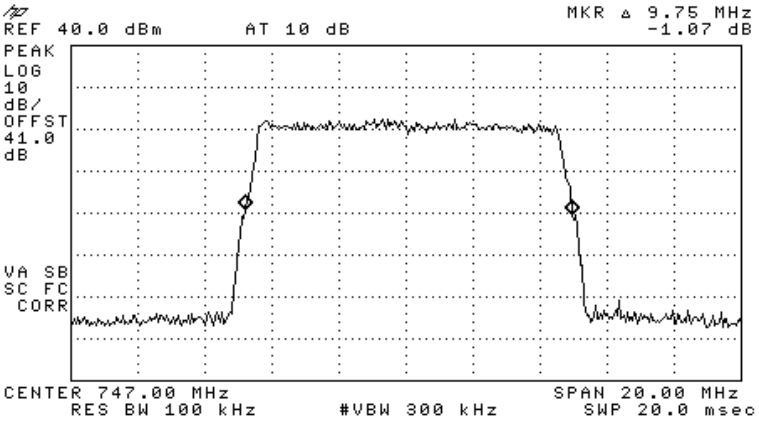

Figure 39.— 64QAM (747 MHz) OUT

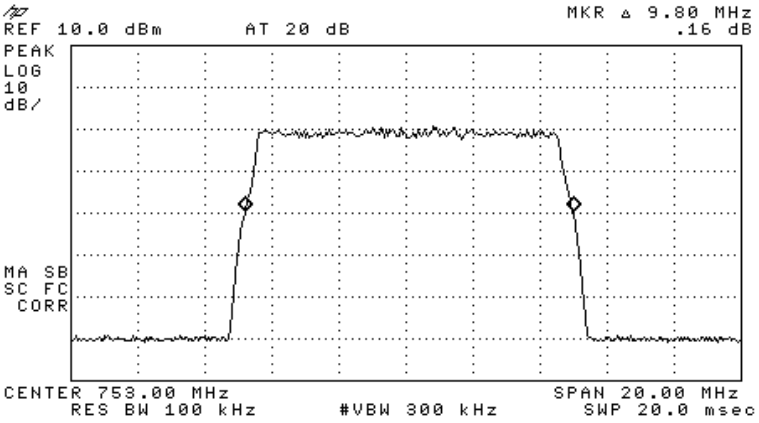

Figure 40.— 64QAM (753 MHz) IN

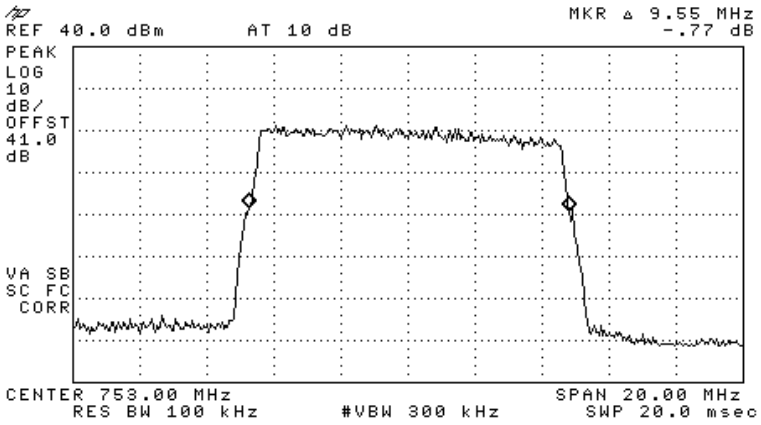

Figure 41.— 64QAM (753 MHz) OUT

5.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-A17L70-AC-A (A17=AWS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (MHz)
WCDMA	Input	733	4.53
	Output	733	4.50
	Input	747	4.55
	Output	747	4.55
	Input	753	4.60
	Output	753	4.60
QPSK	Input	733	9.80
	Output	733	9.80
	Input	747	9.80
	Output	747	9.70
	Input	753	9.75
	Output	753	9.60
16QAM	Input	733	9.55
	Output	733	9.55
	Input	747	9.60
	Output	747	9.60
	Input	753	9.55
	Output	753	9.60
64QAM	Input	733	9.70
	Output	733	9.65
	Input	747	9.70
	Output	747	9.75
	Input	753	9.80
	Output	753	9.55

Figure 42 Occupied Bandwidth LTE

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

5.4 Test Equipment Used.

Occupied Bandwidth LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	February 21, 2011	1 year
Signal Generator	HP	E4438C	MY42082734	July 21, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 43 Test Equipment Used

6. Spurious Emissions at Antenna Terminals LTE

6.1 Test Specification

FCC Part 27, Subpart C, Sections 27.53(c)(1) (3) 27.53 (g)

6.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges 728 MHz-758 MHz must be attenuated below the transmitting power (P) by a factor of 43+ 10 log (P) dB.

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (41dB).
The signal generator was configured for 0dBm output power and 10MHz LTE signal, modulated with W-CDMA, QPSK, 16QAM, 64QAM and 64QAM.

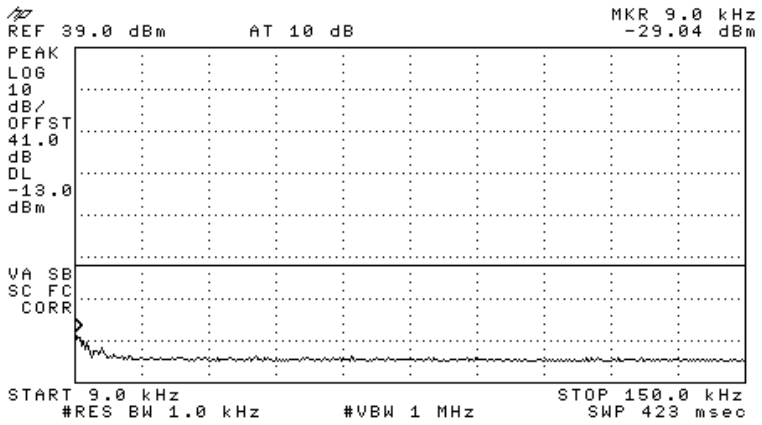

Figure 44.— 733 MHz W-CDMA

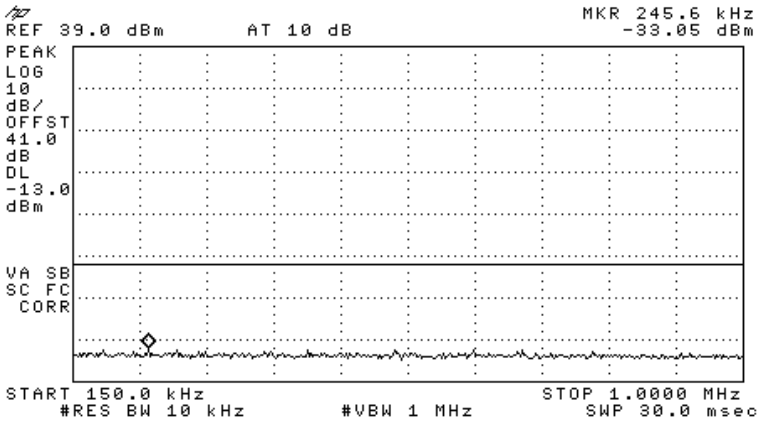

Figure 45.— 733 MHz W-CDMA

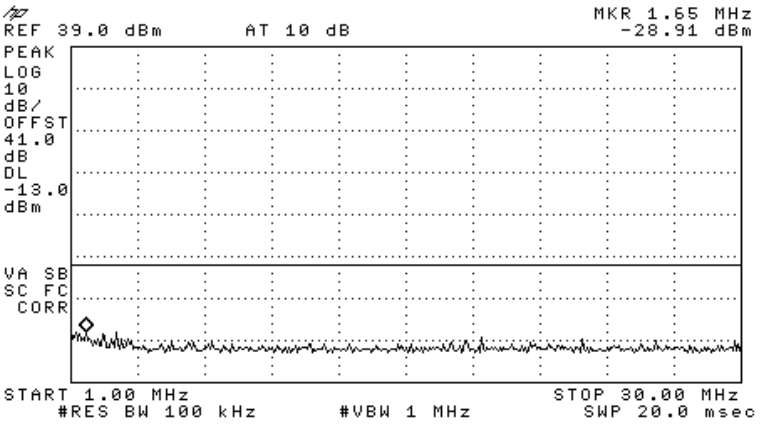

Figure 46.— 733 MHz W-CDMA

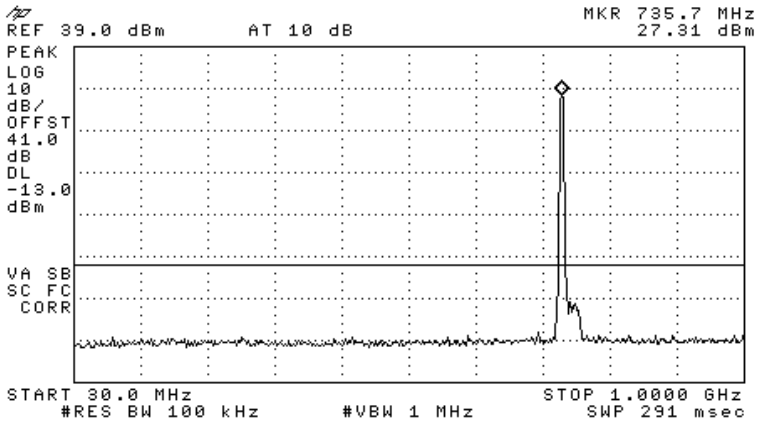

Figure 47.— 733 MHz W-CDMA

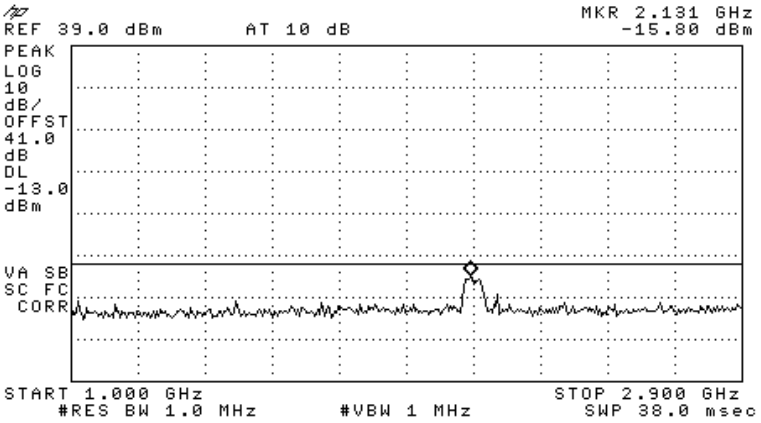

Figure 48.— 733 MHz W-CDMA

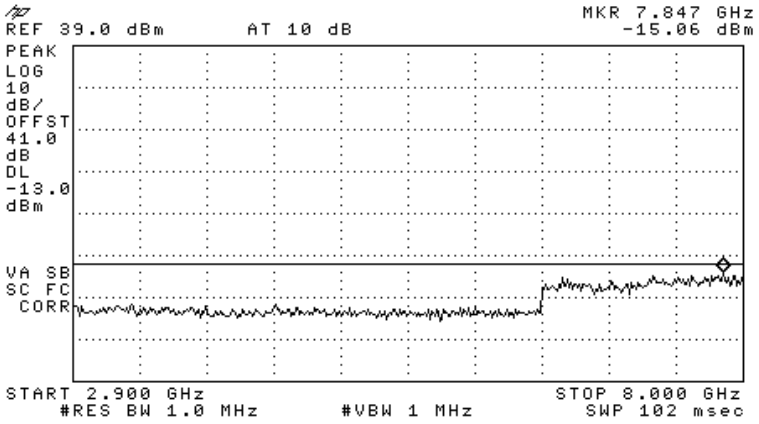

Figure 49.— 733 MHz W-CDMA

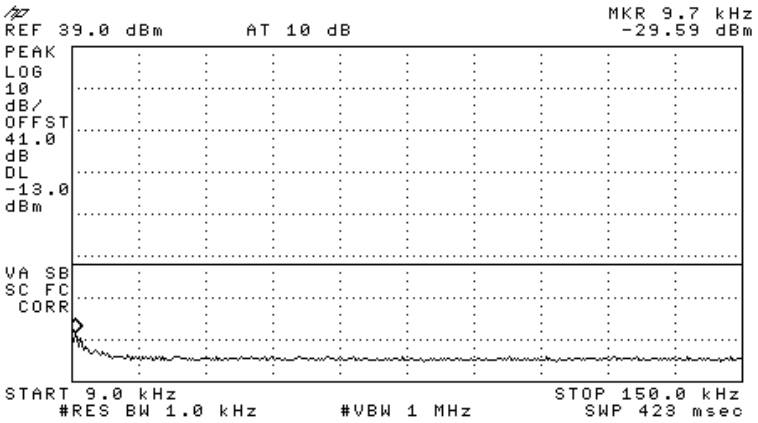

Figure 50.— 747 MHz W-CDMA

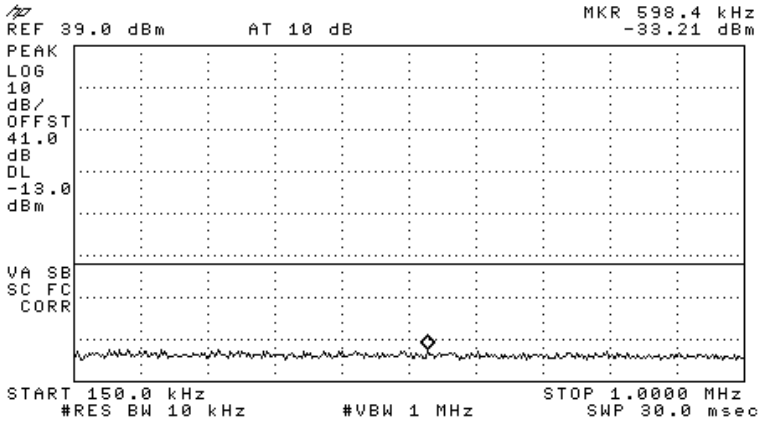

Figure 51.— 747 MHz W-CDMA

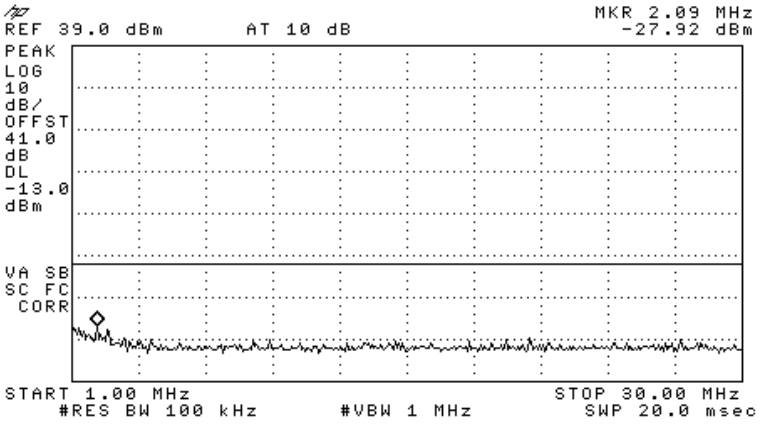

Figure 52.— 747 MHz W-CDMA

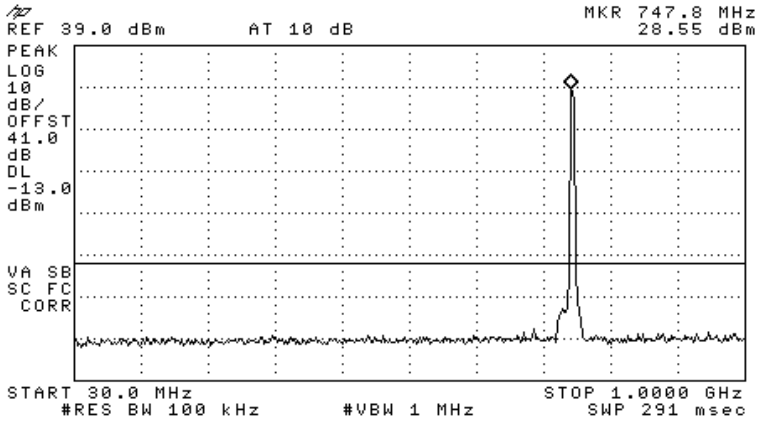

Figure 53.— 747 MHz W-CDMA

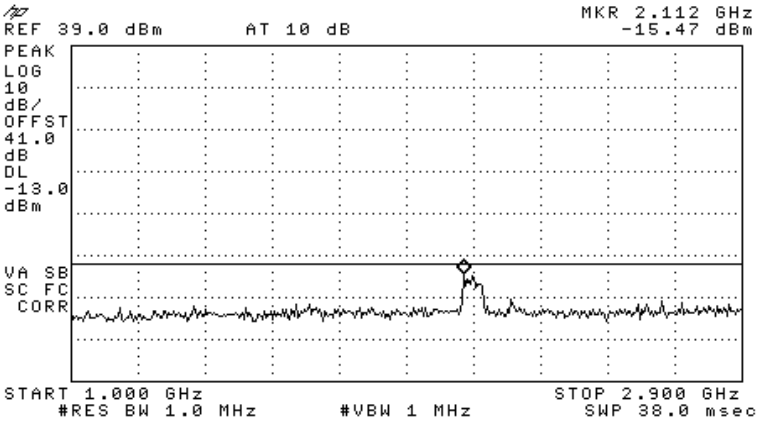

Figure 54.— 747 MHz W-CDMA

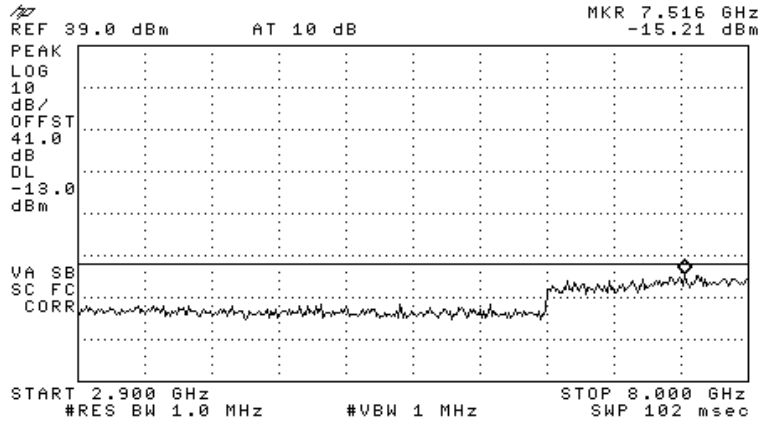

Figure 55.— 747 MHz W-CDMA

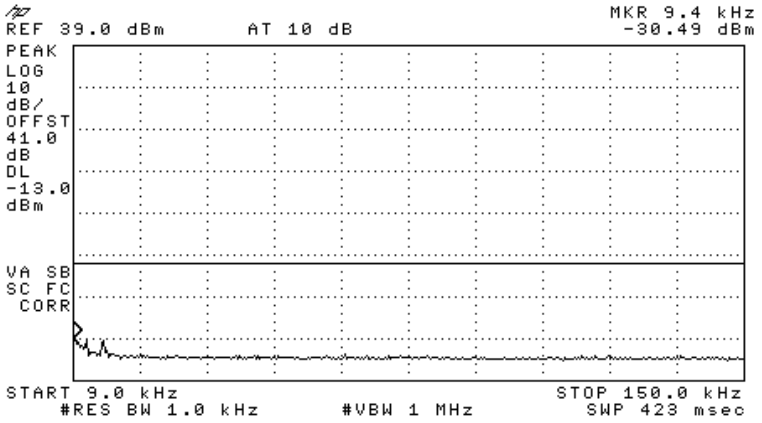

Figure 56.— 753 MHz W-CDMA

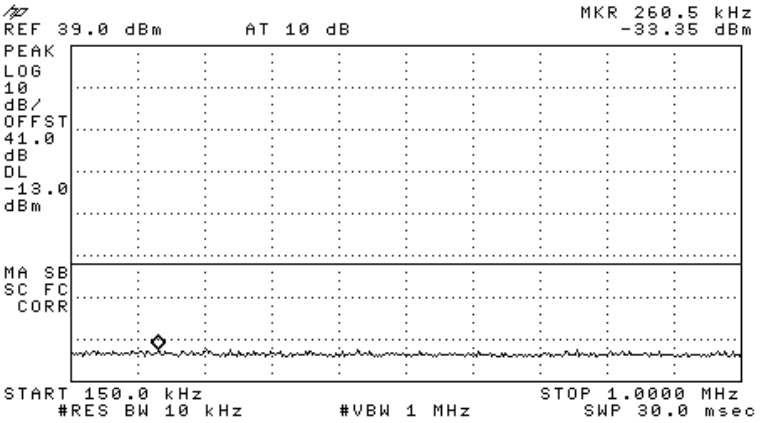

Figure 57.— 753 MHz W-CDMA

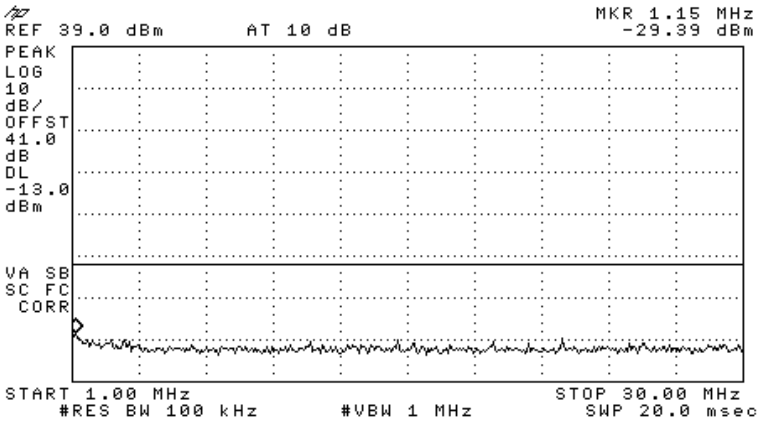

Figure 58.— 753 MHz W-CDMA

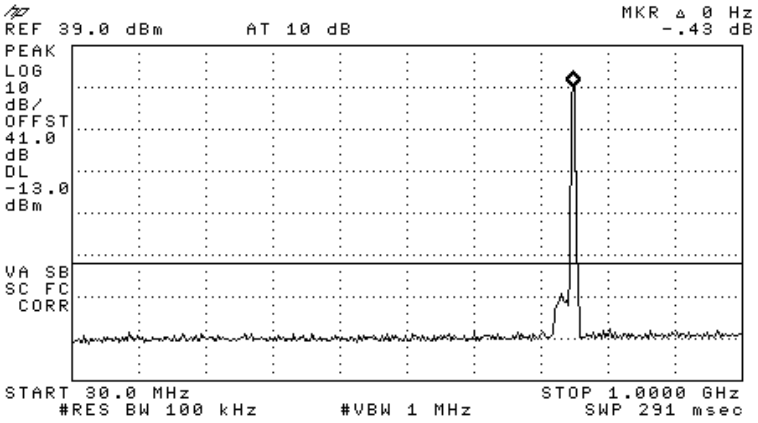

Figure 59.— 753 MHz W-CDMA

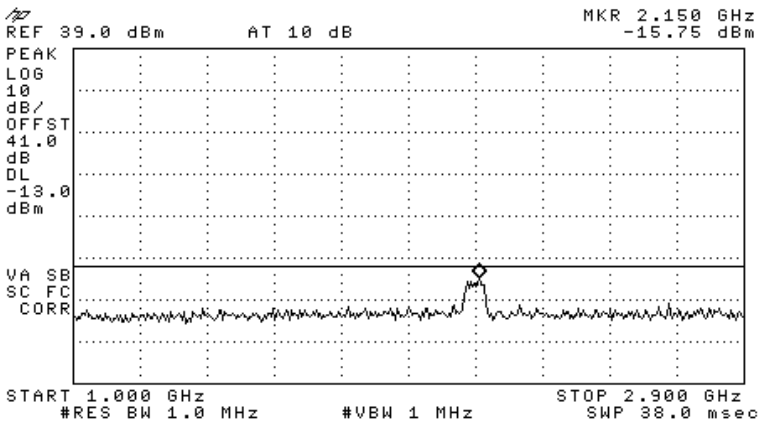

Figure 60.— 753 MHz W-CDMA

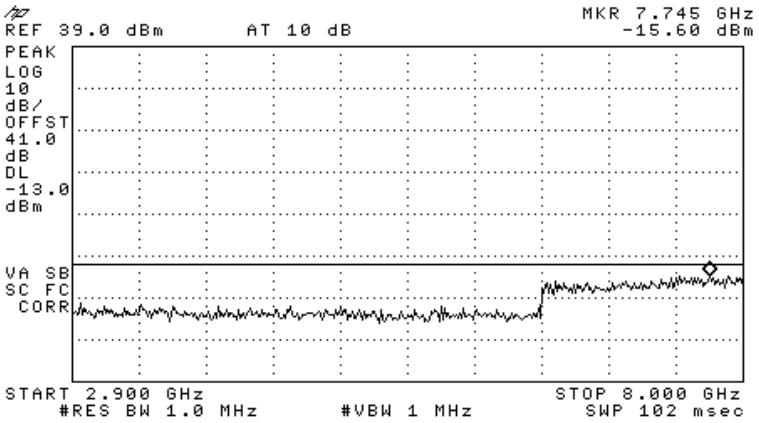

Figure 61.— 753 MHz W-CDMA

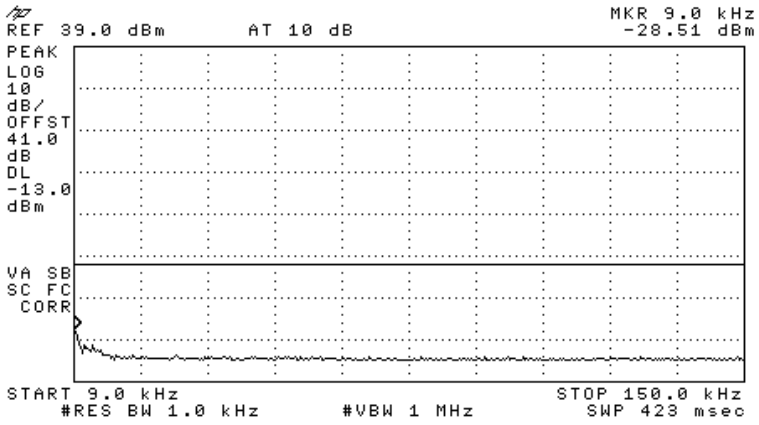

Figure 62.— 733 MHz QPSK

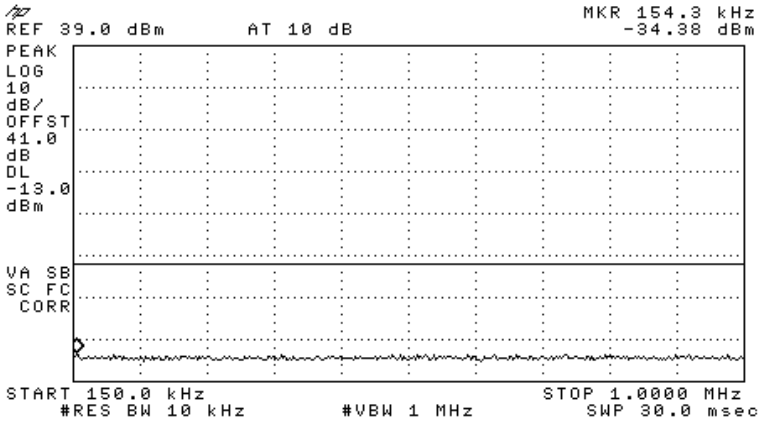

Figure 63.— 733 MHz QPSK

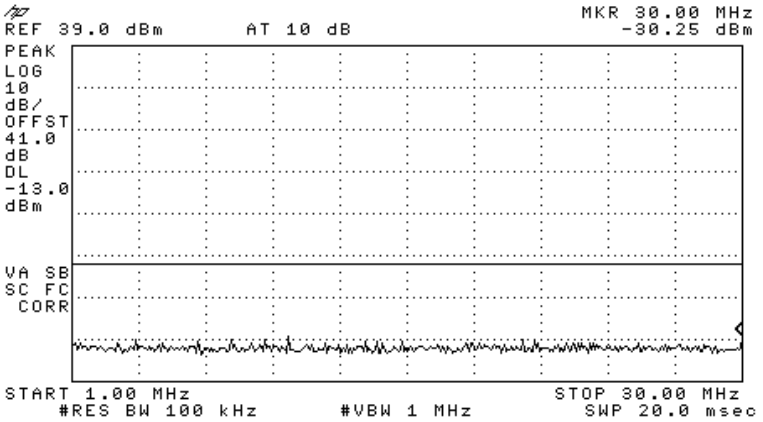

Figure 64.— 733 MHz QPSK

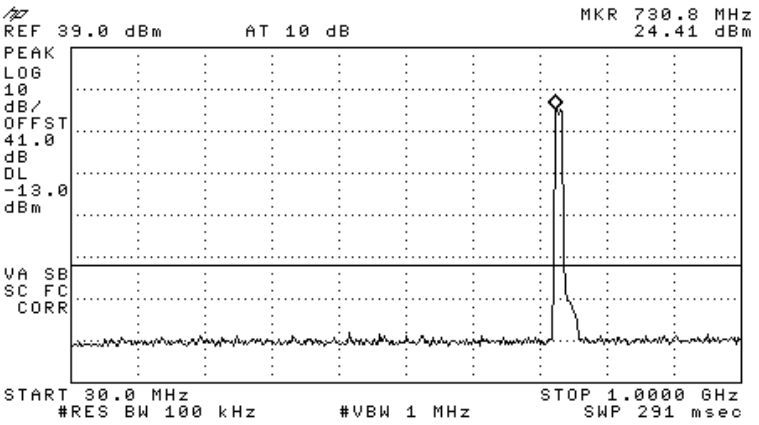

Figure 65.— 733 MHz QPSK

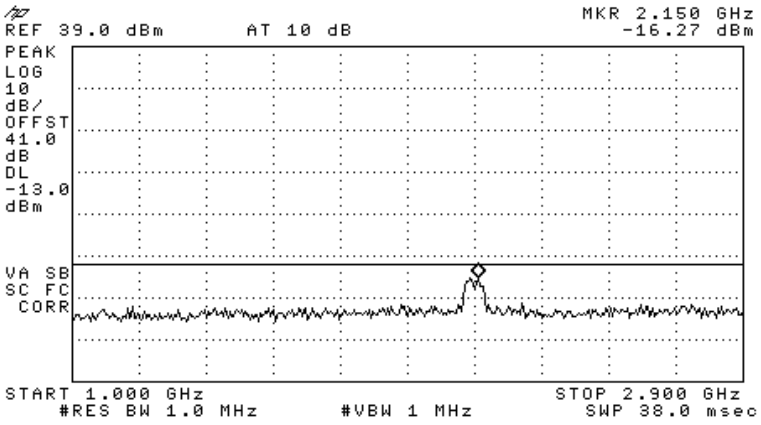

Figure 66.— 733 MHz QPSK

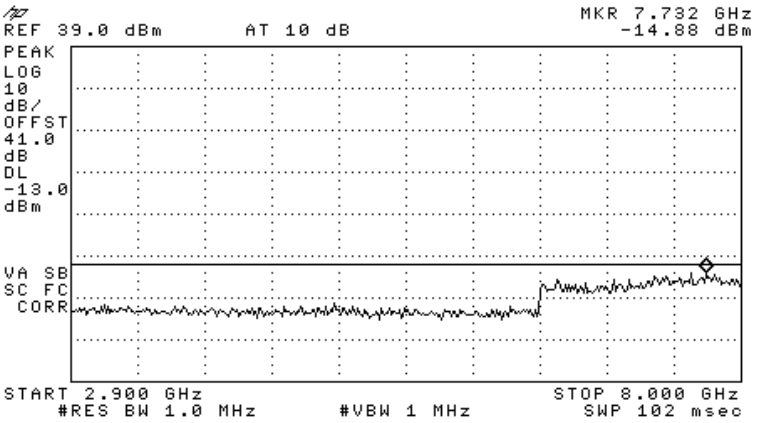

Figure 67.— 733 MHz QPSK

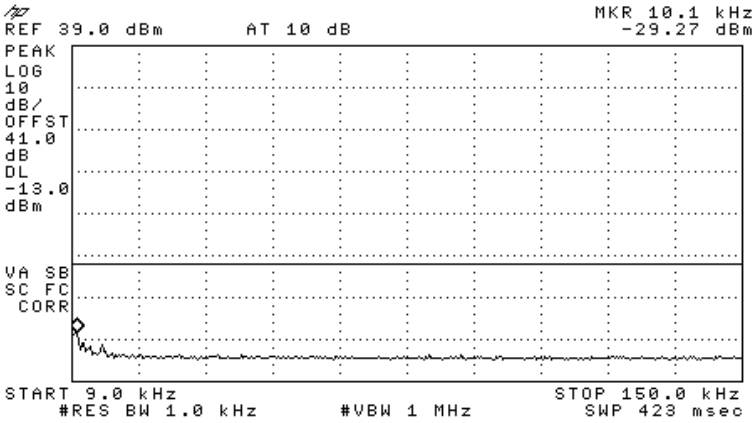

Figure 68.— 747 MHz QPSK

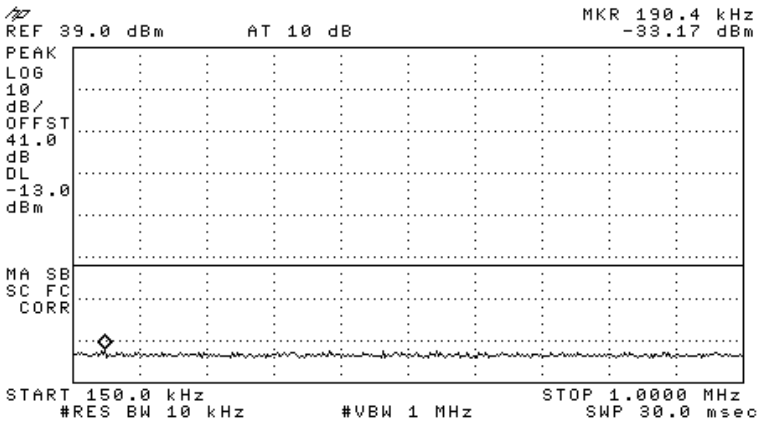

Figure 69.— 747 MHz QPSK

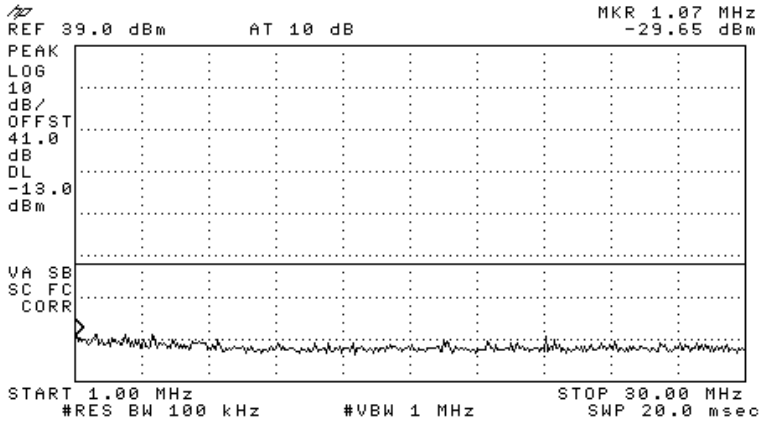

Figure 70.— 747 MHz QPSK

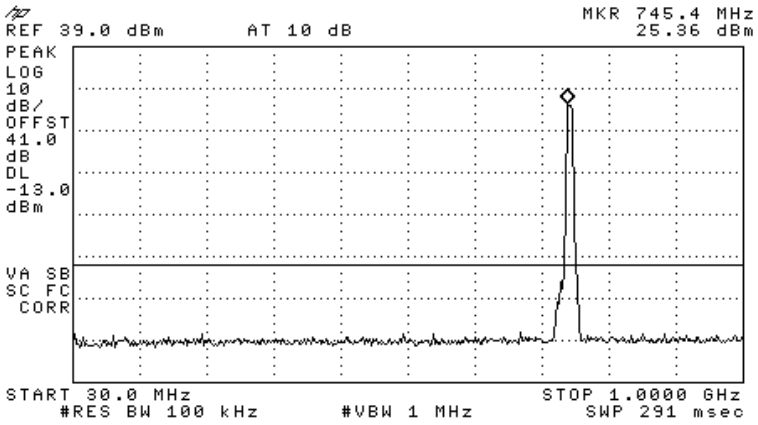

Figure 71.— 747 MHz QPSK

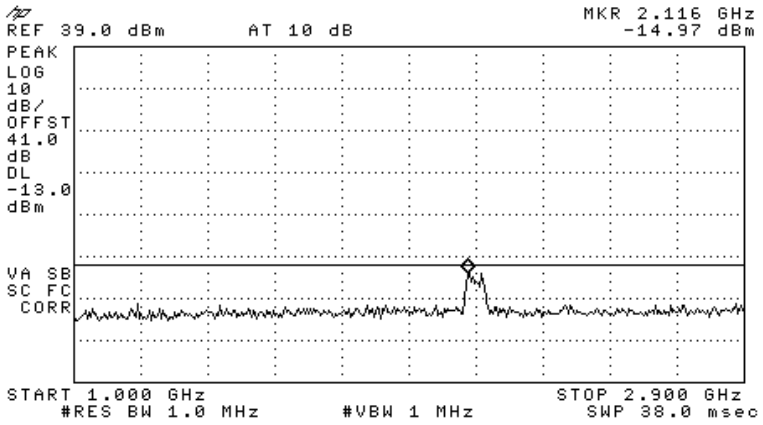

Figure 72.— 747 MHz QPSK

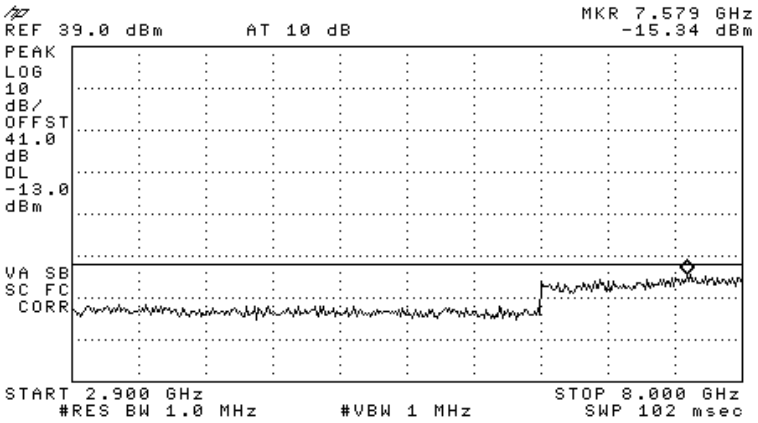

Figure 73.— 747 MHz QPSK

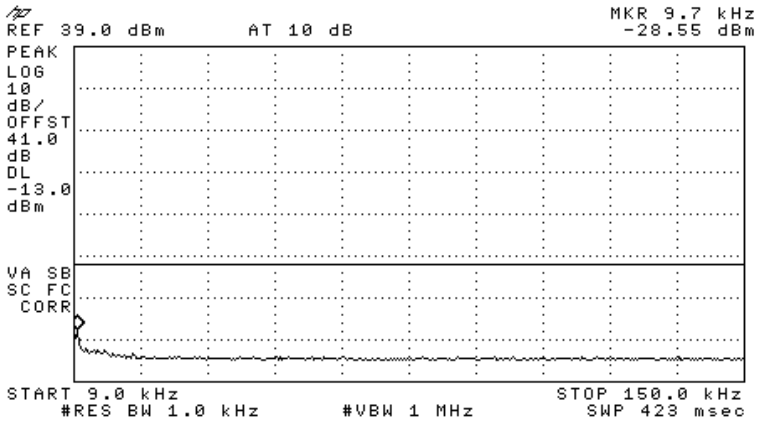

Figure 74.— 753 MHz QPSK

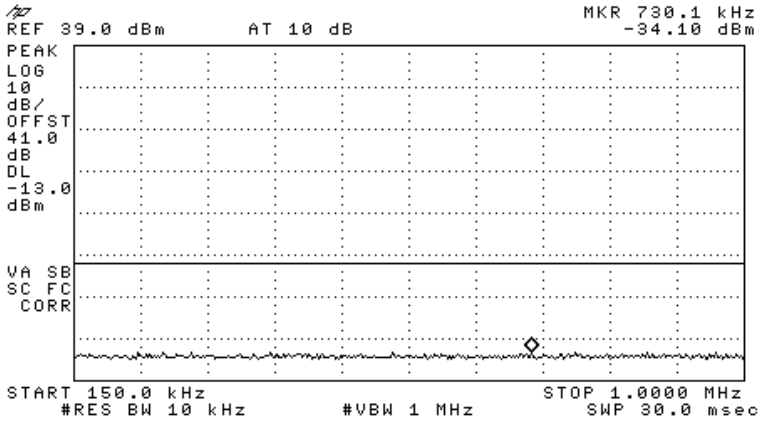

Figure 75.— 753 MHz QPSK

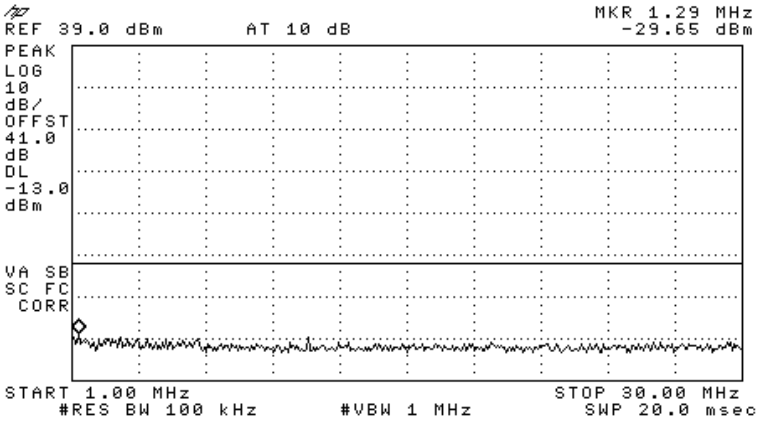

Figure 76.— 753 MHz QPSK

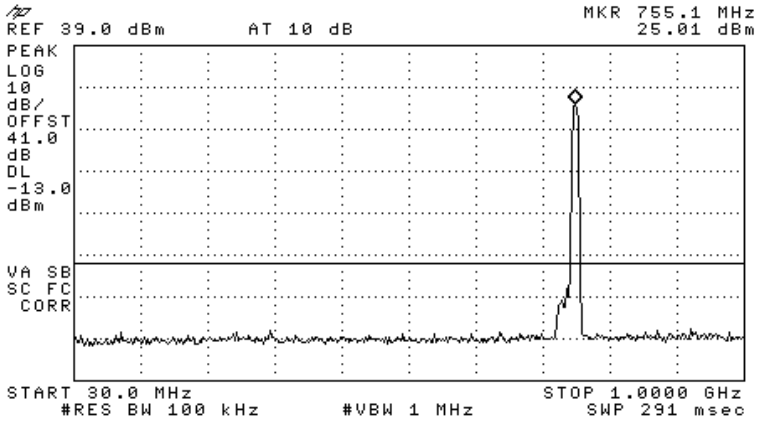

Figure 77.— 753 MHz QPSK

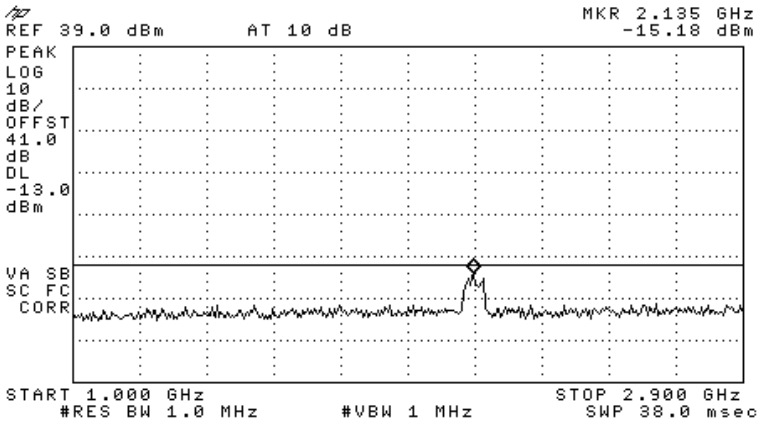

Figure 78.— 753 MHz QPSK

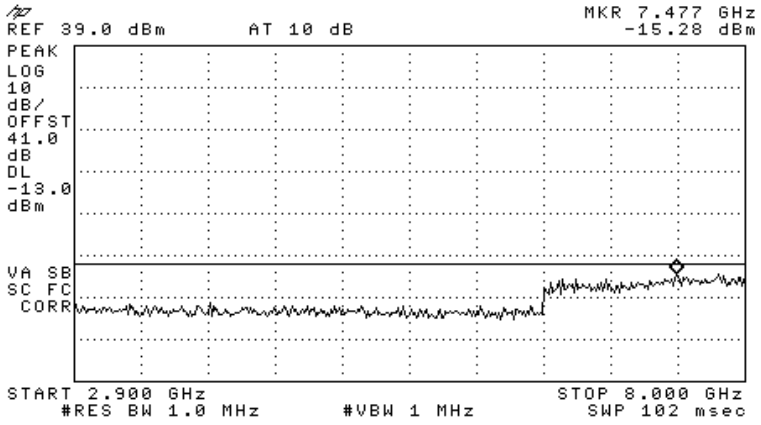

Figure 79.— 753 MHz QPSK

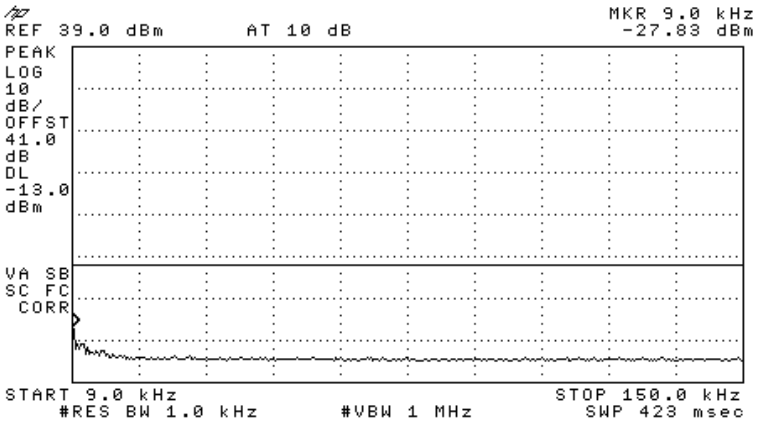

Figure 80.— 733 MHz 16QAM

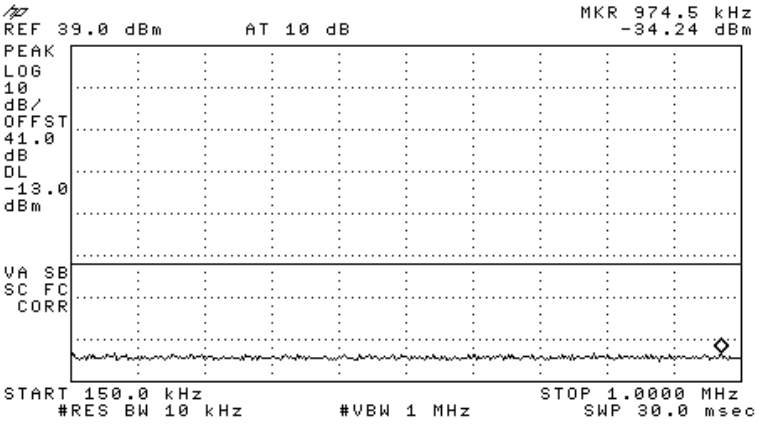

Figure 81.— 733 MHz 16QAM

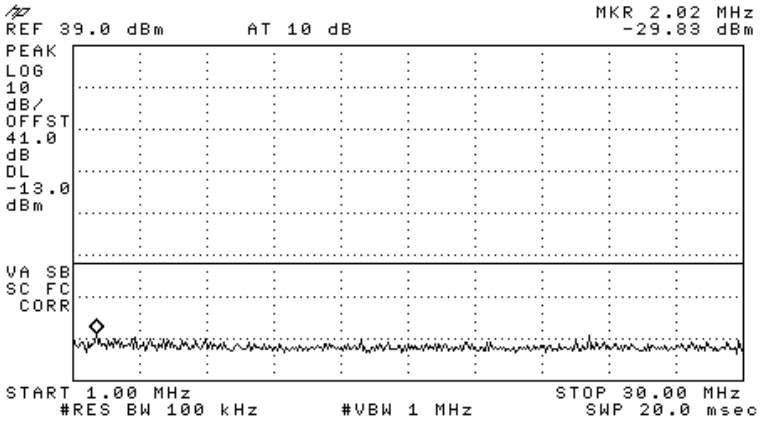

Figure 82.— 733 MHz 16QAM

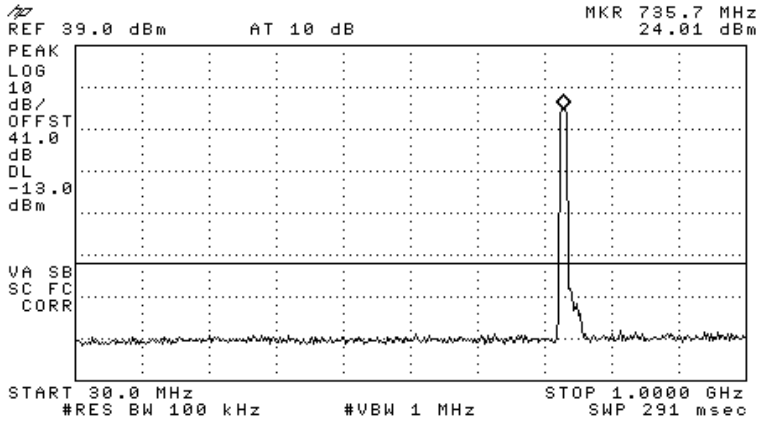

Figure 83.— 733 MHz 16QAM

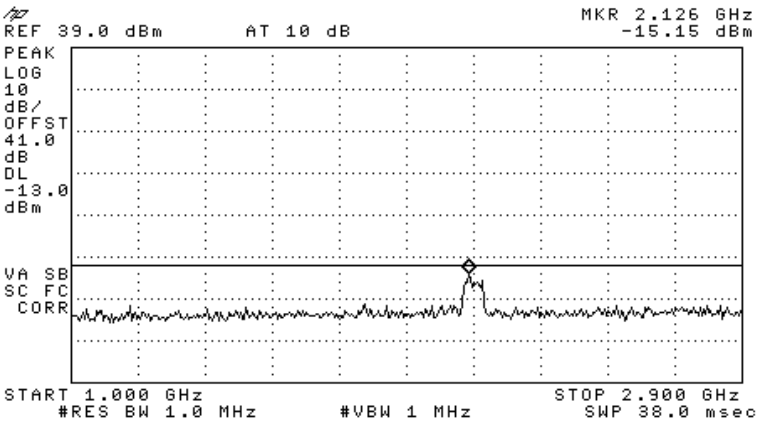

Figure 84.— 733 MHz 16QAM

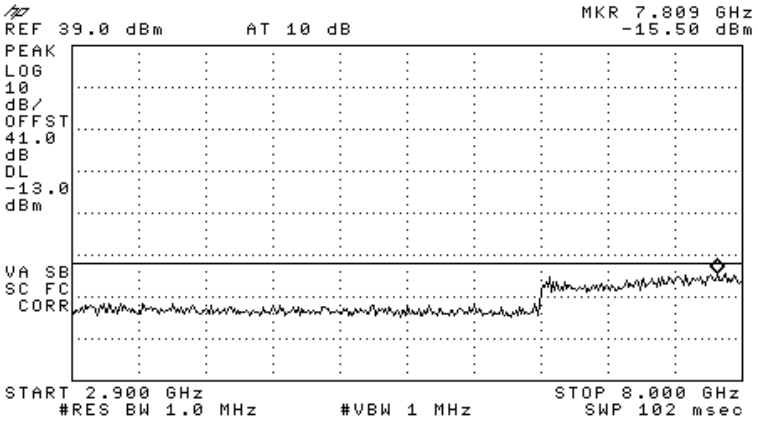

Figure 85.— 733 MHz 16QAM

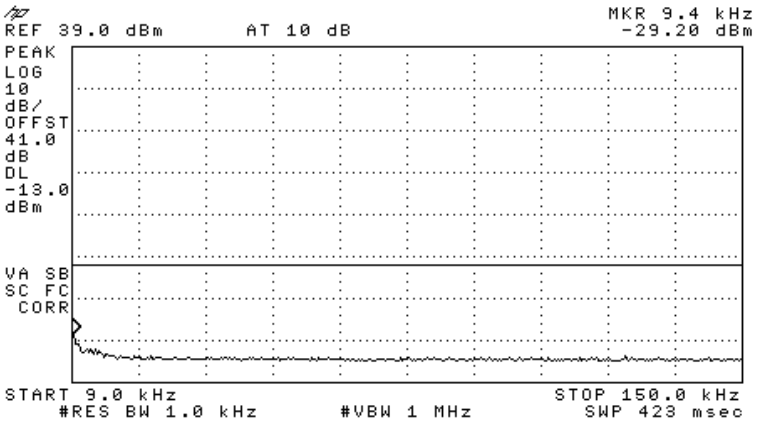

Figure 86.— 747 MHz 16QAM

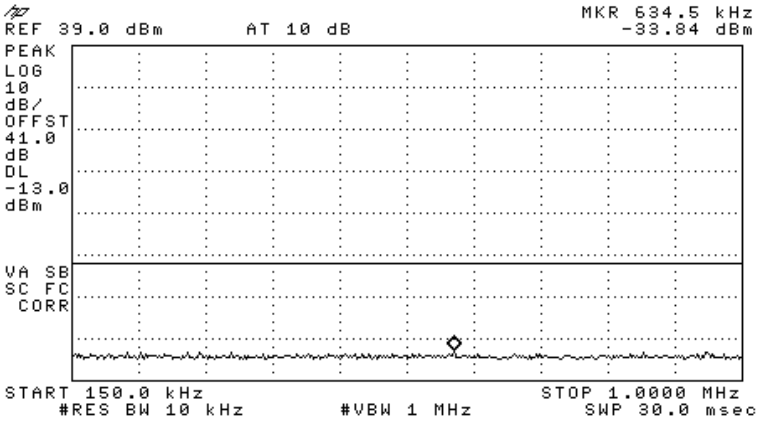

Figure 87.— 747 MHz 16QAM

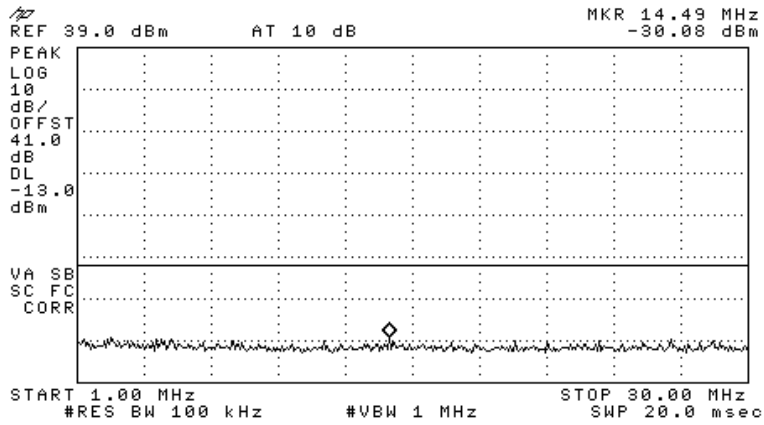

Figure 88.— 747 MHz 16QAM

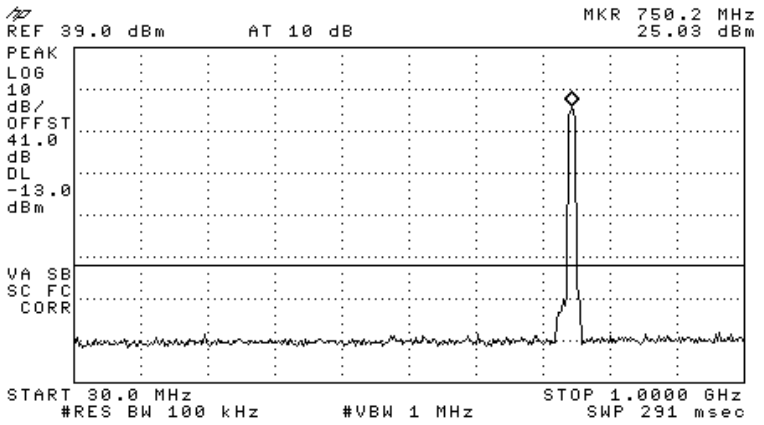

Figure 89.— 747 MHz 16QAM

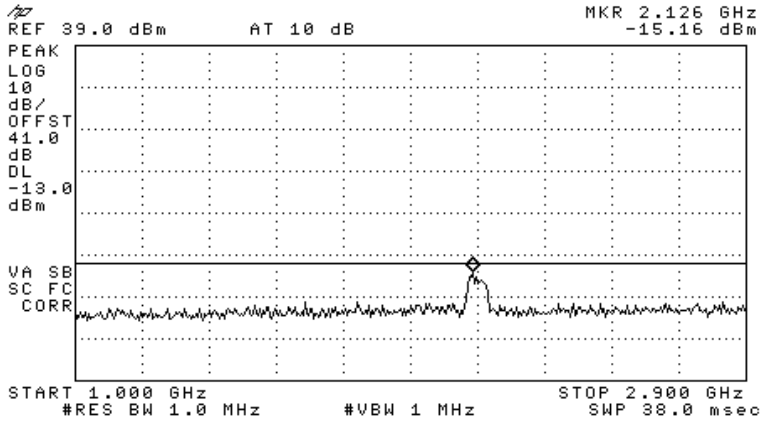

Figure 90.— 747 MHz 16QAM

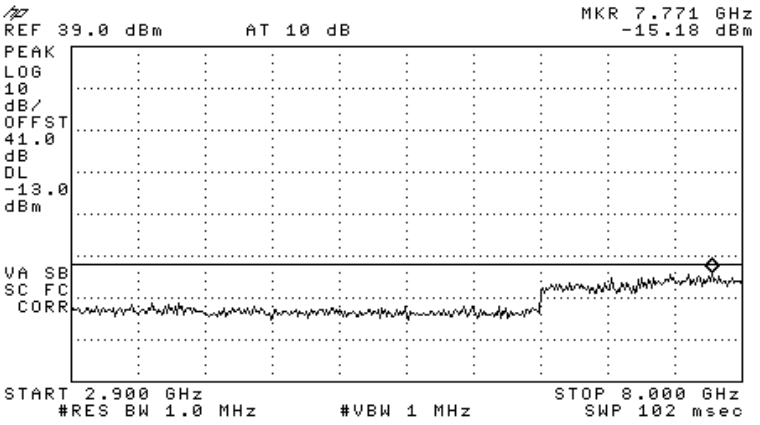

Figure 91.— 747 MHz 16QAM

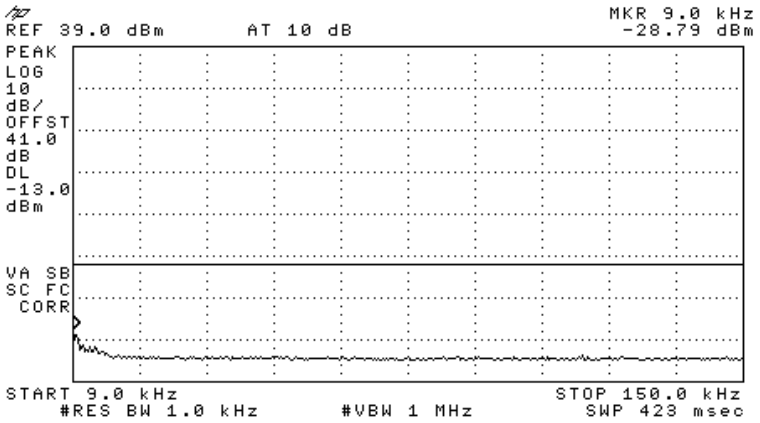

Figure 92.— 753 MHz 16QAM

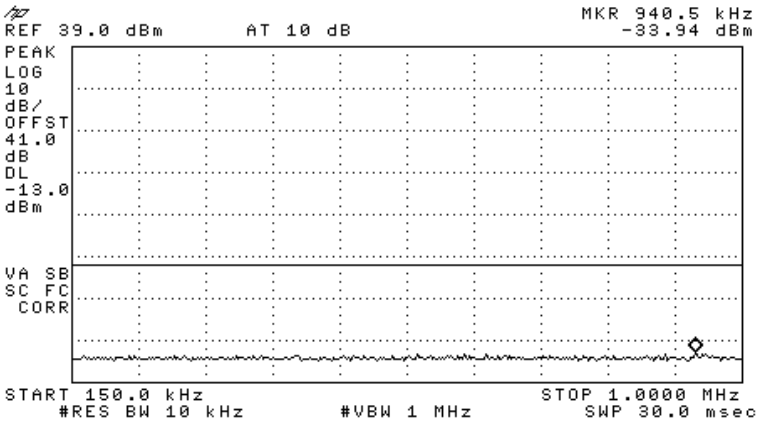

Figure 93.— 753 MHz 16QAM

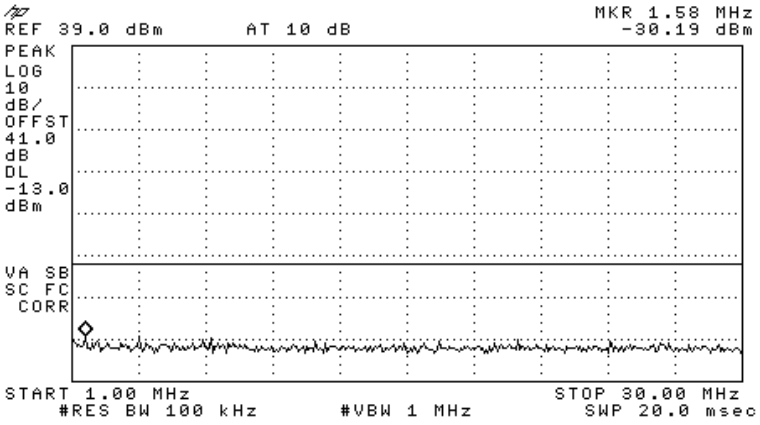

Figure 94.— 753 MHz 16QAM

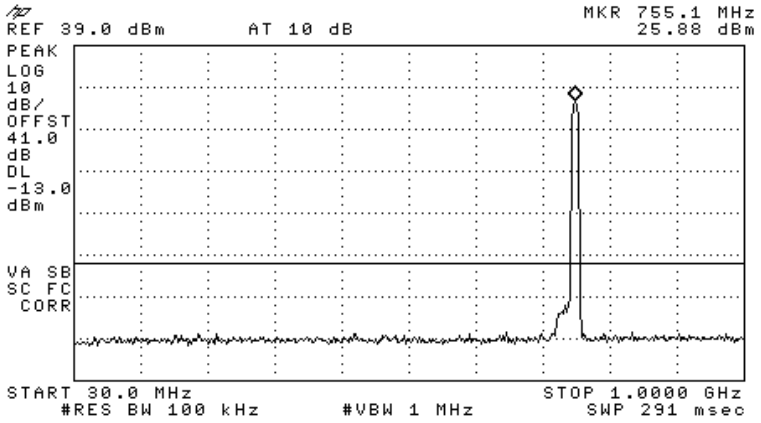

Figure 95.— 753 MHz 16QAM

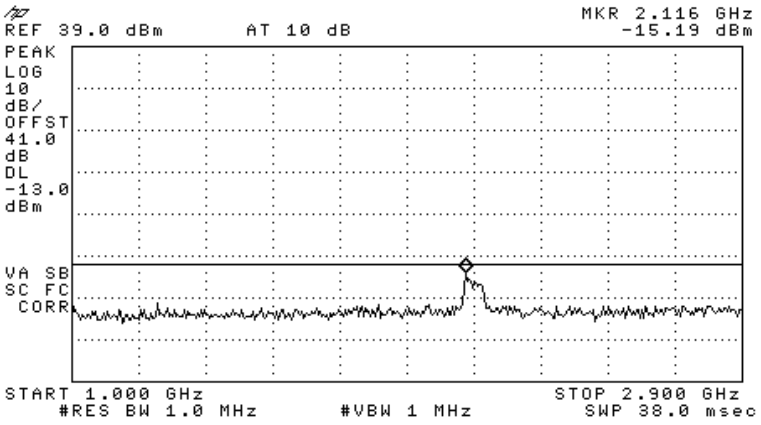

Figure 96.— 753 MHz 16QAM

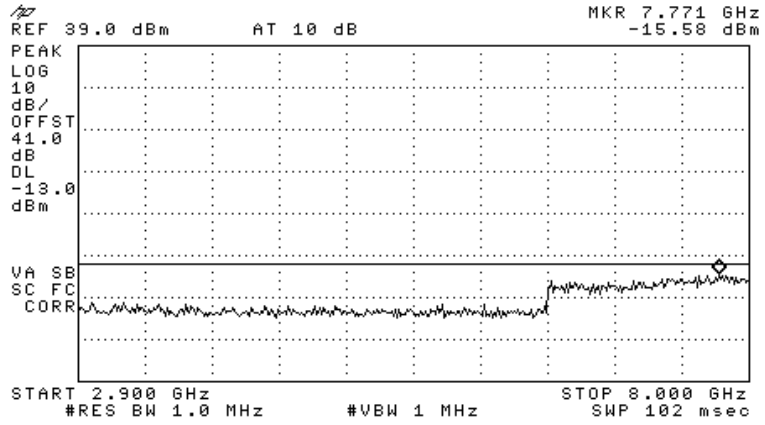

Figure 97.— 753 MHz 16QAM

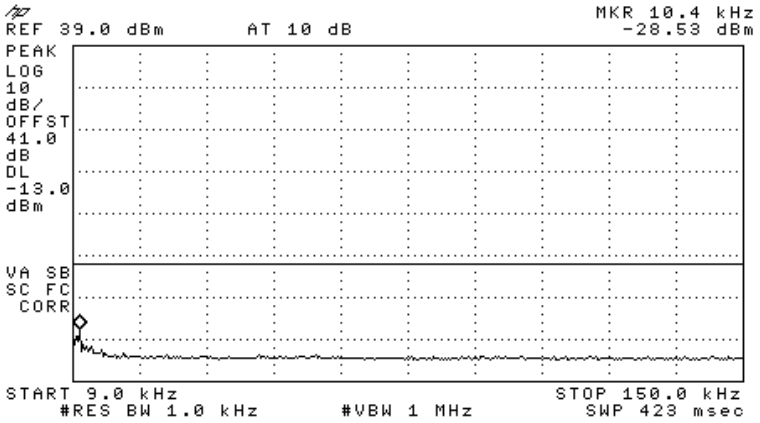

Figure 98.— 733 MHz 64QAM

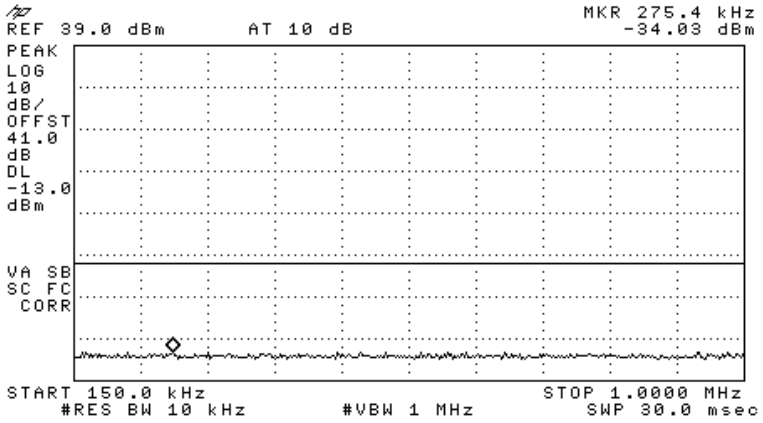

Figure 99.— 733 MHz 64QAM

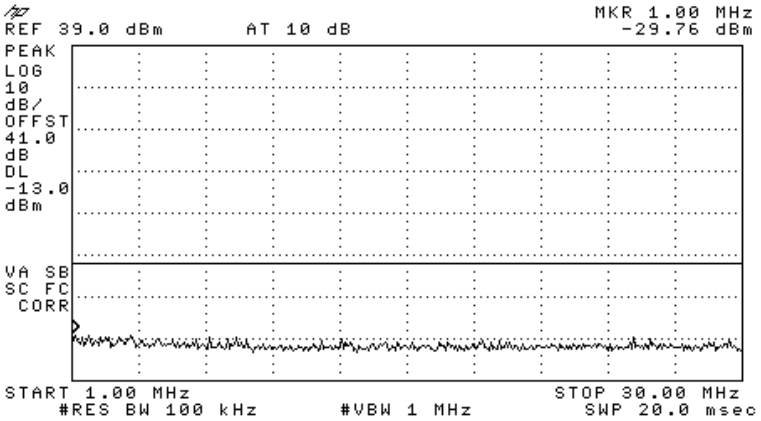

Figure 100.— 733 MHz 64QAM

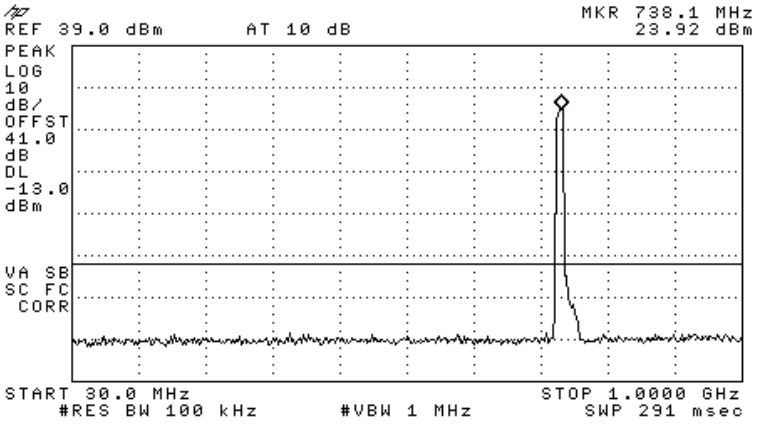

Figure 101.— 733 MHz 64QAM

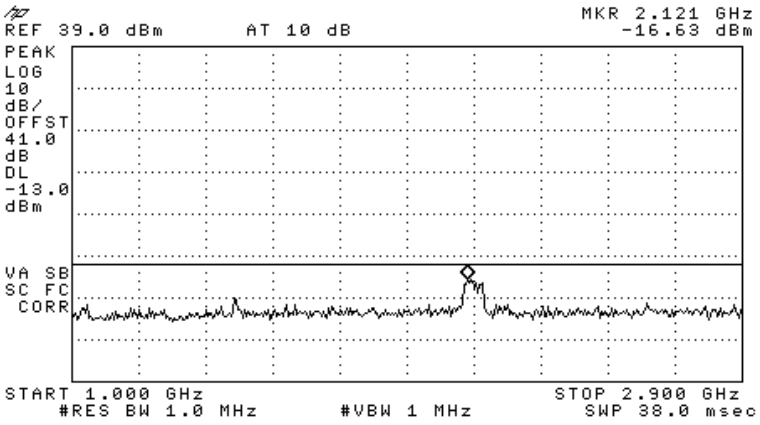

Figure 102.— 733 MHz 64QAM

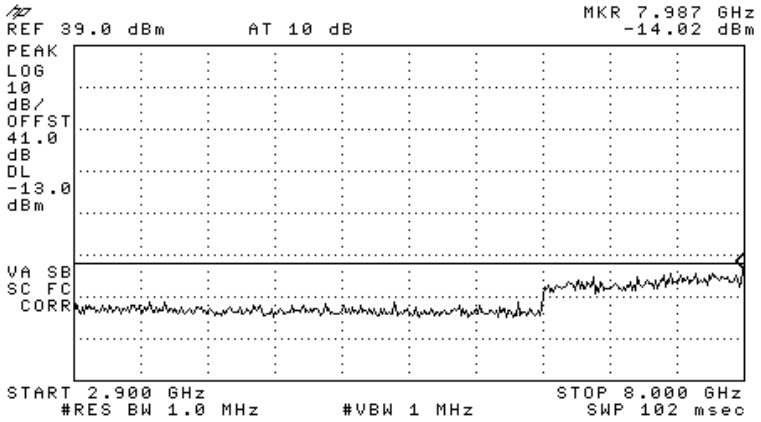

Figure 103.— 733 MHz 64QAM

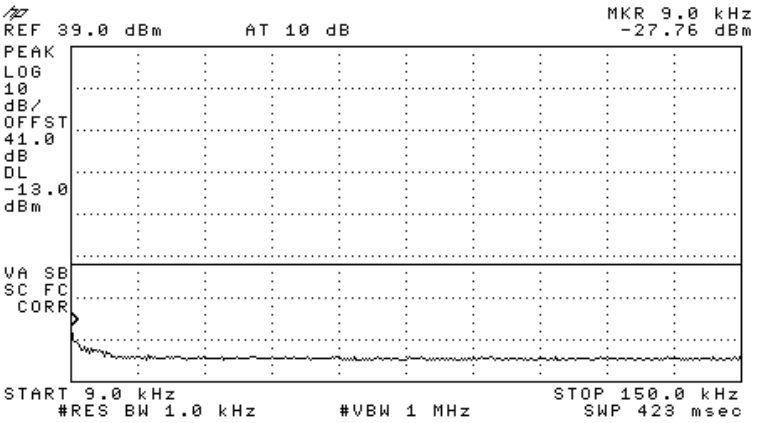

Figure 104.— 747 MHz 64QAM

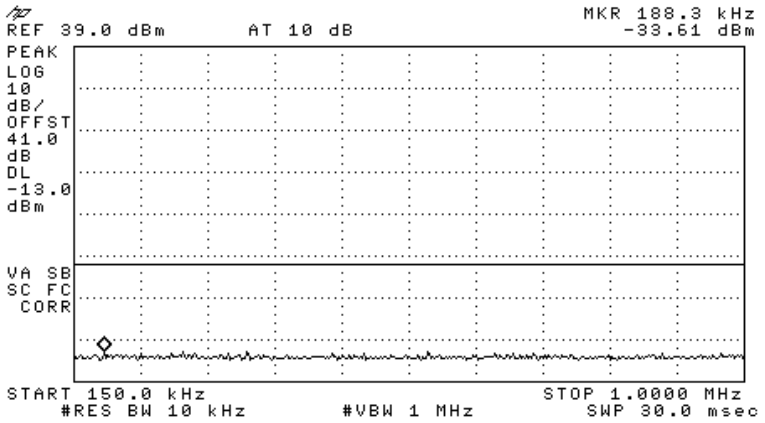

Figure 105.— 747 MHz 64QAM

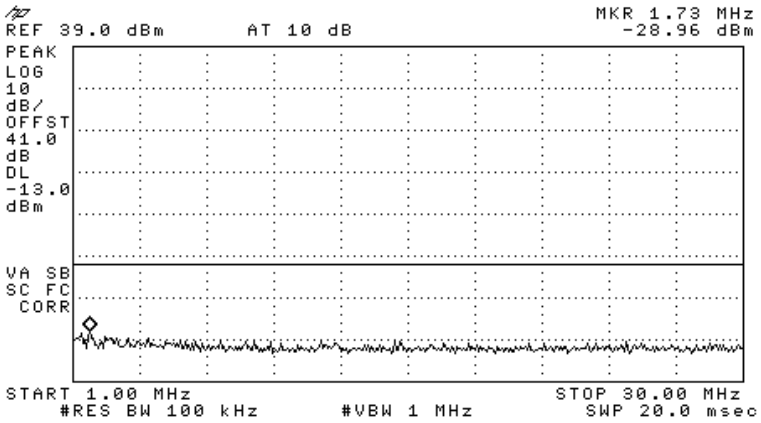

Figure 106.— 747 MHz 64QAM

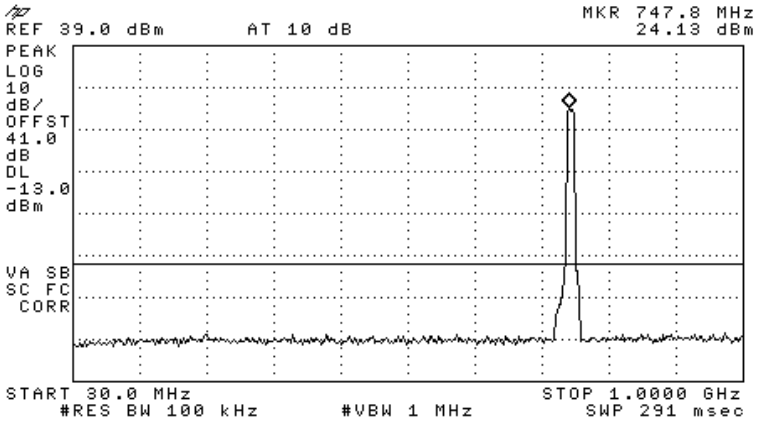

Figure 107.— 747 MHz 64QAM

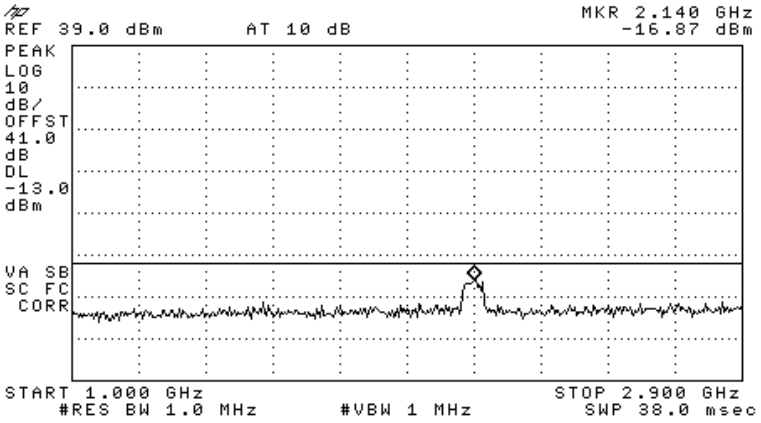

Figure 108.— 747 MHz 64QAM

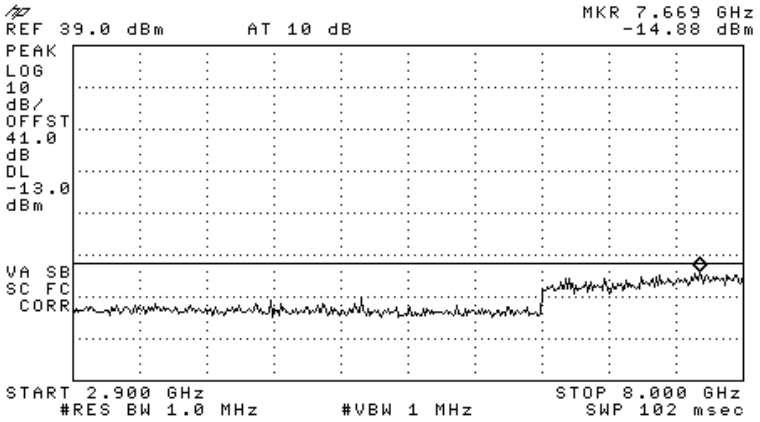

Figure 109.— 747 MHz 64QAM

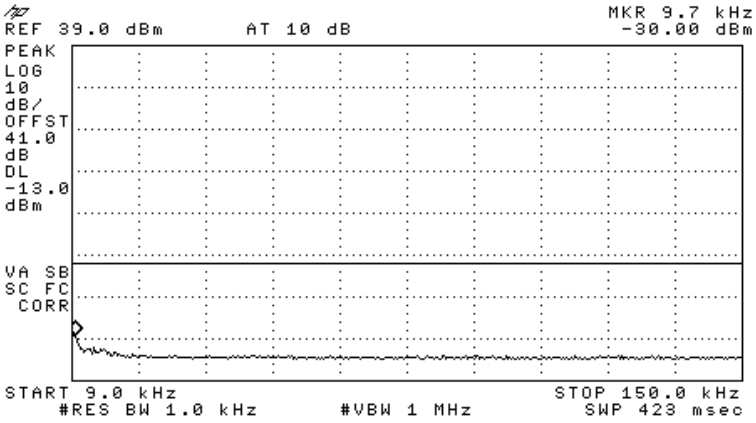

Figure 110.— 753 MHz 64QAM

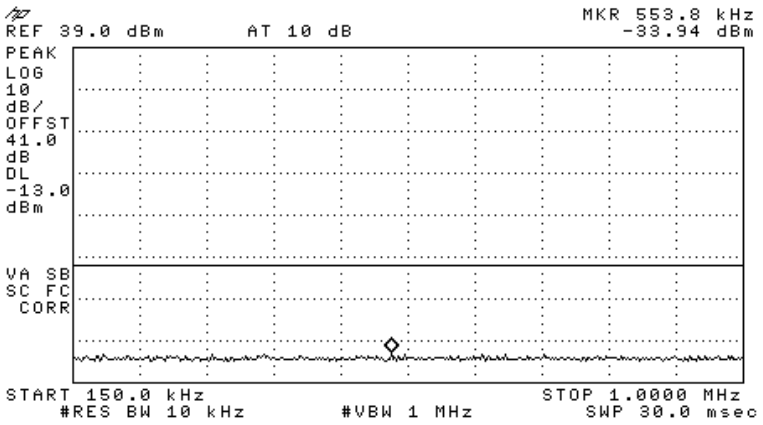

Figure 111.— 753 MHz 64QAM

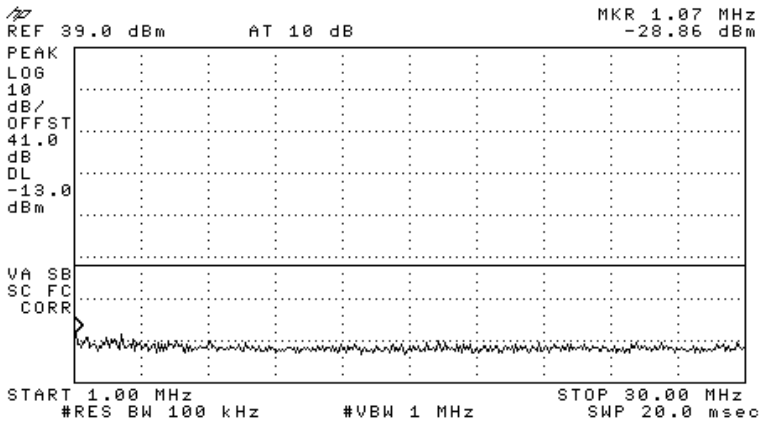

Figure 112.— 753 MHz 64QAM

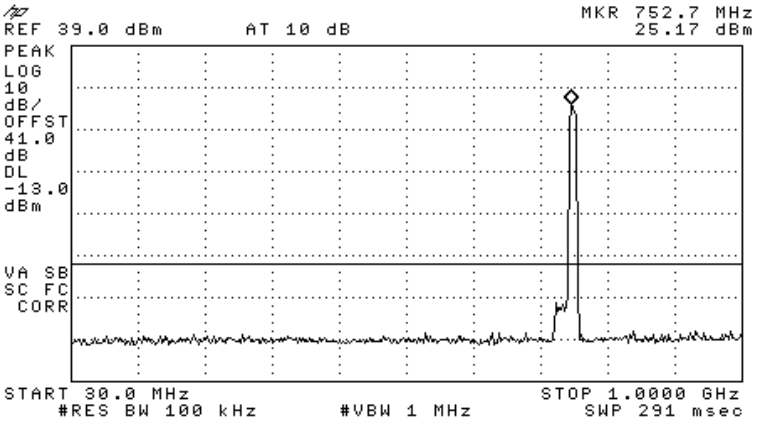

Figure 113.— 753 MHz 64QAM

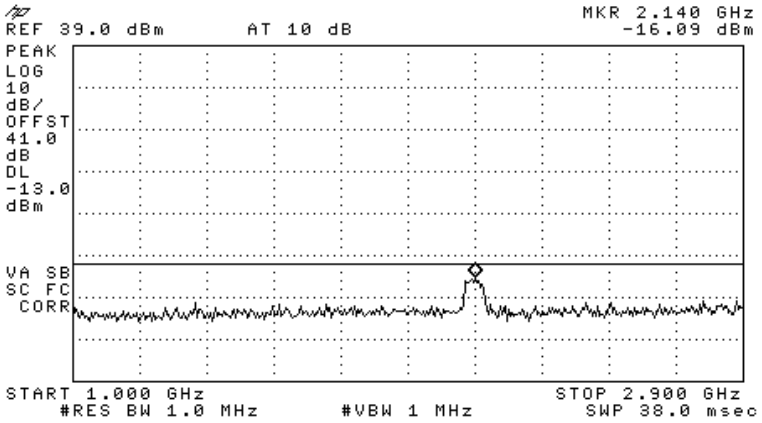

Figure 114.— 753 MHz 64QAM

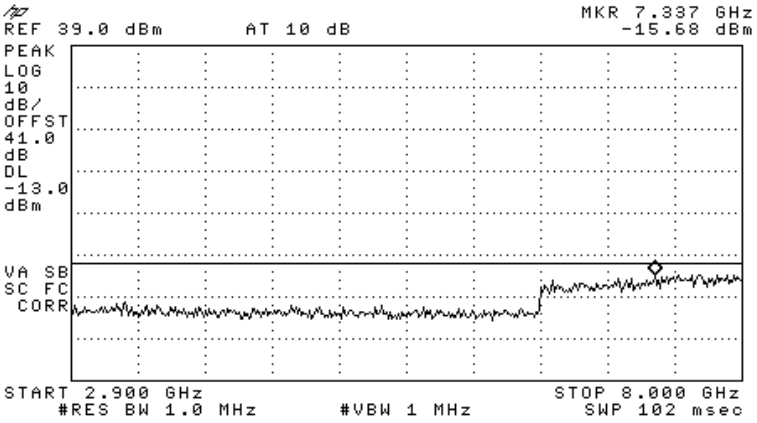

Figure 115.— 753 MHz 64QAM

6.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX- A17L70-AC-A (A17=AWS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Sections 27.53(c)(1) (3) 27.53 (g)

	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
W-CDMA	733	-15.06	-13.0	-2.06
	747	-15.21	-13.0	-2.21
	753	-15.60	-13.0	-2.60
QPSK	733	-14.88	-13.0	-1.88
	747	-14.97	-13.0	-1.97
	753	-15.18	-13.0	-2.18
16QAM	733	-15.15	-13.0	-2.15
	747	-15.16	-13.0	-2.16
	753	-15.19	-13.0	-2.19
64QAM	733	-14.02	-13.0	-1.02
	747	-14.88	-13.0	-1.88
	753	-15.68	-13.0	-2.68

Figure 116 Spurious Emissions at Antenna Terminals Results LTE

JUDGEMENT: Passed by 1.02 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

6.4 Test Equipment Used.

Spurious Emissions at Antenna Terminals LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	February 21, 2011	1 year
Signal Generator	HP	E4438C -	MY42082734	July 21, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 117 Test Equipment Used

7. Band Edge Spectrum LTE

7.1 Test Specification

FCC Part 27, Subpart C, Section 27.53 (c)(1)

7.2 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 (41.0 dB).
The spectrum analyzer was set to 30 kHz R.B.W.

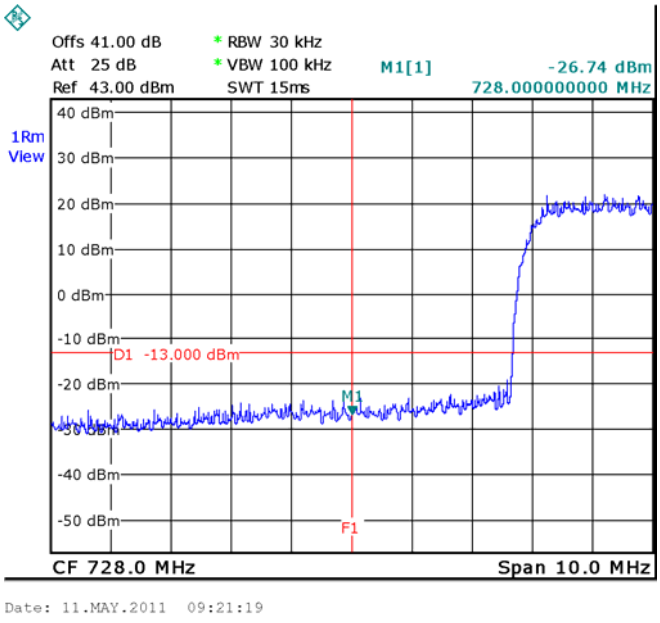

Figure 118.— W-CDMA 733.0 MHz

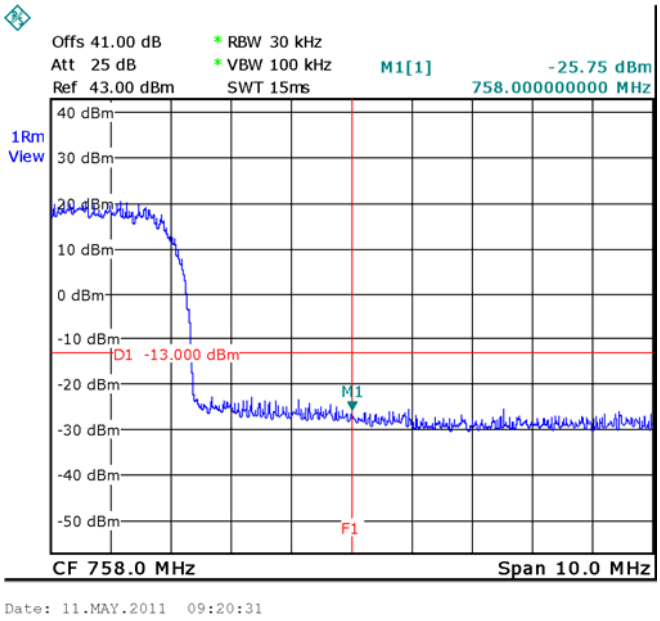

Figure 119.— W-CDMA 753.0 MHz

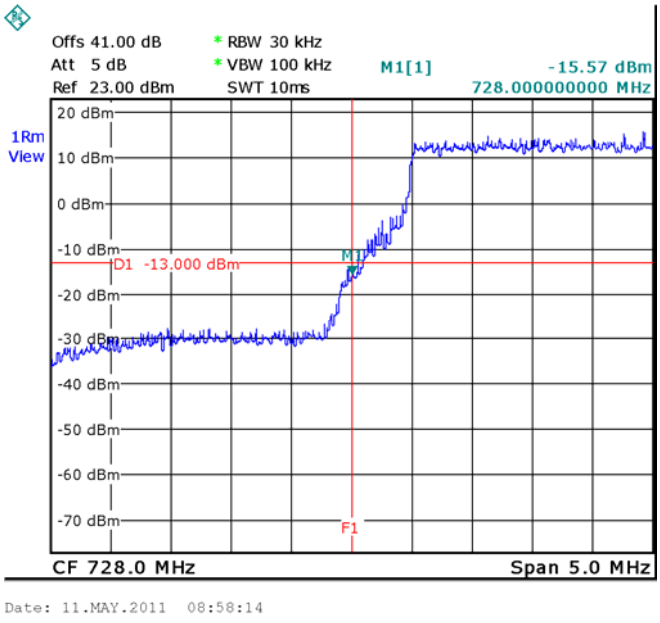

Figure 120.— QPSK 733.0 MHz

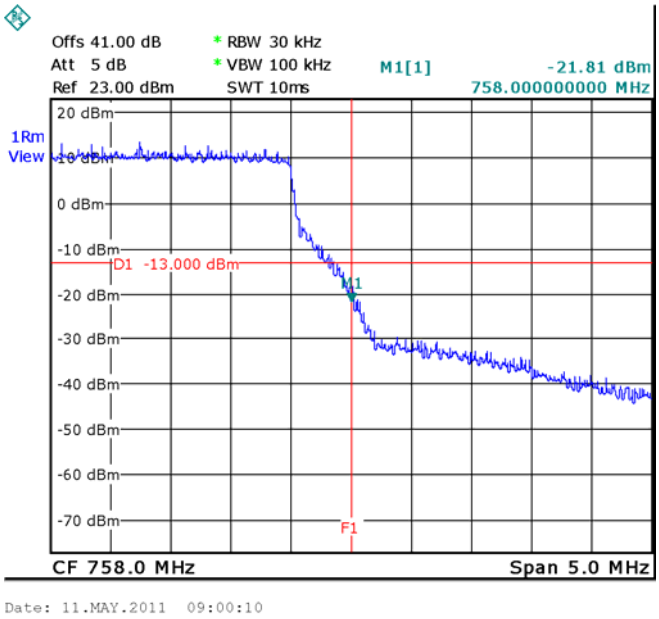

Figure 121.— QPSK 753.0 MHz

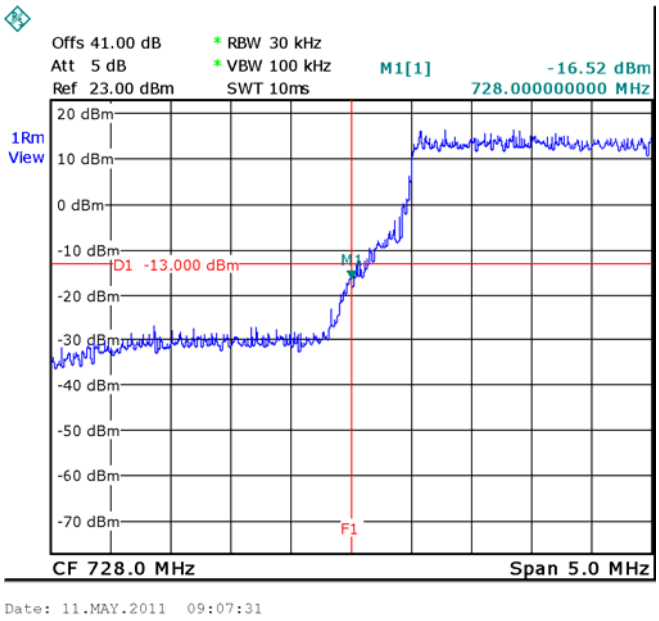

Figure 122.— 16QAM 733.0 MHz

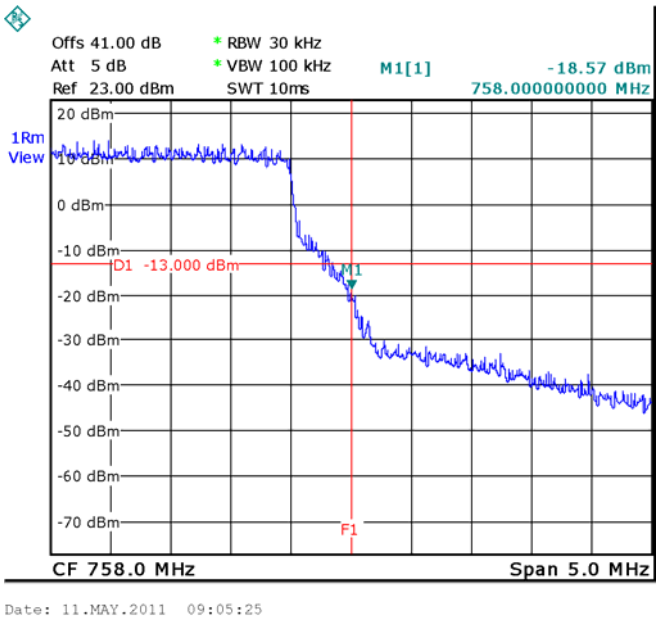

Figure 123.— 16QAM 753.0 MHz

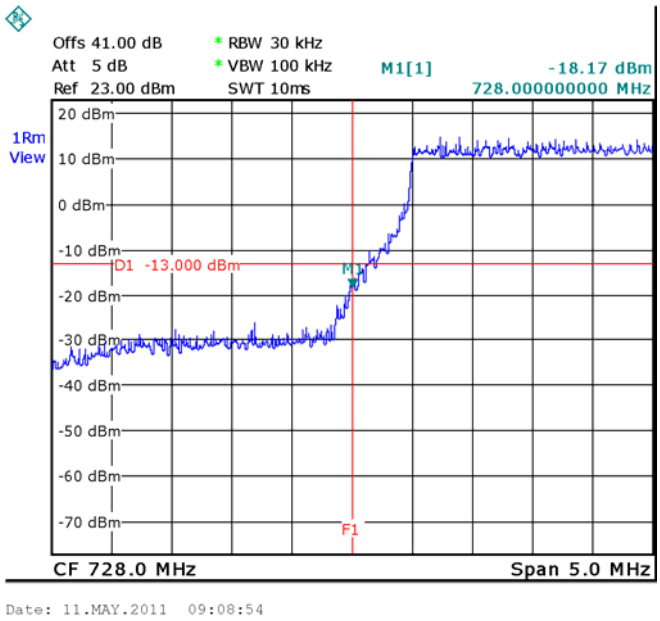

Figure 124.— 64QAM 733.0 MHz

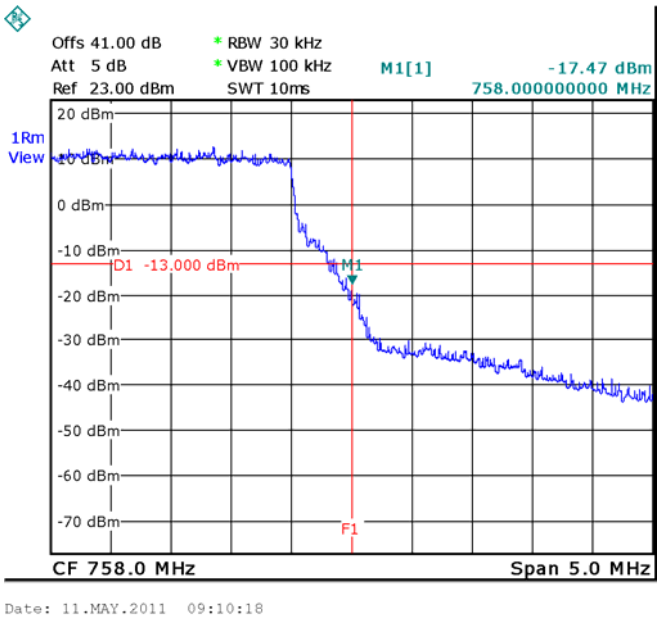

Figure 125.— 64QAM 753.0 MHz

7.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-A17L70-AC-A (A17=AWS ;L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Section 27.53 (m 4-6)

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)
WCDMA	733.00	728.00	-26.74	-13.0
WCDMA	753.00	758.00	-25.75	-13.0
QPSK	733.00	728.00	-15.57	-13.0
QPSK	753.00	758.00	-21.81	-13.0
16QAM	733.00	728.00	-16.52	-13.0
16QAM	753.00	758.00	-18.57	-13.0
64QAM	733.00	728.00	-18.17	-13.0
64QAM	753.00	758.00	-17.47	-13.0

Figure 126 Band Edge Spectrum Results LTE

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

7.4 Test Equipment Used.

Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE& SCHWARZ	FSL6	100194	July 22, 2010	1 year
Signal Generator	HP	E4438C	MY42082734	July 21, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 127 Test Equipment Used

8. Spurious Radiated Emission LTE

8.1 Test Specification

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

8.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (728-758 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.

8.3 Test Results

JUDGEMENT: Passed by 36.87 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: 24.05.11

Typed/Printed Name: A. Sharabi

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)
733.00	1466.00	V	48.11	-53.18	5.15	7.6	-50.73	-13.0	-37.73
733.00	1466.00	H	47.11	-54.32	5.15	7.6	-51.87	-13.0	-38.87
747.00	1494.00	V	46.51	-54.78	5.15	7.6	-52.33	-13.0	-39.33
747.00	1494.00	H	46.83	-54.6	5.15	7.6	-52.15	-13.0	-39.15
753.00	1506.00	V	48.97	-52.32	5.15	7.6	-49.87	-13.0	-36.87
753.00	1506.00	H	48.14	-53.29	5.15	7.6	-50.84	-13.0	-37.84

8.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2010	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	August 1, 2010	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2010	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 4, 2011	1 Year
Signal Generator	HP	E4432B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C	MY42082734	July 21, 2010	1 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2010	2 year

9. RF Power Output AWS

9.1 Test Specification

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

9.2 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (40 dB) and an appropriate coaxial cable (1 dB). The E.U.T. RF output was modulated as follows:

CDMA at 1.25 MHz BW channels (2111.2 MHz, 2135 MHz and 2153.8 MHz)

WCDMA at 5 MHz BW channels (2112.5 MHz, 2135 MHz and 2152.5 MHz)

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

Signal generator input level 10dBm.

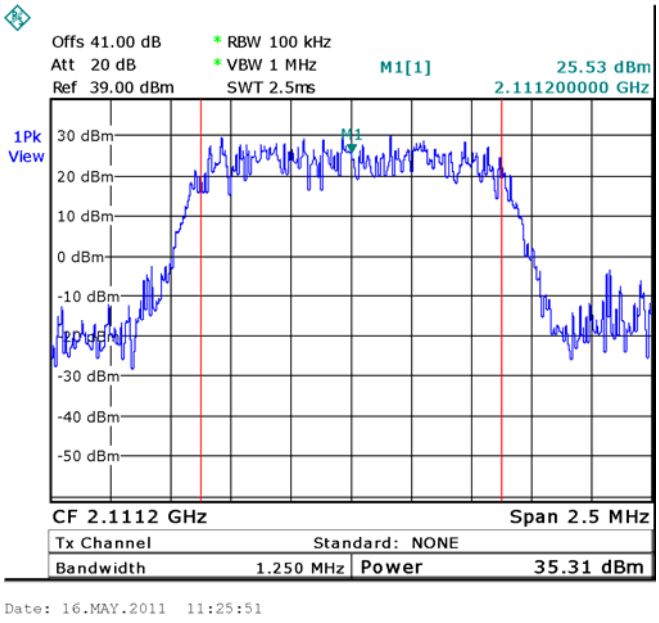

Figure 128.— CDMA (2111.2 MHz)

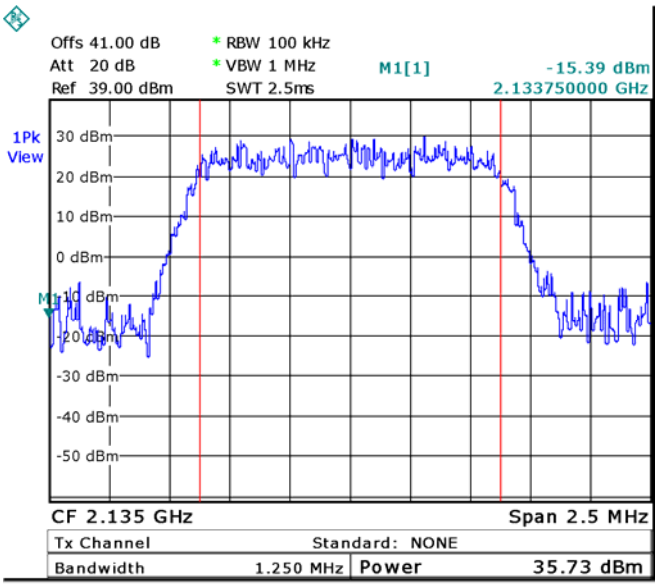

Figure 129.— CDMA (2135.0 MHz)

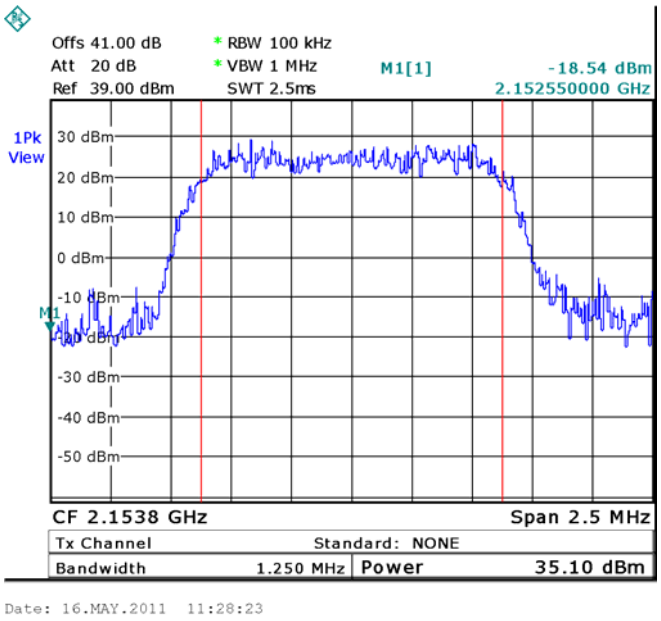

Figure 130.— CDMA (2153.8 MHz)

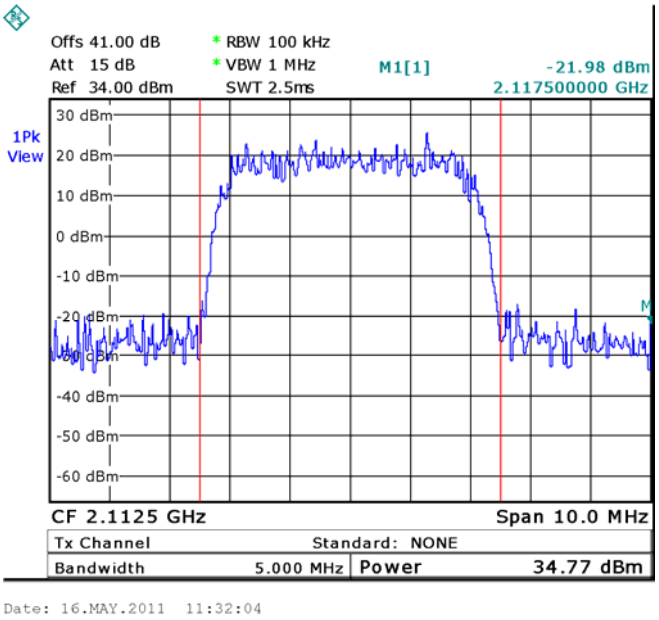

Figure 131.— W-CDMA (2112.5 MHz)

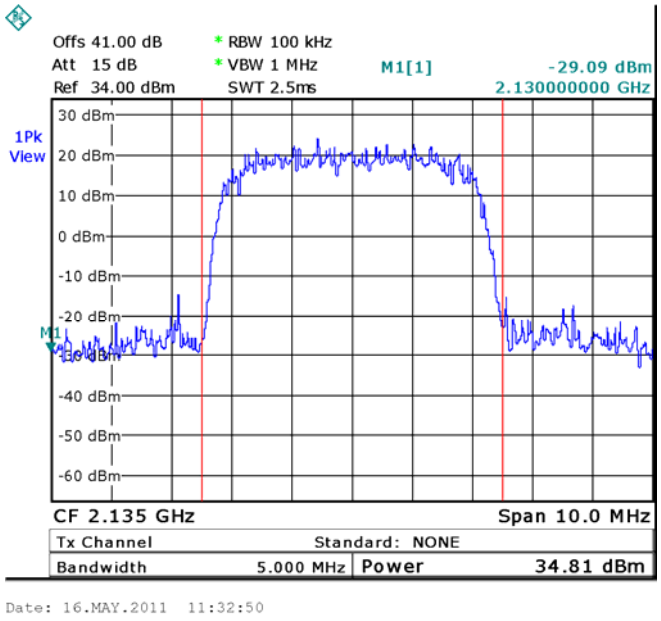

Figure 132.— W-CDMA (2135.0 MHz)

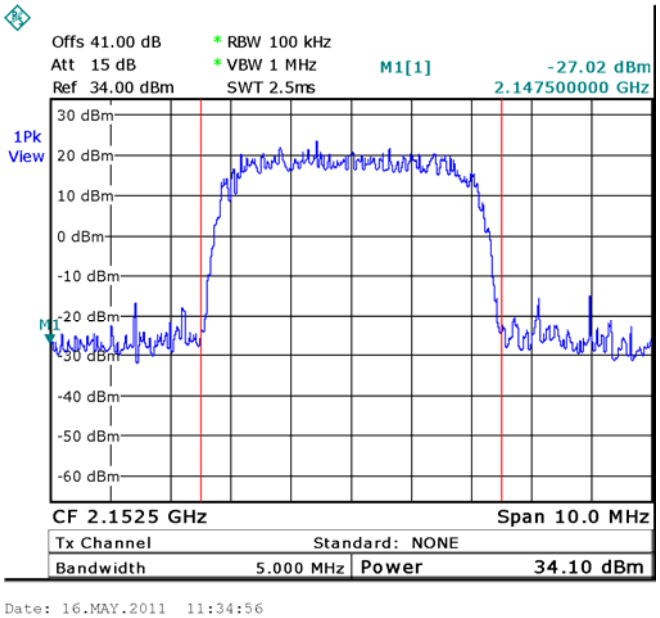

Figure 133.— W-CDMA (2152.5 MHz)

9.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-A17L70-AC-A (A17=AWS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Section 27.50 (d)

Modulation	Operation Frequency (MHz)	Reading (dBm)
CDMA	2111.2	35.31
CDMA	2135.0	35.73
CDMA	2153.8	35.10
WCDMA	2112.5	34.77
WCDMA	2135.0	34.81
WCDMA	2152.5	34.10

Figure 134 RF Power Output AWS

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

9.4 Test Equipment Used.

RF Power Output AWS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE& SCHWARZ	FSL6	100194	July 22, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C ESG	MY45091956	July 22, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 135 Test Equipment Used

10. Occupied Bandwidth AWS

10.1 Test Specification

FCC Part 2, Section 1049

10.2 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.

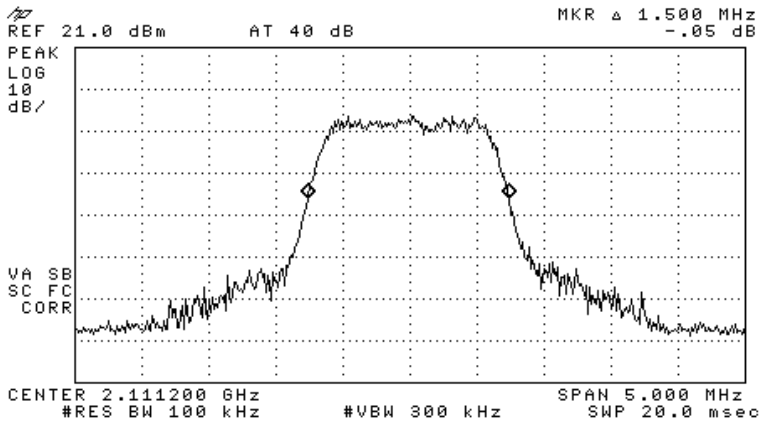

Figure 136.— CDMA (2111.20 MHz) IN

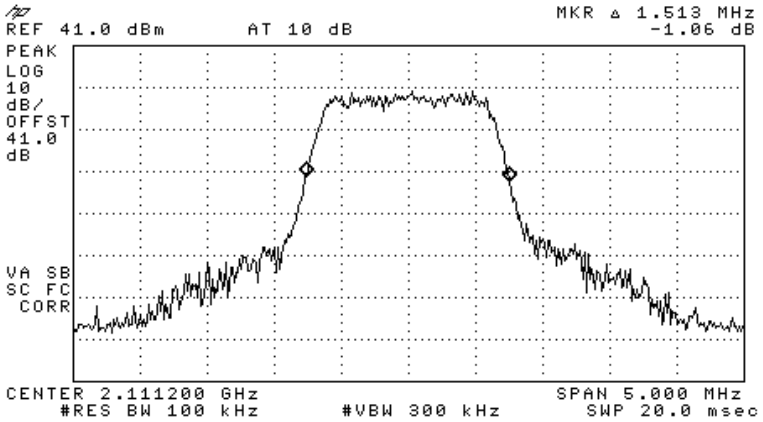

Figure 137.— CDMA (2112.0 MHz) OUT

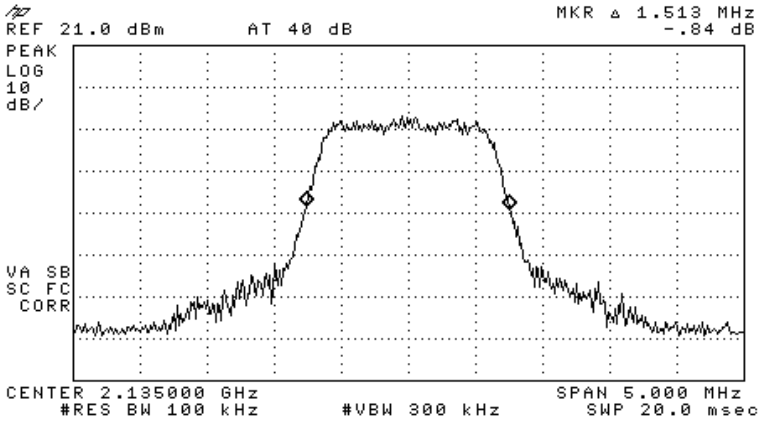

Figure 138.— CDMA (2135.0 MHz) IN

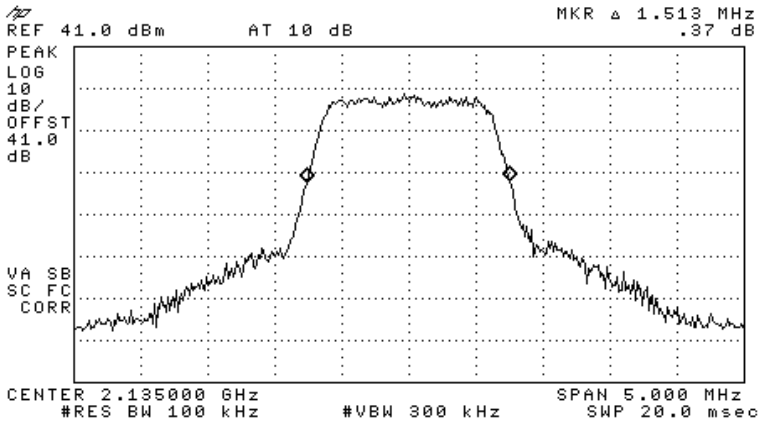

Figure 139.— CDMA (2135.0 MHz) OUT

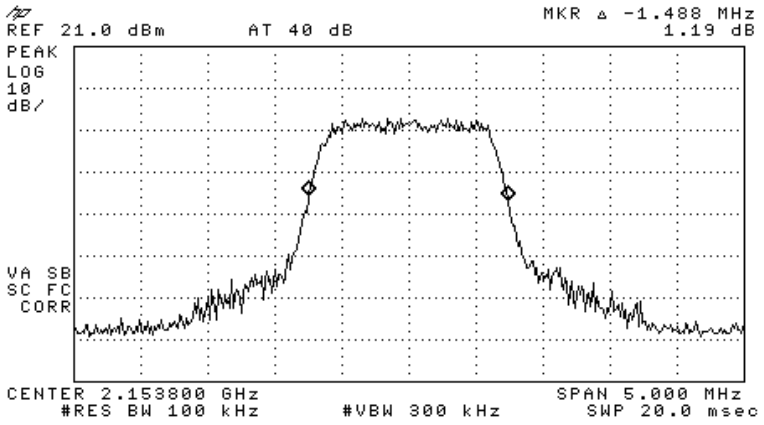

Figure 140.— CDMA (2153.8 MHz) IN

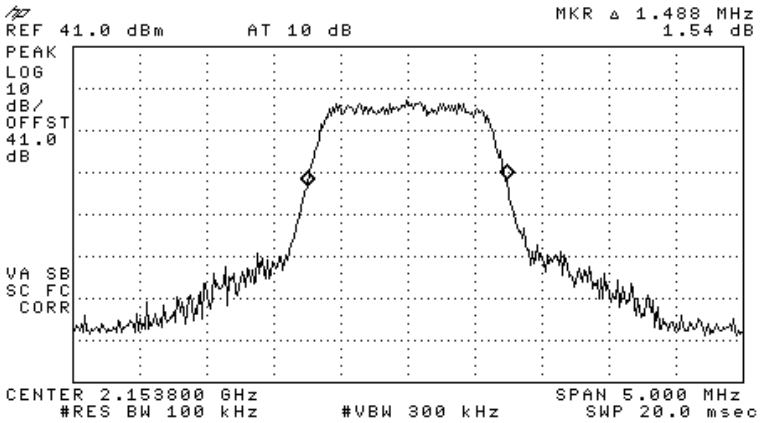

Figure 141.— CDMA (2153.8 MHz) OUT

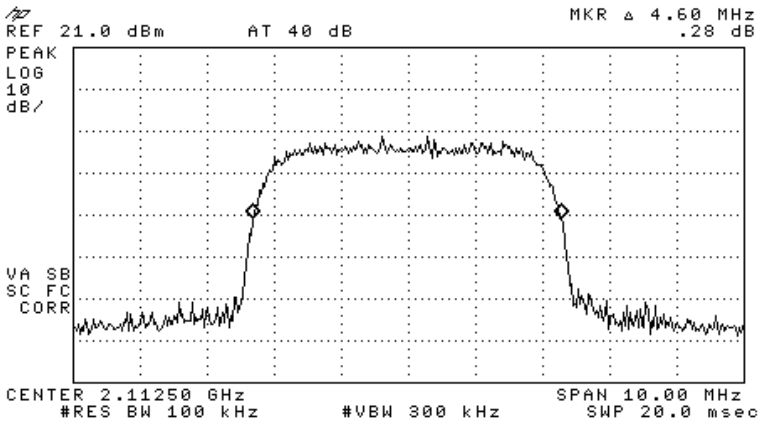

Figure 142.— W-CDMA (2112.5 MHz) IN

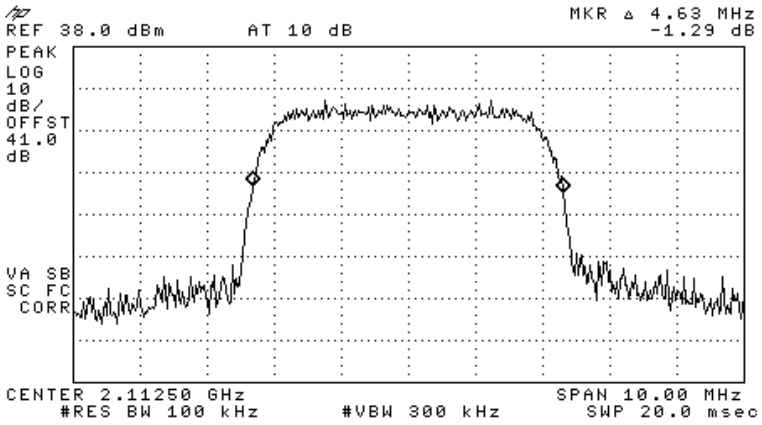

Figure 143.— W-CDMA (2112.5 MHz) OUT

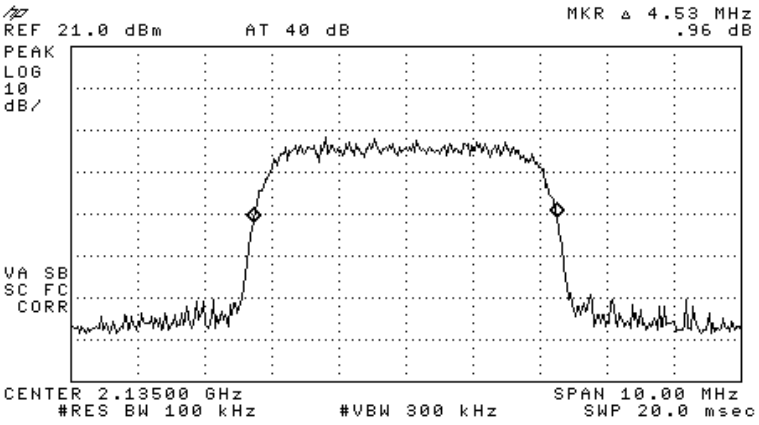

Figure 144.— W-CDMA (2135.0 MHz) IN

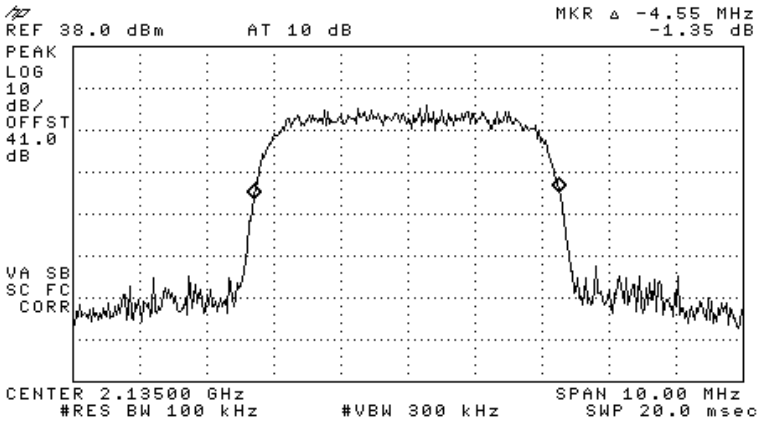

Figure 145.— W-CDMA (2135.0 MHz) OUT

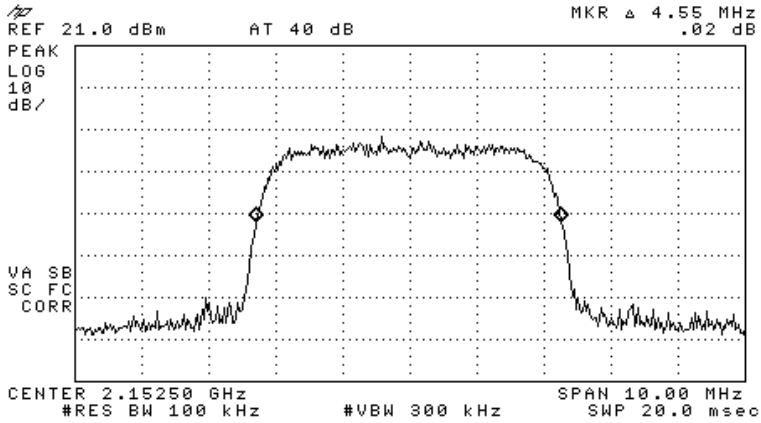

Figure 146.— W-CDMA (2152.5 MHz) IN

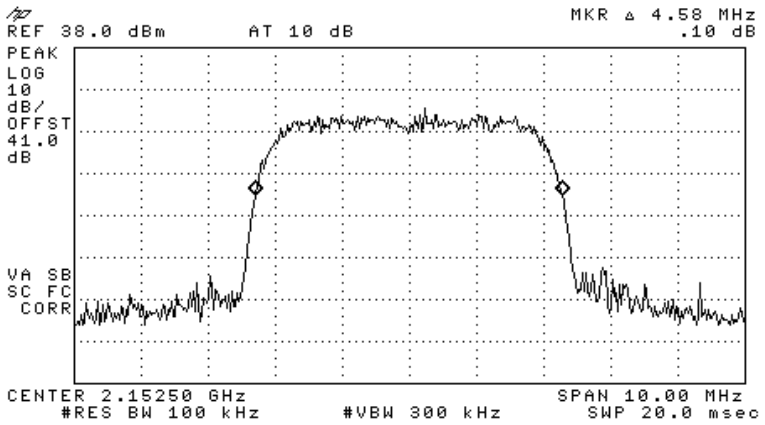

Figure 147.— W-CDMA (2152.5 MHz) OUT

10.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-A17L70-AC-A (A17=AWS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (MHz)
CDMA	Input	2111.2	1.500
	Output	2111.2	1.513
	Input	2135.0	1.513
	Output	2135.0	1.513
	Input	2153.8	1.488
	Output	2153.8	1.488
WCDMA	Input	2112.5	4.60
	Output	2112.5	4.63
	Input	2135.0	4.53
	Output	2135.0	4.55
	Input	2152.5	4.55
	Output	2152.5	4.58

Figure 148 Occupied Bandwidth AWS

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

10.4 Test Equipment Used.

Occupied Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	February 21, 2011	1 year
Signal Generator	HP	E4438C ESG-	MY45091956	July 22, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 149 Test Equipment Used

11. Spurious Emissions at Antenna Terminals AWS

11.1 Test Specification

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

11.2 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 (41.0 dB).

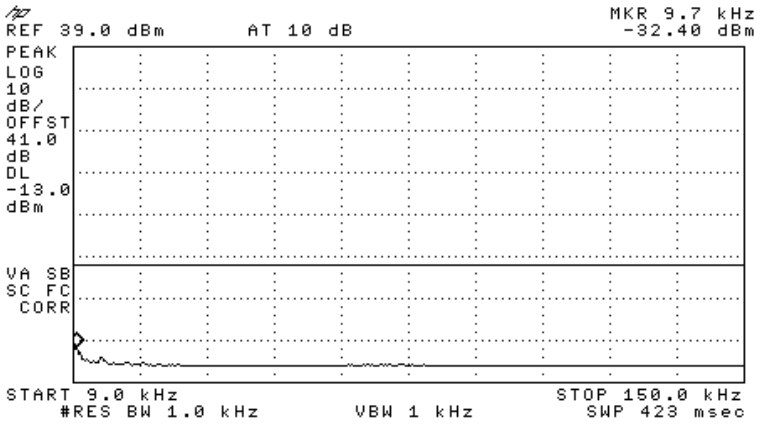

Figure 150.— 2111.20 MHz CDMA

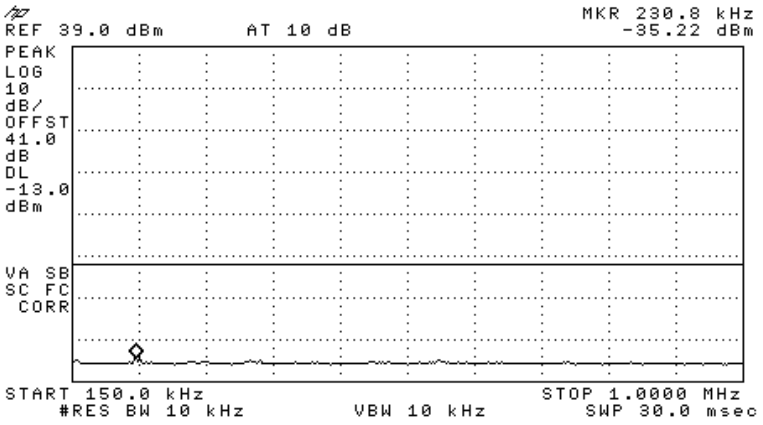

Figure 151.— 2111.20 MHz CDMA

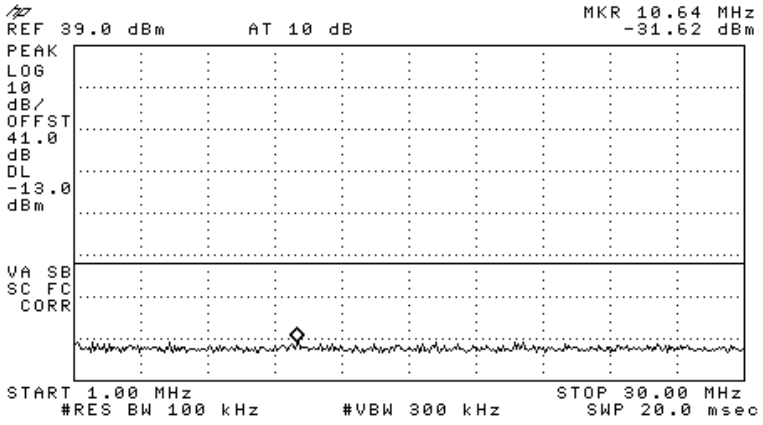

Figure 152.— 2111.20 MHz CDMA

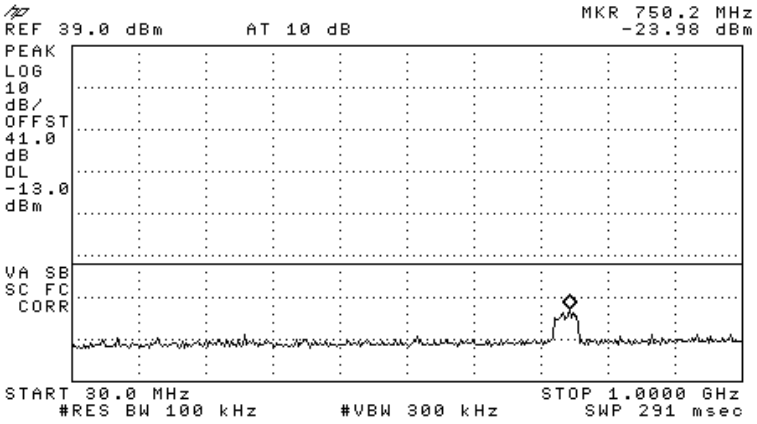

Figure 153.— 2111.20 MHz CDMA

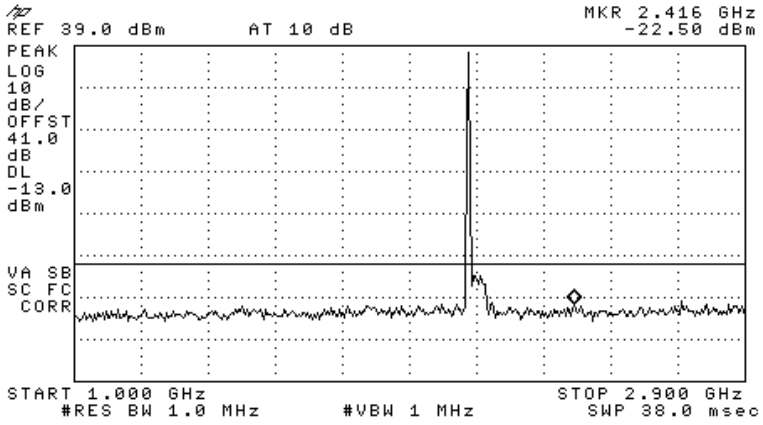

Figure 154.— 2111.20 MHz CDMA

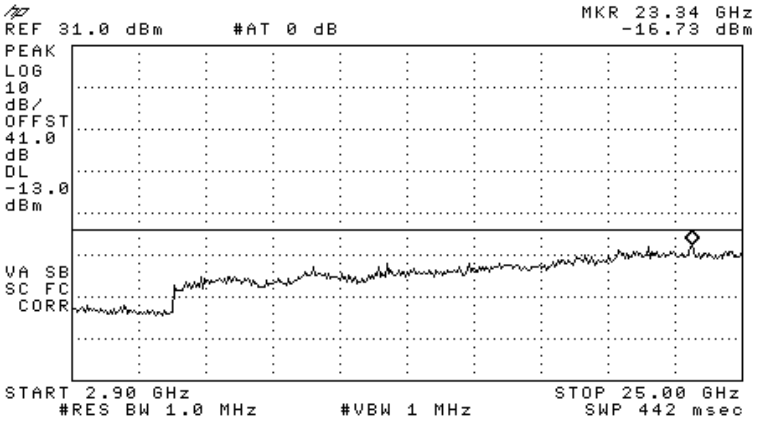

Figure 155.— 2111.20 MHz CDMA

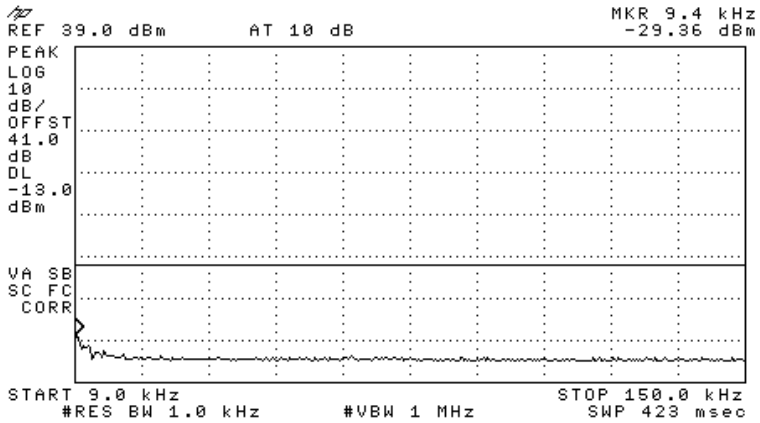

Figure 156.— 2135.00 MHz CDMA

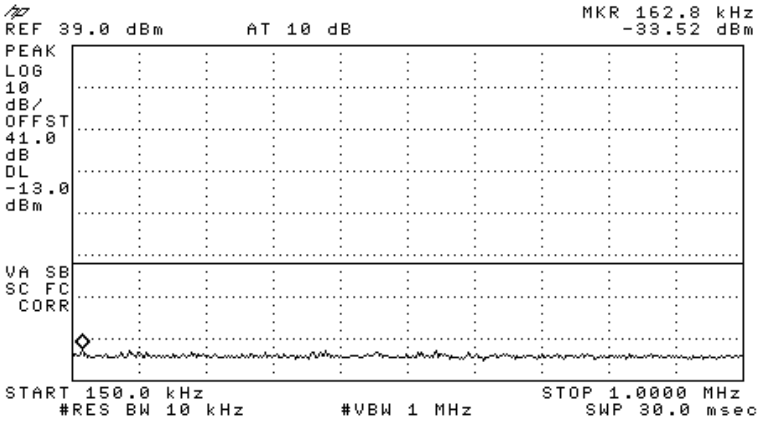

Figure 157.— 2135.00 MHz CDMA

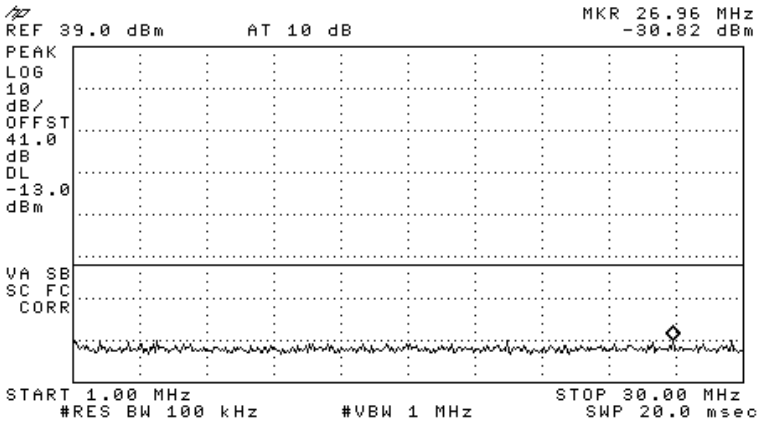

Figure 158.— 2135.00 MHz CDMA

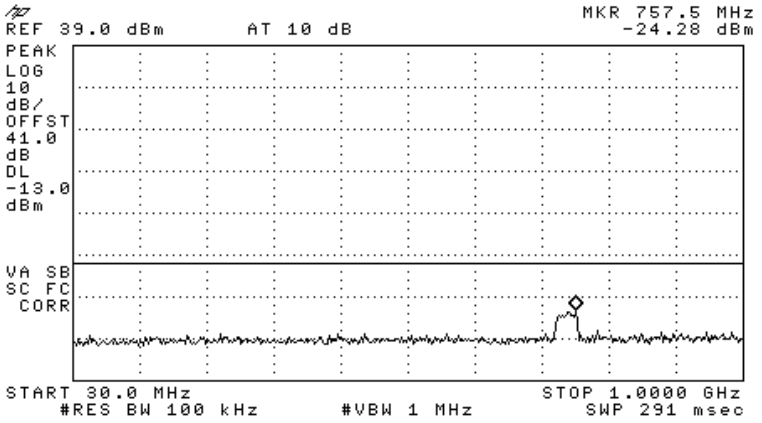

Figure 159.— 2135.00 MHz CDMA

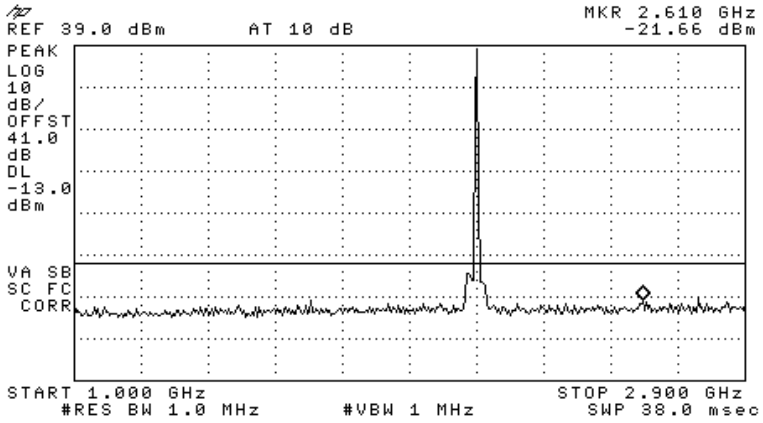

Figure 160.— 2135. 00 MHz CDMA

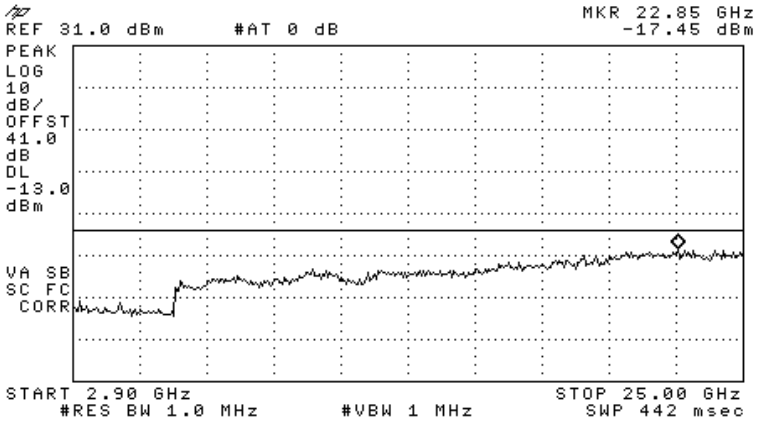

Figure 161.— 2135. 0 MHz CDMA

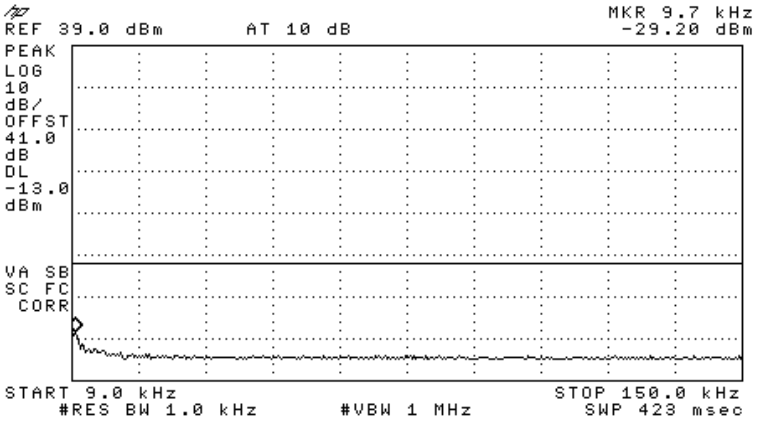

Figure 162.— 2153. 80 MHz CDMA

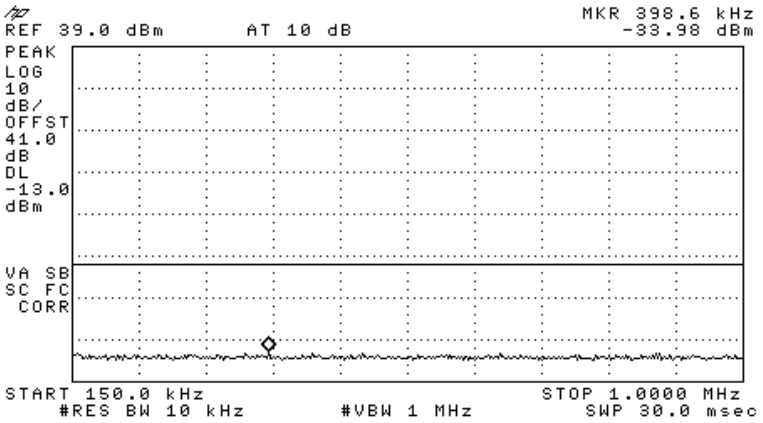

Figure 163.— 2153.80 MHz CDMA

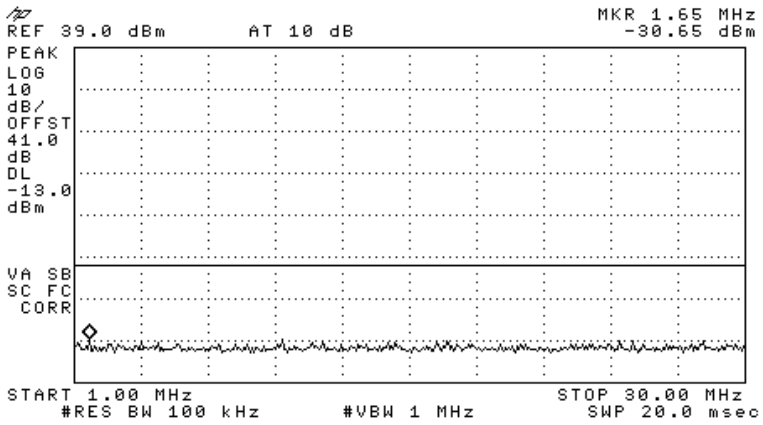

Figure 164.— 2153. 80 MHz CDMA

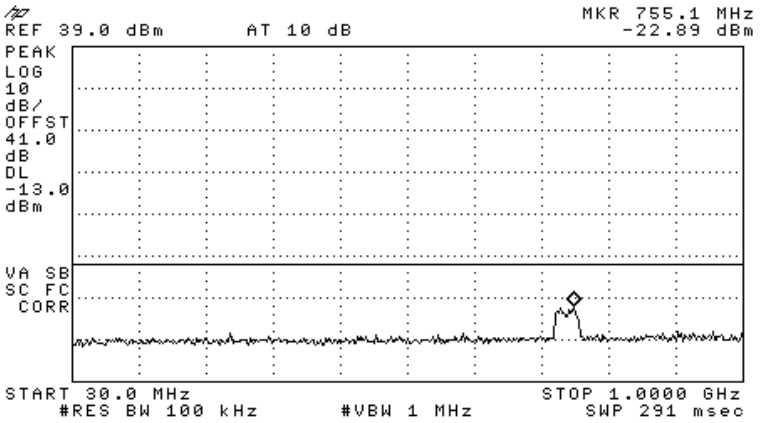

Figure 165.— 2153.80 MHz CDMA

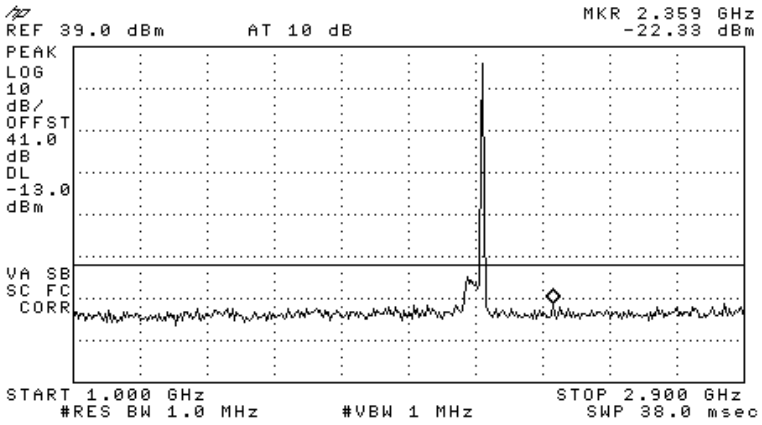

Figure 166.— 2153.80 MHz CDMA

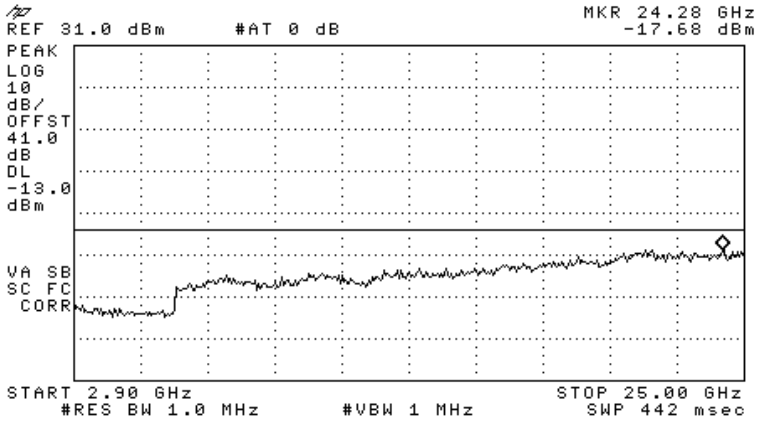

Figure 167.— 2153.80 MHz CDMA

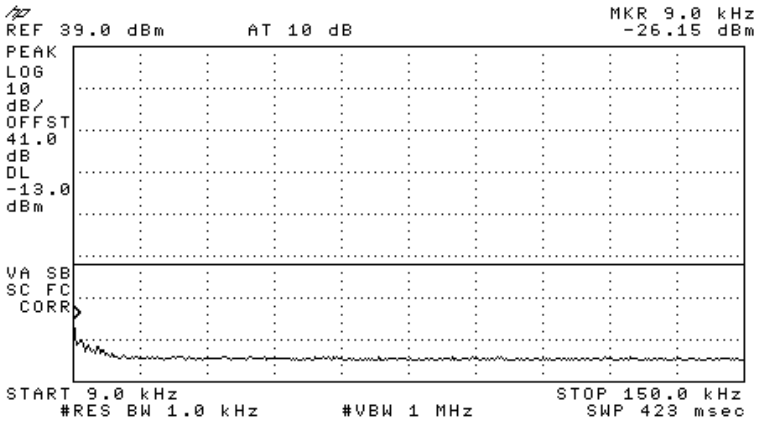

Figure 168.— 2112.50 MHz W-CDMA

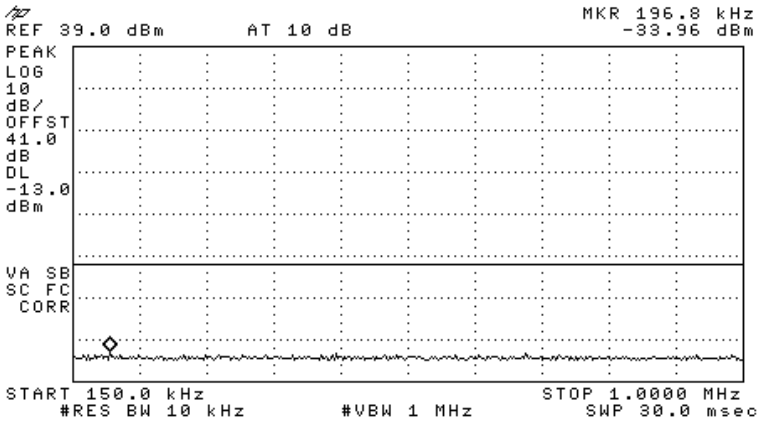

Figure 169.— 2112.50 MHz W-CDMA

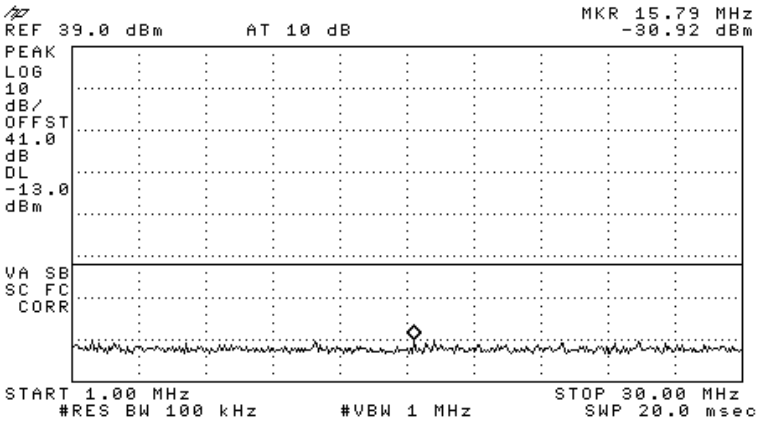

Figure 170.— 2112.50 MHz W-CDMA

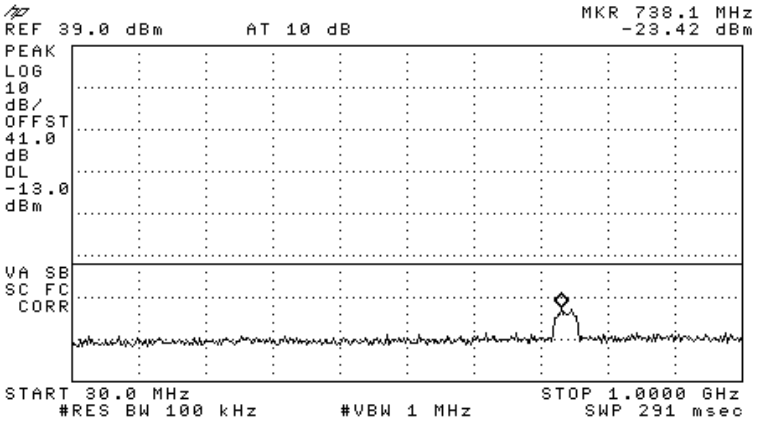

Figure 171.— 2112.50 MHz W-CDMA

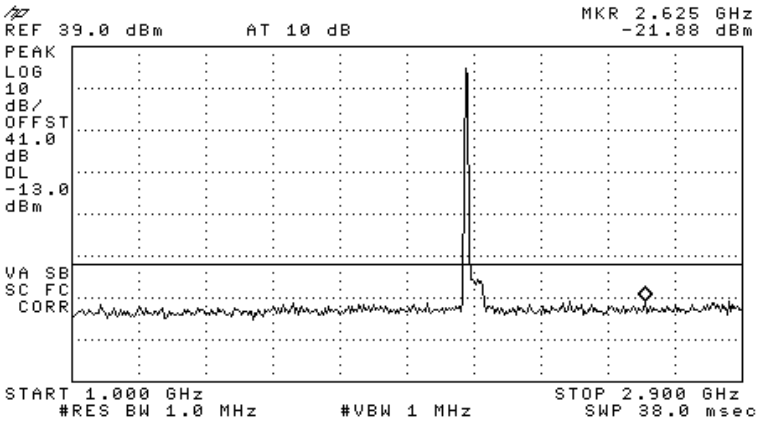

Figure 172.— 2112.50 MHz W-CDMA

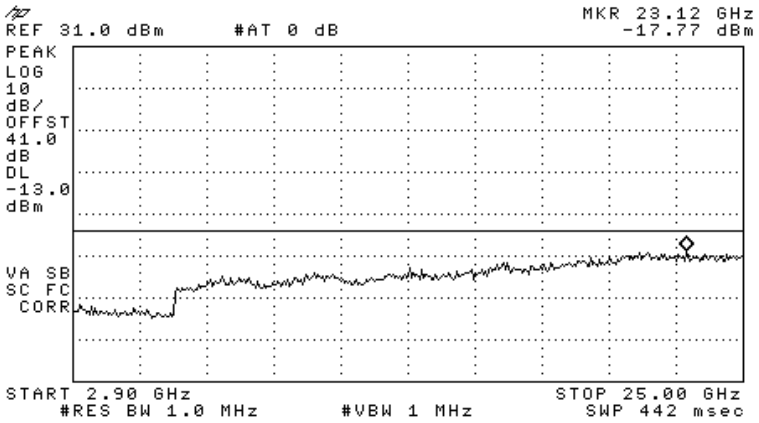

Figure 173.— 2112.50 MHz W-CDMA

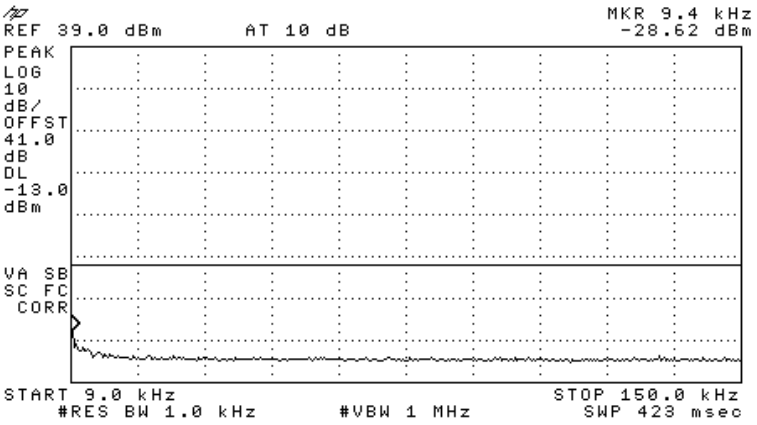

Figure 174.— 2135.00 MHz W-CDMA

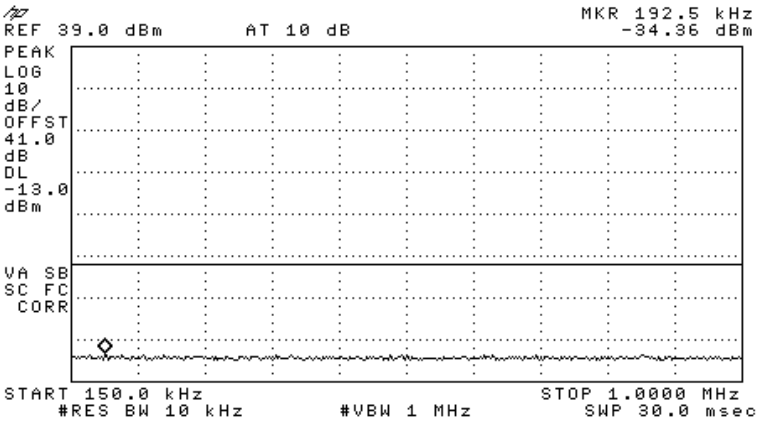

Figure 175.— 2135.00 MHz W-CDMA

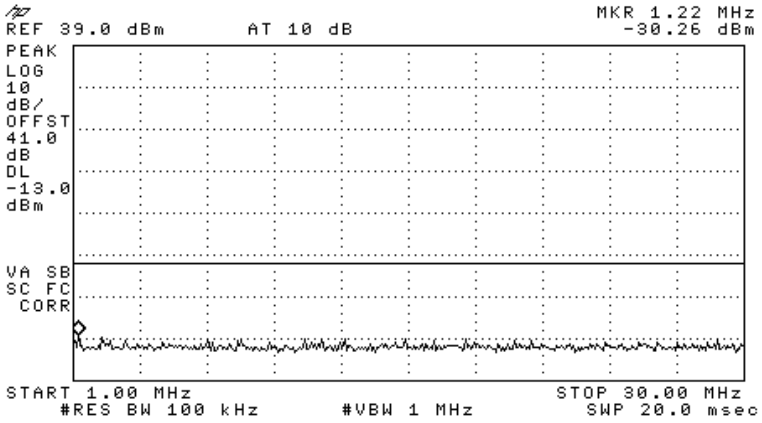

Figure 176.— 2135.00 MHz W-CDMA

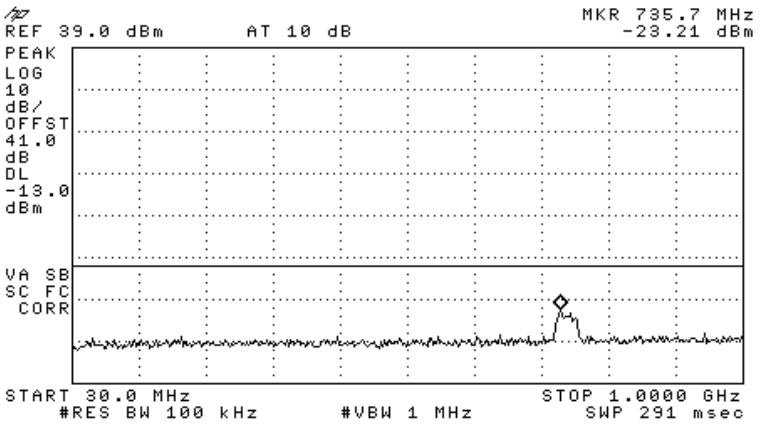

Figure 177.— 2135.00 MHz W-CDMA

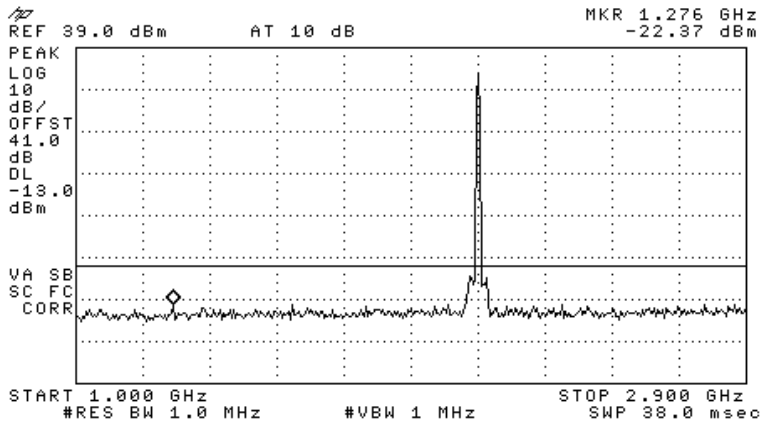

Figure 178.— 2135.00 MHz W-CDMA

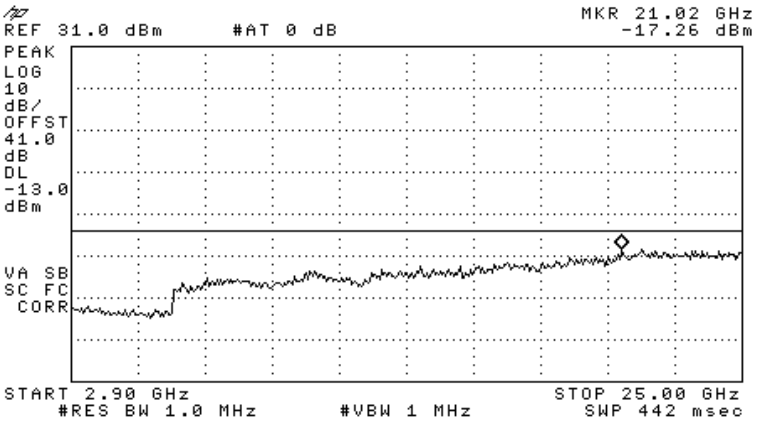

Figure 179.— 2135.00 MHz W-CDMA

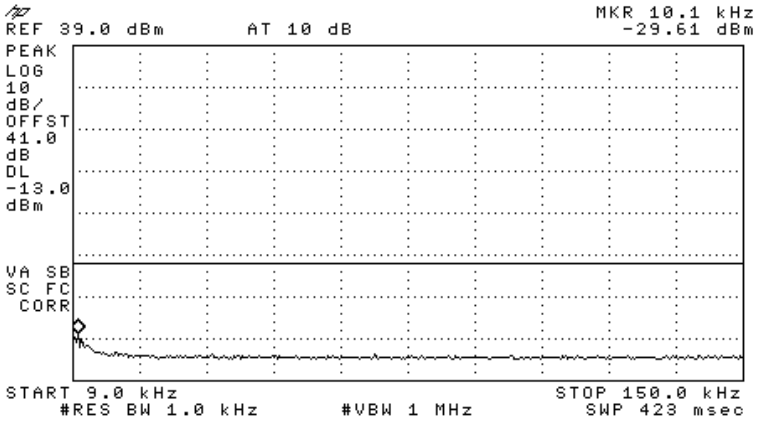

Figure 180.— 2152.50 MHz W-CDMA

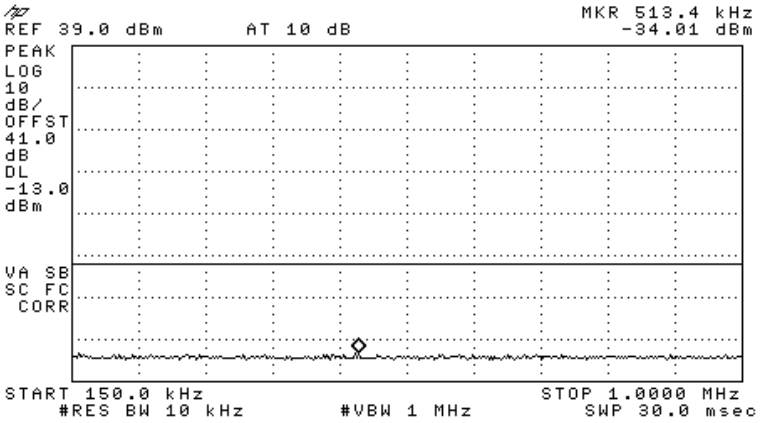

Figure 181.— 2152.50 MHz W-CDMA

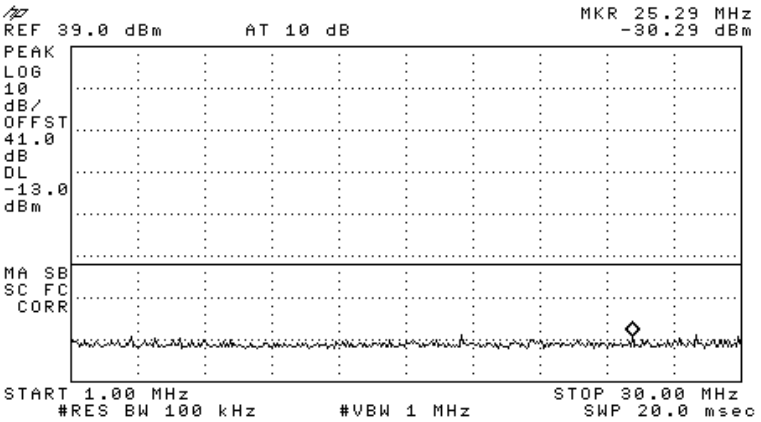

Figure 182.— 2152.50 MHz W-CDMA

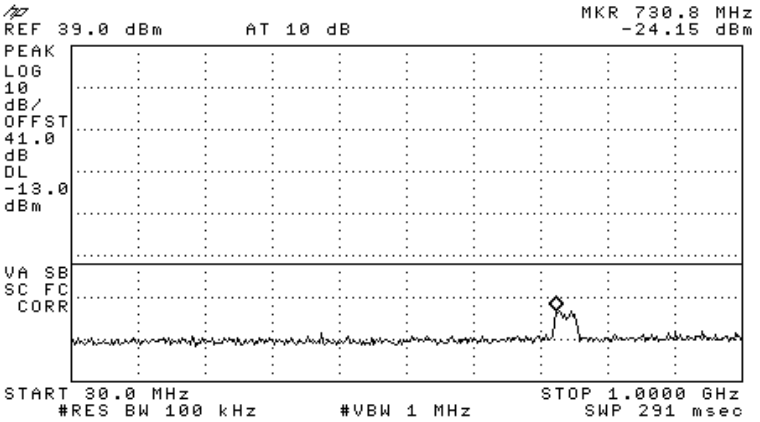

Figure 183.— 2152.50 MHz W-CDMA

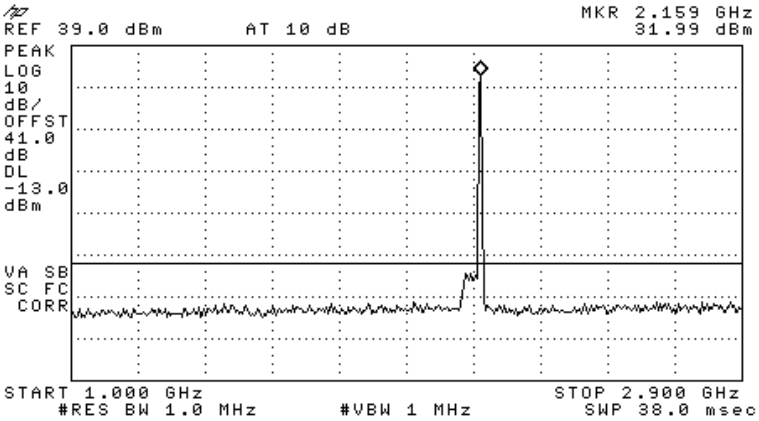

Figure 184.— 2152.50 MHz W-CDMA

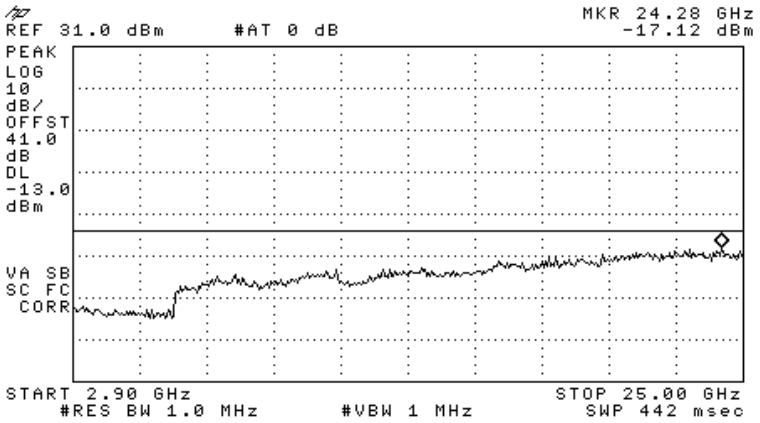

Figure 185.— 2152.50 MHz W-CDMA

11.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-A17L70-AC-A (A17=AWS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Section 27.53 (g)

	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	2111.20	-16.73	-13.0	-3.73
	2135.00	-17.45	-13.0	-4.45
	2153.80	-17.68	-13.0	-4.68
WCDMA	2112.50	-17.77	-13.0	-4.77
	2135.00	-17.26	-13.0	-4.26
	2152.50	-17.12	-13.0	-4.12

Figure 186 Spurious Emissions at Antenna Terminals Results AWS

JUDGEMENT: Passed by 3.73 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

11.4 Test Equipment Used.

Spurious Emissions at Antenna Terminals AWS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	February 21, 2011	1 year
Signal Generator	HP	E4438C ESG-	MY45091956	July 22, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 187 Test Equipment Used

12. Band Edge Spectrum AWS

12.1 Test Specification

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

12.2 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 (41.0 dB).

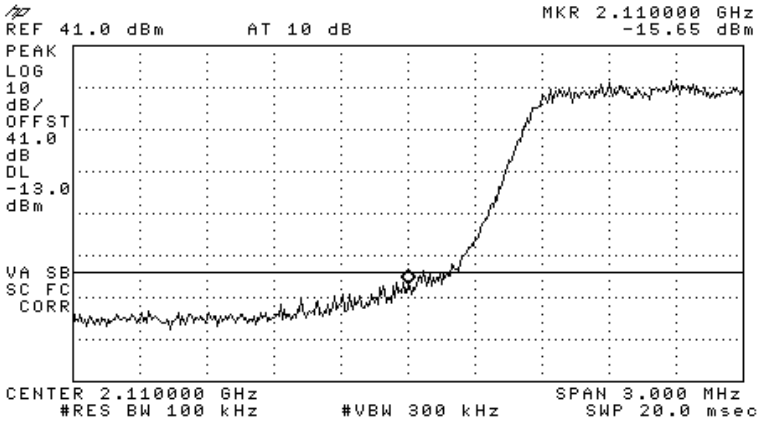

Figure 188.— CDMA 2111.20 MHz

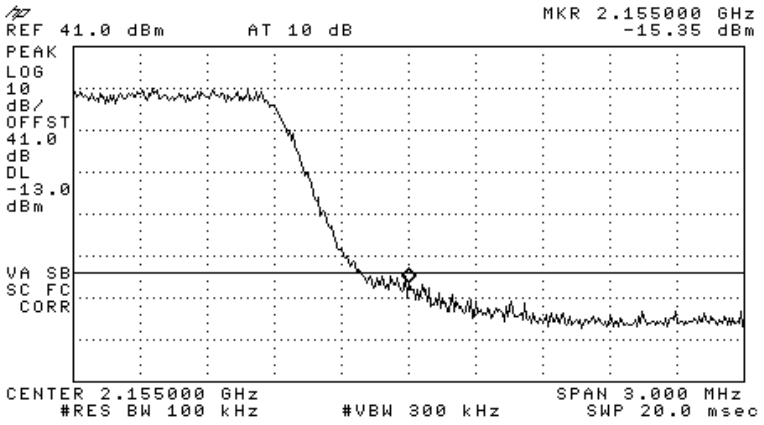

Figure 189.— CDMA 2153.80 MHz

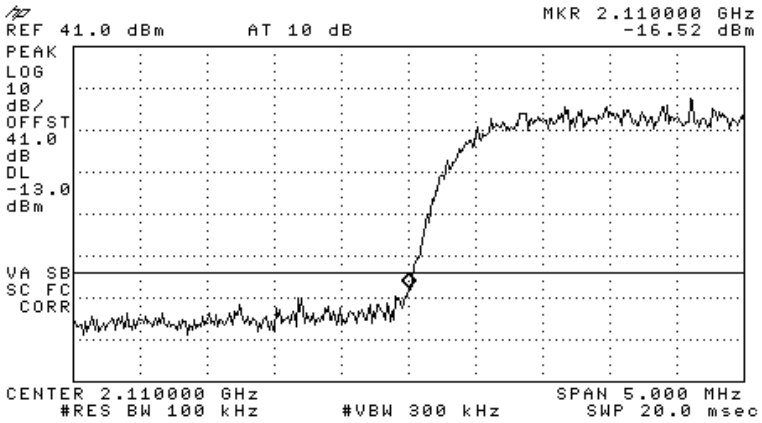

Figure 190.— W-CDMA 2112.50 MHz

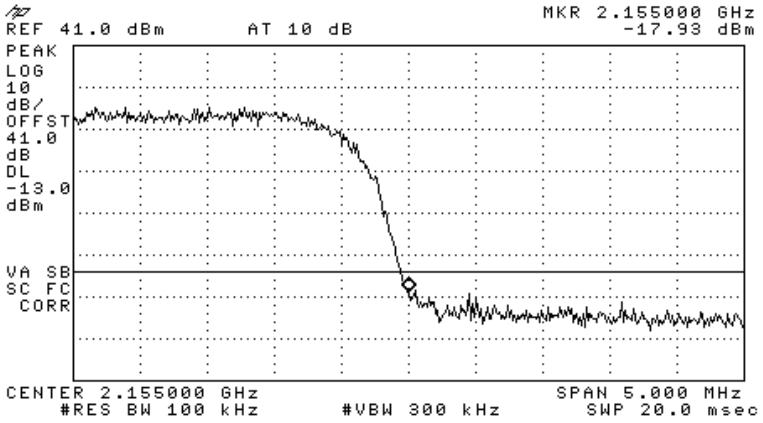

Figure 191.— W-CDMA 2152.50 MHz

12.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-A17L70-AC-A (A17=AWS; L70=LTE)
Serial Number: Not Designated
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	2111.20	2110.00	-15.65	-13.0
CDMA	2153.80	2155.00	-15.35	-13.0
W-CDMA	2112.50	2110.00	-16.52	-13.0
W-CDMA	2152.50	2155.00	-17.93	-13.0

Figure 192 Band Edge Spectrum Results AWS

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 24.05.11

Typed/Printed Name: A. Sharabi

12.4 Test Equipment Used.

Band Edge Spectrum AWS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE&SCHWARZ	FSL6	100194	July 22, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C ESG	MY45091956	July 22, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 193 Test Equipment Used

13. Spurious Radiated Emission AWS

13.1 Test Specification

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

13.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, 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 2. 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.

(c) 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.

13.3 Test Results

JUDGEMENT: Passed by 25.30 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: 24.05.11

Typed/Printed Name: A. Sharabi

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)
2111.20	4222.40	V	60.42	-42.97	4.45	9.12	-38.3	-13.0	-25.30
2111.20	4222.40	H	54.65	-48.5	4.45	9.12	-43.83	-13.0	-30.83
2135.00	4270.00	V	55.13	-48.94	4.45	9.38	-44.01	-13.0	-31.01
2135.00	4270.00	H	55.07	-48.54	4.45	9.38	-43.61	-13.0	-30.61
2153.80	4307.60	V	60.12	-43.95	4.45	9.38	-39.02	-13.0	-26.02
2153.80	4307.60	H	57.45	-46.16	4.45	9.38	-41.23	-13.0	-28.23

13.4 Test Instrumentation Used, Radiated Measurements AWS

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2010	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	August 1, 2010	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2010	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 4, 2011	1 Year
Signal Generator	HP	E4432B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C ESG	MY45091956	July 22, 2010	1 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2010	2 year

14. Intermodulation Conducted

14.1 Test procedure

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (loss = 41.0 dB). The spectrum analyzer was set to 1 kHz resolution BW for the frequency range 9.0-150.0 kHz, 10 kHz for the frequency range10 kHz–10.0 MHz, 100k Hz for the frequency range 10.0 – 30.0 MHz, and 1 MHz for the frequency range 30 MHz - 26.0GHz.

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

LTE 747 MHz QPSK 0 dBm

AWS: 2135 MHz W-CDMA 10 dBm

The frequency range of 9 kHz – 26.0GHz was scanned for unwanted signals.

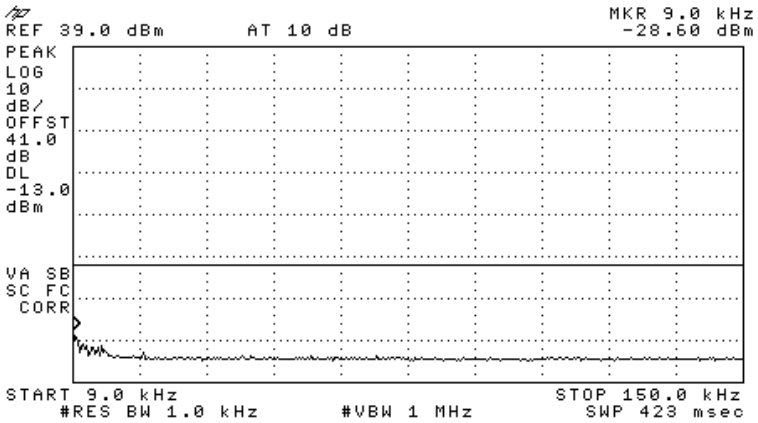

Figure 194 Intermodulation

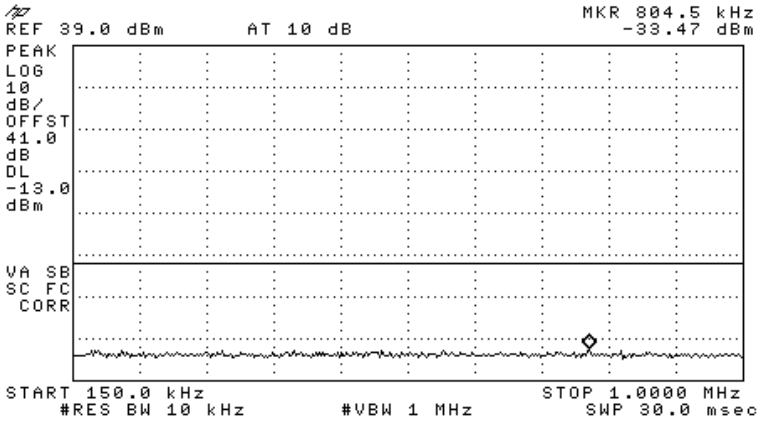

Figure 195 Intermodulation

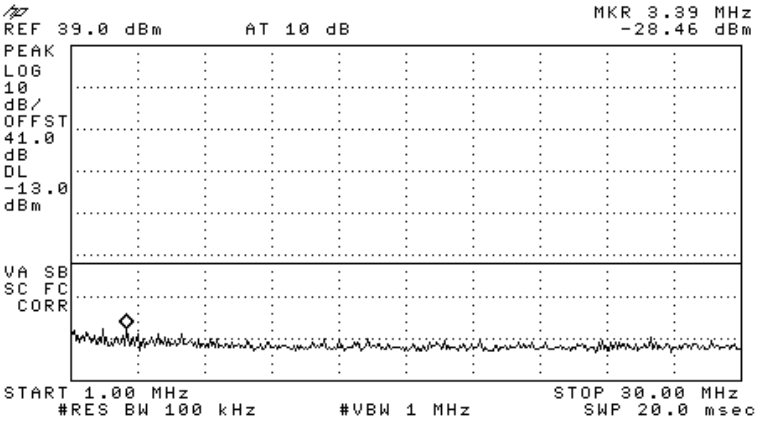

Figure 196 Intermodulation

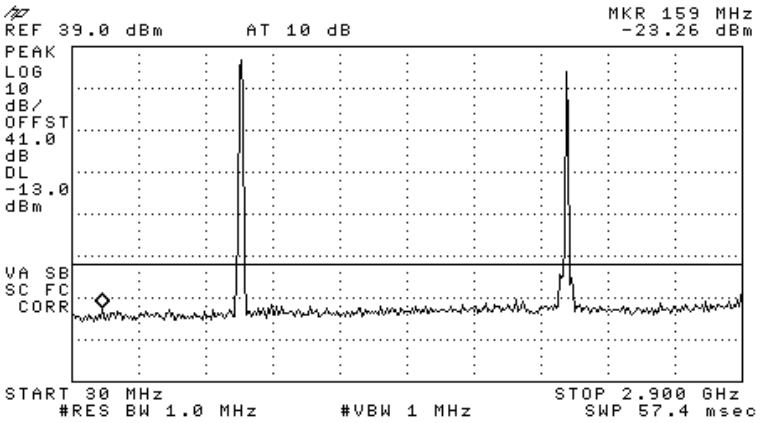

Figure 197 Intermodulation

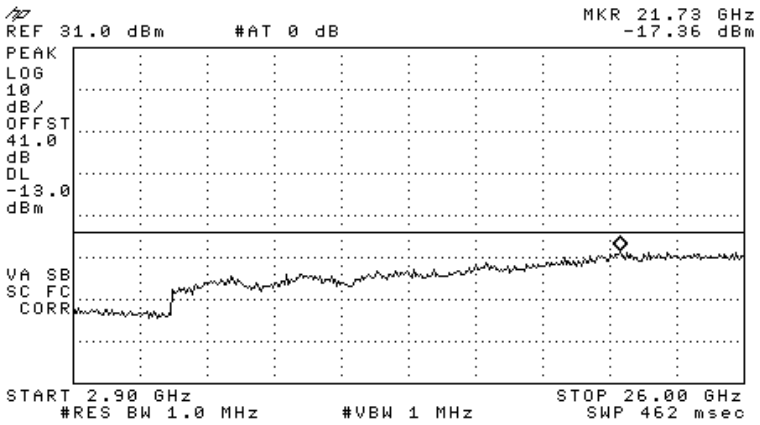

Figure 198 Intermodulation

14.2 Test Equipment Used.

Intermodulation Conducted

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8529L	3826A01204	February 21, 2011	1 year
Signal Generator	HP	E4438C ESG-	MY45091956	July 22, 2010	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C	MY42082734	July 21, 2010	1 year
Signal Generator	HP	83731B	US37100653	February 21, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 199 Test Equipment Used

15. Intermodulation Radiated

15.1 Test procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (728-758; 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 2.
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 E.U.T. was operated in Downlink mode at 4 different channels at center frequency of each band at the same time, transmitting at CW signal.

(b) The frequency range 9 kHz-25 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.

(d) 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.

15.2 Test Results

JUDGEMENT: Passed

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)
2135-2*747	641.00	V	37.04	-59.3	3.2	0.97	-61.53	-13.0	-48.53
3*747-2135	853.00	V	43.3	-49.63	3.9	0.49	-53.04	-13.0	-40.04
2*2135-747	3523.00	V	50.3	-51.85	4.15	8.7	-47.3	-13.0	-34.30
3*2135-2*747	4911.00	V	52.8	-49.92	4.6	9.74	-44.78	-13.0	-31.78

15.3 Test Instrumentation Used, Radiated Measurements Intermodulation

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 24, 2010	1 year
RF Section	HP	85420E	3705A00248	November 24, 2010	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2010	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	August 1, 2010	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2010	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 4, 2011	1 Year
Signal Generator	HP	E4432B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4432B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C	MY42082734	July 21, 2010	1 year
Signal Generator	HP	83731B	US37100653	February 21, 2011	1 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2010	2 year

16. APPENDIX A - CORRECTION FACTORS

16.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

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

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

NOTES:

1. The cable type is RG-214.

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

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

16.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

16.3 Correction factors for CABLE

from spectrum analyzer to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

16.4 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

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

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

NOTES:

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

16.5 Correction factors 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			