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DATE: 12 February 2012

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

FCC Radio Test Report

for

Mobile Access Networks

Equipment under test:

Mobile AccessHX High-Power DAS Remote Unit MIMO

HX-C85P19L70MA17M-AC-A (LTE/AWS Section)

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
I. Siboni, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

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Measurement/Technical Report for

Mobile Access Networks

Mobile AccessHX High-Power DAS Remote Unit MIMO

HX-C85P19L70MA17M-AC-A

FCC ID: OJFHXCPL70MAM

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:

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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 MIMO
Equipment Model No.:	HX-C85P19L70MA17M-AC-A
Equipment Serial No.:	0B422A0
Date of Receipt of E.U.T:	19.12.2011
Start of Test:	19.12.2011
End of Test:	01.01.2012
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

MobileAccess**HX** is a high power, remote solution for the MobileAccess**1000** (MA1000) and MobileAccess**2000** (MA2000) Distributed Antenna Systems. It is a fiber-fed, compact and scalable multi-service platform designed to complement the MA1000 and MA2000 and provide complete RF open space coverage for large-scale public venues, such as campuses, stadiums, convention centers, hotels, airports, and train stations. The solution can be deployed in new sites or alongside existing MA1000 and MA2000 systems, sharing a common head-end and element management system (EMS).

MobileAccess**HX** will support 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.

Alongside MA1000 and 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 GSM, UMTS, HSPA, LTE, EDGE, EV-DO, AWS, and more. Provides MIMO configuration for LTE700, AWS and UMTS band.

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.

Indoor Models: Supports either SISO or MIMO service in a single compact enclosure.

Outdoor Models: Outdoor enclosures are compliant to IP65/NEMA standard.

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 and are available in AC or DC power supply options. Antenna splitting schemes are possible due to the higher power output capability.

Backwards Compatible: Connects to an existing MobileAccess**1000** or MobileAccess**2000** 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 MA1000 or 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-SISO/MIMO and outdoor-SISO models) consists of a compact enclosure that houses the RF module, power elements, and the required interfaces. The RF module supports three bands (GSM, DCS, and UMTS) and two types of quad bands (Type 1: LTE700, CELL, PCS, and AWS or Type 2: CELL, EGSM, DCS, or UMTS) All mobile services are combined and distributed through a single antenna port over antennas installed at the remote locations.

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

Both conducted and 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

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:

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

± 3.44 dB

Radiated Emission (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 (LTE and AWS) 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

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)
72.60	47.5	45.5
373.00	42.9	42.6
865.00	41.9	39.9
4270.00	43.4	43.6

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

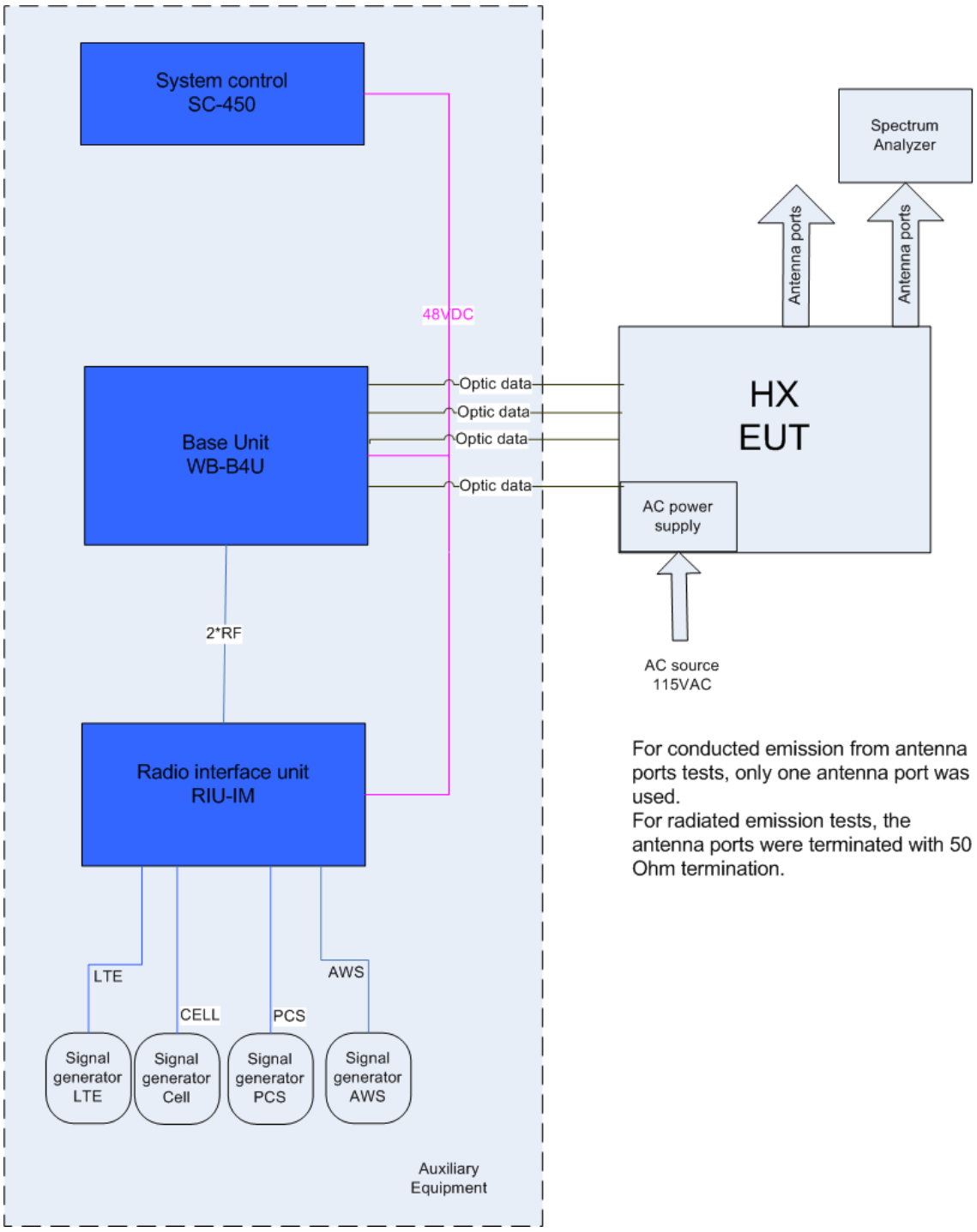

Figure 1. Test Set-up

3. Conducted and Radiated Measurement Test Set-ups PhotoS

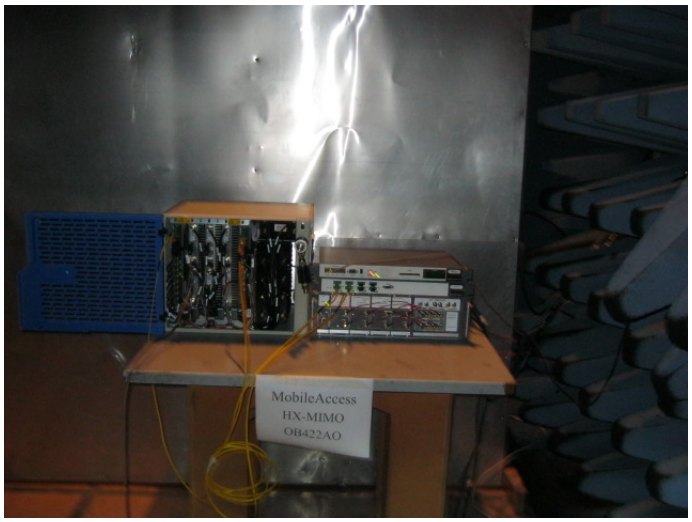

Figure 2. Conducted Emission From AC Mains Test

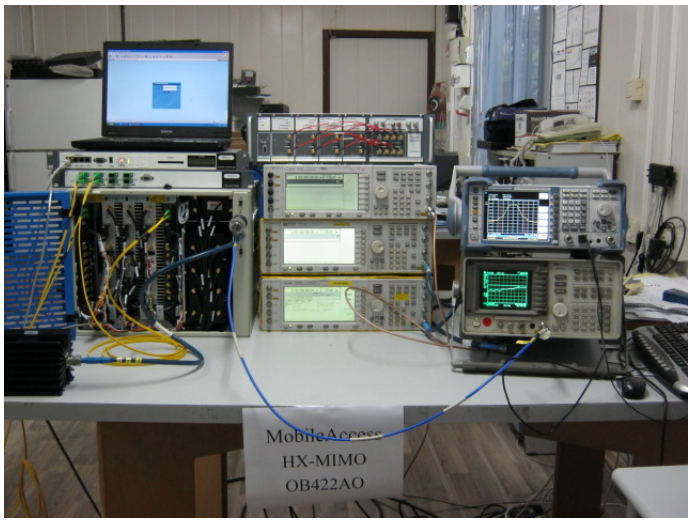

Figure 3. Conducted Emission From Antenna Ports Tests

Figure 4. 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 2.7 dB

The margin between the emission levels and the specification limit is, in the worst case, 2.7 dB for the phase line at 11.61 MHz and 3.8 dB at 11.62 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 5* to *Figure 8*.

TEST PERSONNEL:

Tester Signature: _____ Date: 13.02.12

Typed/Printed Name: I. Siboni

Conducted Emission

E.U.T Description	Mobile AccessHX High-Power DAS Remote Unit MIMO
Type	HX-C85P19L70MA17M-AC-A
Serial Number:	0B422A0

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	0.151625	57.2	50.5	-28.5	34.9	-31.1	0.0
2	0.169082	54.4	48.0	-31.0	26.8	-39.2	0.0
3	0.326575	47.4	41.4	-37.6	32.1	-33.9	0.0
4	0.553687	51.2	44.1	-28.9	27.1	-32.9	0.0
5	3.436953	47.7	44.2	-28.8	32.9	-27.1	0.0
6	11.614840	57.7	57.3	-15.7	57.3	-2.7	0.0

Figure 5. 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	Mobile AccessHX High-Power DAS Remote Unit MIMO
Type	HX-C85P19L70MA17M-AC-A
Serial Number:	0B422A0

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

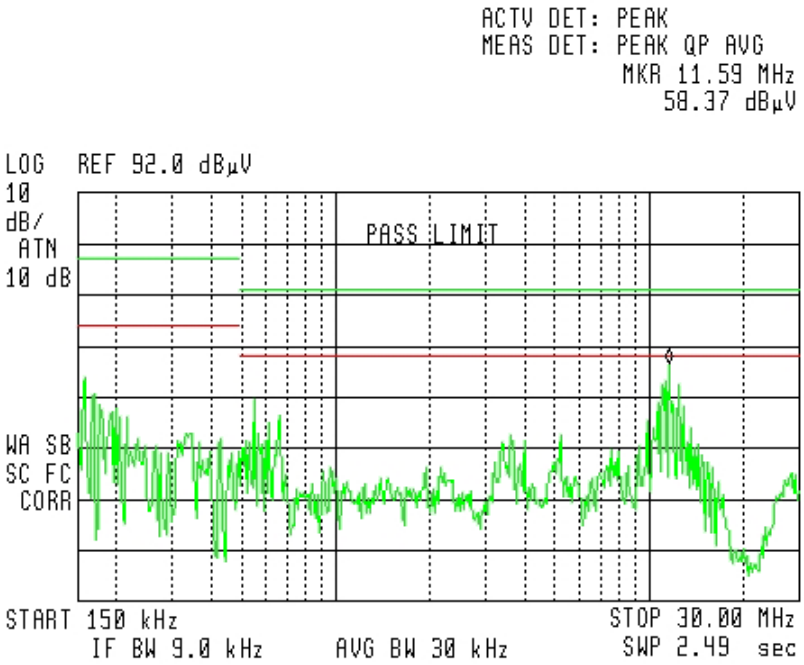

Figure 6. Detectors: Peak, Quasi-peak, Average

Conducted Emission

E.U.T Description	Mobile AccessHX High-Power DAS Remote Unit MIMO
Type	HX-C85P19L70MA17M-AC-A
Serial Number:	0B422A0

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	0.151639	57.3	49.8	-29.2	35.0	-31.0	0.0
2	0.220585	48.3	41.5	-37.5	25.5	-40.5	0.0
3	0.641202	44.1	38.5	-34.5	20.5	-39.5	0.0
4	3.657524	47.8	43.8	-29.2	31.7	-28.3	0.0
5	5.049944	48.3	43.2	-29.8	30.7	-29.3	0.0
6	11.623800	57.1	56.3	-16.7	56.2	-3.8	0.0

Figure 7. 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	Mobile AccessHX High-Power DAS Remote Unit MIMO
Type	HX-C85P19L70MA17M-AC-A
Serial Number:	0B422A0

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

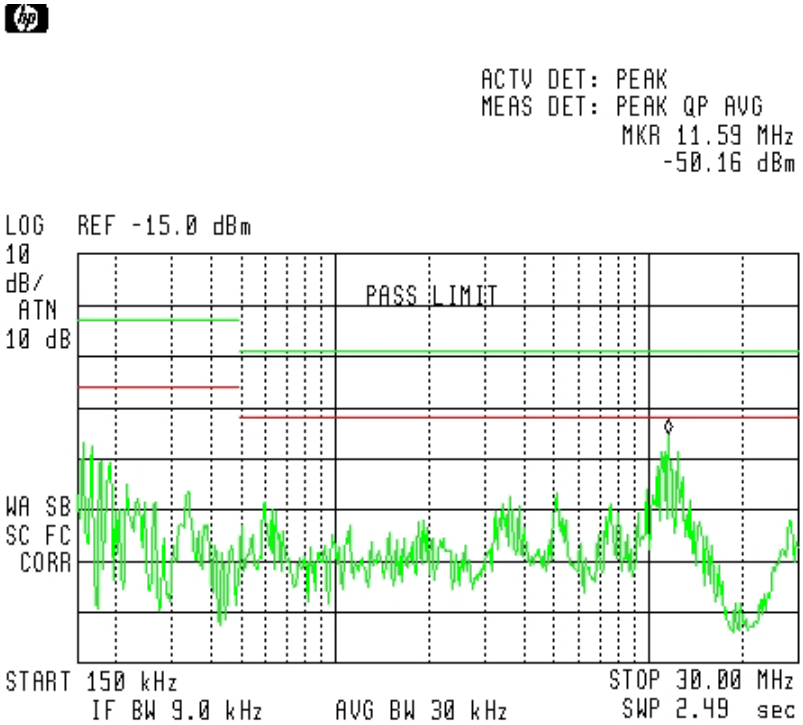

Figure 8 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

4.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 3, 2011	1 Year
EMI Receiver	HP	85422E	3906A00276	December 12 2011	1Year
RF Filter Section	HP	85420E	3705A00248	December 12 2011	1Year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

5. RF Power Output LTE

5.1 Test Specification

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

5.2 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 728-758MHz 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.

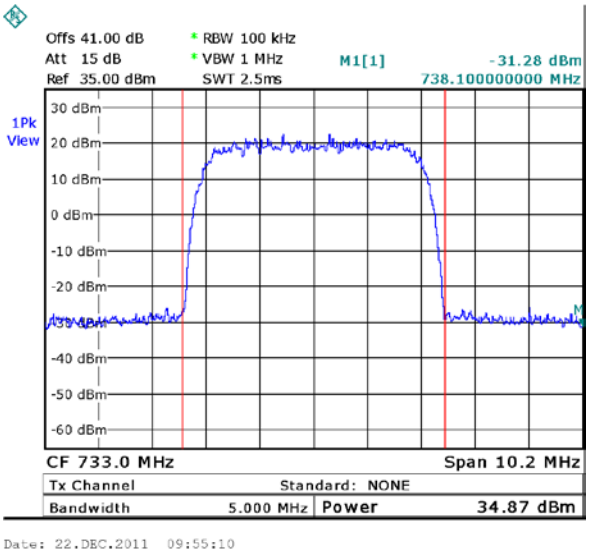

Figure 9.— W-CDMA (733 MHz)

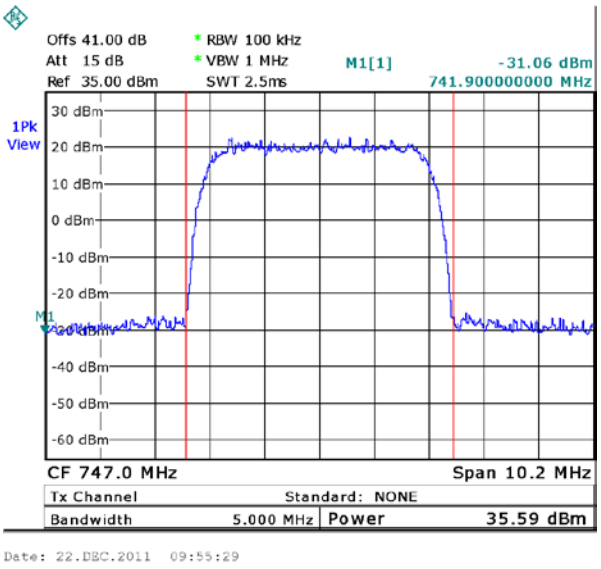

Figure 10.— W-CDMA (747 MHz)

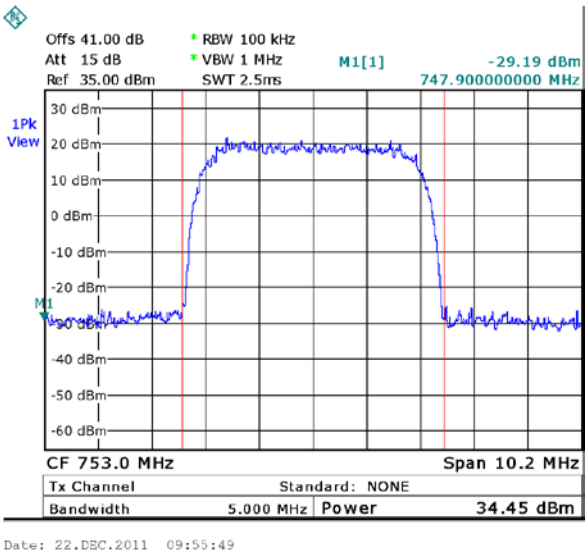

Figure 11.— W-CDMA (753 MHz)

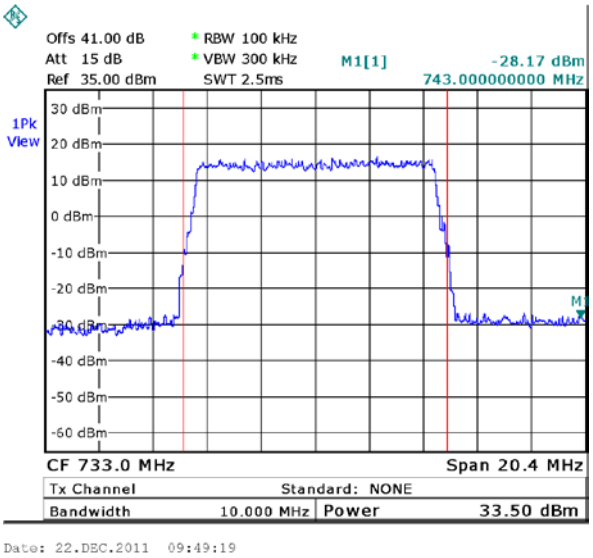

Figure 12.— QPSK (733 MHz)

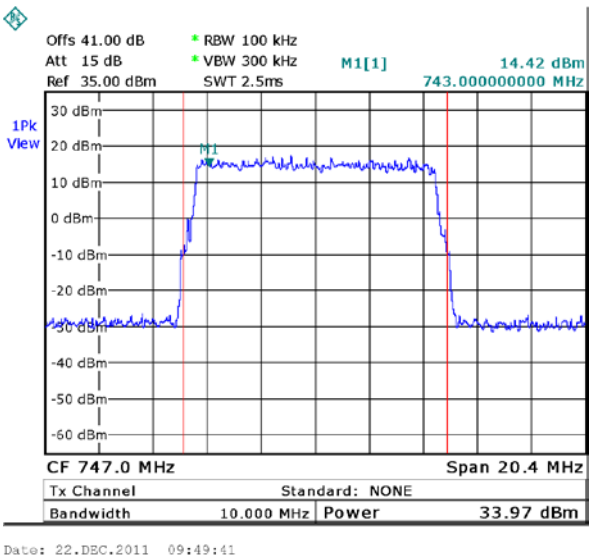

Figure 13.— QPSK (747 MHz)

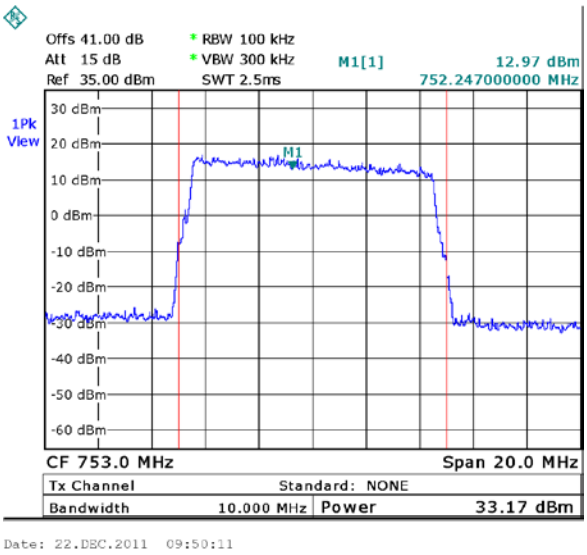

Figure 14.— QPSK (753 MHz)

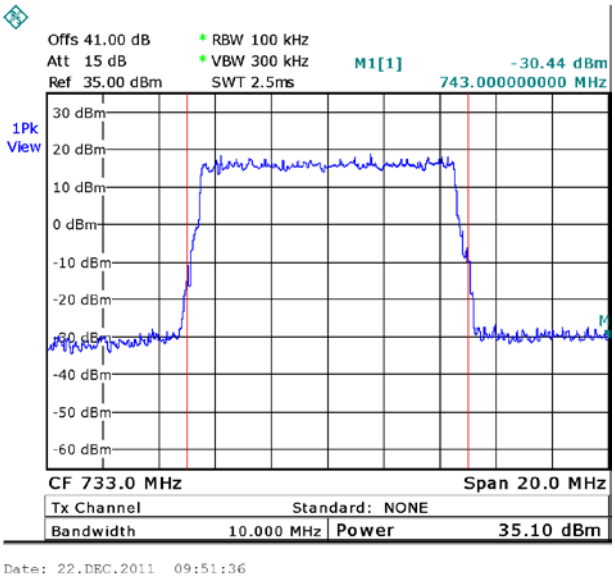

Figure 15.— 16QAM (733 MHz)

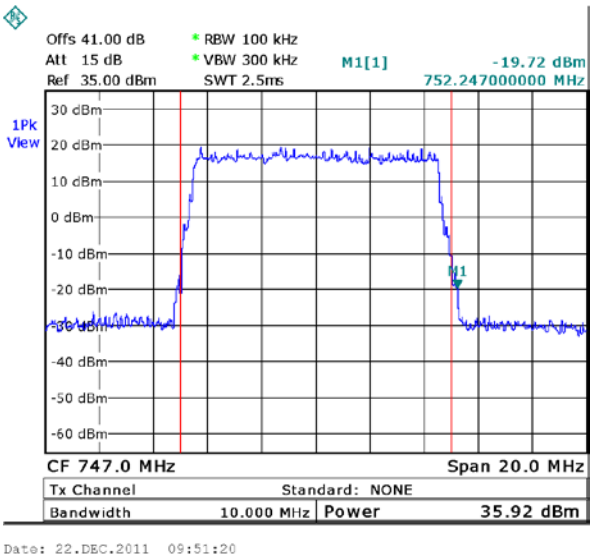

Figure 16.— 16QAM (747 MHz)

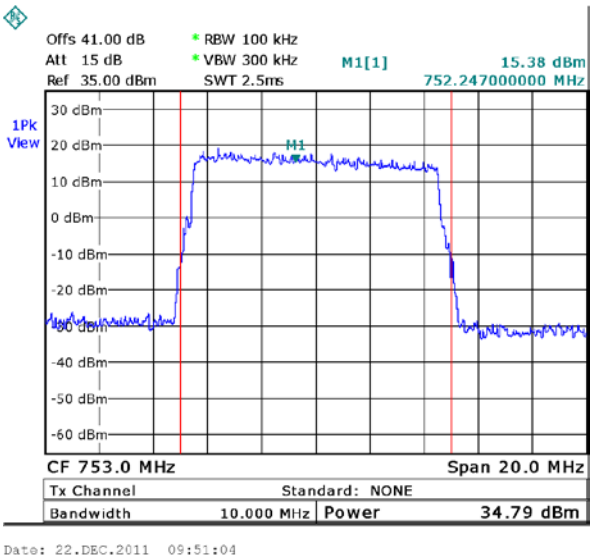

Figure 17.— 16QAM (753 MHz)

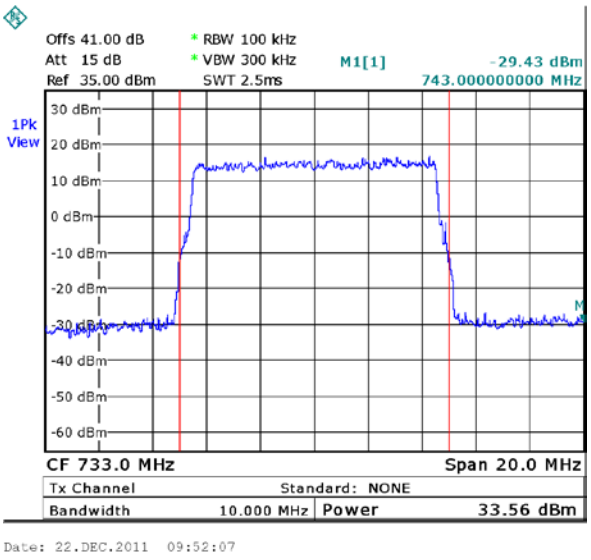

Figure 18.— 64QAM (733 MHz)

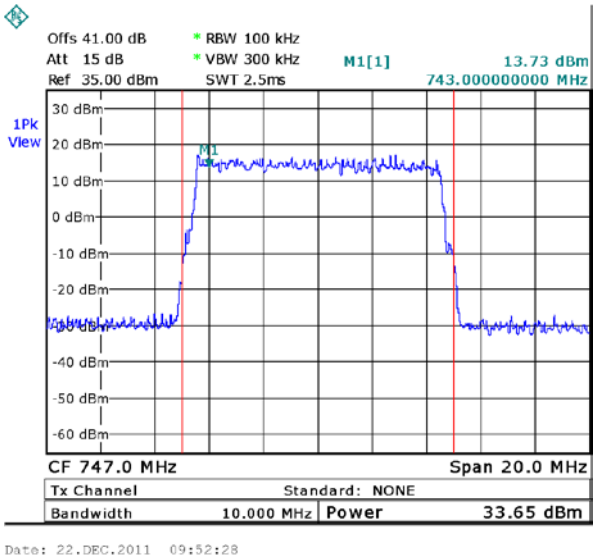

Figure 19.— 64QAM (747 MHz)

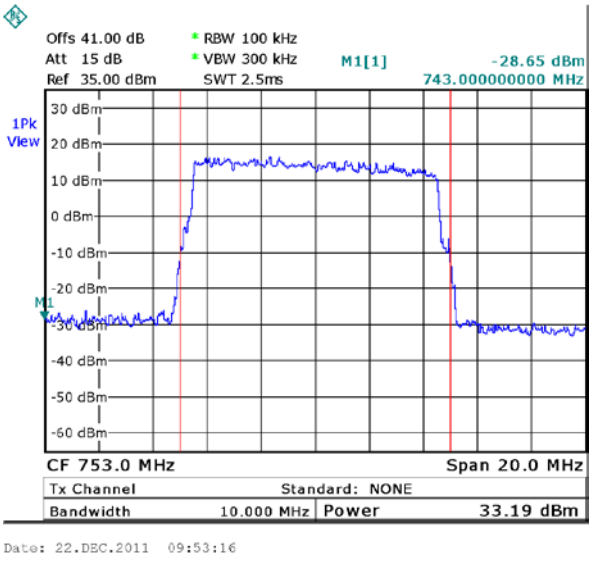

Figure 20.— 64QAM (753 MHz)

5.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
Specification: FCC Part 27, Subpart C, Section 27.50 (d)

Modulation	Operation Frequency (MHz)	Reading (dBm)	2 ports MIMO (dBm)
WCDMA	733	34.87	37.87
	747	35.59	38.59
	753	34.45	37.45
QPSK	733	33.50	36.50
	747	33.97	36.97
	753	33.17	36.17
16QAM	733	35.10	38.10
	747	35.92	38.92
	753	34.79	37.79
64QAM	733	33.56	37.56
	747	33.65	36.65
	753	33.19	36.19

Figure 21 RF Power Output LTE

TEST PERSONNEL:

Tester Signature: _____ Date: 13.02.12

Typed/Printed Name: I. Siboni

5.4 Test Equipment Used.

RF Power Output LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE&SCHWARZ	FSL6	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Signal Generator	HP	E4438C	MY42082764	July 18, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 22 Test Equipment Used

6. Occupied Bandwidth LTE

6.1 Test Specification

FCC Part 2, Section 1049

6.2 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.

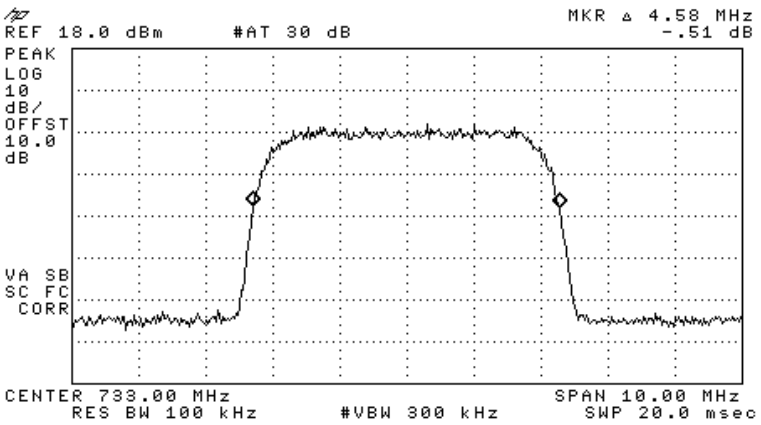

Figure 23.— W-CDMA (733 MHz) IN

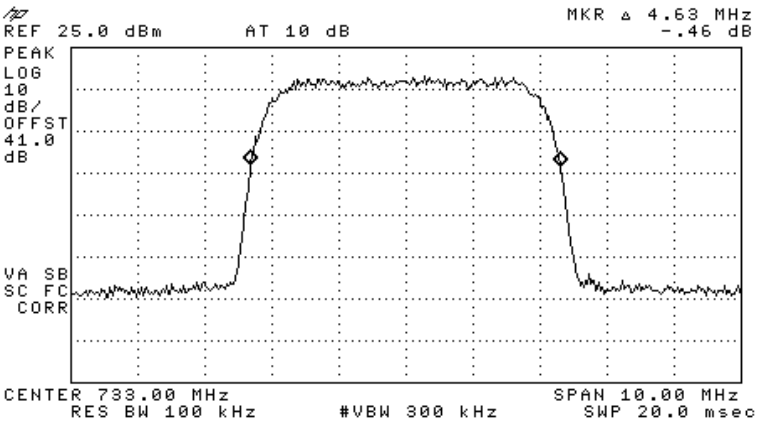

Figure 24.— W-CDMA (733 MHz) OUT

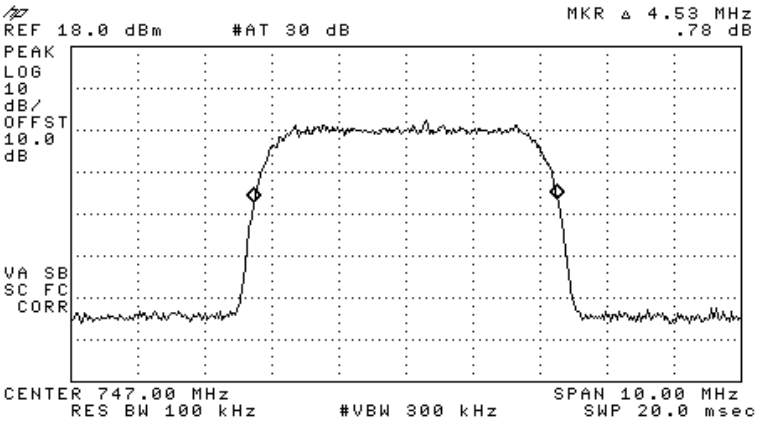

Figure 25.— W-CDMA (747 MHz) IN

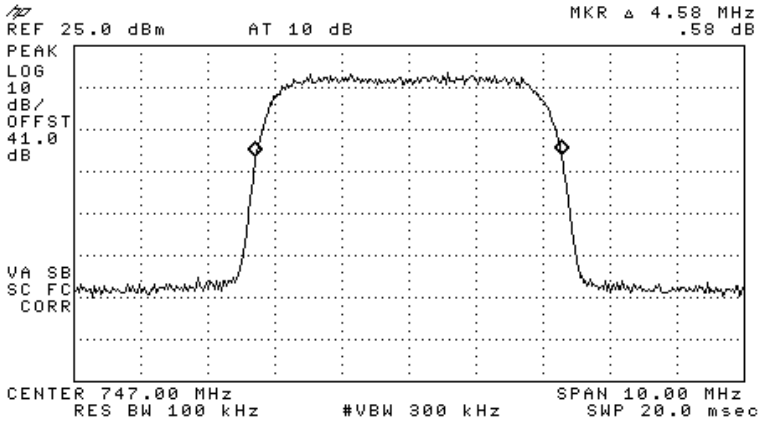

Figure 26.— W-CDMA (747 MHz) OUT

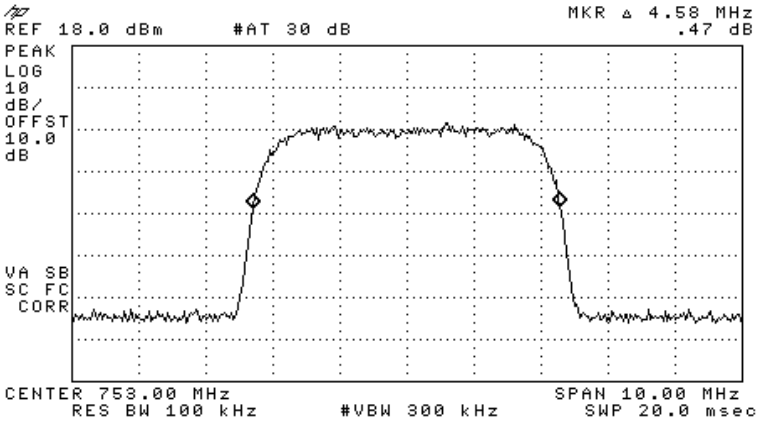

Figure 27.— W-CDMA (753 MHz) IN

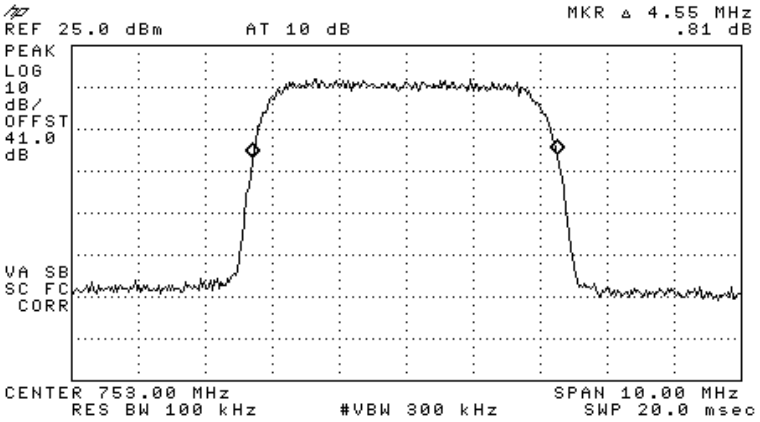

Figure 28.— W-CDMA (753 MHz) OUT

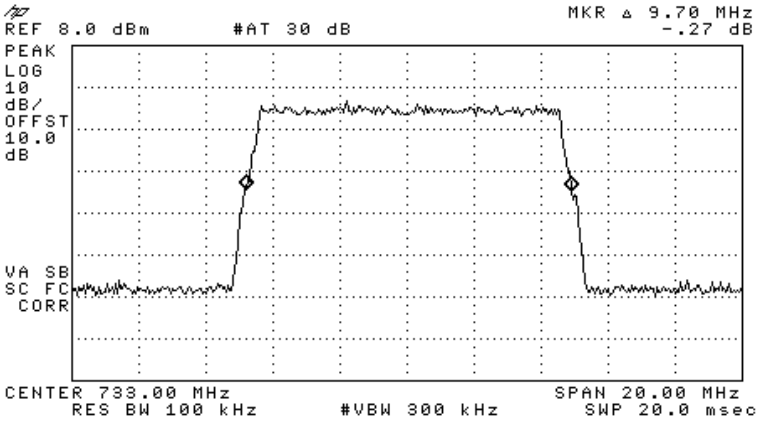

Figure 29.— QPSK (733 MHz) IN

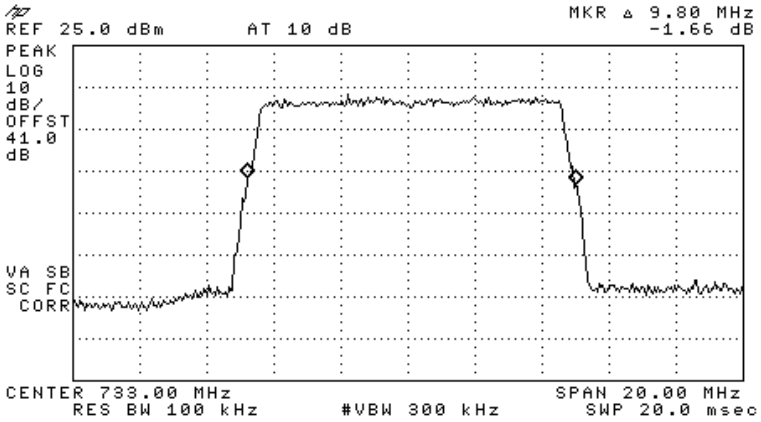

Figure 30.— QPSK (733 MHz) OUT

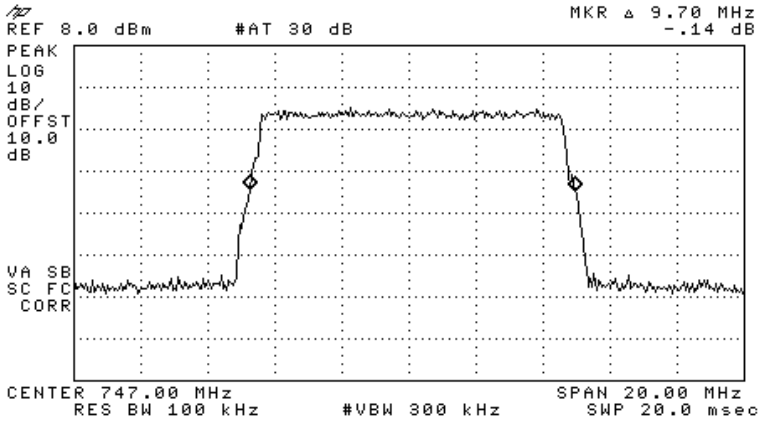

Figure 31.— QPSK (747 MHz) IN

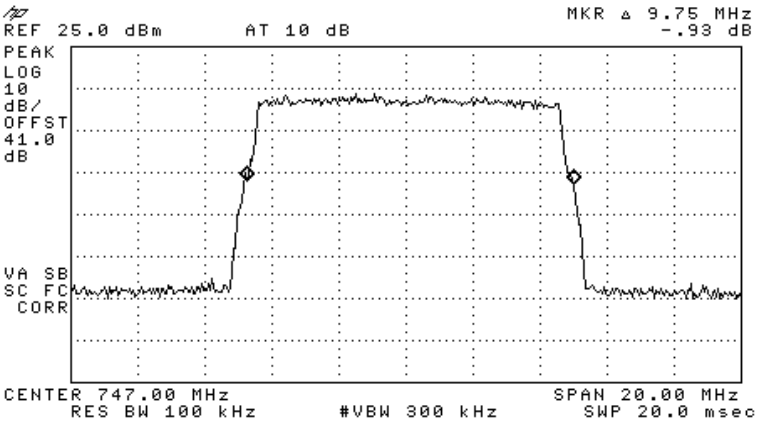

Figure 32.— QPSK (747 MHz) OUT

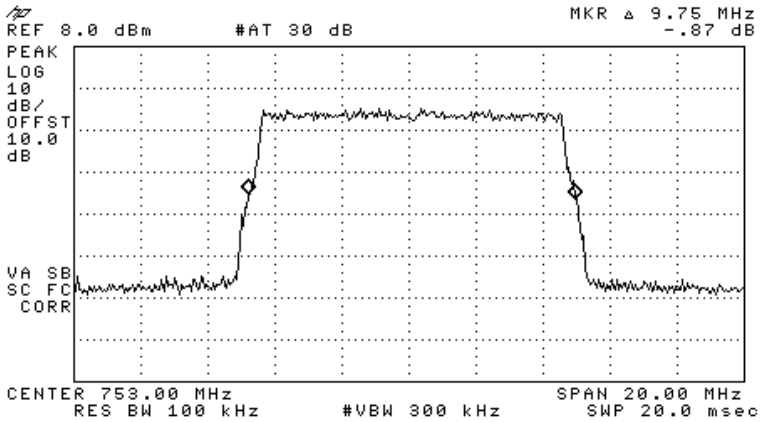

Figure 33.— QPSK (753 MHz) IN

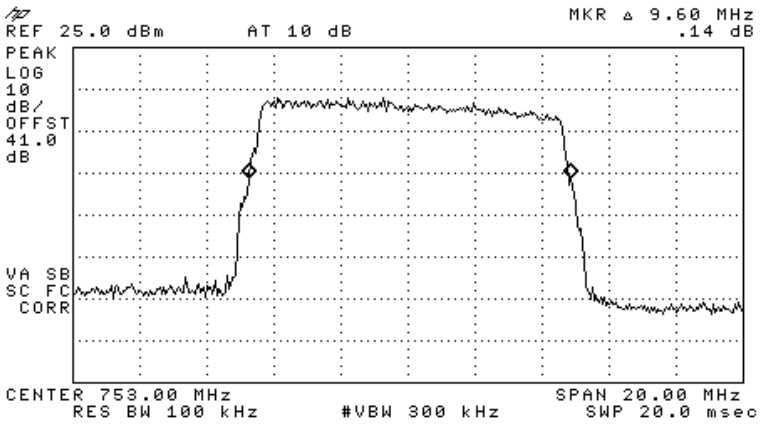

Figure 34.— QPSK (753 MHz) OUT

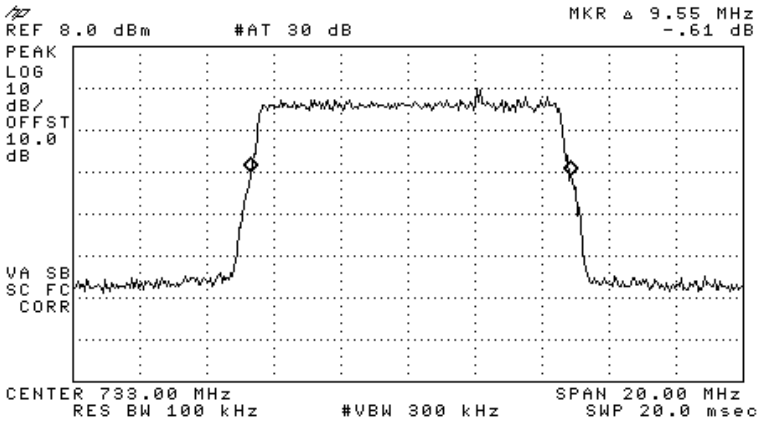

Figure 35.— 16QAM (733 MHz) IN

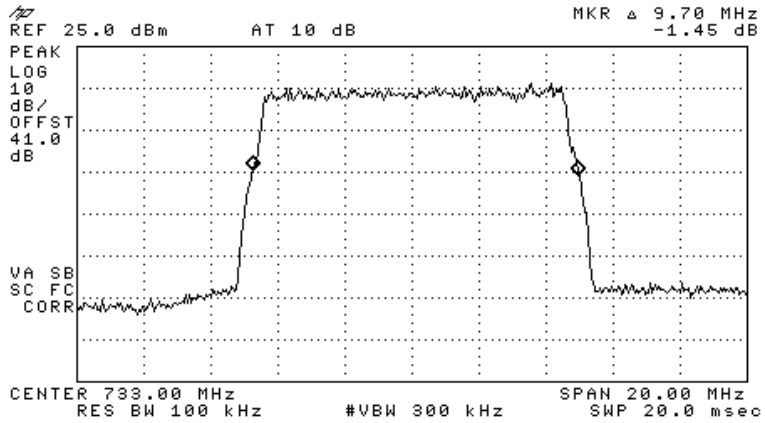

Figure 36.— 16QAM (733 MHz) OUT

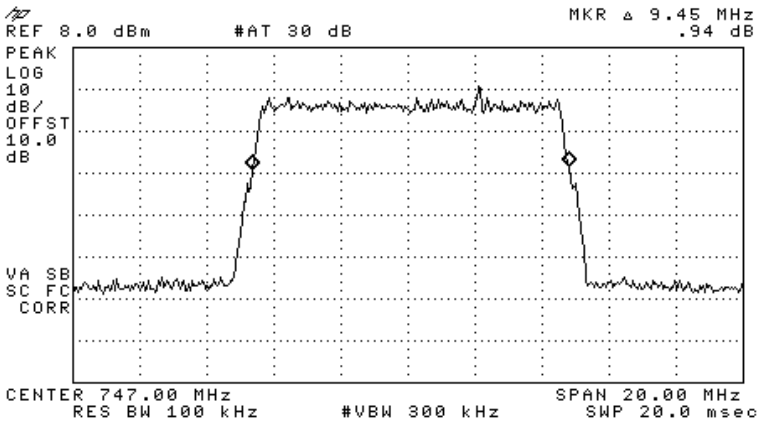

Figure 37.— 16QAM (747 MHz) IN

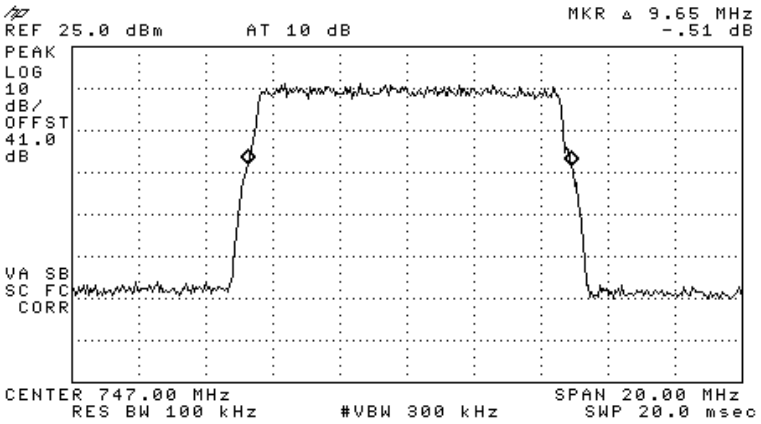

Figure 38.— 16QAM (747 MHz) OUT

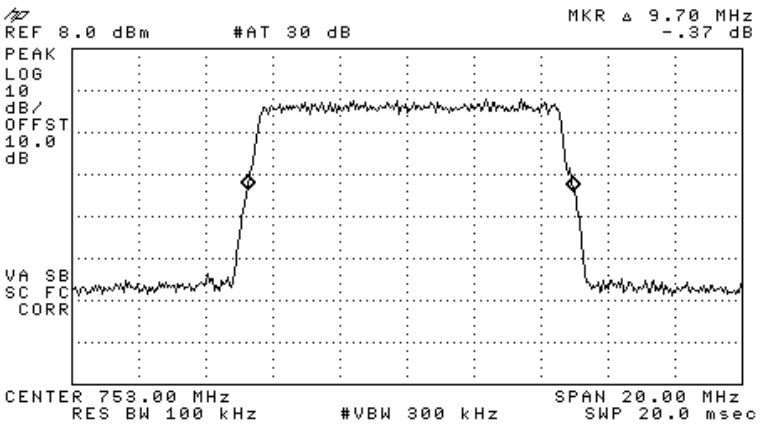

Figure 39.— 16QAM (753 MHz) IN

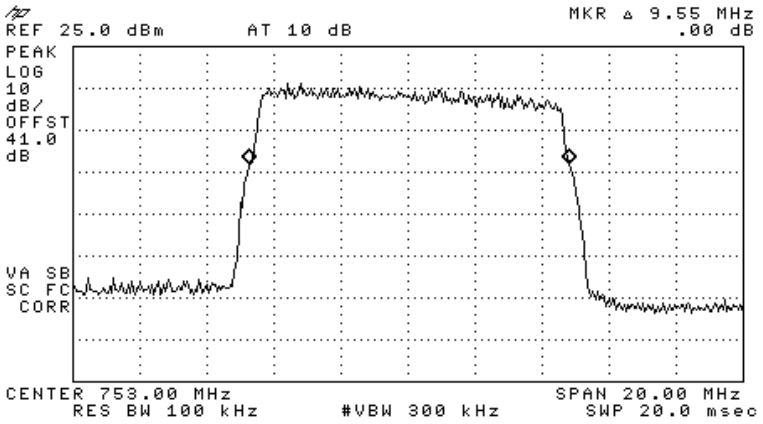

Figure 40.— 16QAM (753 MHz) OUT

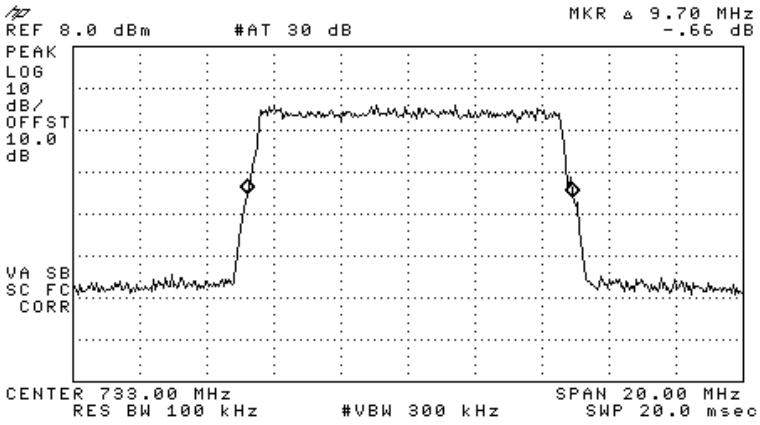

Figure 41.— 64QAM (733 MHz) IN

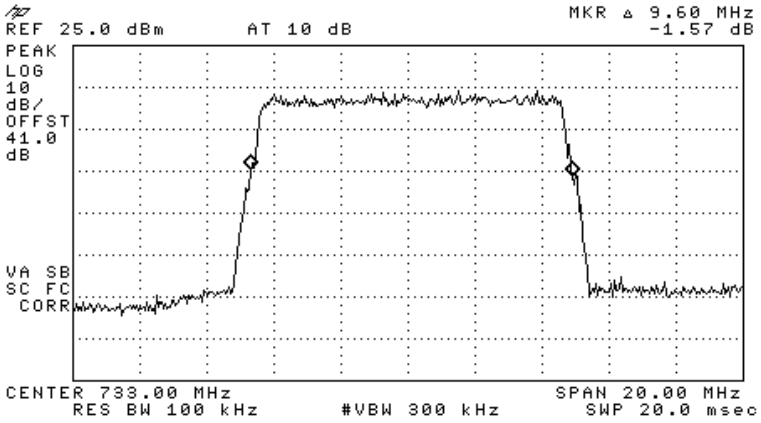

Figure 42.— 64QAM (733 MHz) OUT

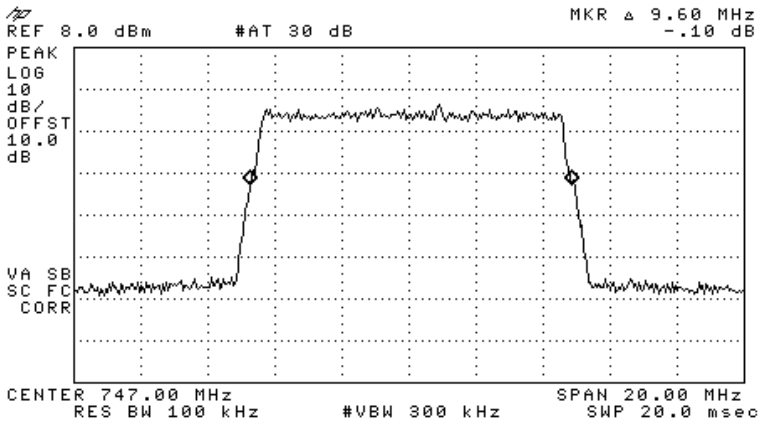

Figure 43.— 64QAM (747 MHz) IN

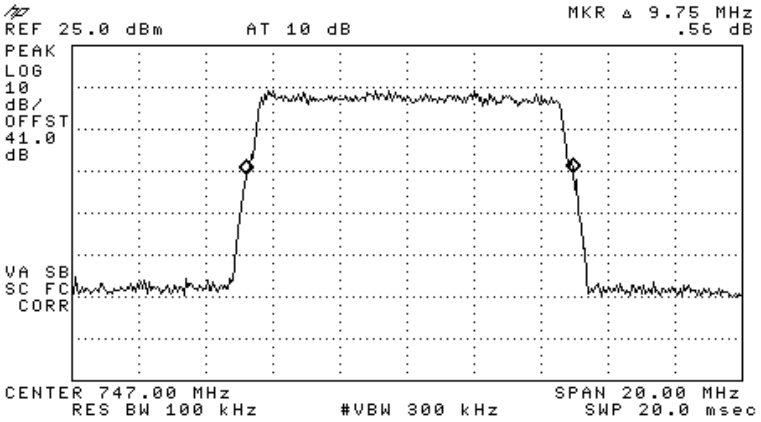

Figure 44.— 64QAM (747 MHz) OUT

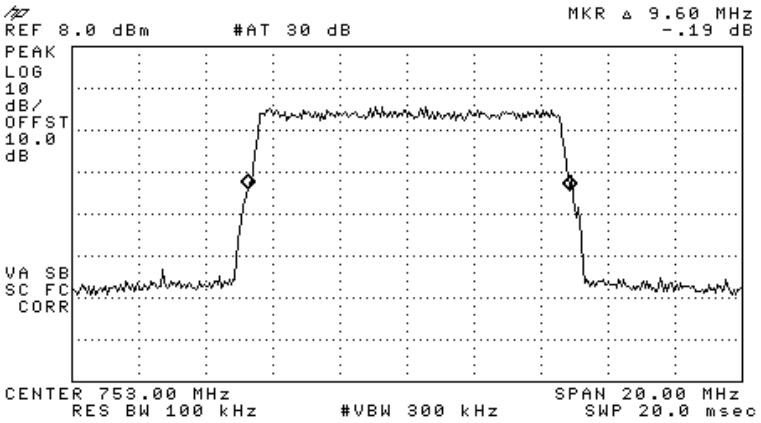

Figure 45.— 64QAM (753 MHz) IN

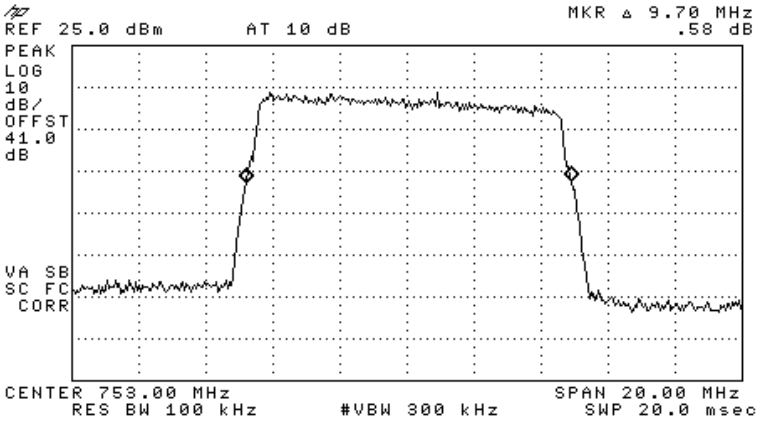

Figure 46.— 64QAM (753 MHz) OUT

6.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (26dBc) (MHz)
WCDMA	Input	733	4.58
	Output	733	4.63
	Input	747	4.53
	Output	747	4.58
	Input	753	4.58
	Output	753	4.55
QPSK	Input	733	9.70
	Output	733	9.80
	Input	747	9.70
	Output	747	9.75
	Input	753	9.75
	Output	753	9.60
16QAM	Input	733	9.55
	Output	733	9.70
	Input	747	9.45
	Output	747	9.65
	Input	753	9.70
	Output	753	9.55
64QAM	Input	733	9.70
	Output	733	9.60
	Input	747	9.60
	Output	747	9.75
	Input	753	9.60
	Output	753	9.70

Figure 47 Occupied Bandwidth LTE9.70

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 13.02.12

Typed/Printed Name: I. Siboni

6.4 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	MY42082764	July 18, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 48 Test Equipment Used

7. Spurious Emissions at Antenna Terminals LTE

7.1 Test Specification

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

7.2 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.

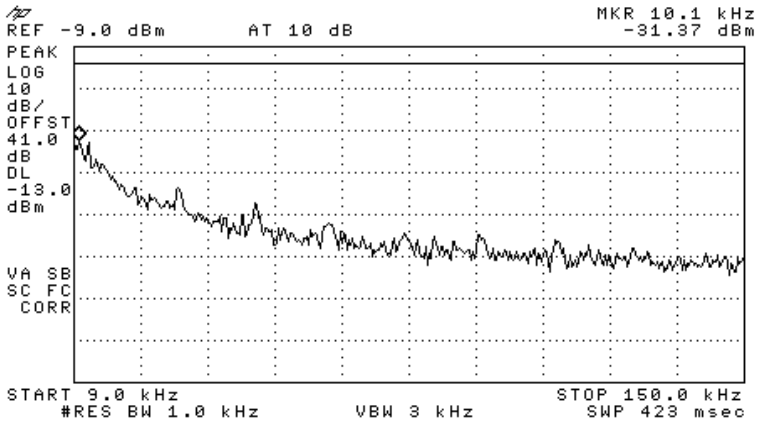

Figure 49.— 733 MHz W-CDMA

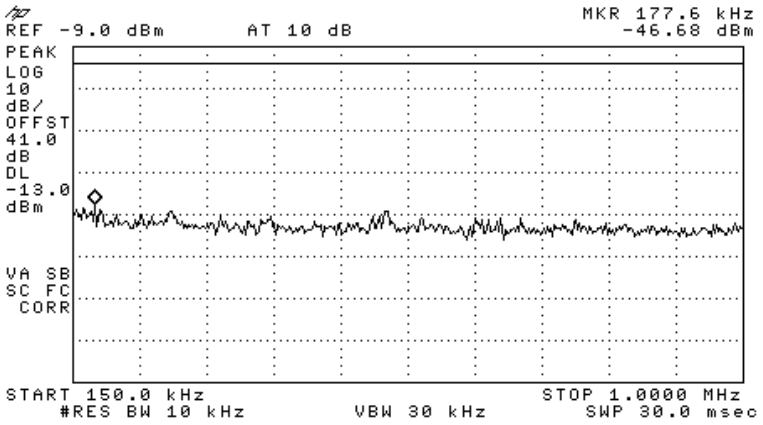

Figure 50.— 733 MHz W-CDMA

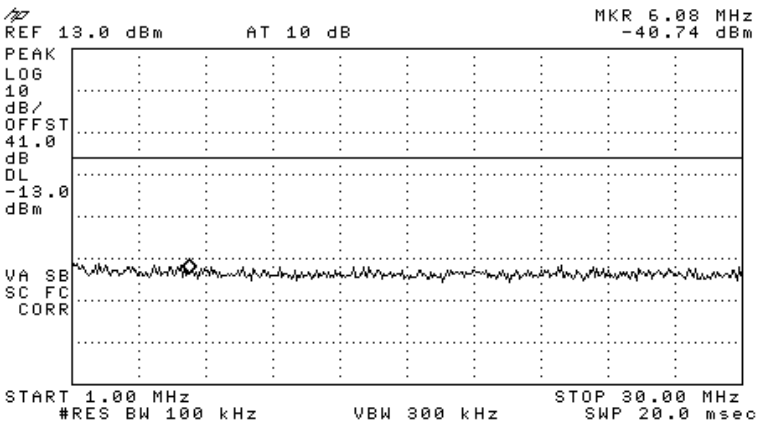

Figure 51.— 733 MHz W-CDMA

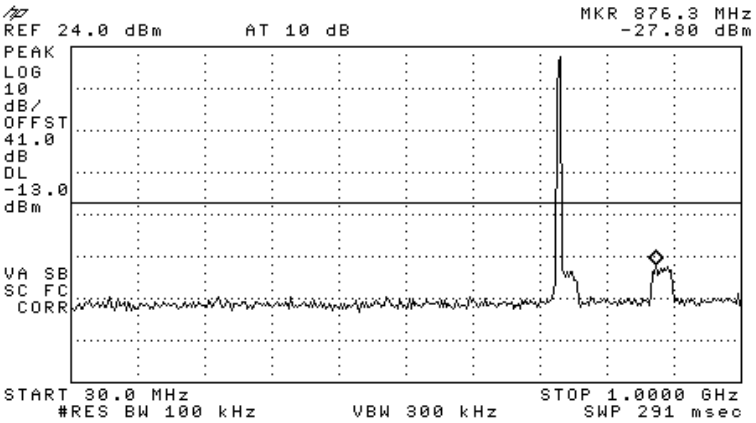

Figure 52.— 733 MHz W-CDMA

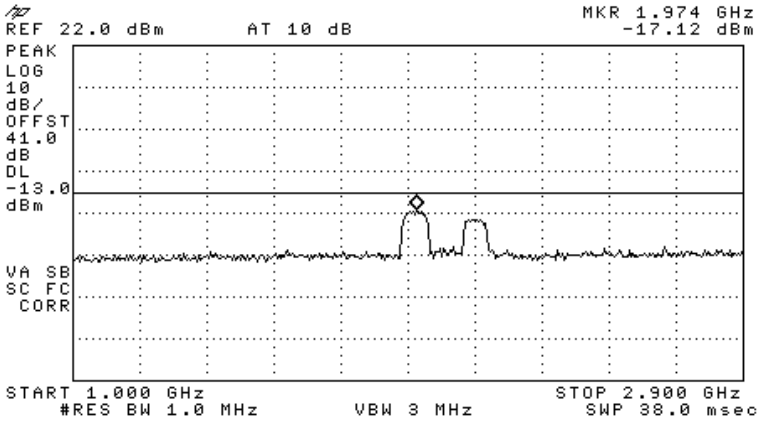

Figure 53.— 733 MHz W-CDMA

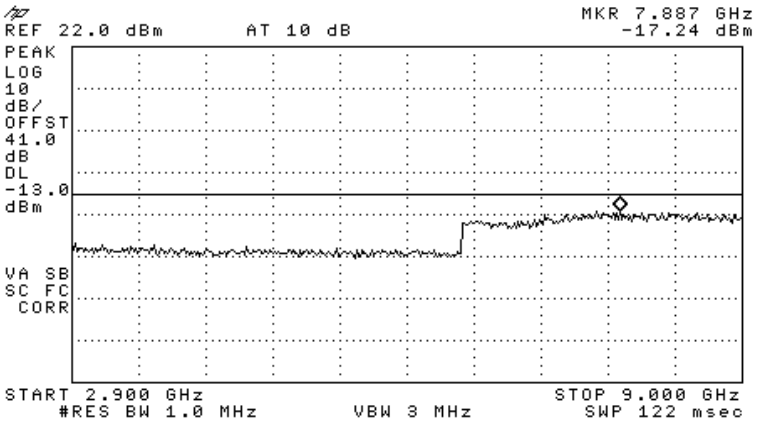

Figure 54.— 733 MHz W-CDMA

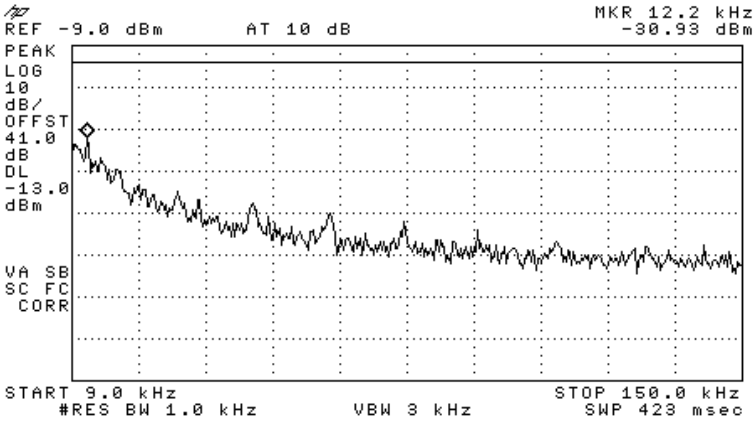

Figure 55.— 747 MHz W-CDMA

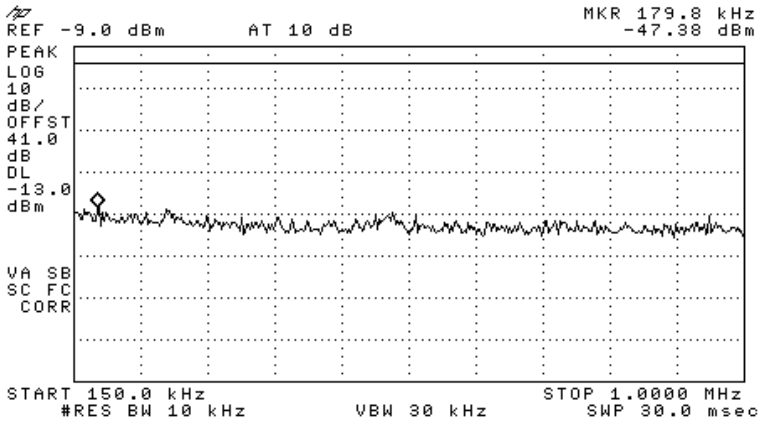

Figure 56.— 747 MHz W-CDMA

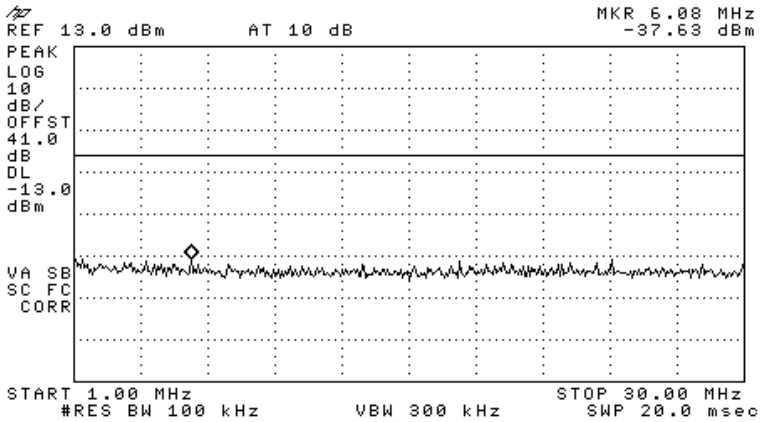

Figure 57.— 747 MHz W-CDMA

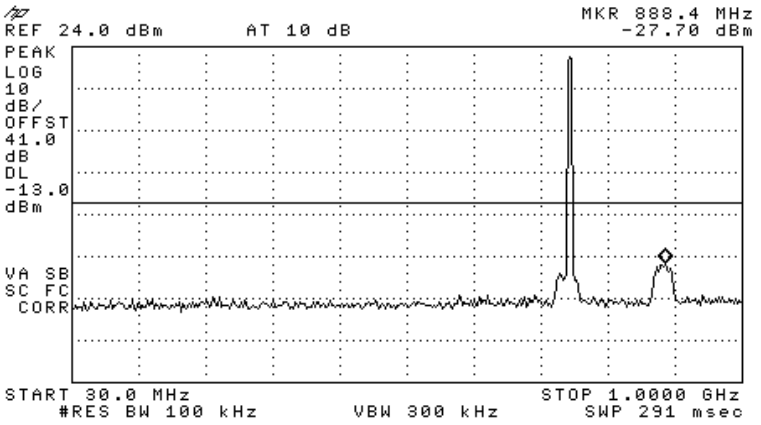

Figure 58.— 747 MHz W-CDMA

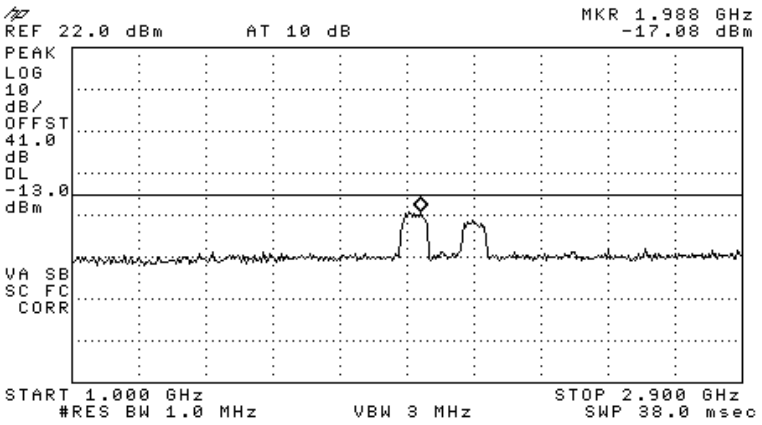

Figure 59.— 747 MHz W-CDMA

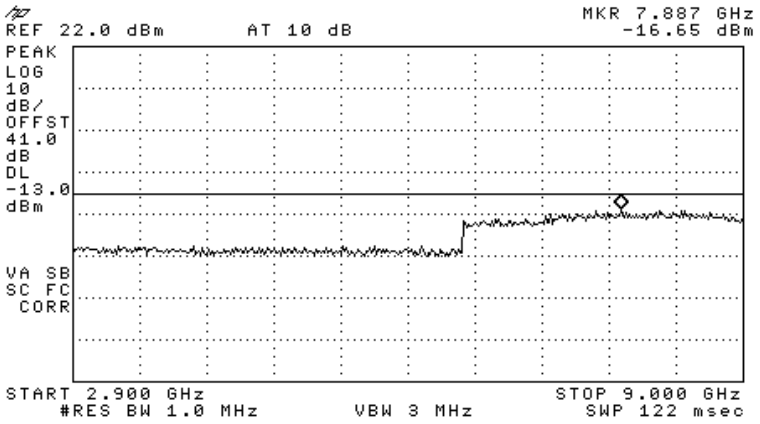

Figure 60.— 747 MHz W-CDMA

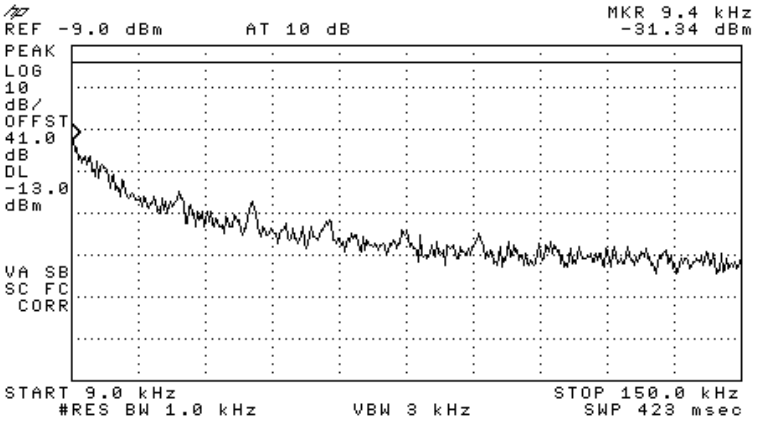

Figure 61.— 753 MHz W-CDMA

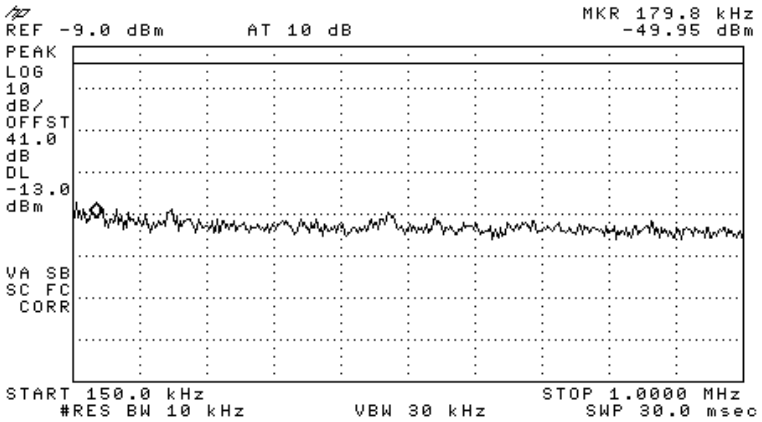

Figure 62.— 753 MHz W-CDMA

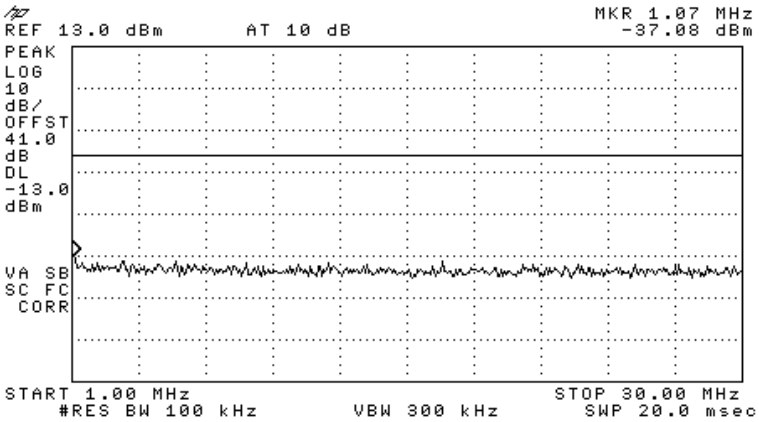

Figure 63.— 753 MHz W-CDMA

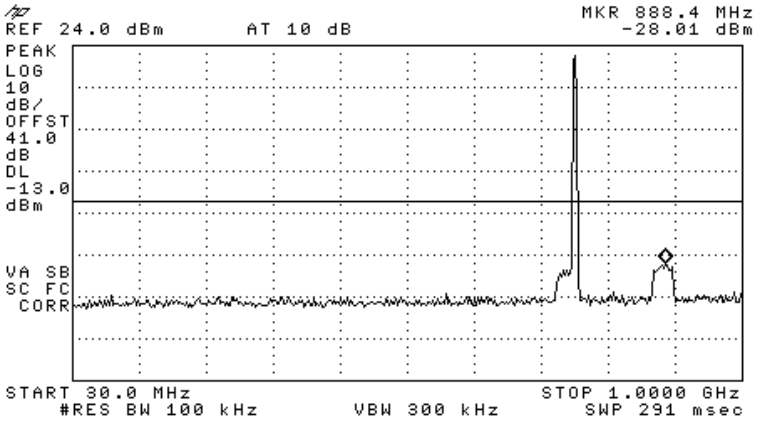

Figure 64.— 753 MHz W-CDMA

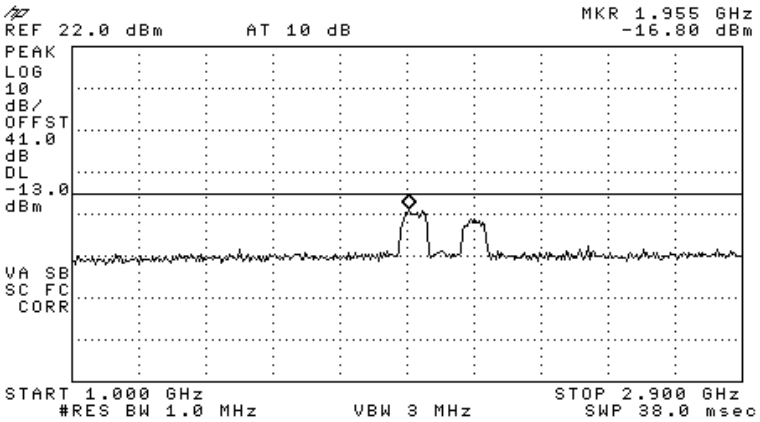

Figure 65.— 753 MHz W-CDMA

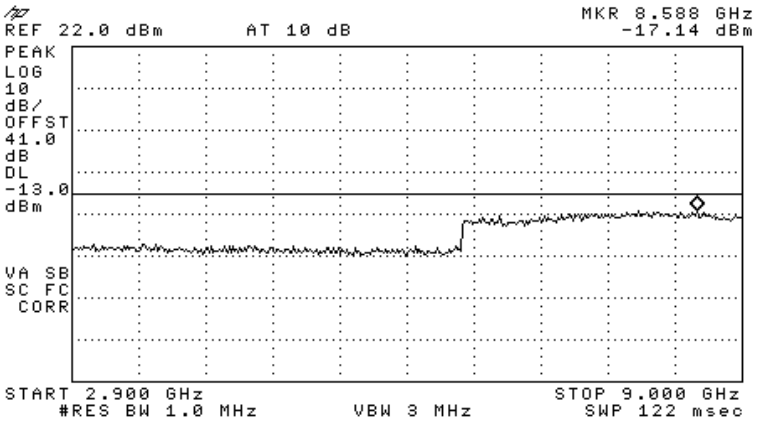

Figure 66.— 753 MHz W-CDMA

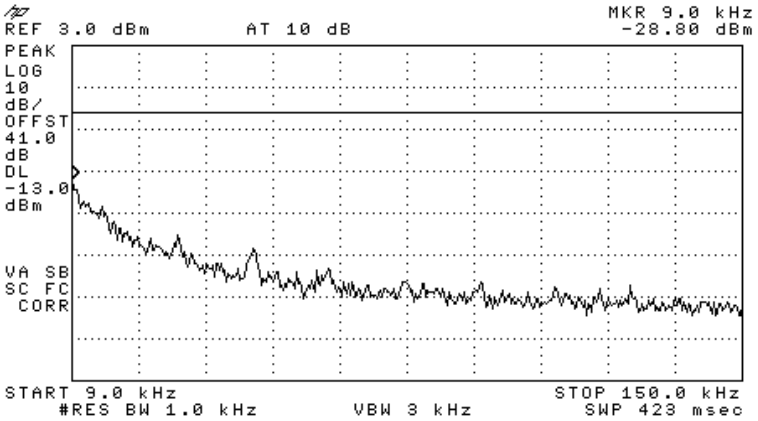

Figure 67.— 733 MHz QPSK

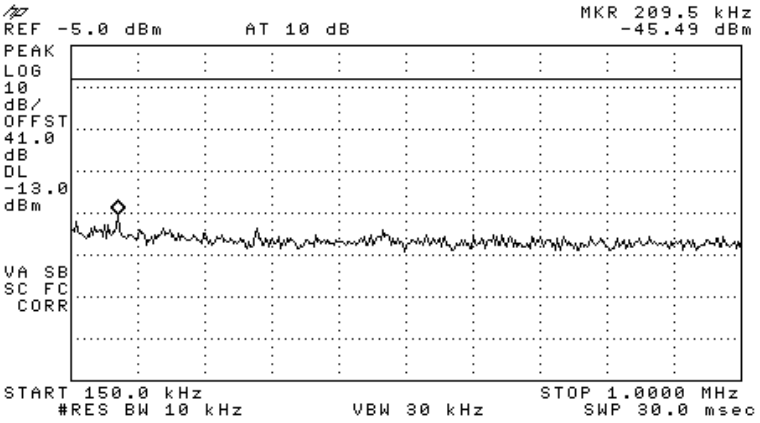

Figure 68.— 733 MHz QPSK

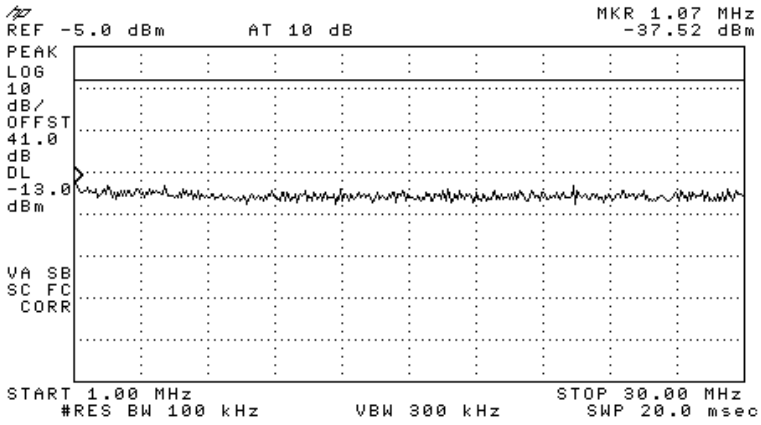

Figure 69.— 733 MHz QPSK

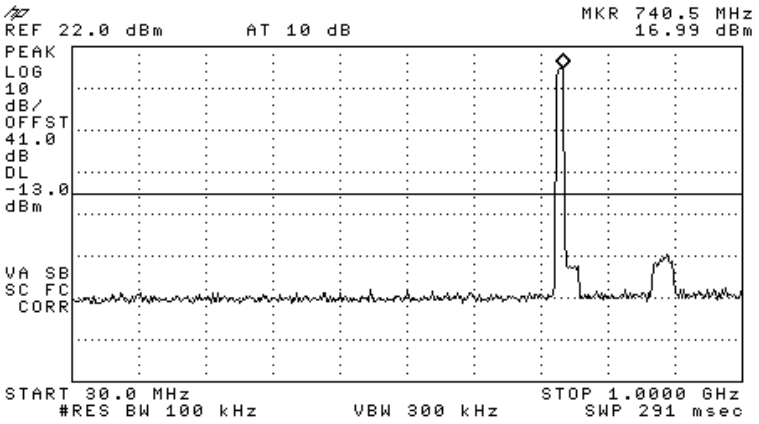

Figure 70.— 733 MHz QPSK

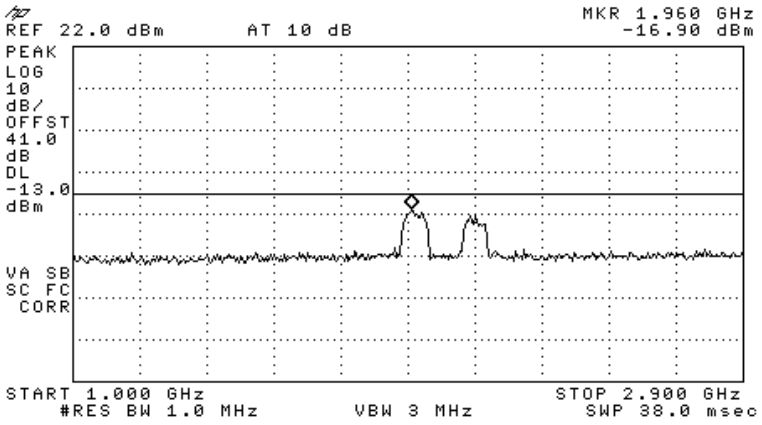

Figure 71.— 733 MHz QPSK

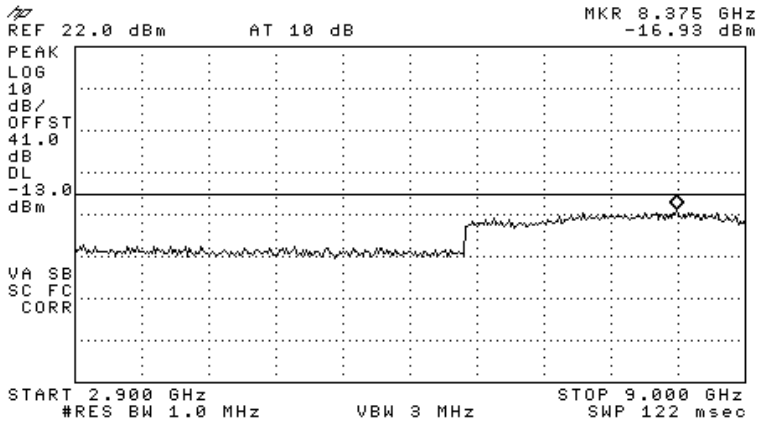

Figure 72.— 733 MHz QPSK

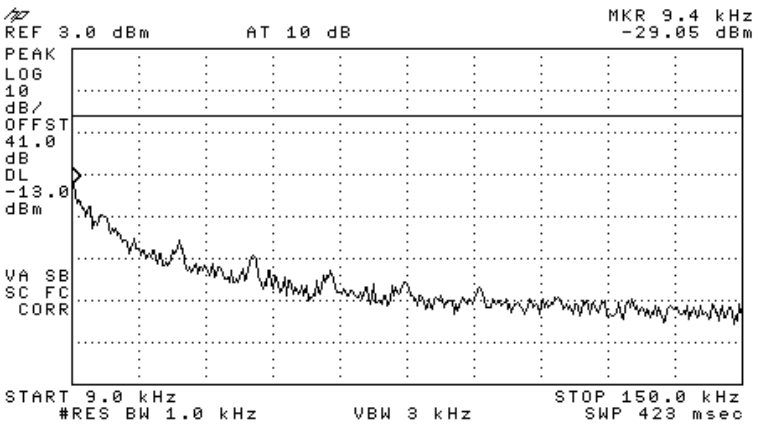

Figure 73.— 747 MHz QPSK

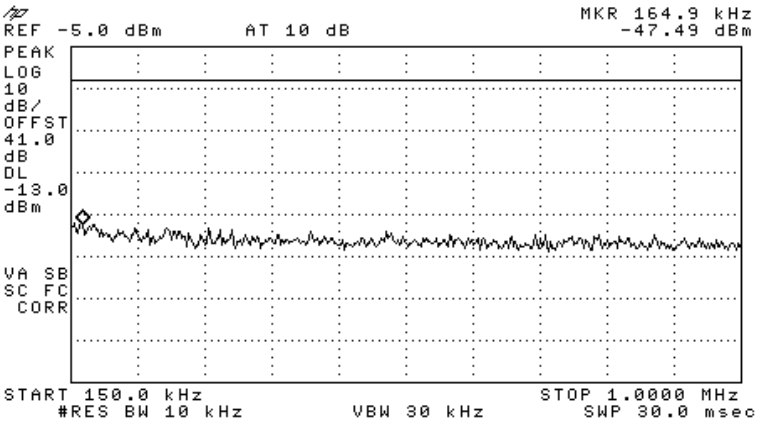

Figure 74.— 747 MHz QPSK

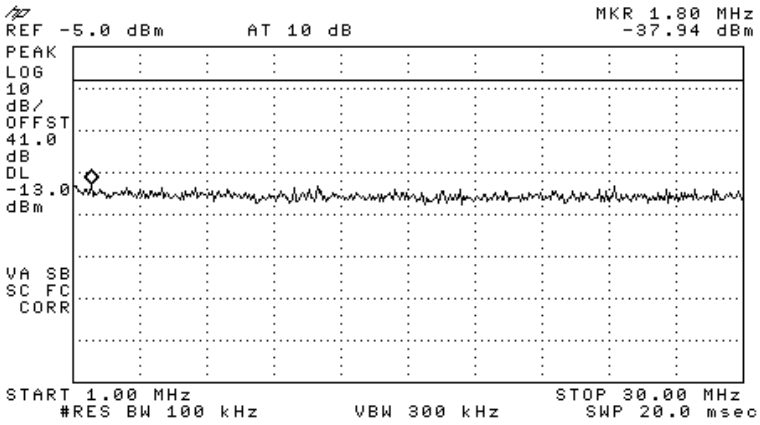

Figure 75.— 747 MHz QPSK

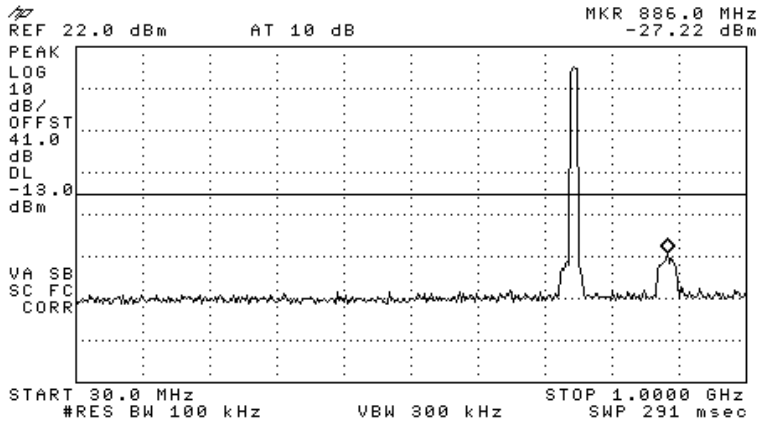

Figure 76.— 747 MHz QPSK

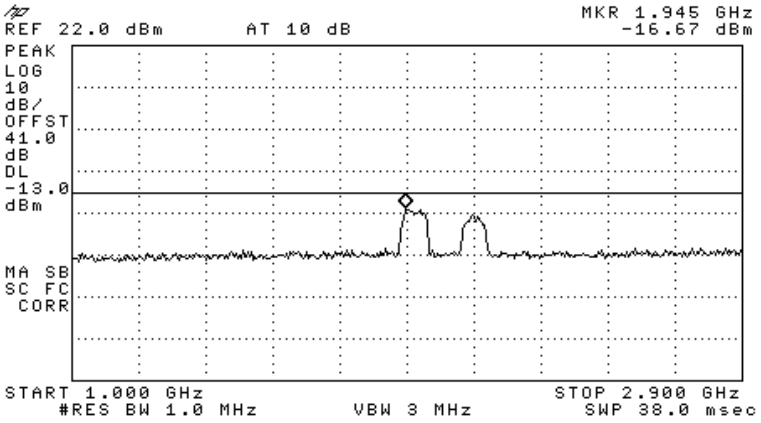

Figure 77.— 747 MHz QPSK

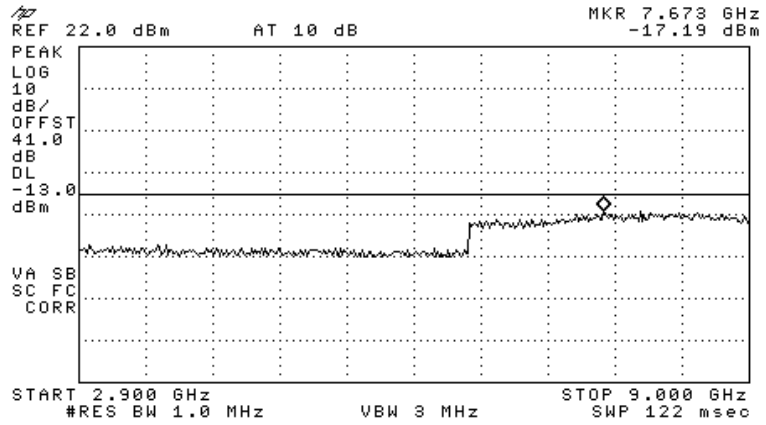

Figure 78.— 747 MHz QPSK

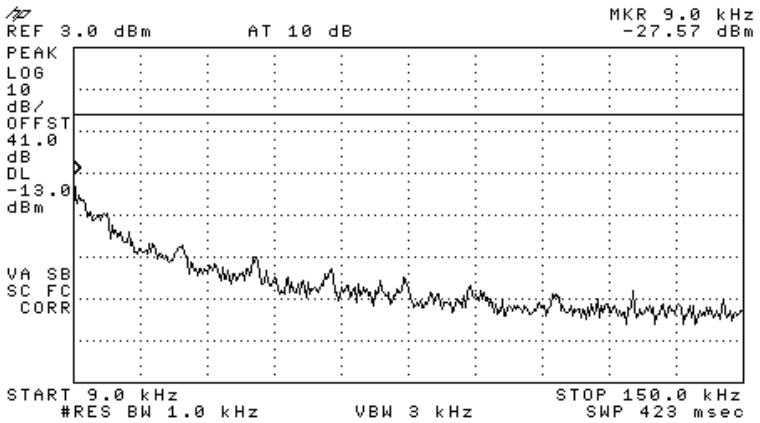

Figure 79.— 753 MHz QPSK

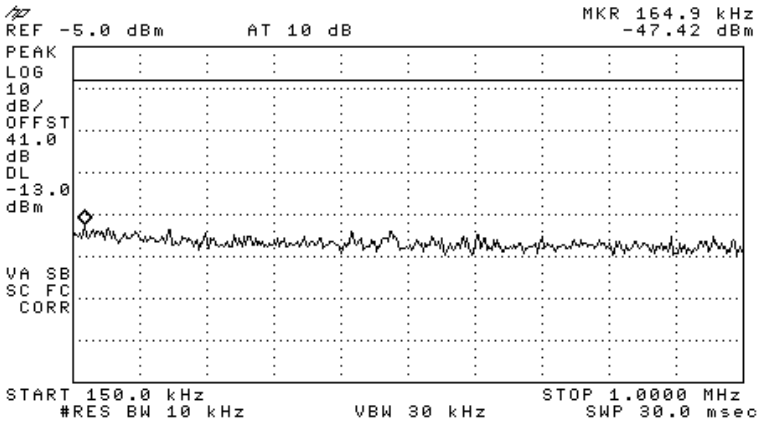

Figure 80.— 753 MHz QPSK

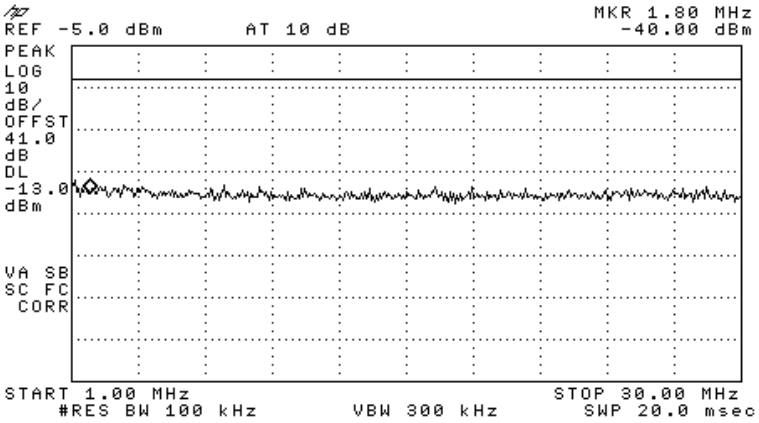

Figure 81.— 753 MHz QPSK

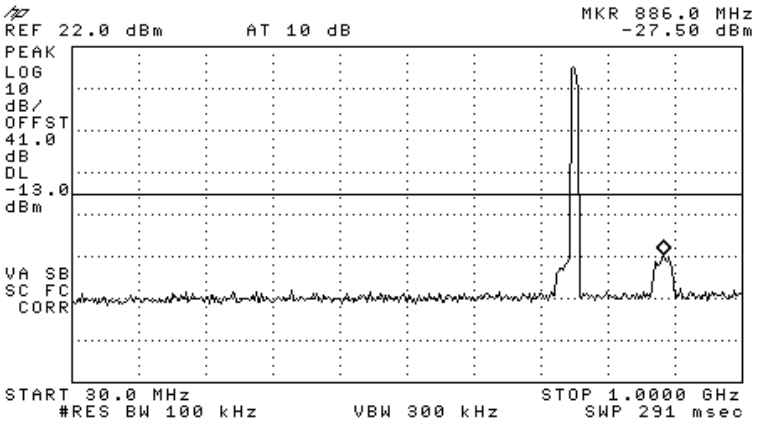

Figure 82.— 753 MHz QPSK

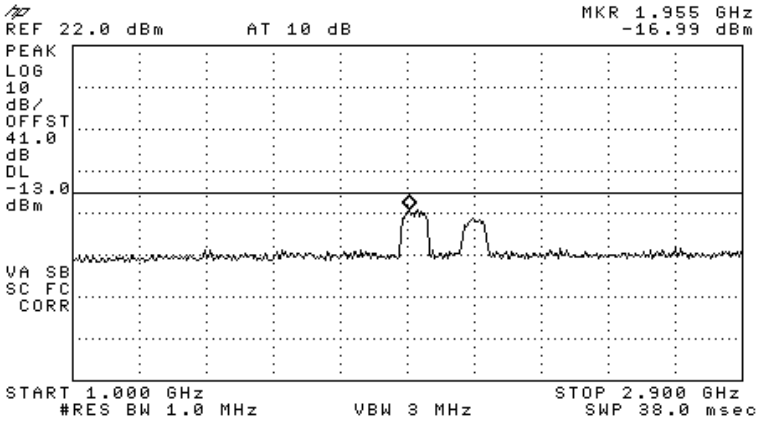

Figure 83.— 753 MHz QPSK

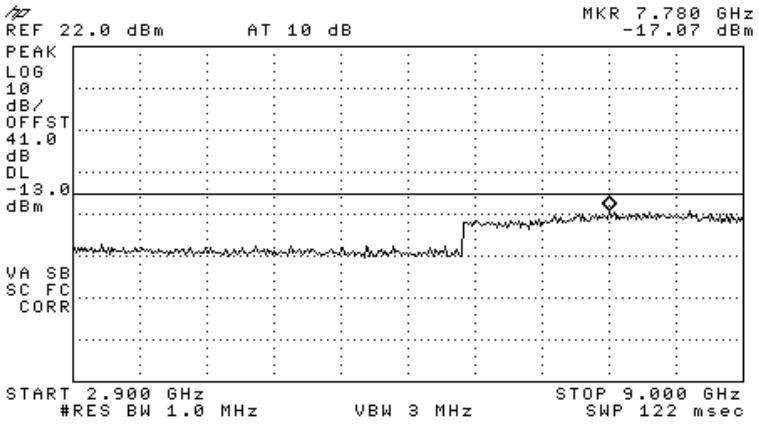

Figure 84.— 753 MHz QPSK

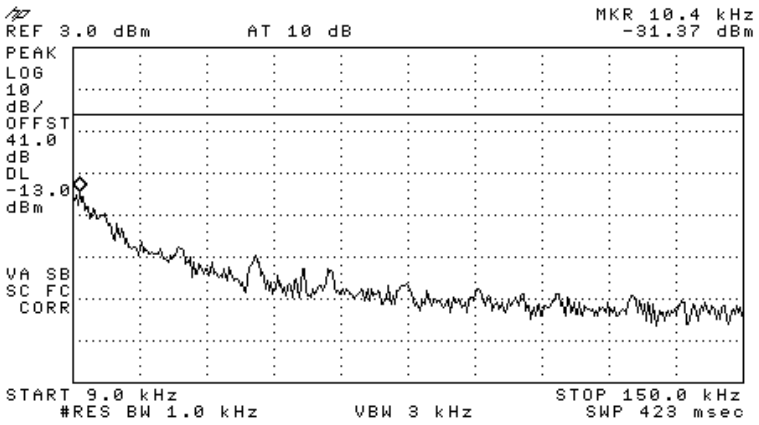

Figure 85.— 733 MHz 16QAM

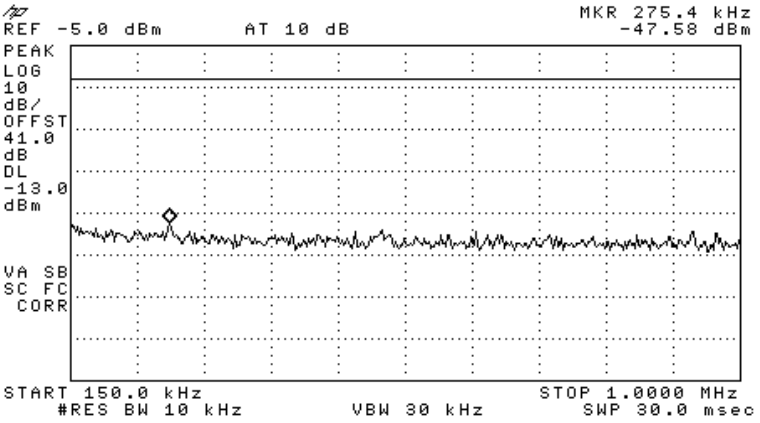

Figure 86.— 733 MHz 16QAM

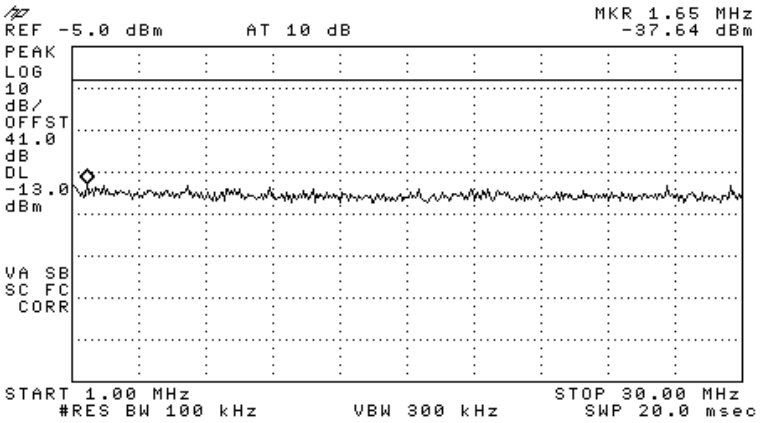

Figure 87.— 733 MHz 16QAM

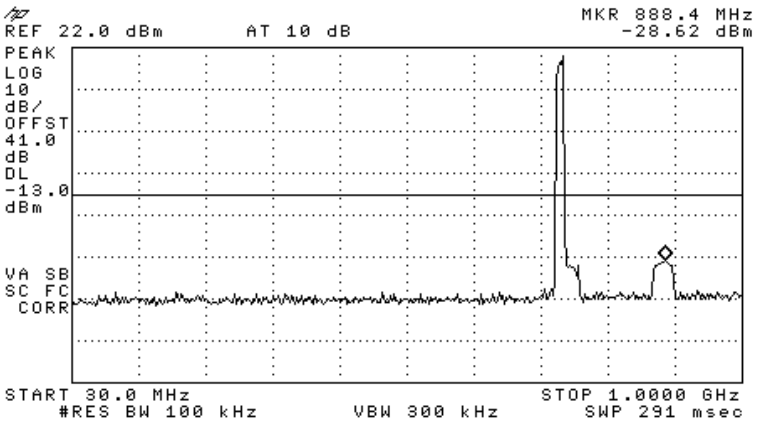

Figure 88.— 733 MHz 16QAM

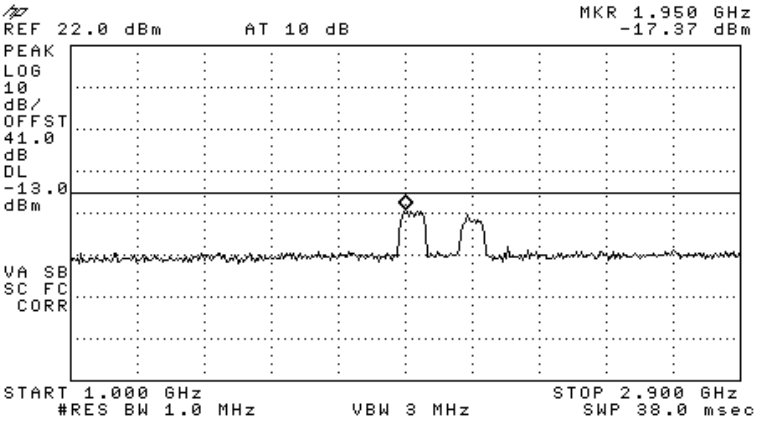

Figure 89.— 733 MHz 16QAM

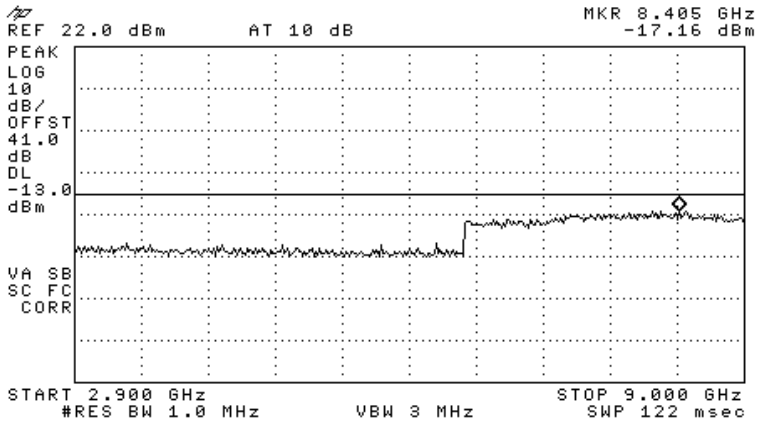

Figure 90.— 733 MHz 16QAM

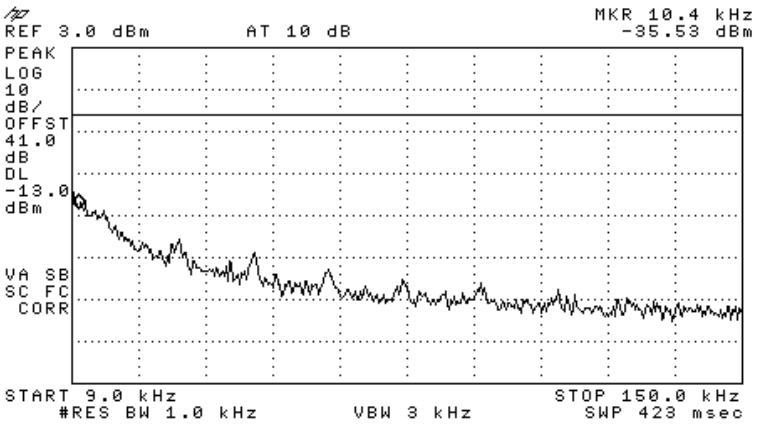

Figure 91.— 747 MHz 16QAM

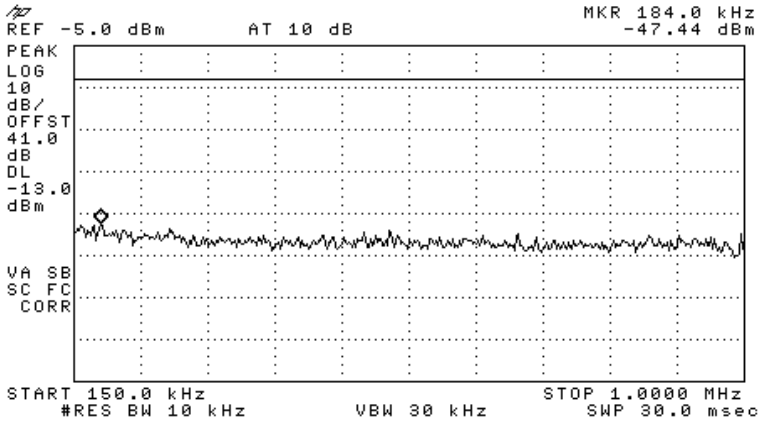

Figure 92.— 747 MHz 16QAM

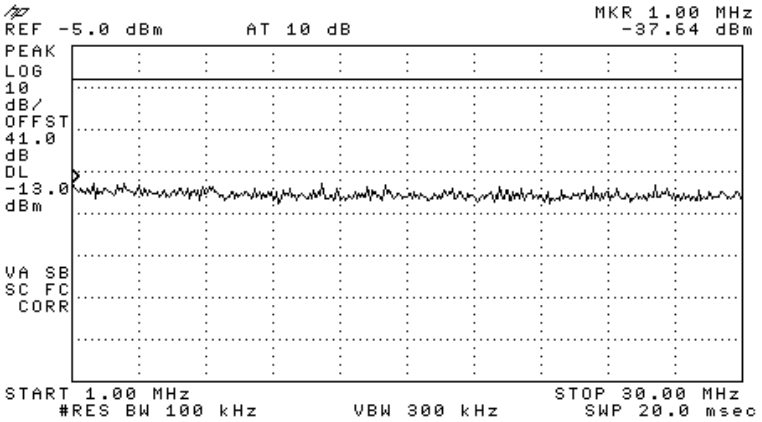

Figure 93.— 747 MHz 16QAM

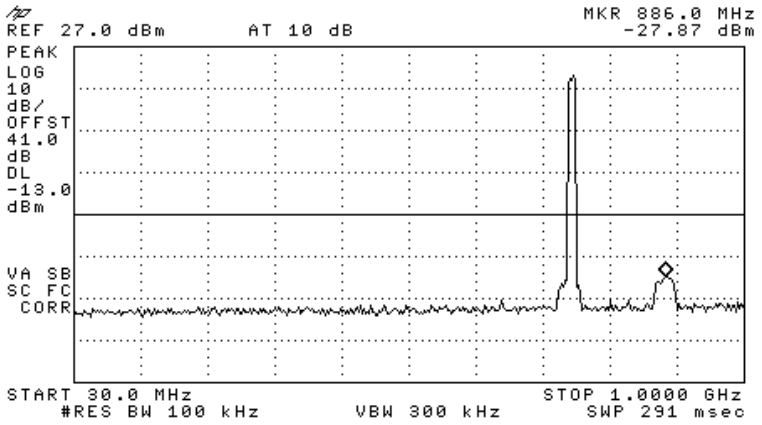

Figure 94.— 747 MHz 16QAM

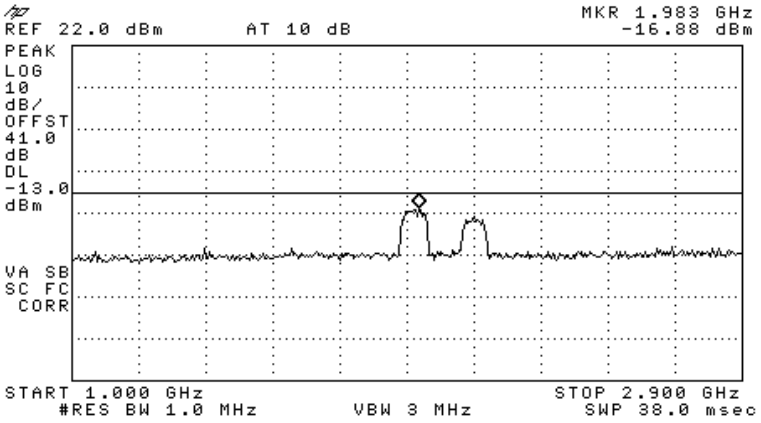

Figure 95.— 747 MHz 16QAM

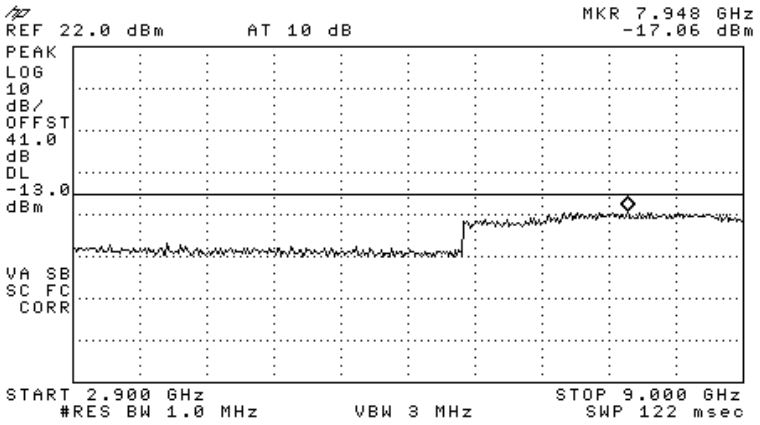

Figure 96.— 747 MHz 16QAM

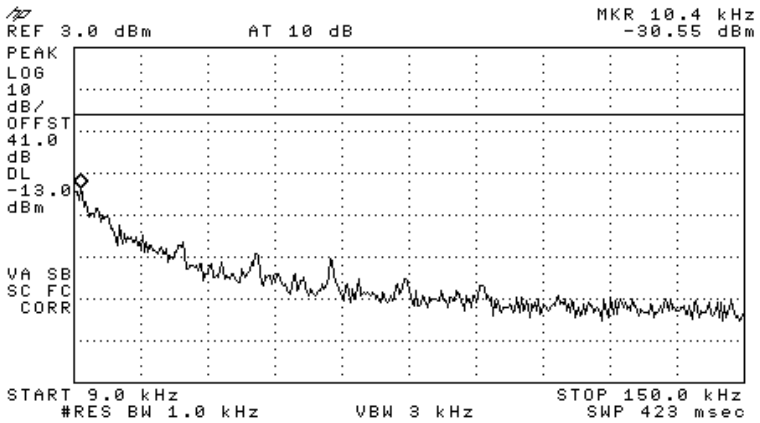

Figure 97.— 753 MHz 16QAM

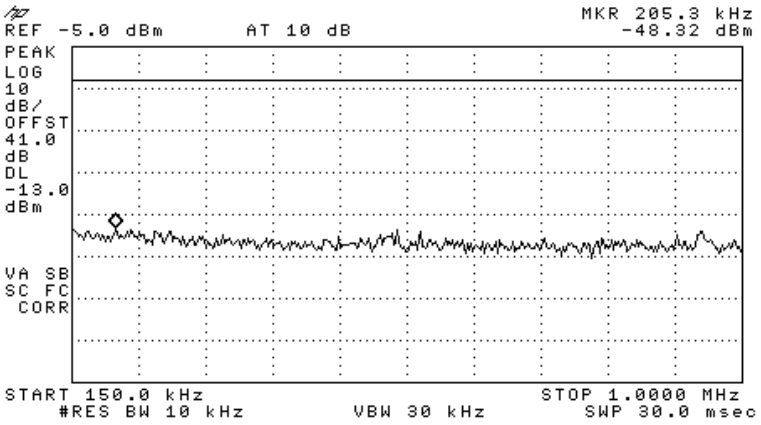

Figure 98.— 753 MHz 16QAM

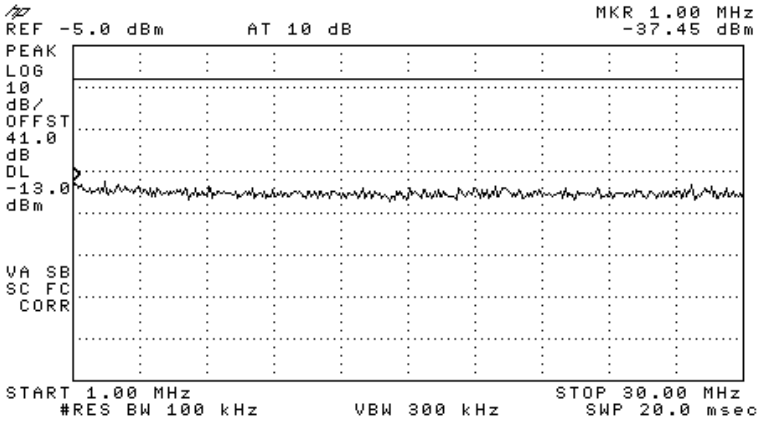

Figure 99.— 753 MHz 16QAM

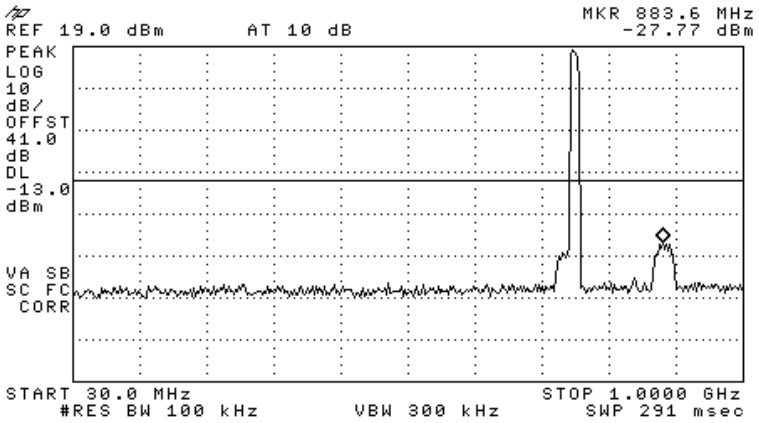

Figure 100.— 753 MHz 16QAM

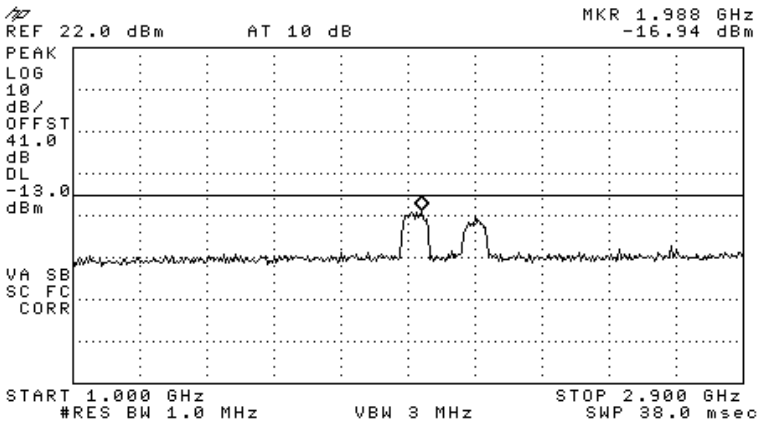

Figure 101.— 753 MHz 16QAM

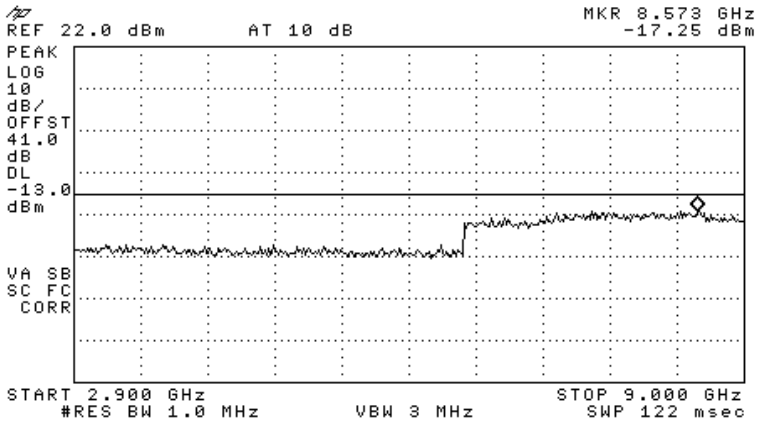

Figure 102.— 753 MHz 16QAM

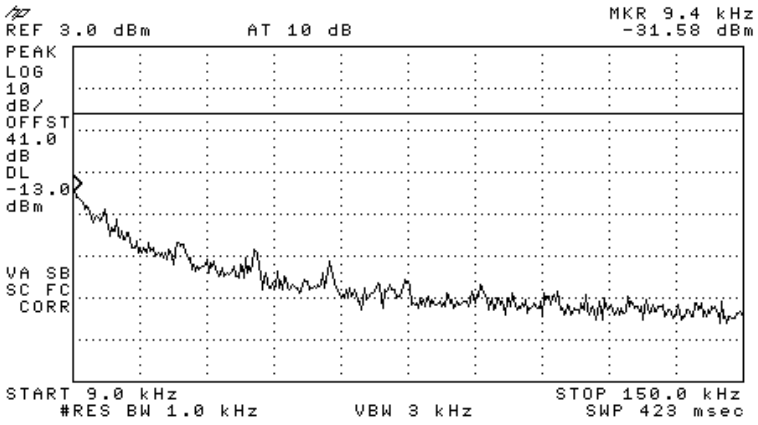

Figure 103.— 733 MHz 64QAM

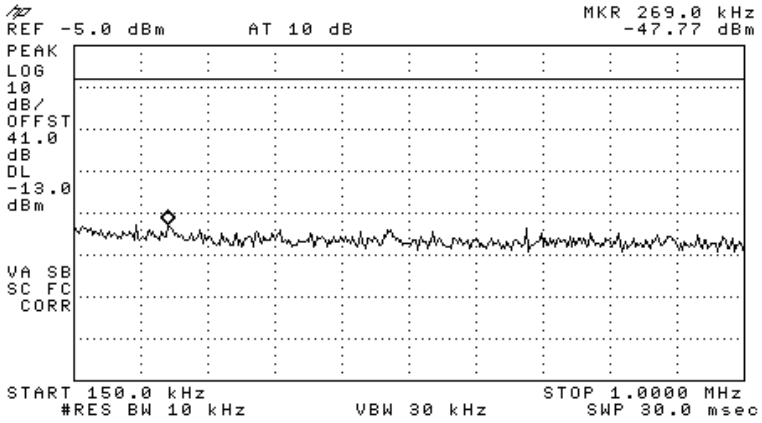

Figure 104.— 733 MHz 64QAM

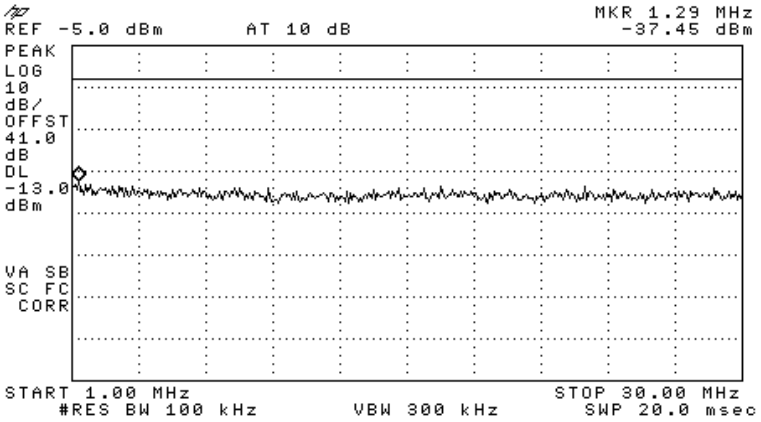

Figure 105.— 733 MHz 64QAM

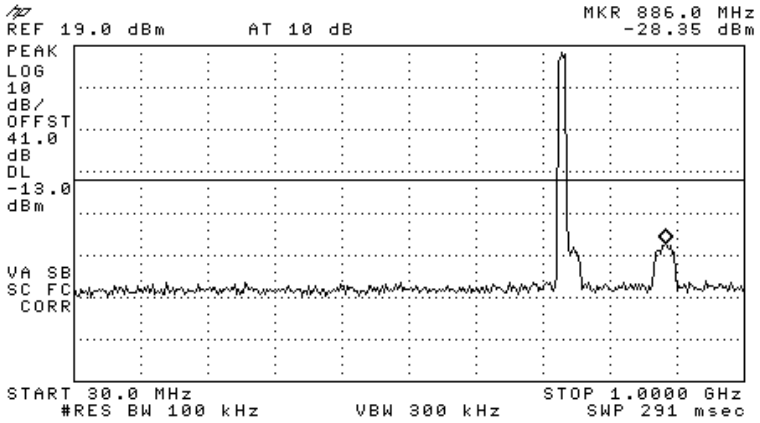

Figure 106.— 733 MHz 64QAM

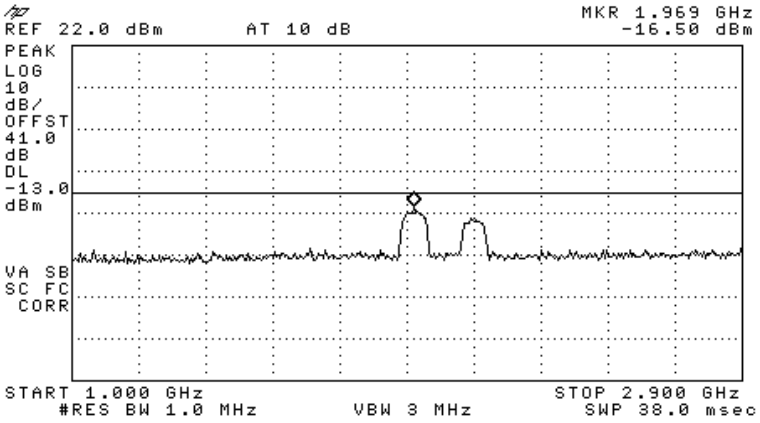

Figure 107.— 733 MHz 64QAM

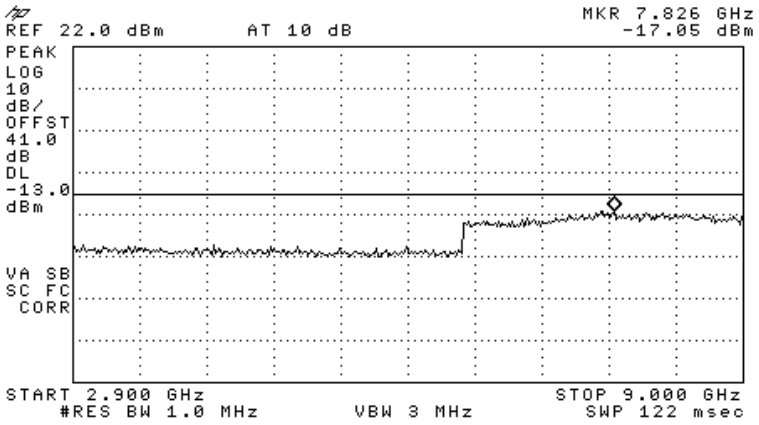

Figure 108.— 733 MHz 64QAM

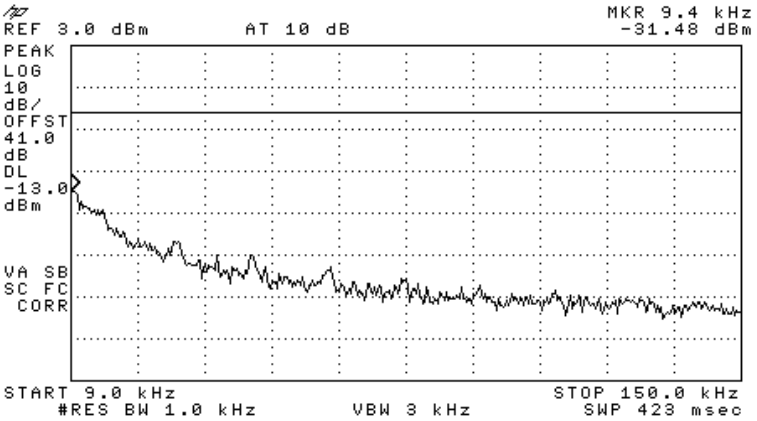

Figure 109.— 747 MHz 64QAM

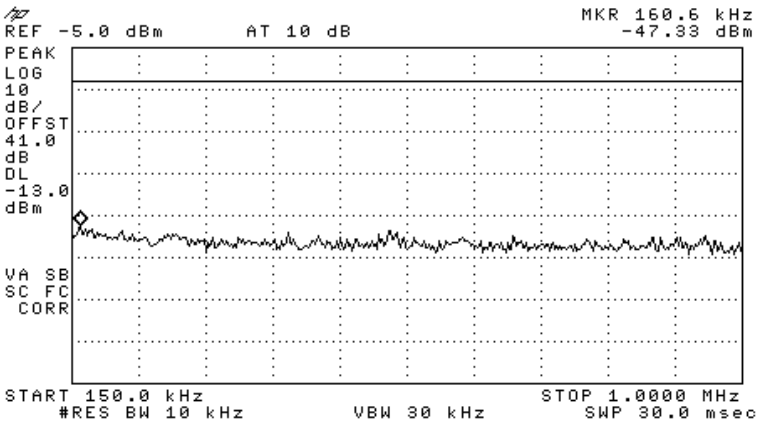

Figure 110.— 747 MHz 64QAM

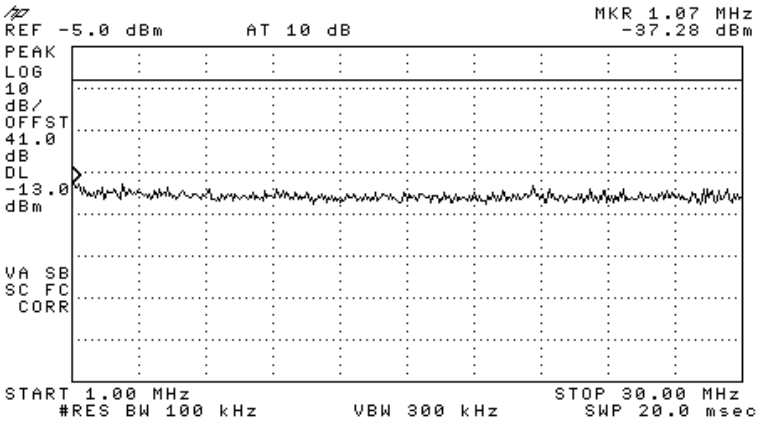

Figure 111.— 747 MHz 64QAM

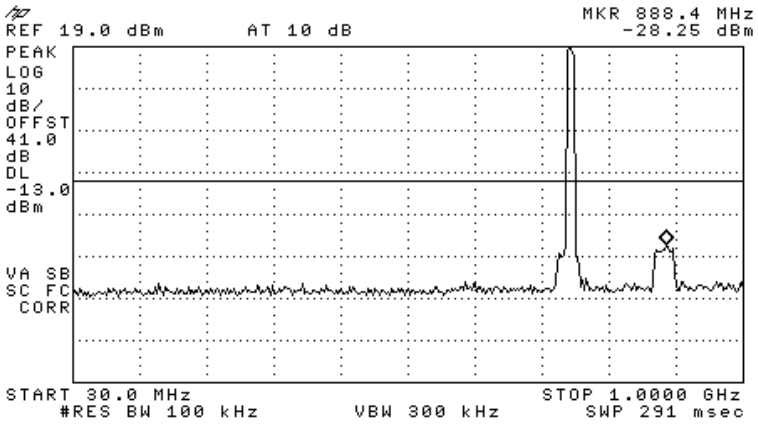

Figure 112.— 747 MHz 64QAM

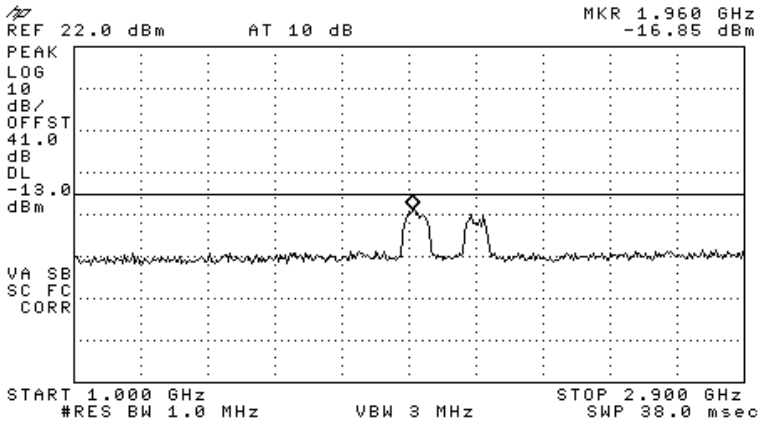

Figure 113.— 747 MHz 64QAM

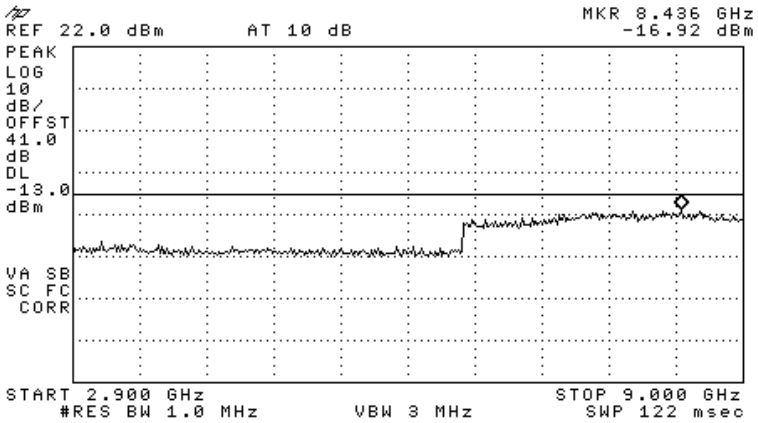

Figure 114.— 747 MHz 64QAM

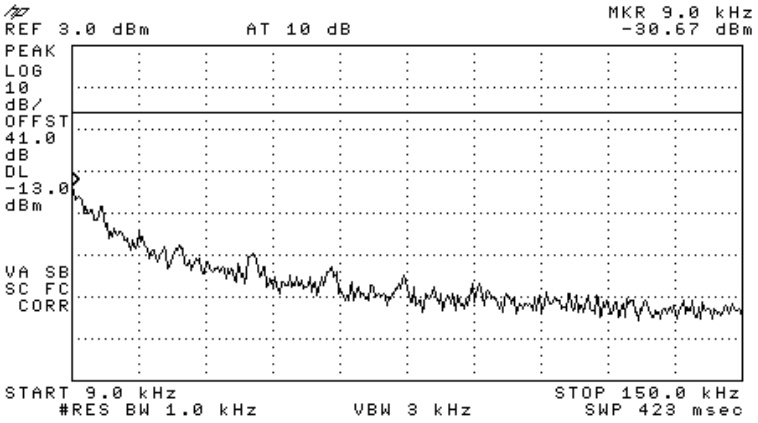

Figure 115.— 753 MHz 64QAM

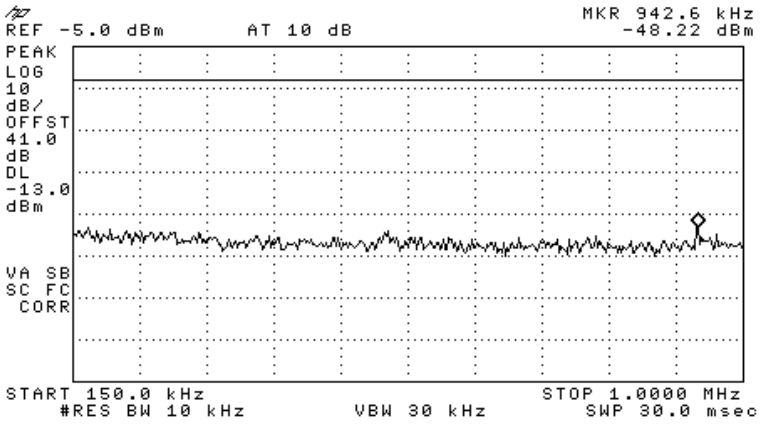

Figure 116.— 753 MHz 64QAM

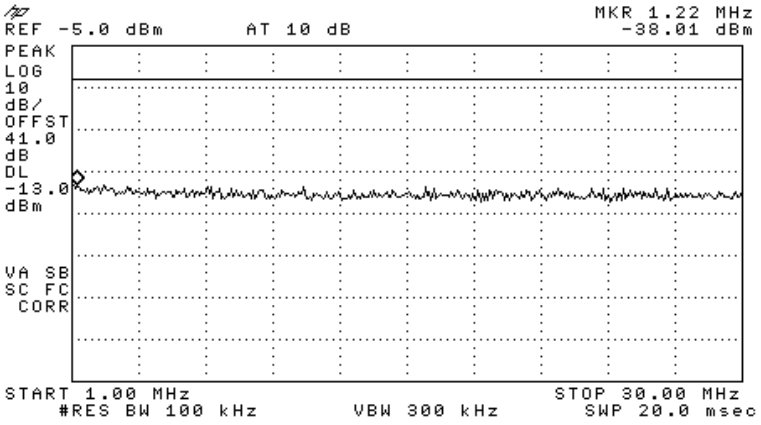

Figure 117.— 753 MHz 64QAM

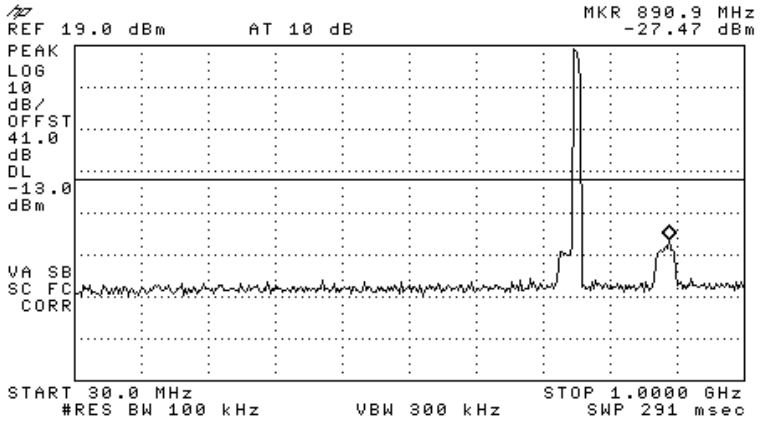

Figure 118.— 753 MHz 64QAM

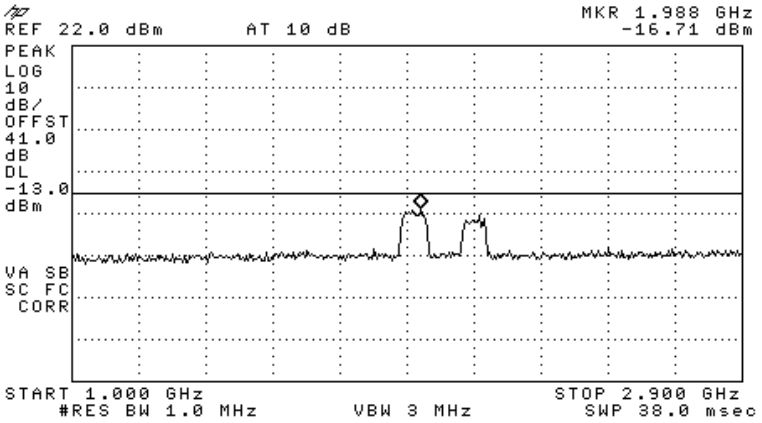

Figure 119.— 753 MHz 64QAM

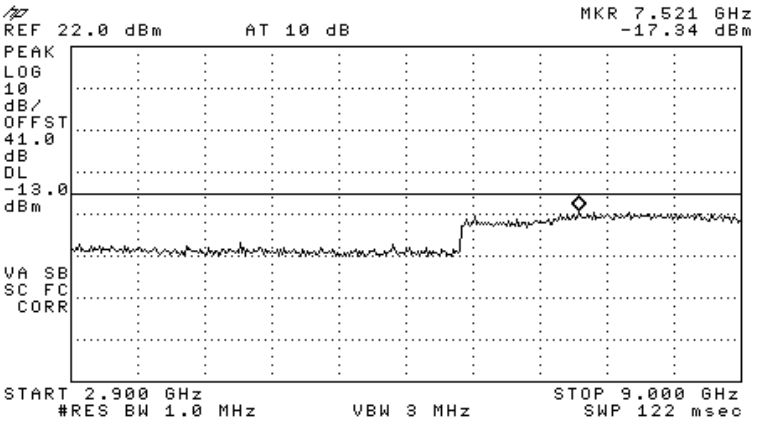

Figure 120.— 753 MHz 64QAM

7.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
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	-17.12	-13.0	-4.12
	747	-16.65	-13.0	-3.65
	753	-16.80	-13.0	-3.80
QPSK	733	-16.90	-13.0	-3.90
	747	-16.67	-13.0	-3.67
	753	-16.99	-13.0	-3.99
16QAM	733	-17.16	-13.0	-4.16
	747	-16.88	-13.0	-3.88
	753	-16.94	-13.0	-3.94
64QAM	733	-16.50	-13.0	-3.50
	747	-16.85	-13.0	-3.85
	753	-16.71	-13.0	-3.71

Figure 121 Spurious Emissions at Antenna Terminals Results LTE

JUDGEMENT: Passed by 3.50 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 13.02.12
Typed/Printed Name: I. Siboni

7.4 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	MY42082764	July 18, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 122 Test Equipment Used

8. Band Edge Spectrum LTE

8.1 Test Specification

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

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

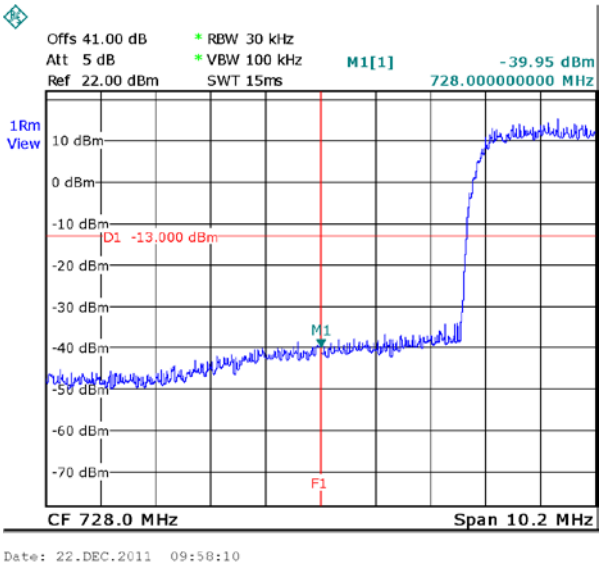

Figure 123.— W-CDMA 733.0 MHz

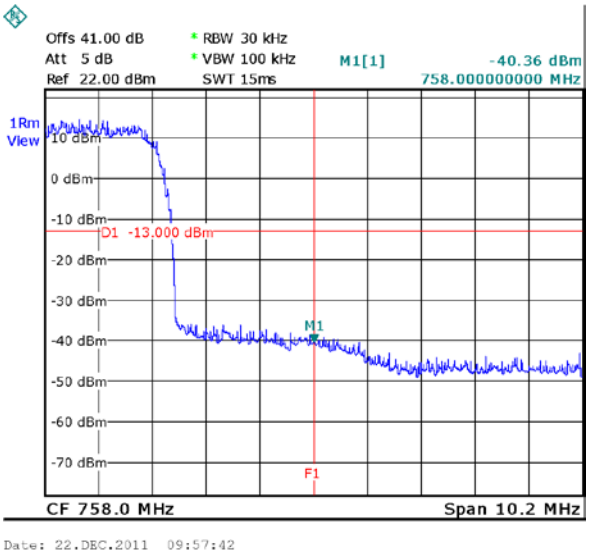

Figure 124.— W-CDMA 753.0 MHz

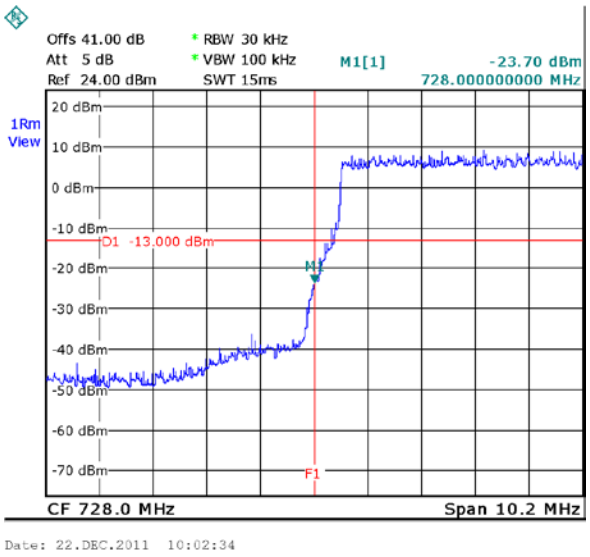

Figure 125.— QPSK 733.0 MHz

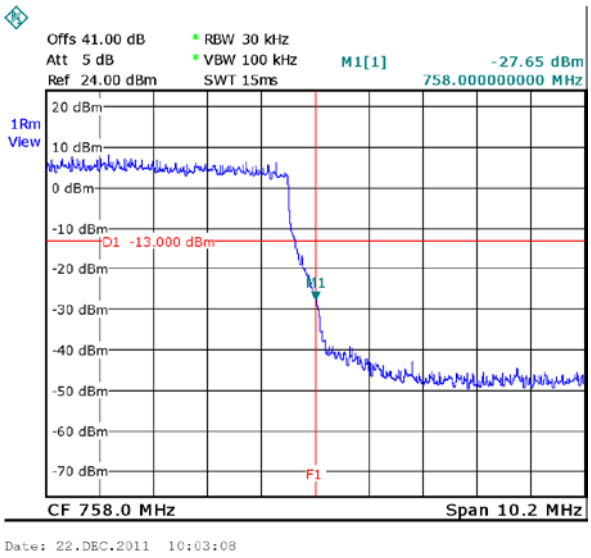

Figure 126.— QPSK 753.0 MHz

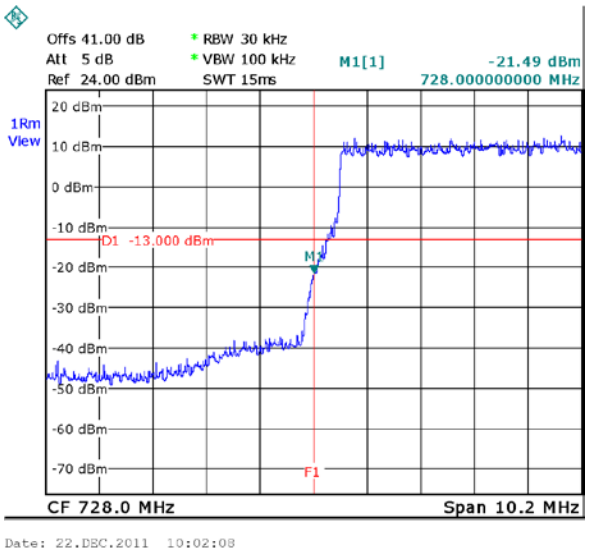

Figure 127.— 16QAM 733.0 MHz

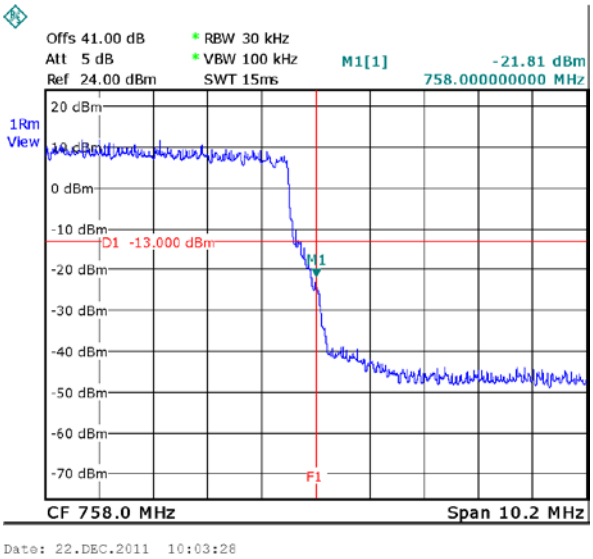

Figure 128.— 16QAM 753.0 MHz

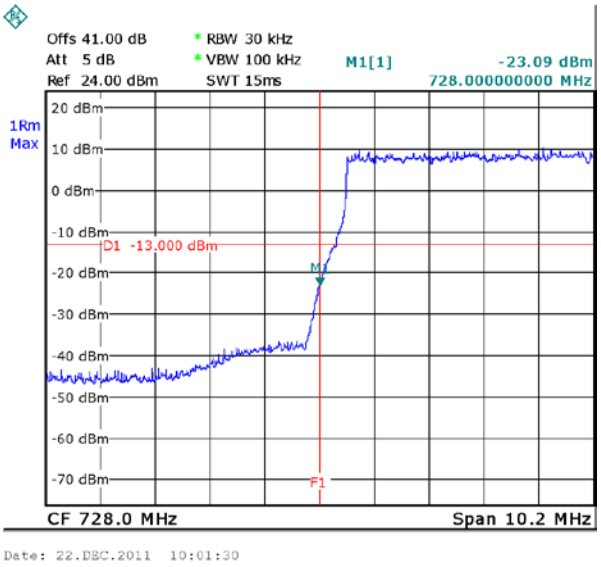

Figure 129.— 64QAM 733.0 MHz

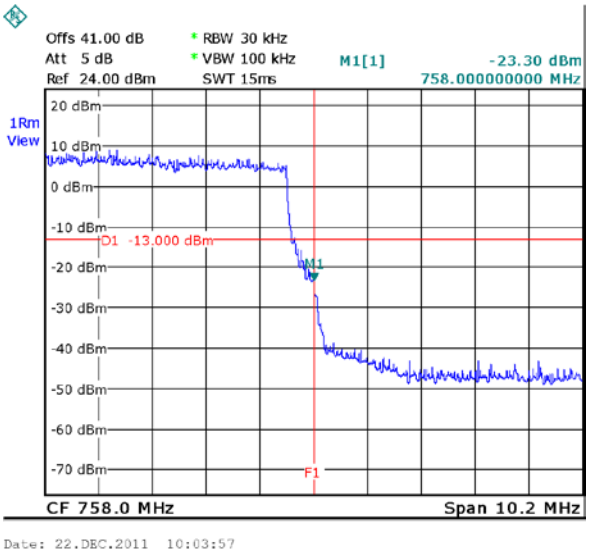

Figure 130.— 64QAM 753.0 MHz

8.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
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	728	-39.95	-13.0
WCDMA	753	758	-40.36	-13.0
QPSK	733	728	-23.70	-13.0
QPSK	753	758	-27.65	-13.0
16QAM	733	728	-21.49	-13.0
16QAM	753	758	-21.81	-13.0
64QAM	733	728	-23.09	-13.0
64QAM	753	758	-23.30	-13.0

Figure 131 Band Edge Spectrum Results LTE

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 13.02.12

Typed/Printed Name: I. Siboni

8.4 Test Equipment Used.

Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE& SCHWARZ	FSL6	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4438C	MY42082764	July 18, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 132 Test Equipment Used

9. Spurious Radiated Emission LTE

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-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.

9.3 Test Results

JUDGEMENT: Passed by 38.9 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: 13.02.12

Typed/Printed Name: I. Siboni

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	1466	V	46.5	-54.79	5.15	7.6	-52.34	-13.0	-39.34
733	1466	H	46.8	-54.63	5.15	7.6	-52.18	-13.0	-39.18
747	1494	V	46.9	-54.39	5.15	7.6	-51.94	-13.0	-38.94
747	1494	H	45.1	-56.33	5.15	7.6	-53.88	-13.0	-40.88
753	1506	V	46.3	-54.99	5.15	7.6	-52.54	-13.0	-39.54
753	1506	H	45.4	-56.03	5.15	7.6	-53.58	-13.0	-40.58

Figure 133 Out of Band (Radiated) CELL

9.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2011	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	November 13, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 23, 2011	1 Year
Signal Generator	HP	E4432B ESG-D	GB40050702	May 4, 2011	1 year
Signal Generator	HP	E4438C	MY42082764	July 18, 2011	1 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2010	2 year

10. RF Power Output AWS

10.1 Test Specification

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

10.2 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.

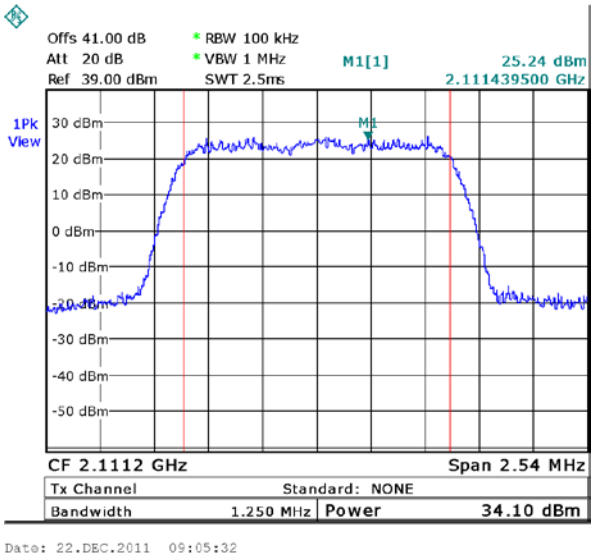

Figure 134.— CDMA (2111.2 MHz)

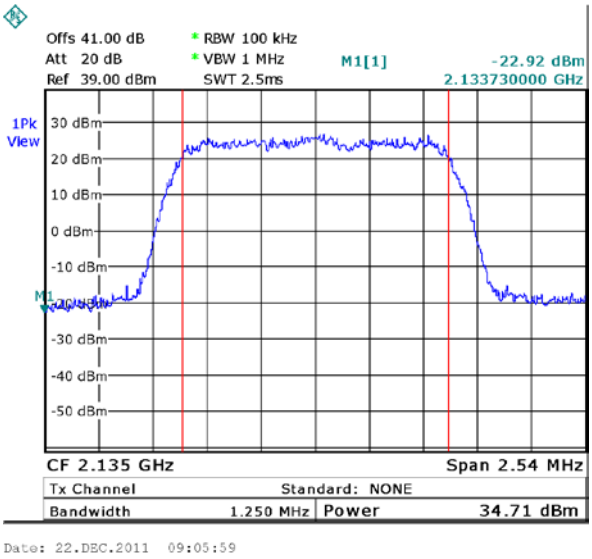

Figure 135.— CDMA (2135.0 MHz)

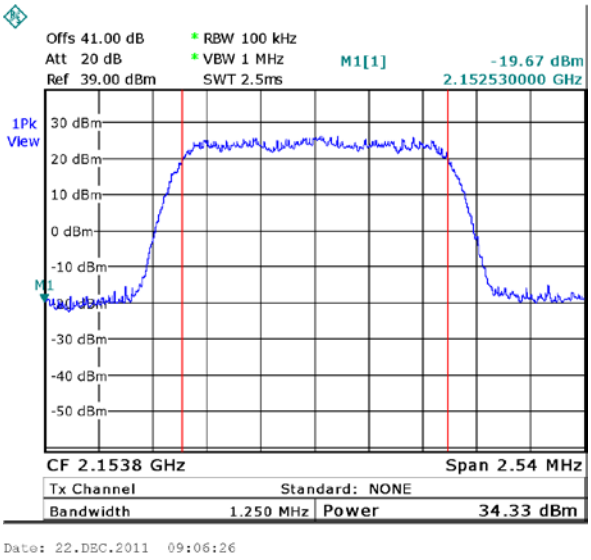

Figure 136.— CDMA (2153.8 MHz)

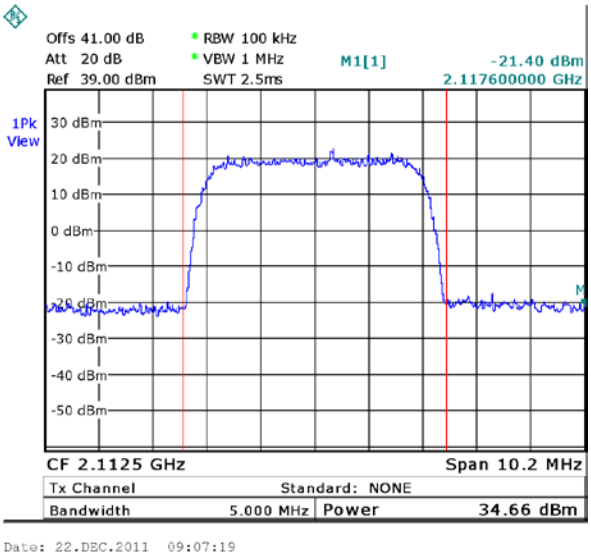

Figure 137.— W-CDMA (2112.5 MHz)

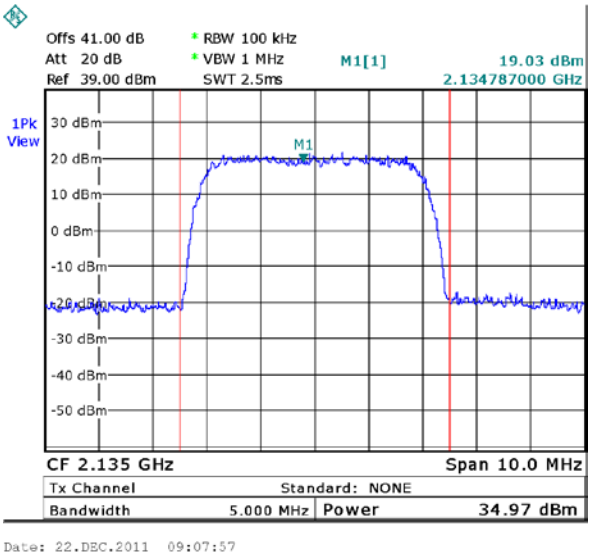

Figure 138.— W-CDMA (2135.0 MHz)

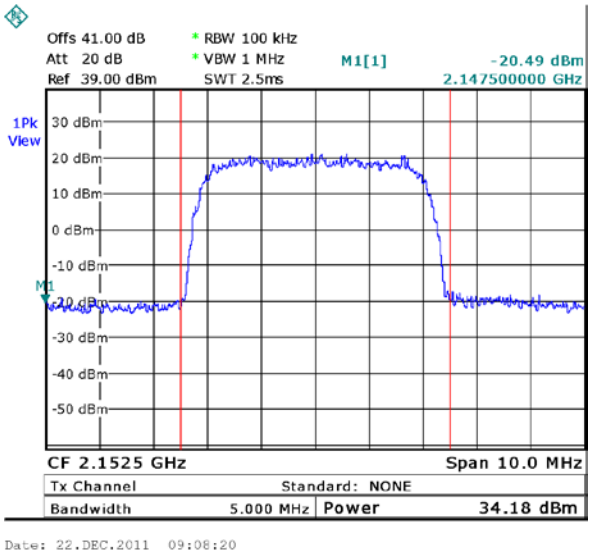

Figure 139.— W-CDMA (2152.5 MHz)

10.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
Specification: FCC Part 27, Subpart C, Section 27.50 (d)

Modulation	Operation Frequency (MHz)	Reading (dBm)	2 ports MIMO (dBm)
CDMA	2112.2	34.10	37.10
CDMA	2135.0	34.71	37.71
CDMA	2153.8	34.33	37.33
WCDMA	2112.2	34.66	37.66
WCDMA	2135.0	34.97	37.97
WCDMA	2153.8	34.18	37.18

Figure 140 RF Power Output AWS

TEST PERSONNEL:

Tester Signature: _____ Date: 13.02.12

Typed/Printed Name: I. Siboni

10.4 Test Equipment Used.

RF Power Output AWS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE&SCHWARZ	FSL6	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Signal Generator	HP	E4438C ESG	MY45091956	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 141 Test Equipment Used

11. Occupied Bandwidth AWS

11.1 Test Specification

FCC Part 2, Section 1049

11.2 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.

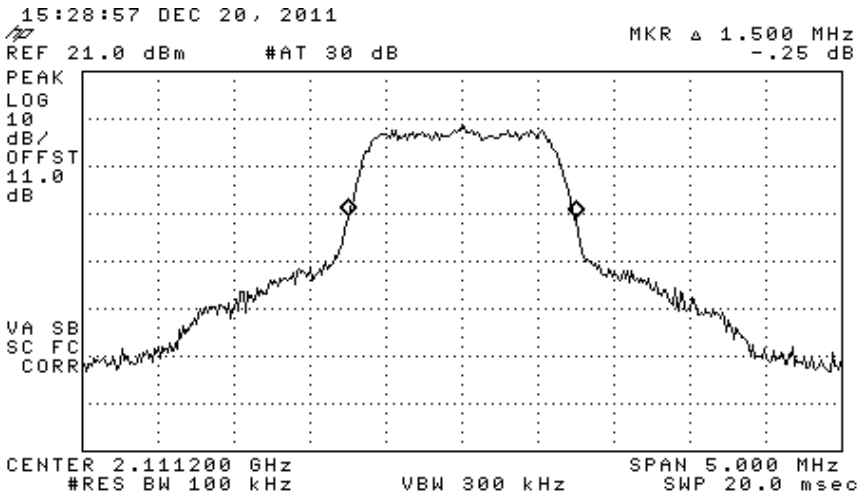

Figure 142.— CDMA (2111.20 MHz) IN

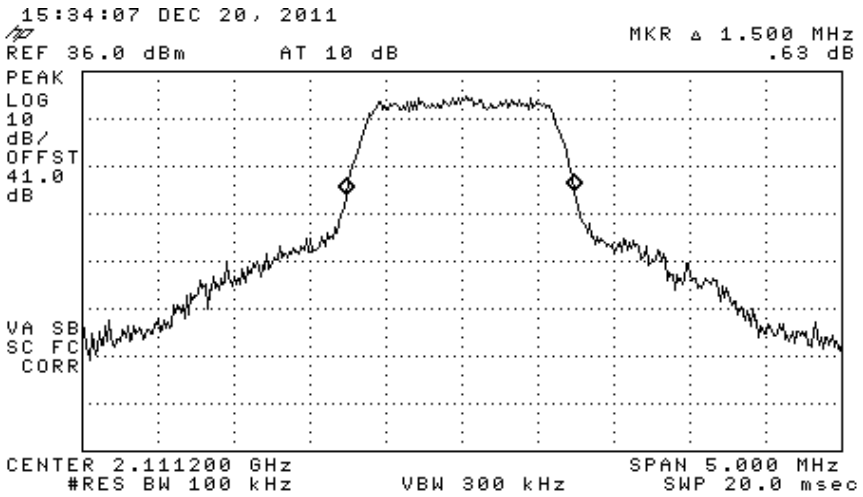

Figure 143.— CDMA (2111.2 MHz) OUT

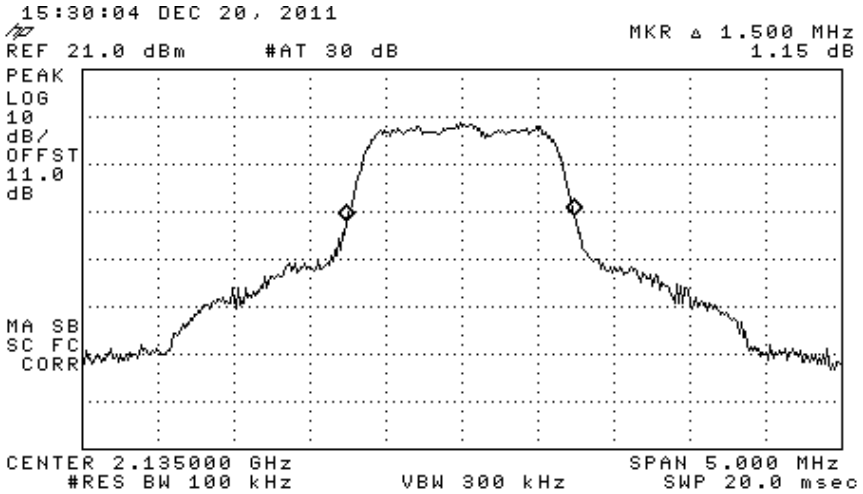

Figure 144.— CDMA (2135.0 MHz) IN

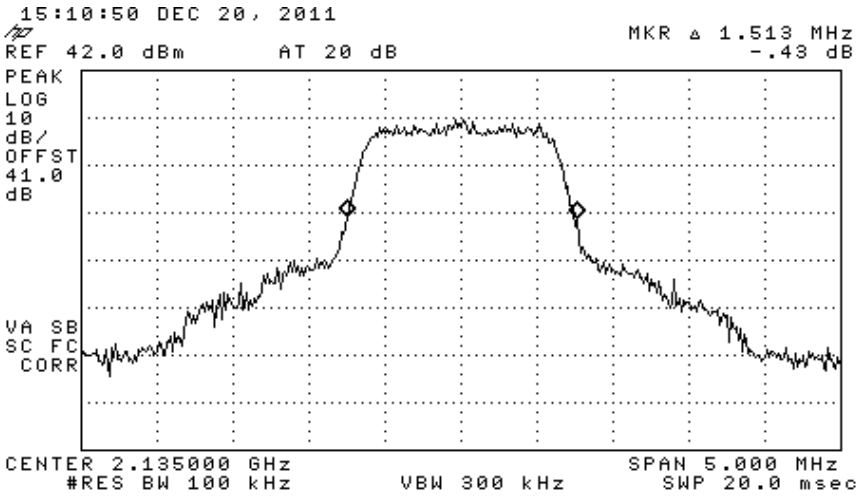

Figure 145.— CDMA (2135.0 MHz) OUT

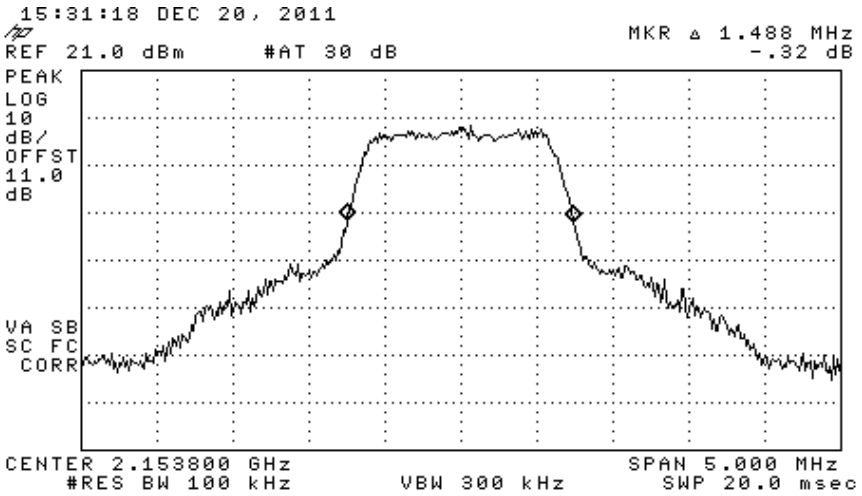

Figure 146.— CDMA (2153.8 MHz) IN

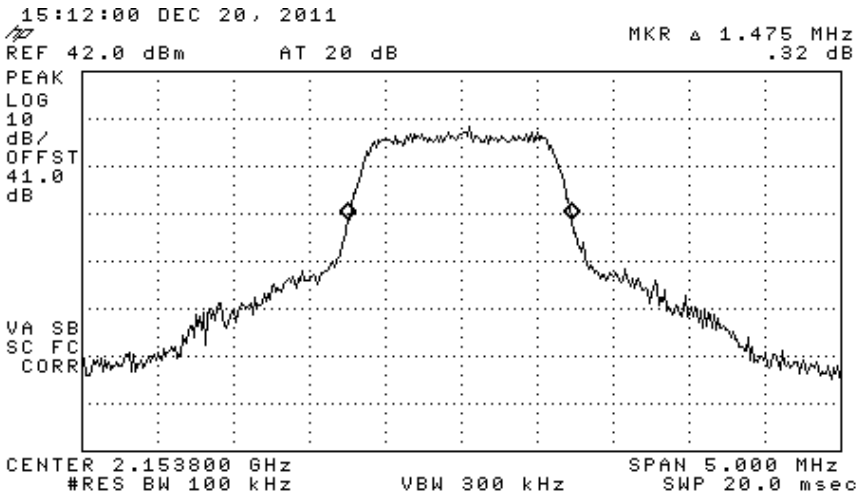

Figure 147.— CDMA (2153.8 MHz) IOUT

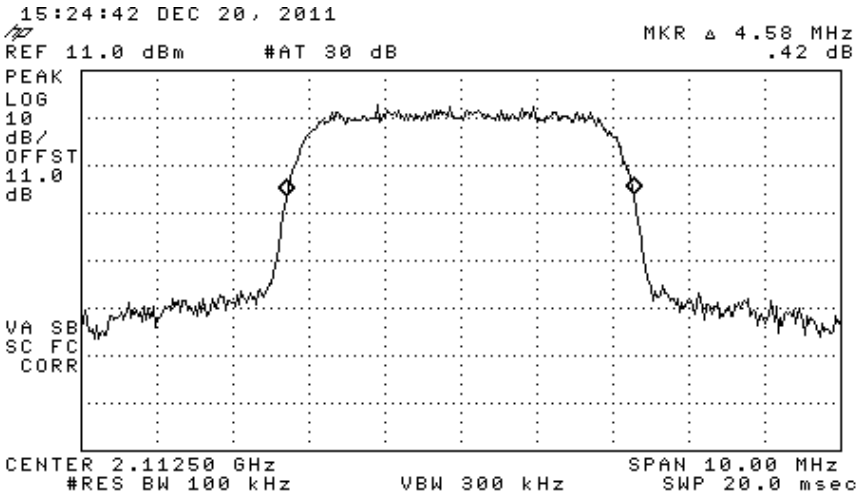

Figure 148.— W-CDMA (2112.5 MHz) IN

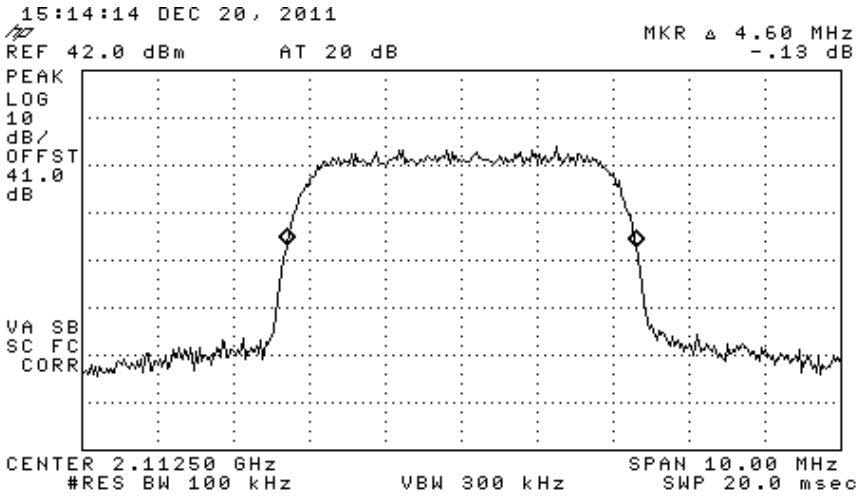

Figure 149.— W-CDMA (2112.5 MHz) OUT

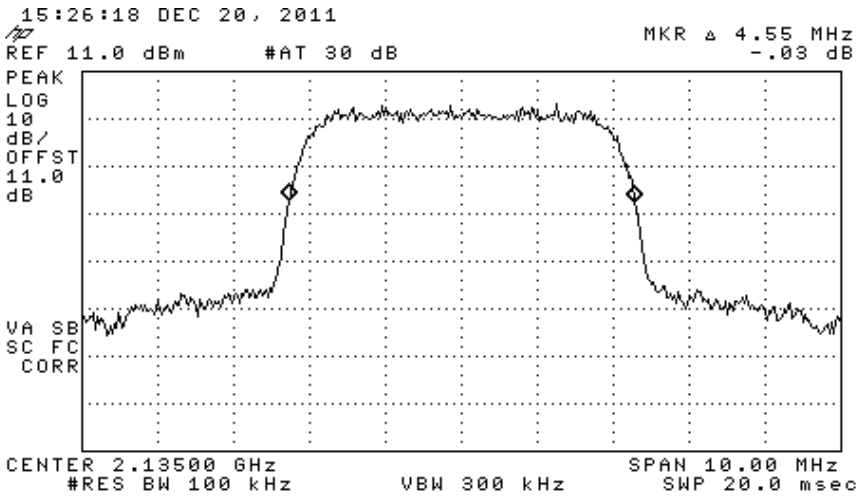

Figure 150.— W-CDMA (2135.0 MHz) IN

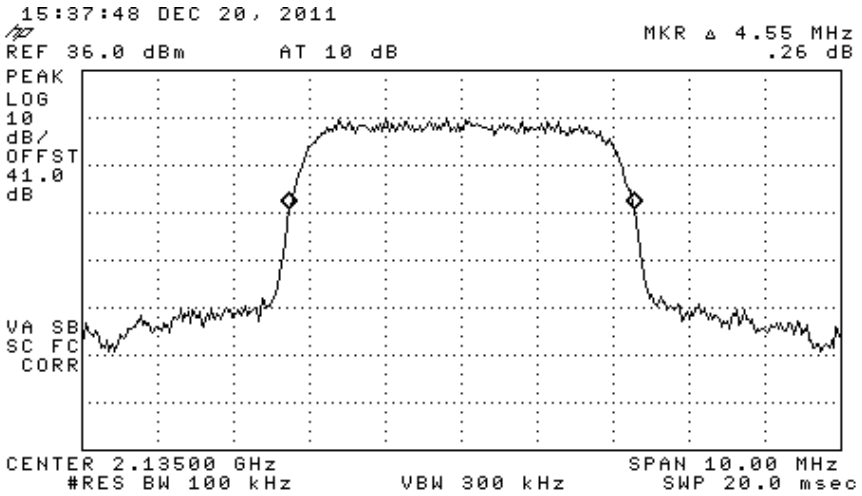

Figure 151.— W-CDMA (2135.0 MHz) OUT

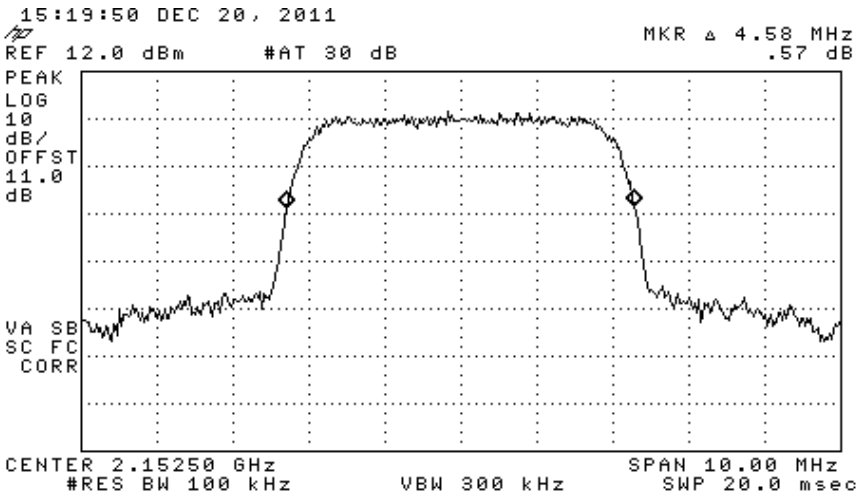

Figure 152.— W-CDMA (2152.5 MHz) IN

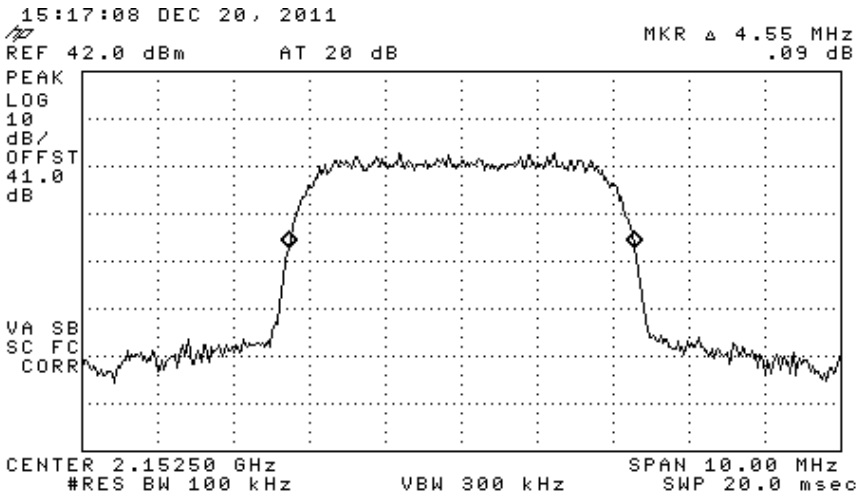

Figure 153.— W-CDMA (2152.5 MHz) OUT

11.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (MHz)
CDMA	Input	2111.20	1.500
	Output	2111.20	1.500
	Input	2135.00	1.500
	Output	2135.00	1.513
	Input	2153.80	1.488
	Output	2153.80	1.475
WCDMA	Input	2112.50	4.580
	Output	2112.50	4.600
	Input	2135.00	4.550
	Output	2135.00	4.550
	Input	2152.50	4.580
	Output	2152.50	4.550

Figure 154 Occupied Bandwidth AWS

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 13.02.12

Typed/Printed Name: I. Siboni

11.4 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	May 4, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 155 Test Equipment Used

12. Spurious Emissions at Antenna Terminals AWS

12.1 Test Specification

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

12.2 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).

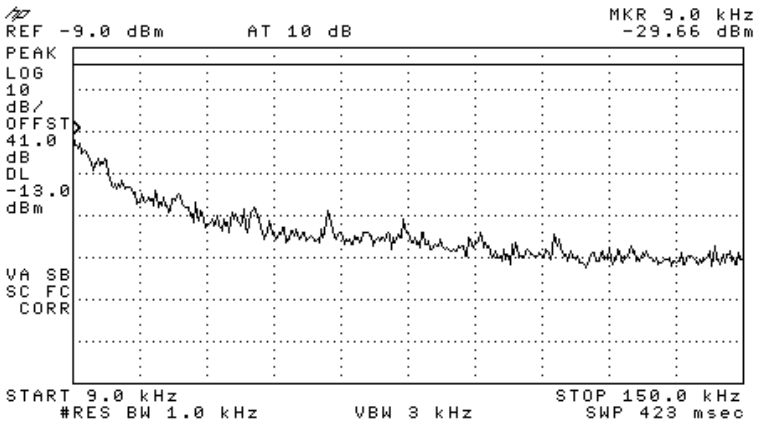

Figure 156.— 2111.20 MHz CDMA

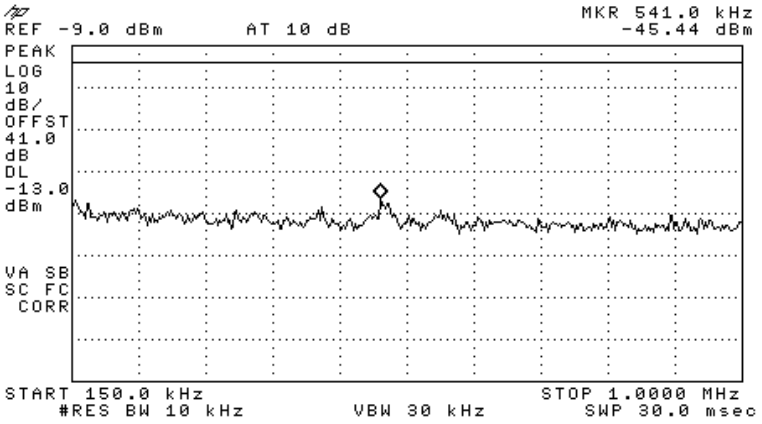

Figure 157.— 2111.20 MHz CDMA

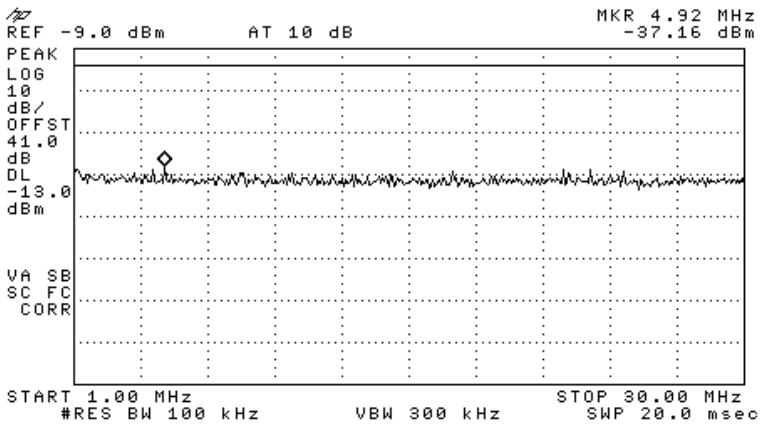

Figure 158.— 2111.20 MHz CDMA

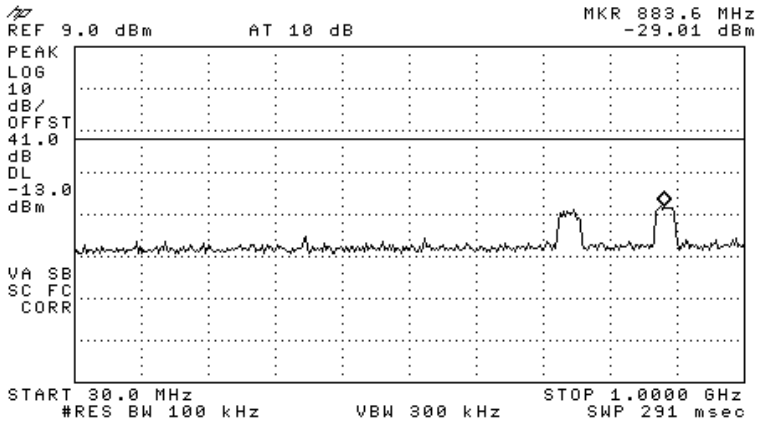

Figure 159.— 2111.20 MHz CDMA

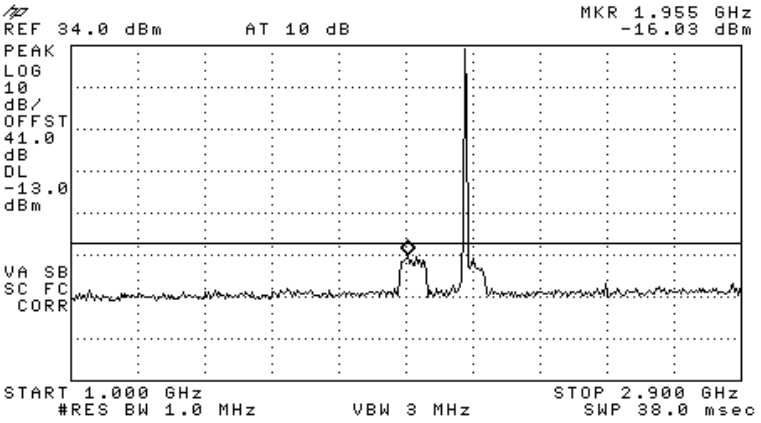

Figure 160.— 2111.20 MHz CDMA

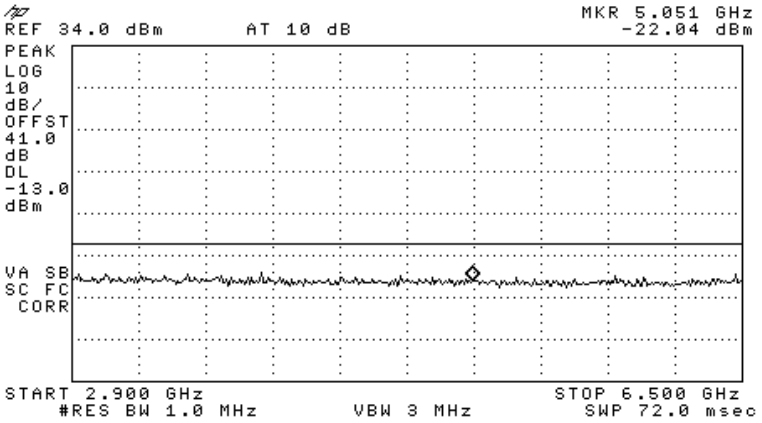

Figure 161.— 2111.20 MHz CDMA

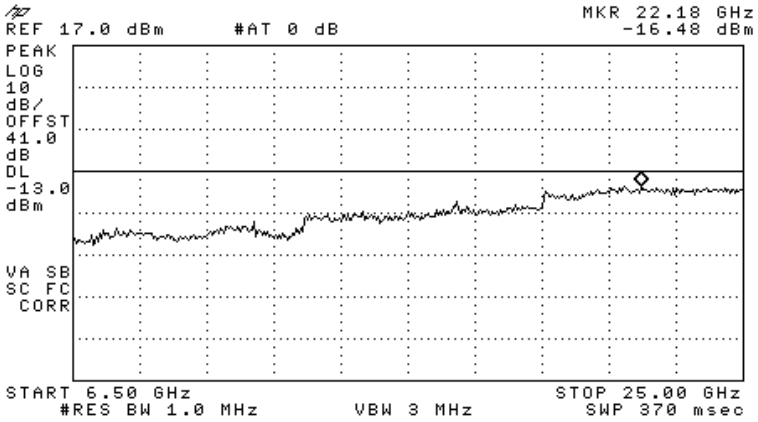

Figure 162.— 2111.20 MHz CDMA

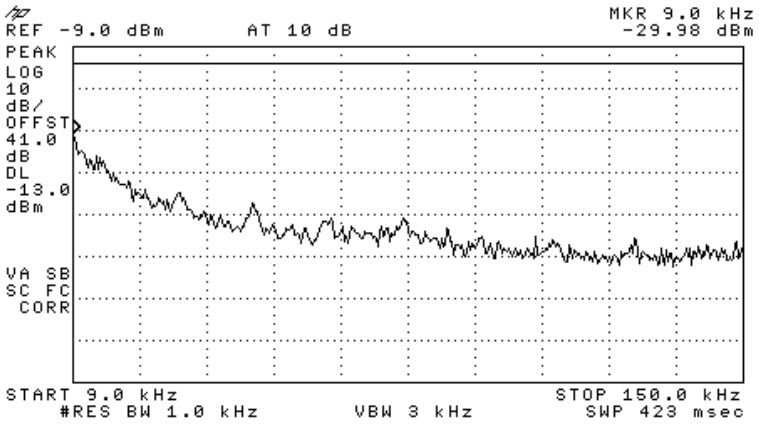

Figure 163.— 2135.00 MHz CDMA

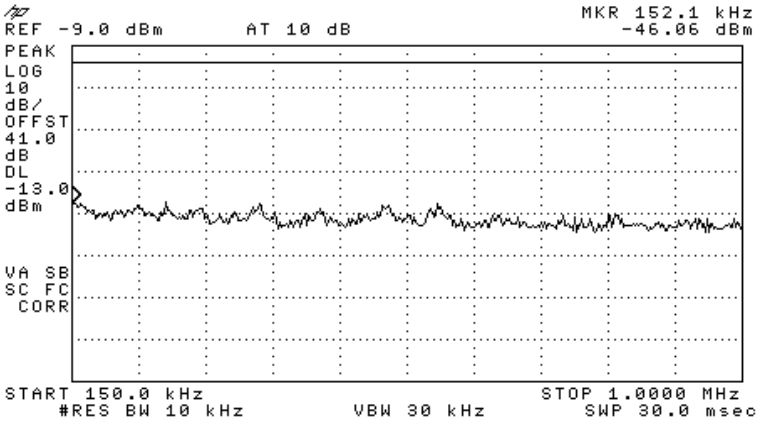

Figure 164.— 2135.00 MHz CDMA

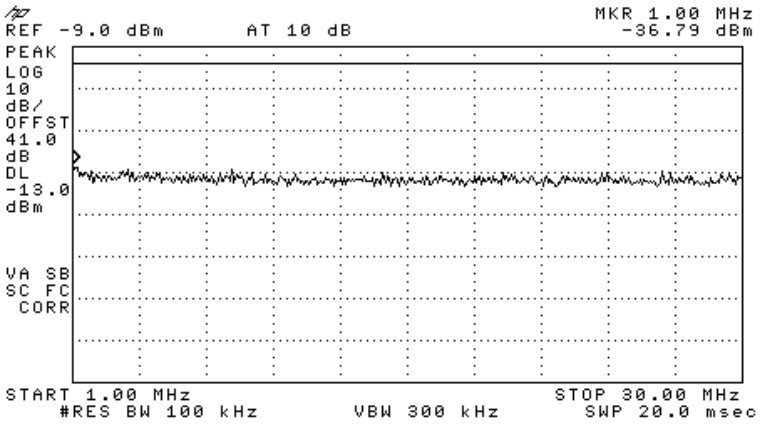

Figure 165.— 2135.00 MHz CDMA

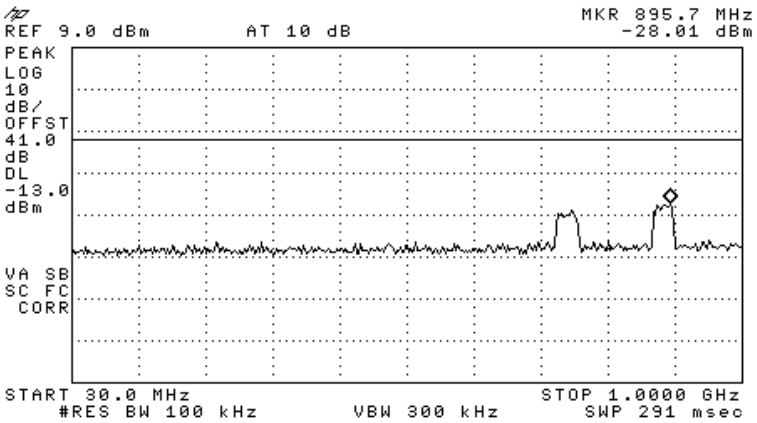

Figure 166.— 2135.00 MHz CDMA

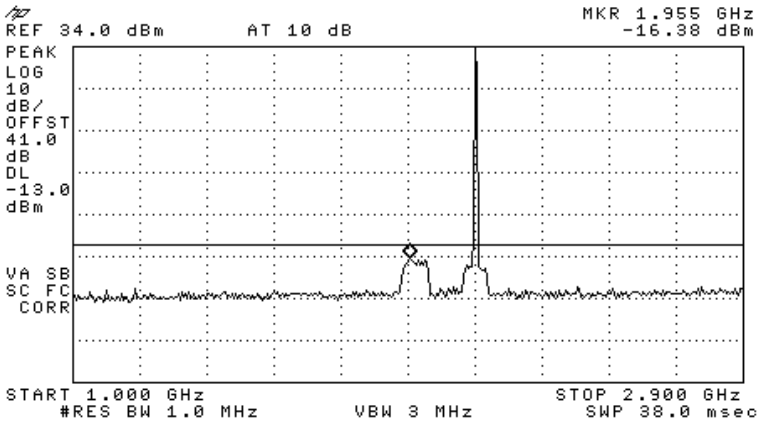

Figure 167.— 2135. 00 MHz CDMA

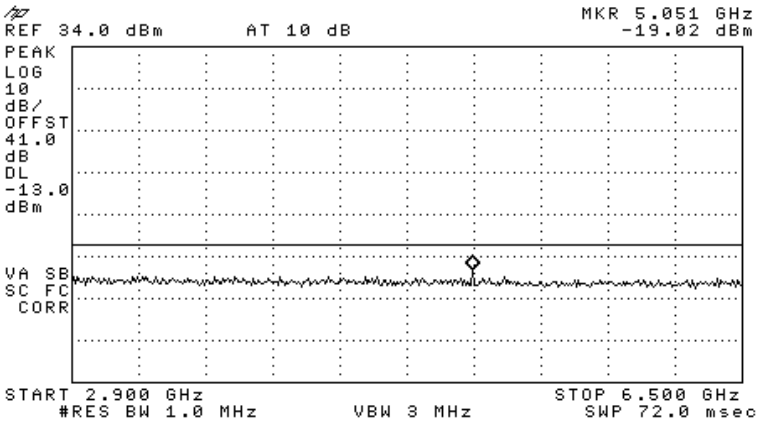

Figure 168.— 2135. 0 MHz CDMA

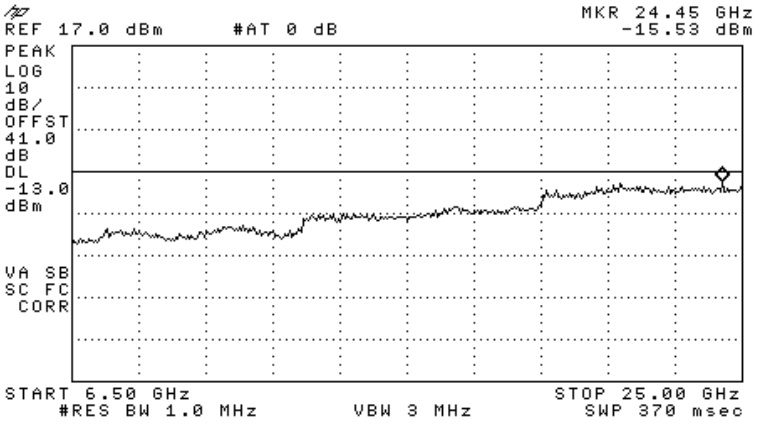

Figure 169.— 2135. 0 MHz CDMA

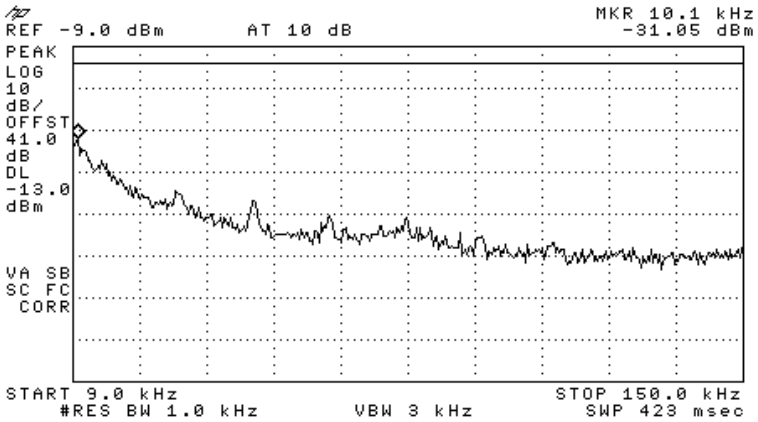

Figure 170.— 2153. 80 MHz CDMA

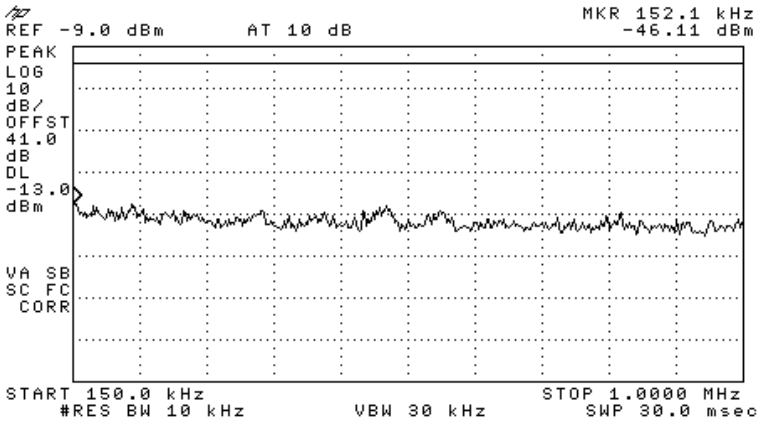

Figure 171.— 2153.80 MHz CDMA

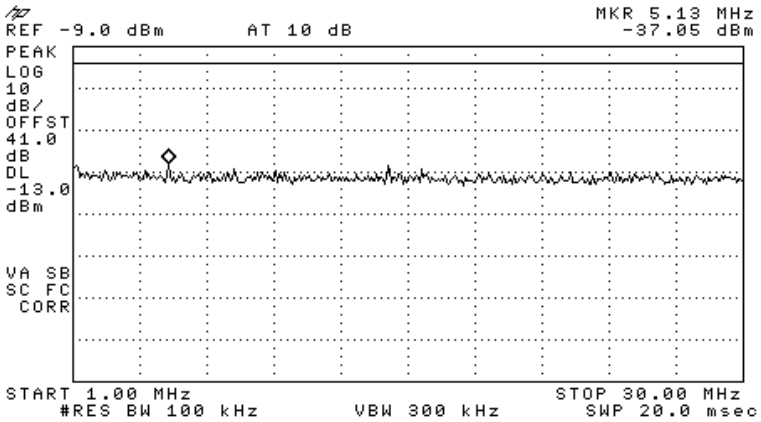

Figure 172.— 2153. 80 MHz CDMA

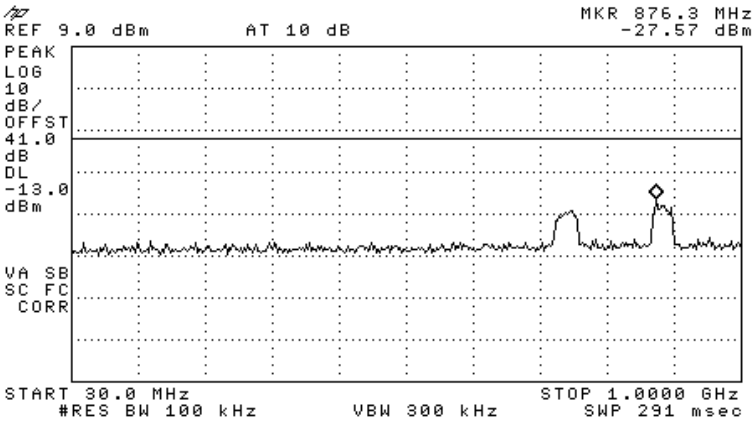

Figure 173.— 2153.80 MHz CDMA

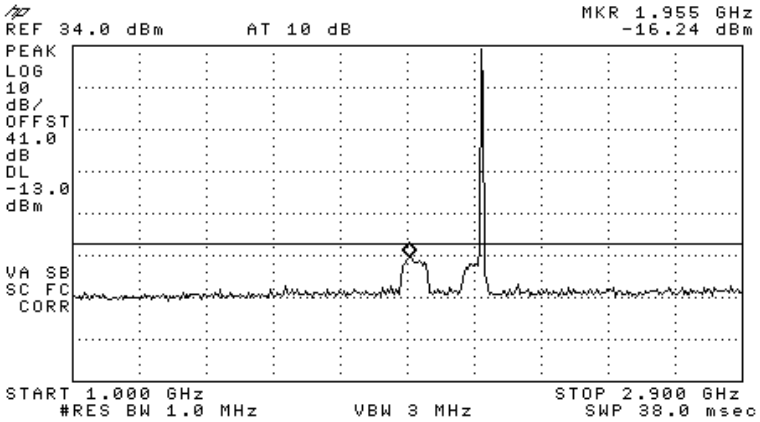

Figure 174.— 2153.80 MHz CDMA

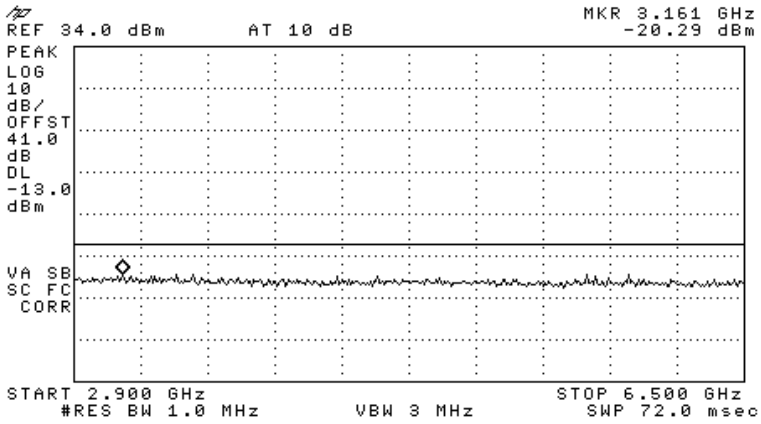

Figure 175.— 2153.80 MHz CDMA

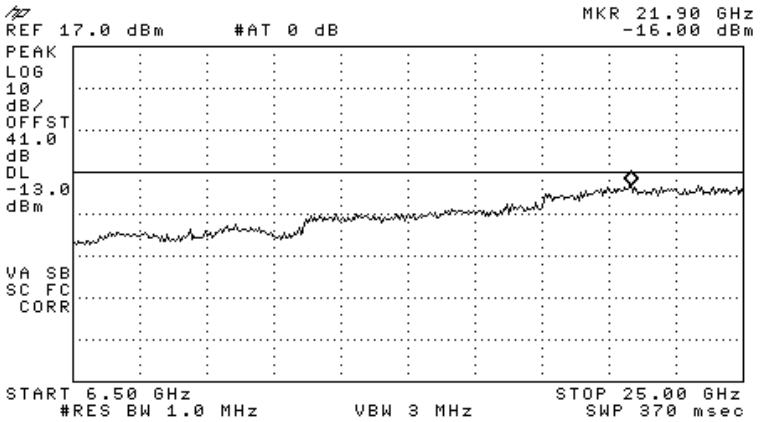

Figure 176.— 2153.80 MHz CDMA

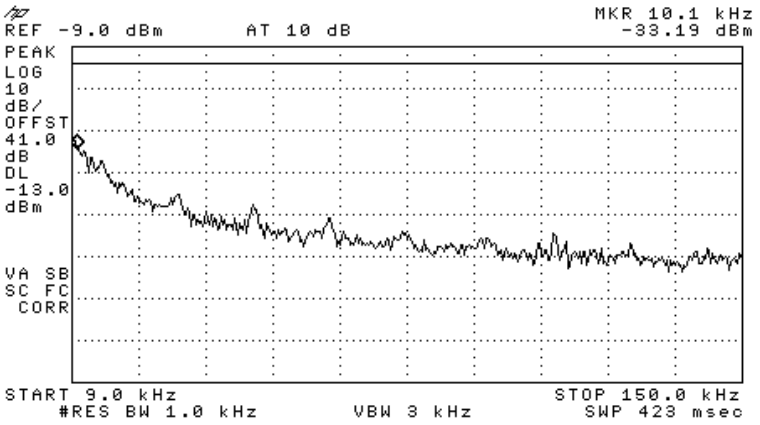

Figure 177.— 2112.50 MHz W-CDMA

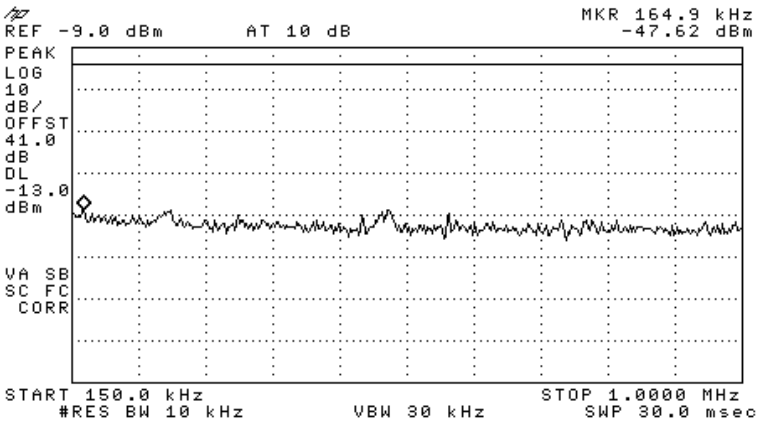

Figure 178.— 2112.50 MHz W-CDMA

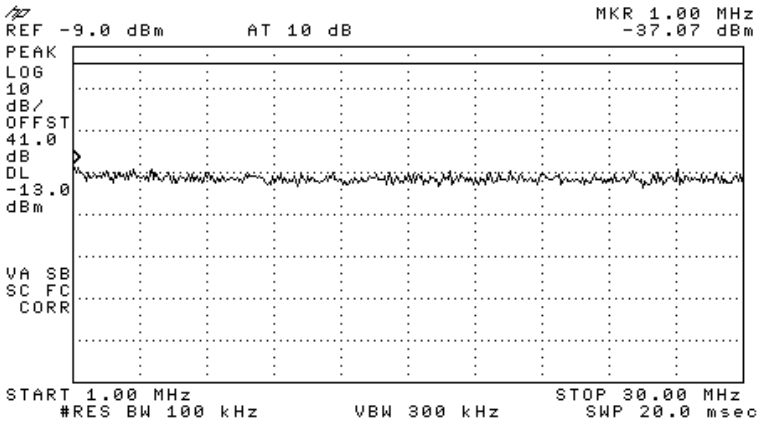

Figure 179.— 2112.50 MHz W-CDMA

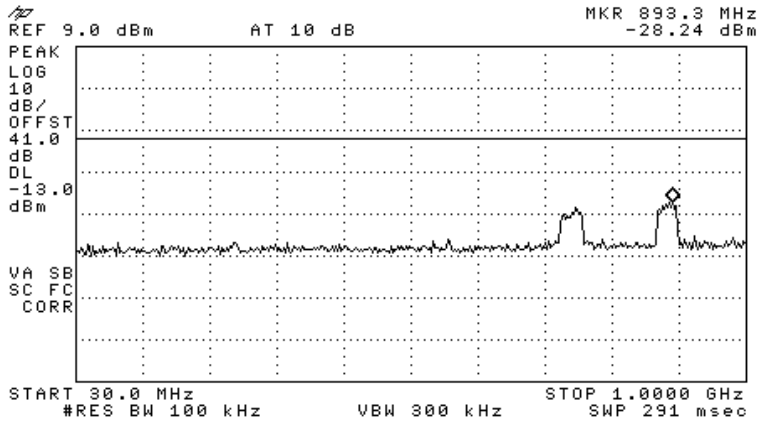

Figure 180.— 2112.50 MHz W-CDMA

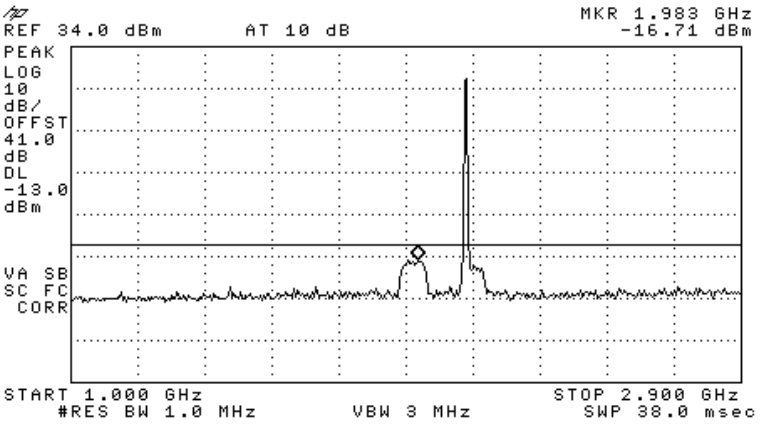

Figure 181.— 2112.50 MHz W-CDMA

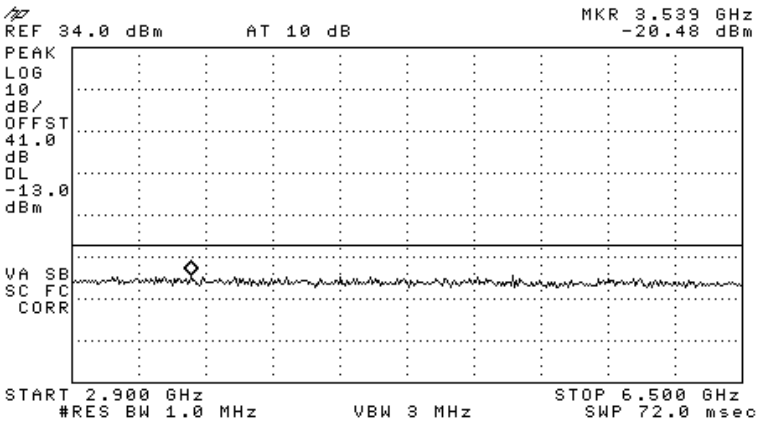

Figure 182.— 2112.50 MHz W-CDMA

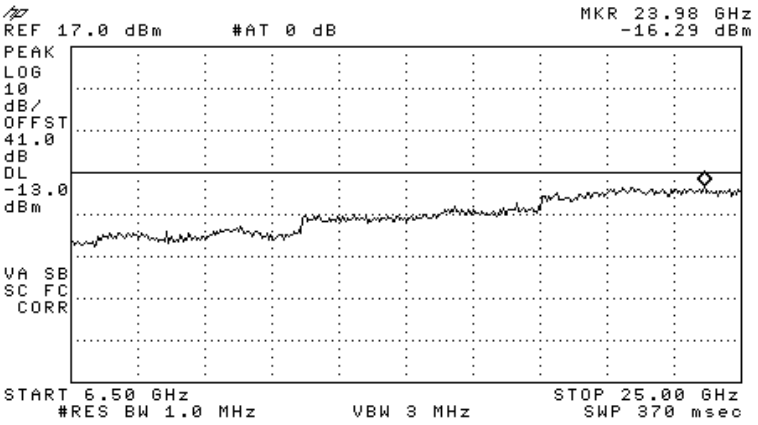

Figure 183.— 2112.50 MHz W-CDMA

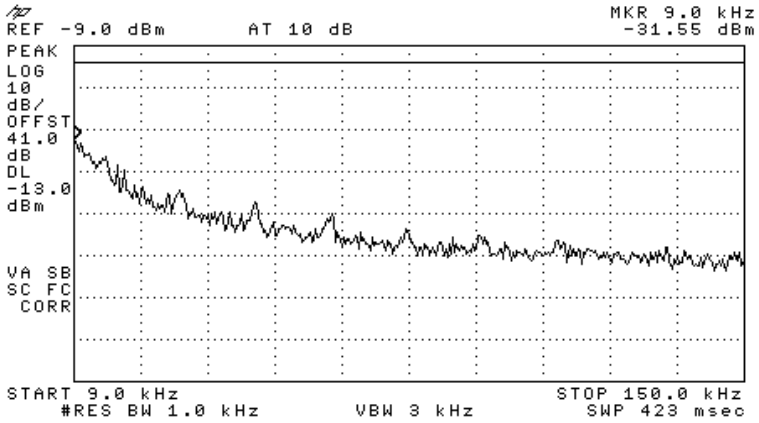

Figure 184.— 2135.00 MHz W-CDMA

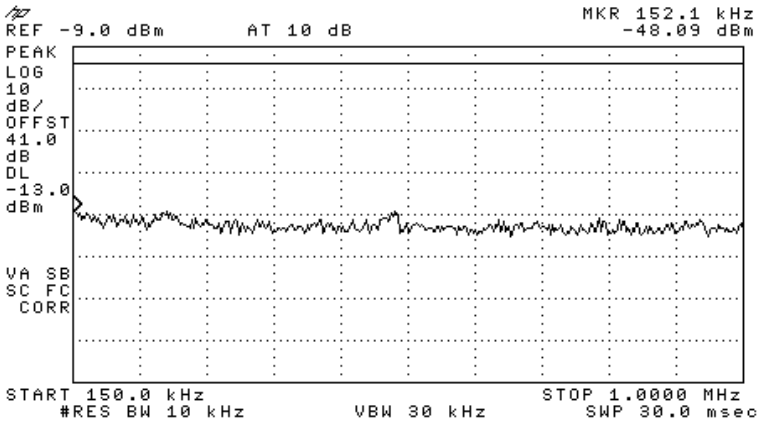

Figure 185.— 2135.00 MHz W-CDMA

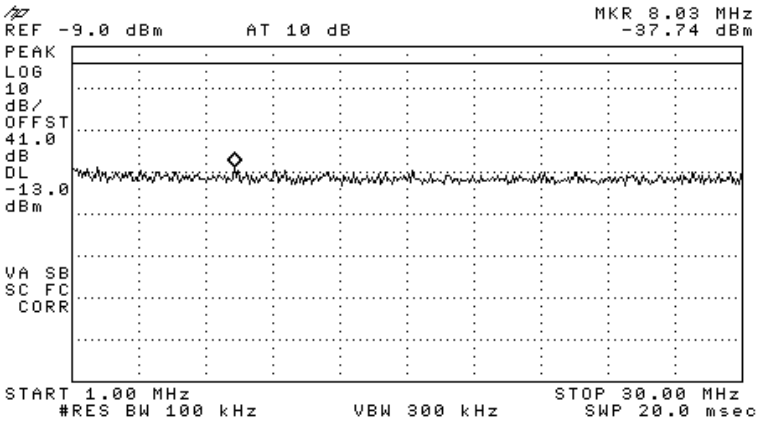

Figure 186.— 2135.00 MHz W-CDMA

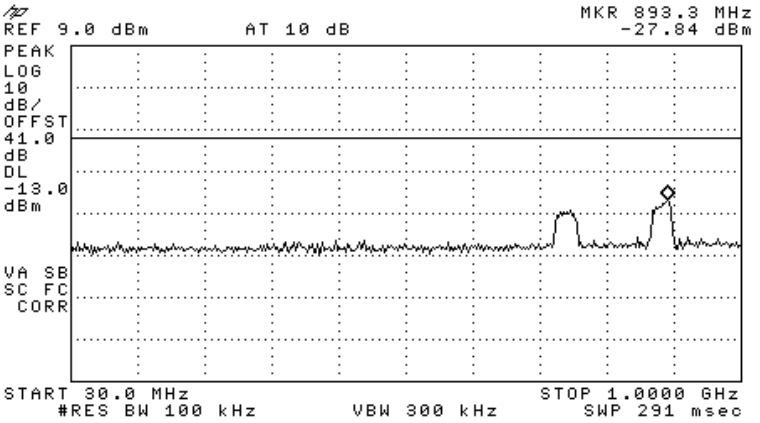

Figure 187.— 2135.00 MHz W-CDMA

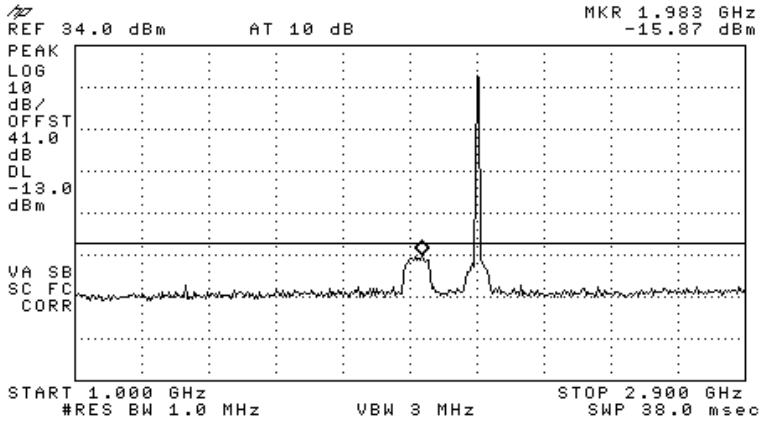

Figure 188.— 2135.00 MHz W-CDMA

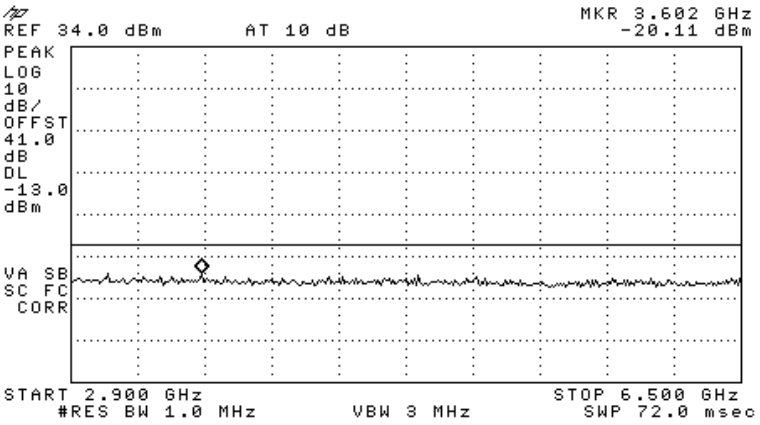

Figure 189.— 2135.00 MHz W-CDMA

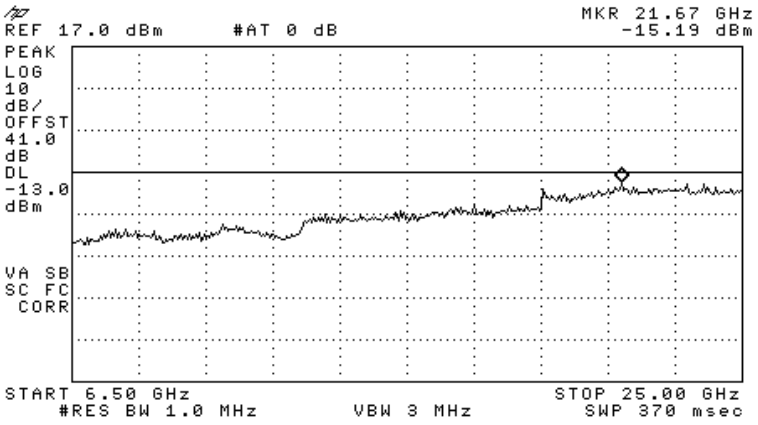

Figure 190.— 2135.00 MHz W-CDMA

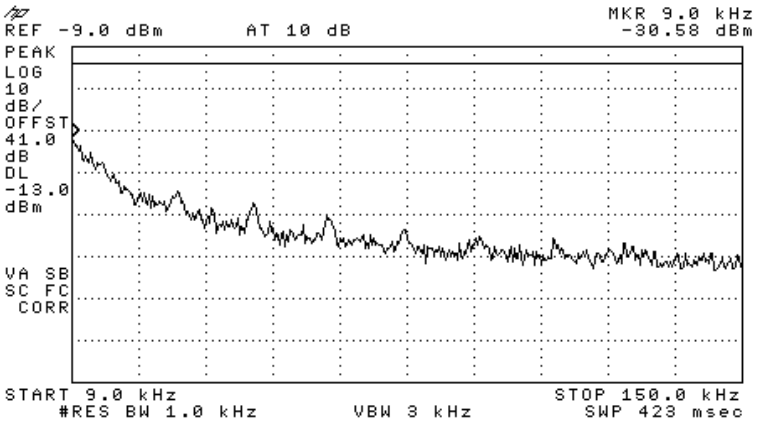

Figure 191.— 2152.50 MHz W-CDMA

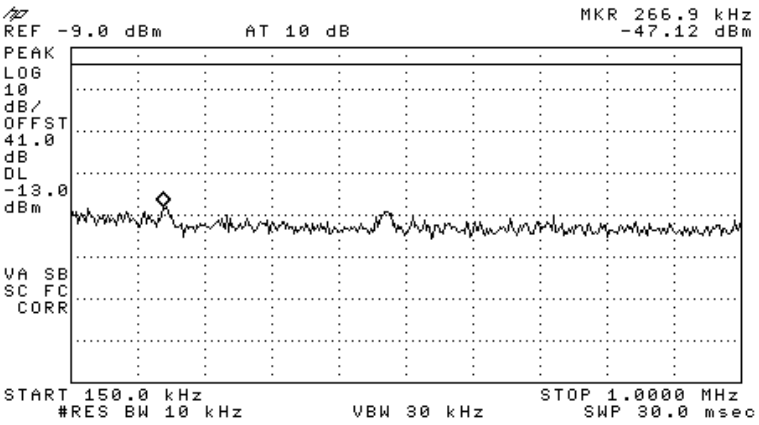

Figure 192.— 2152.50 MHz W-CDMA

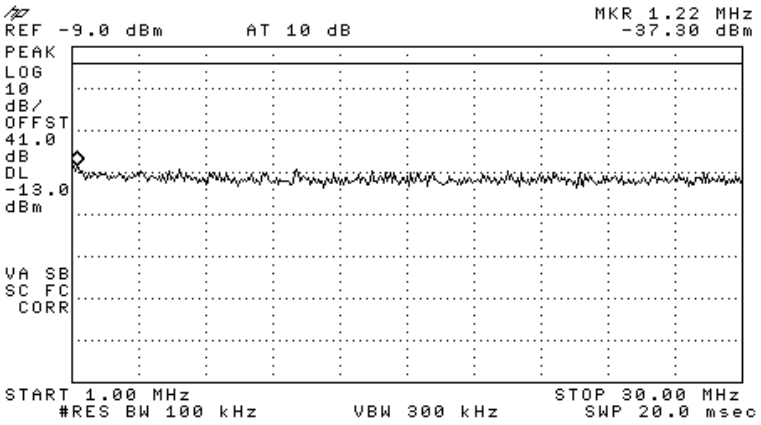

Figure 193.— 2152.50 MHz W-CDMA

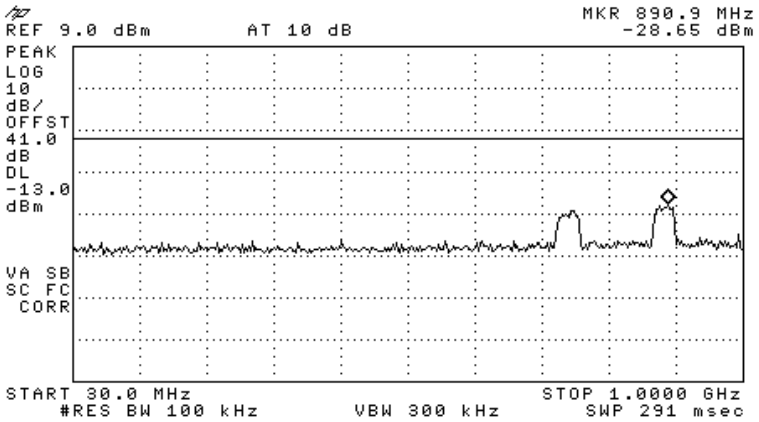

Figure 194.— 2152.50 MHz W-CDMA

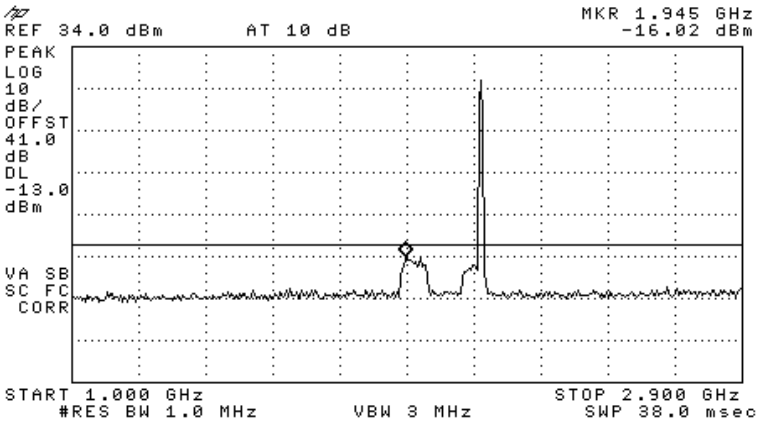

Figure 195.— 2152.50 MHz W-CDMA

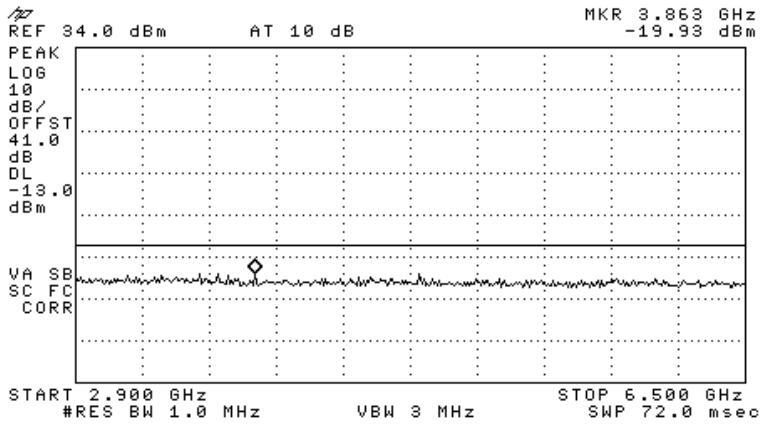

Figure 196.— 2152.50 MHz W-CDMA

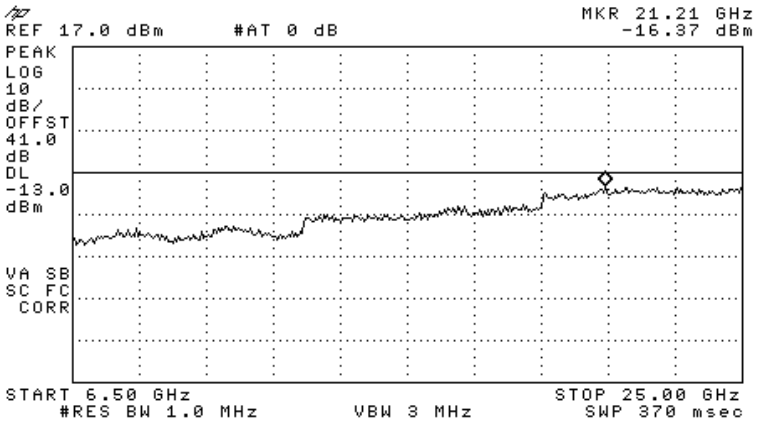

Figure 197.— 2152.50 MHz W-CDMA

12.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
Specification: FCC Part 27, Subpart C, Section 27.53 (g)

	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	2111.20	-16.03	-13.0	-3.03
	2135.00	-15.53	-13.0	-2.53
	2153.80	-16.00	-13.0	-3.00
WCDMA	2112.50	-16.29	-13.0	-3.29
	2135.00	-15.19	-13.0	-2.19
	2152.50	-16.02	-13.0	-3.02

Figure 198 Spurious Emissions at Antenna Terminals Results AWS

JUDGEMENT: Passed by: 2.53 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 1302.12

Typed/Printed Name: I. Siboni

12.4 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	May 4, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 199 Test Equipment Used

13. Band Edge Spectrum AWS

13.1 Test Specification

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

13.2 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).

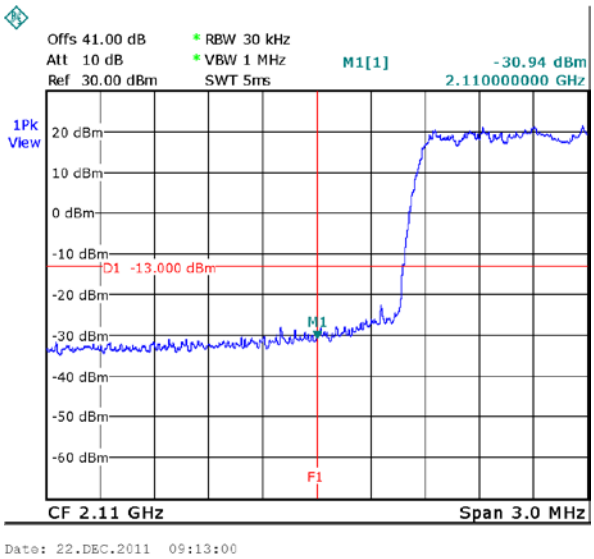

Figure 200.— CDMA 2111.20 MHz

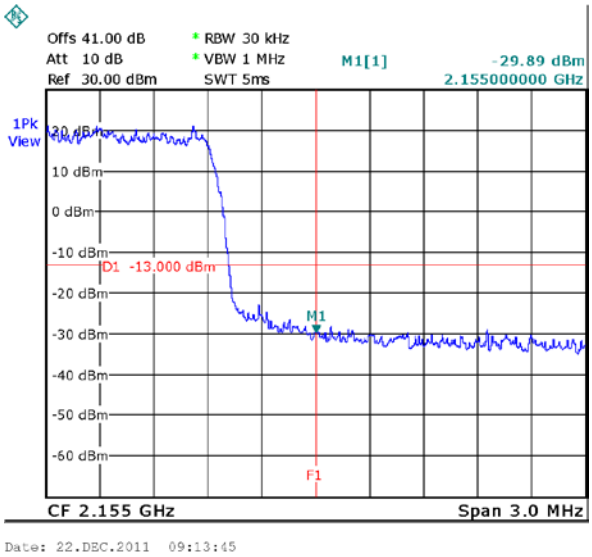

Figure 201.— CDMA 2153.80 MHz

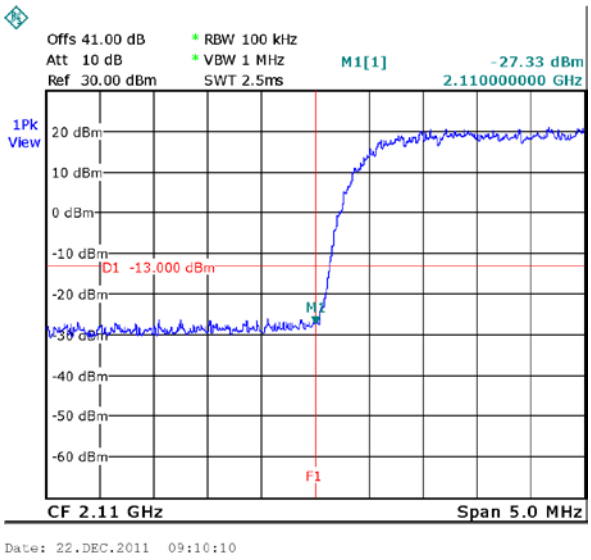

Figure 202.— W-CDMA 2112.50 MHz

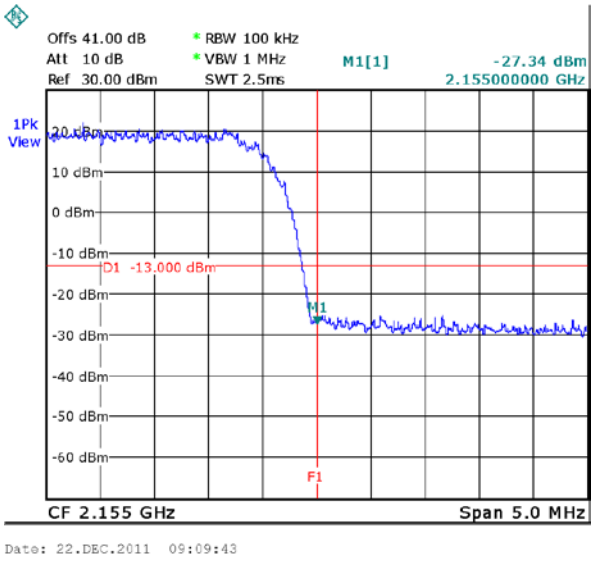

Figure 203.— W-CDMA 2152.50 MHz

13.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
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	2112.5	2110.0	-30.94	-13.0
CDMA	2153.8	2155.0	-29.89	-13.0
W-CDMA	2112.5	2110.0	-27.33	-13.0
W-CDMA	2153.8	2155.0	-27.34	-13.0

Figure 204 Band Edge Spectrum Results AWS

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 1302.12

Typed/Printed Name: I. Siboni

13.4 Test Equipment Used.

Band Edge Spectrum AWS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	RHODE&SCHWARZ	FSL6	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Signal Generator	HP	E4438C ESG	MY45091956	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 205 Test Equipment Used

14. Spurious Radiated Emission AWS

14.1 Test Specification

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

14.2 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.

14.3 Test Results

JUDGEMENT: Passed by 10.0 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: 13.02.12

Typed/Printed Name: I. Siboni

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	63.6	-39.79	4.45	9.12	-35.12	-13.0	-22.12
2111.20	4222.40	H	57.85	-45.54	4.45	9.12	-40.87	-13.0	-27.87
2135.00	4270.00	V	75.65	-27.96	4.45	9.38	-23.03	-13.0	-10.03
2135.00	4270.00	H	62.49	-41.58	4.45	9.38	-36.65	-13.0	-23.65
2153.80	4307.60	V	53.7	-50.37	4.45	9.38	-45.44	-13.0	-32.44
2153.80	4307.60	H	54.2	-49.41	4.45	9.38	-44.48	-13.0	-31.48

Figure 206 Out of Band Emission (Radiated) AWS

14.4 Test Instrumentation Used, Radiated Measurements AWS

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2011	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	November 13, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 4, 2011	1 Year
Signal Generator	HP	E4432B ESG-D	GB40050702	August 28, 2011	1 year
Signal Generator	HP	E4438C ESG	MY45091956	August 28, 2011	1 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2010	2 year

15. Intermodulation Conducted

15.1 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 range 10 kHz–10.0 MHz, 100 kHz for the frequency range 10.0 MHz-2.4385 GHz, and 1 MHz for the frequency range 2.4385-26.0 GHz.

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

LTE 747 MHz QPSK 10 dBm

CELL 881 MHz GSM 10 dBm

PCS 1960 MHz CW 10 dBm

AWS: 2135 MHz W-CDMA 10 dBm

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

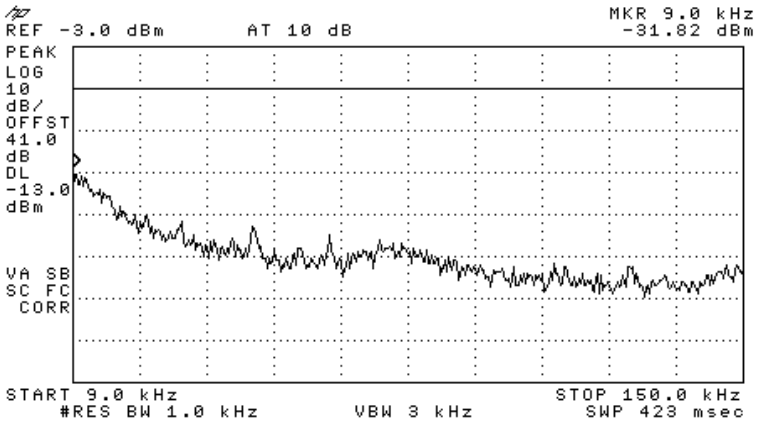

Figure 207 Intermodulation

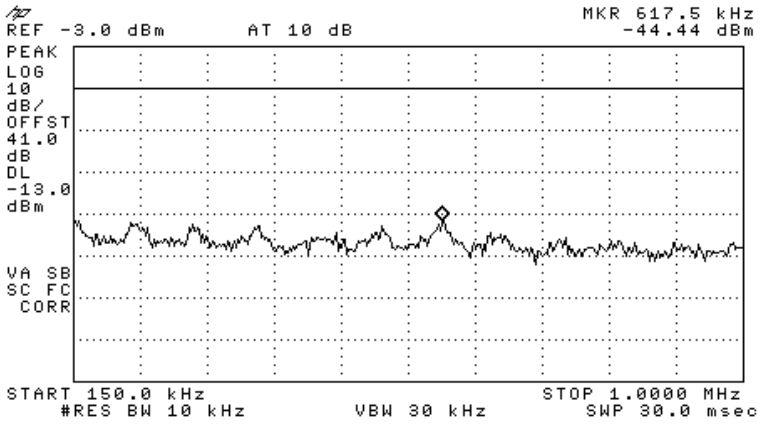

Figure 208 Intermodulation

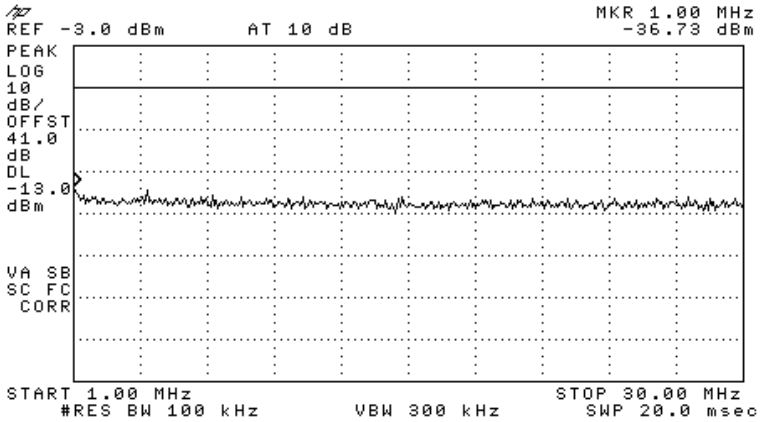

Figure 209 Intermodulation

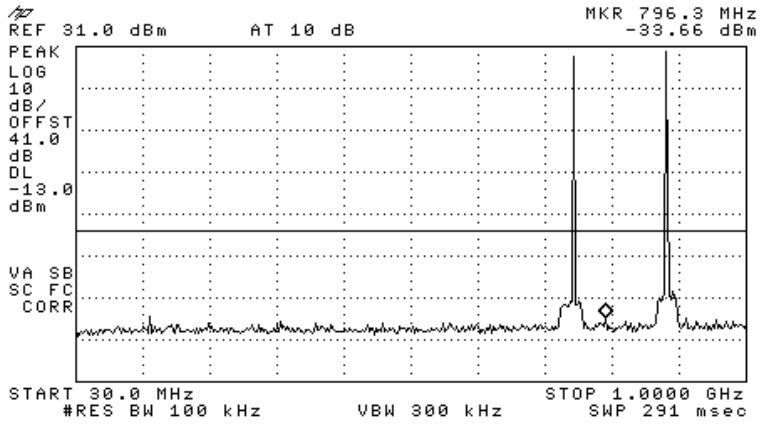

Figure 210 Intermodulation

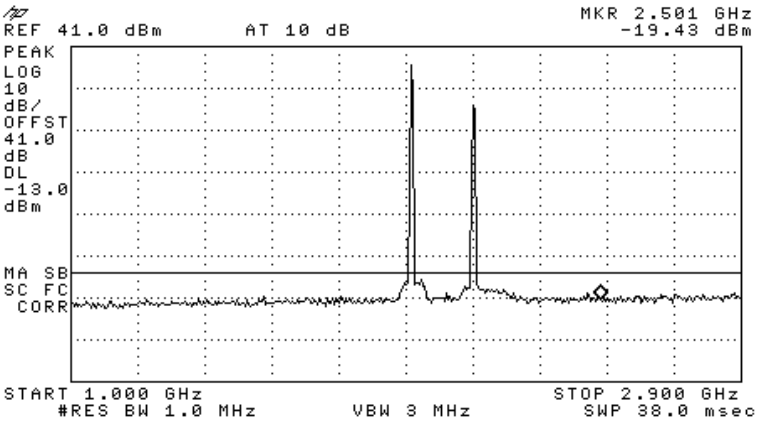

Figure 211 Intermodulation

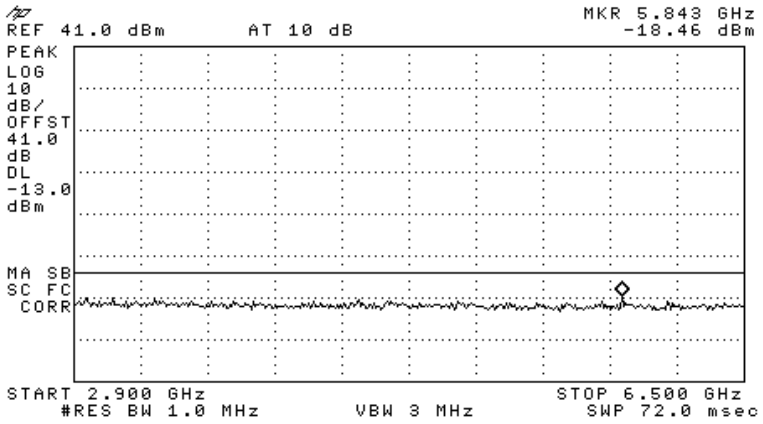

Figure 212 Intermodulation

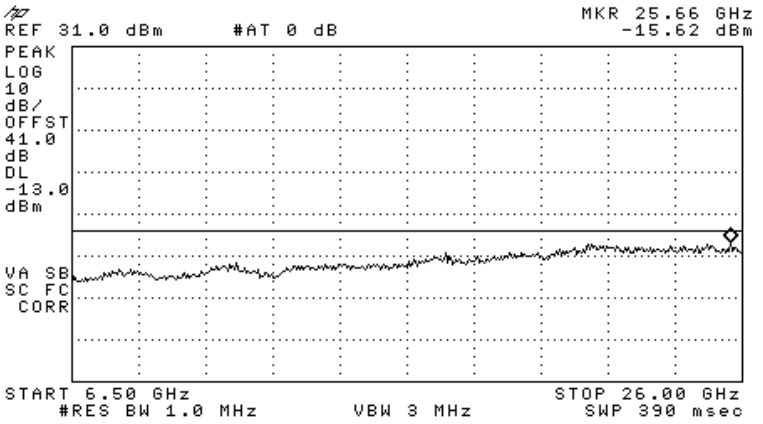

Figure 213 Intermodulation

15.2 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	May 4, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Signal Generator	HP	E4438C	MY42082764	July 18, 2011	1 year
Signal Generator	HP	83731B	US37100653	February 21, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 214 Test Equipment Used

16. Intermodulation Radiated

16.1 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.

16.2 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)
2*747+881	2375.00	V	52.8	-38.56	7.2	12	-33.76	-13.0	-20.76
2*747+881	2375.00	H	51.4	51.4	7.2	12	56.2	-13.0	-43.20
2*747-881	613.00	V	43.9	-52.44	3.2	0.97	-54.67	-13.0	-41.67
2*747-881	613.00	H	38.8	-58.91	3.2	0.97	-61.14	-13.0	-48.14
2*881-747	1015.00	V	41.8	-59.99	4.2	5.4	-58.79	-13.0	-45.79
2*881-747	1015.00	H	40.7	-60.75	4.2	5.4	-59.55	-13.0	-46.55
2*881+747	2509.00	V	54.8	-45.96	7.7	8.4	-45.26	-13.0	-32.26
2*881+747	2509.00	H	53.4	-48.21	7.7	8.4	-47.51	-13.0	-34.51
3*747-2*881	579.00	V	37.8	-58.54	3.2	0.97	-60.77	-13.0	-47.77
3*747-2*881	579.00	H	38.7	-59.01	3.2	0.97	-61.24	-13.0	-48.24
3*881-2*747	1149.00	V	40.3	-61.19	4.45	5.84	-59.8	-13.0	-46.80
3*881-2*747	1149.00	H	40.5	-61.01	4.45	5.84	-59.62	-13.0	-46.62
2*1960-2135	1785.00	V	37.1	-62.69	5.6	7.66	-60.63	-13.0	-47.63
2*1960-2135	1785.00	H	37.0	-63.05	5.6	7.66	-60.99	-13.0	-47.99
2*2135-1960	2310.00	V	38.5	-63.08	7.1	8.12	-62.06	-13.0	-49.06
2*2135-1960	2310.00	H	38.9	-63.48	7.1	8.12	-62.46	-13.0	-49.46
3*2135-2*1960	2485.00	V	52.5	-48.26	7.7	8.4	-47.56	-13.0	-34.56
3*2135-2*1960	2485.00	H	51.2	-50.41	7.7	8.4	-49.71	-13.0	-36.71
2*2135-3*1960	1610.00	V	46.2	-54.8	5.3	7.62	-52.48	-13.0	-39.48
2*2135-3*1960	1610.00	H	44.8	-56.64	5.3	7.62	-54.32	-13.0	-41.32

16.3 Test Instrumentation Used, Radiated Measurements Intermodulation

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2011	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	November 13, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 4, 2011	1 Year
Signal Generator	HP	E4432B ESG-D	GB40050702	May 4, 2011	1 year
Signal Generator	HP	E4438C	MY42082764	July 18, 2011	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

17. APPENDIX A - CORRECTION FACTORS

17.1 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".

17.2 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.

17.3 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.

17.4 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".*

17.5 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			