DATE: 13 June 2011

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

FCC Radio Test Report

for

Mobile Access Networks

Equipment under test:

Mobile AccessHX High-Power DAS Remote Unit

HX-C85P19L70-AC-A
(C85=CELL; P19=PCS;L70=LTE)
(CELL/PCS/LTE)

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
A. Sharabi, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Measurement/Technical Report for

Mobile Access Networks

Mobile AccessHX High-Power DAS Remote Unit

FCC ID: OJFHXC85P19L70

This report concerns:	Original Grant: X Class II change: Class I change:
Equipment type:	PCS Licensed Transmitter
Limits used: 47CFR Parts 22, 24, 27	

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

Application for Certification prepared by:

Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
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Israel
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Applicant for this device:
(different from "prepared by")

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Mobile Access Networks
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e-mail: sblum@mobileaccess.com

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1. General Information

1.1 Administrative Information

Manufacturer:	Mobile Access Networks
Manufacturer's Address:	8391 Old Courthouse Rd. Suite #300 Vienna, VA 22182 U.S.A. Tel: +1-541-758-2880 Fax: +1-703-848-0260
Manufacturer's Representative:	Steve Blum
Equipment Under Test (E.U.T):	Mobile AccessHX High-Power DAS Remote Unit
Equipment Model No.:	HX-C85P19L70-AC-A (C85=CELL; P19=PCS;L70=LTE)
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	25.05.11
Start of Test:	25.05.11
End of Test:	09.06.11
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Parts 22, 24, 27

1.2 List of Accreditations

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

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

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

1.3 Product Description

The MobileAccess**HX** is a high power, Distributed Antenna System (DAS) solution for indoors or outdoors (model dependent). It is a fiber-fed, compact and scalable multi-service platform designed to provide complete RF open space coverage for large scale public venues, such as campuses, stadiums, convention centers, hotels, airports, and train stations.
HX supports multiple wireless technologies and operator services over a single broadband infrastructure. Using low loss fiber optic cabling remote units can cover distances of up to 2Km from the BTS signal sources at the head-end.
The solution can be deployed in new sites or alongside existing MobileAccess**1000** (MA1000) and/or MobileAccess**2000** (MA2000) systems, sharing a common head-end and element management system (EMS).
Alongside MA1000/MA2000 deployments, MobileAccess**HX** provides a comprehensive indoor and outdoor coverage solution for varying site requirements, supporting everything from high-rise buildings and campus topologies to stadiums and airports.

Features & Benefits:

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

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

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

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

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

Design and Deployment Flexibility:

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

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

System Architecture

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

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

1.4 Test Methodology

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 (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 (CELL, PCS, and LTE) are represented in the setup by appropriate signal generators.
An "Exercise" SW on the computer was used to enable / disable transmission of the EUT, while the EUT output was connected to the spectrum analyzer.

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

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

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

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

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

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

2.2 EUT Exercise Software

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

2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.

2.5 Configuration of Tested System

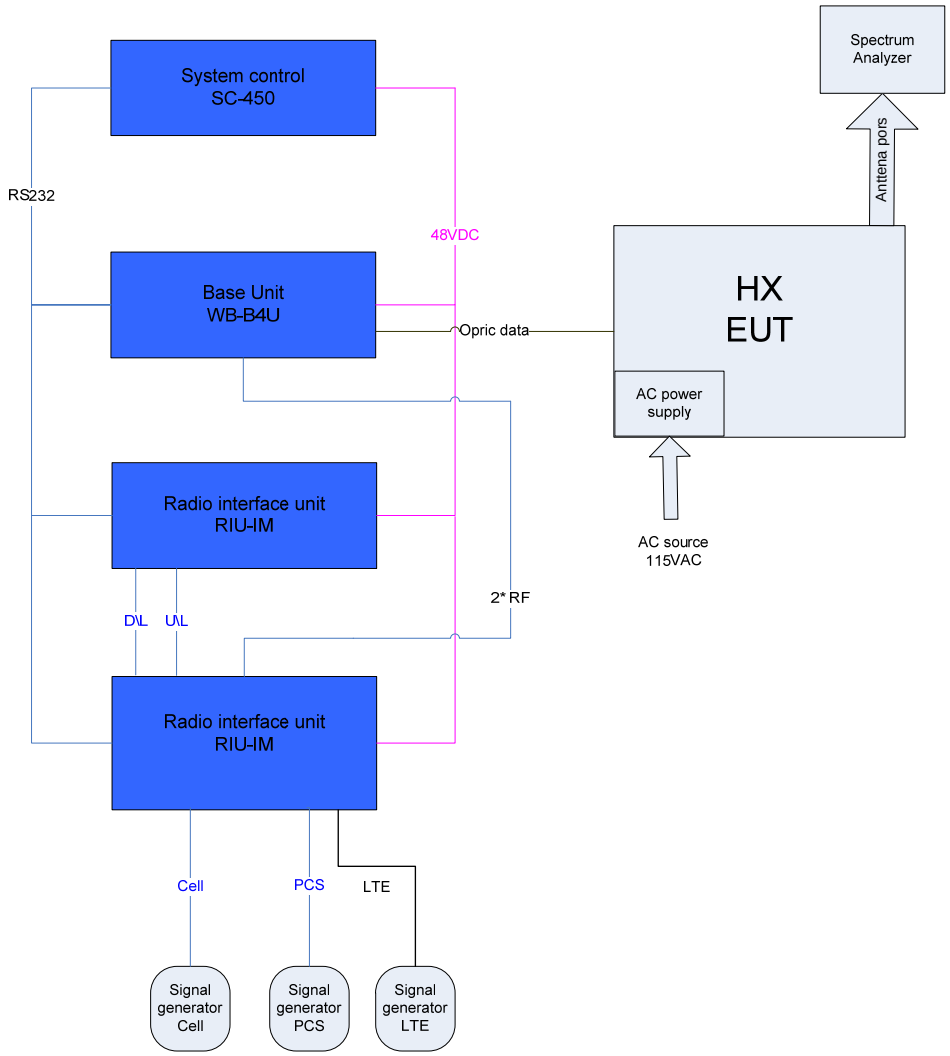

Figure 1. Tests Set-up

3. Conducted and Radiated Measurement Test Set-ups Photo

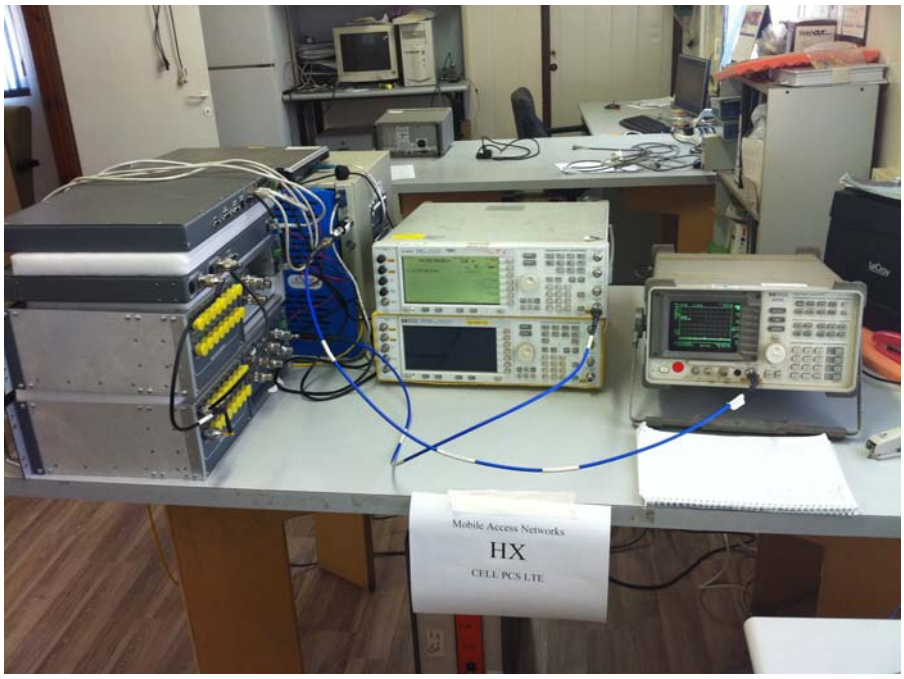

Figure 2. Conducted Emission From Antenna Ports Tests

Figure 3. Radiated Emission Test

4. Peak Output Power CELL

4.1 Test Specification

FCC Part 22.913

4.2 Test procedure

Peak Power Output must not exceed 500 Watts (57dBm).

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (40 dB) and an appropriate coaxial cable (1dB). The E.U.T. RF output was modulated. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 1.0 MHz RBW. The output power level was measured at 870.20, 881.0, and 892.80 MHz.

CDMA:

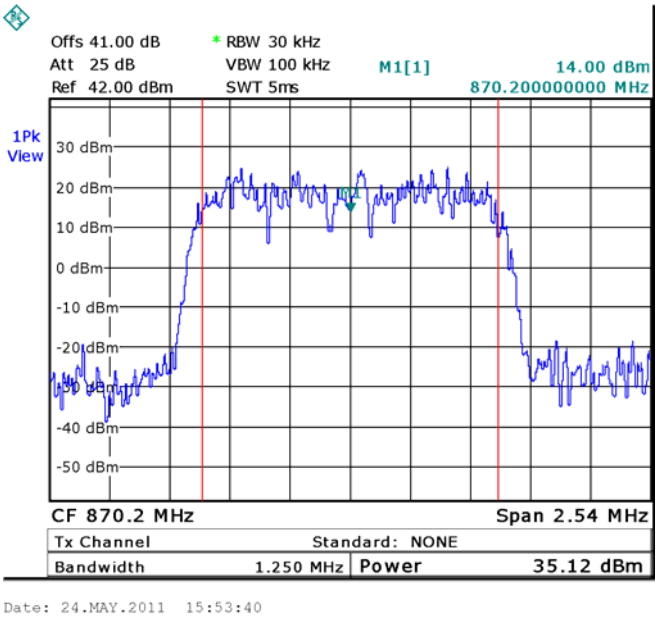

Figure 4.— 870.20 MHz

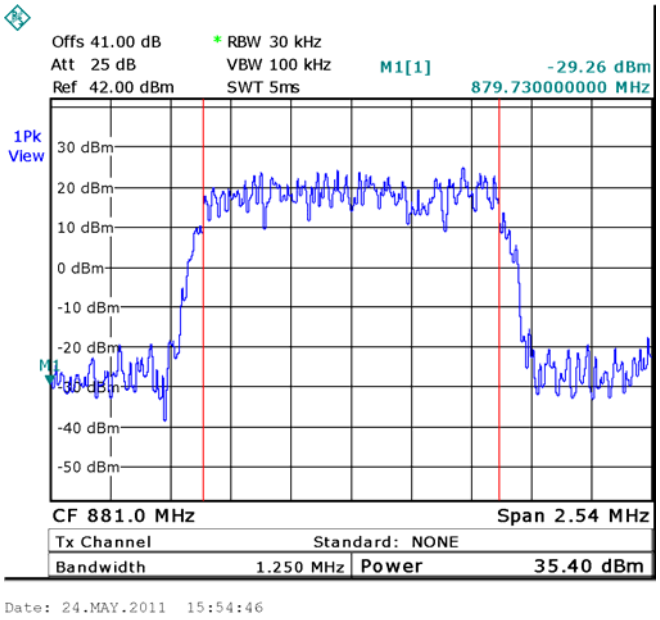

Figure 5.— 881.00 MHz

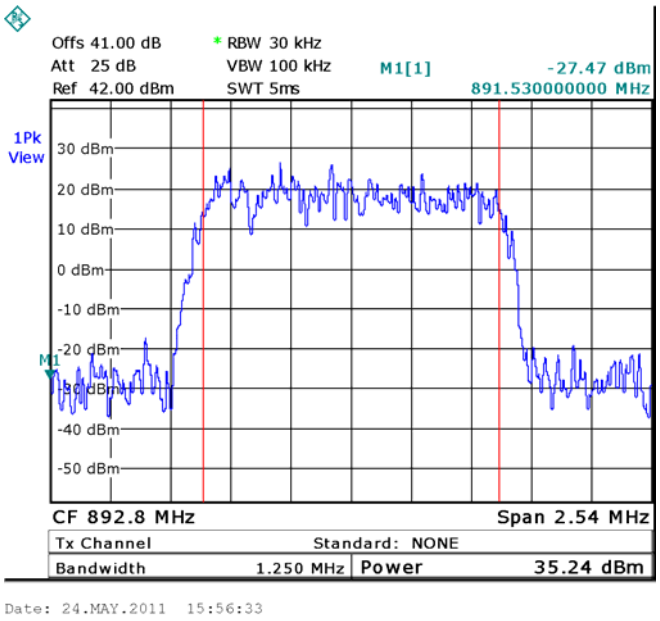

Figure 6.— 892.80 MHz

GSM:

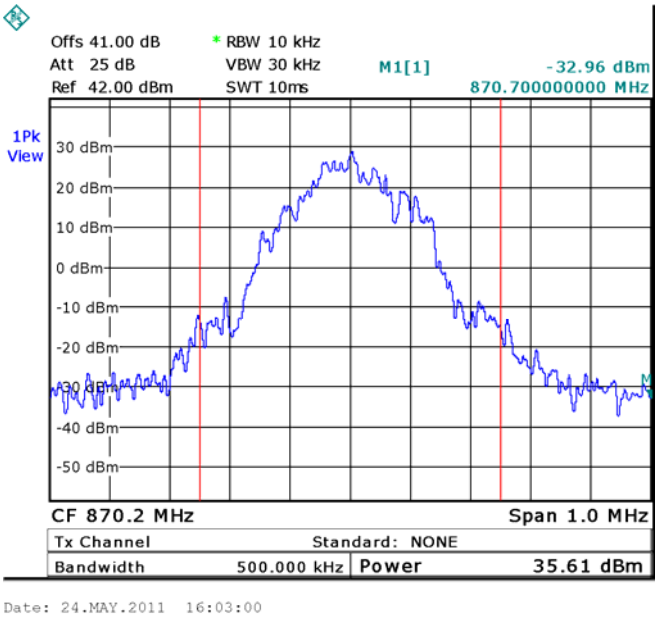

Figure 7.— 870.20 MHz

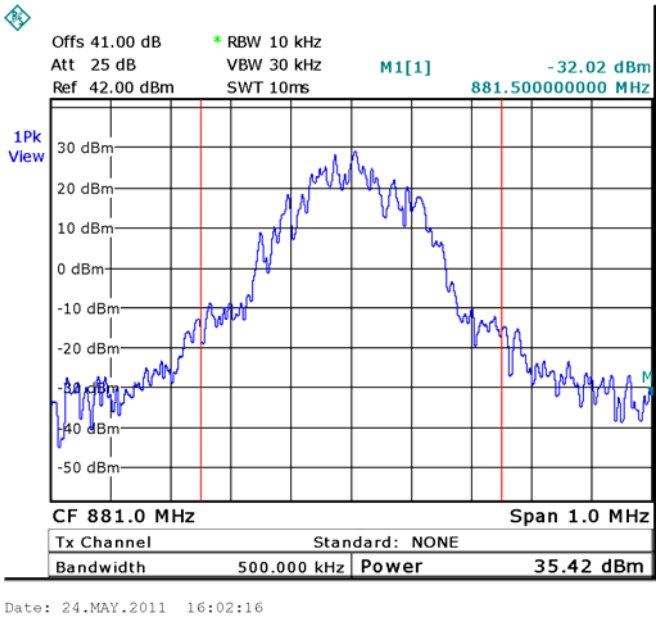

Figure 8.— 881.00 MHz

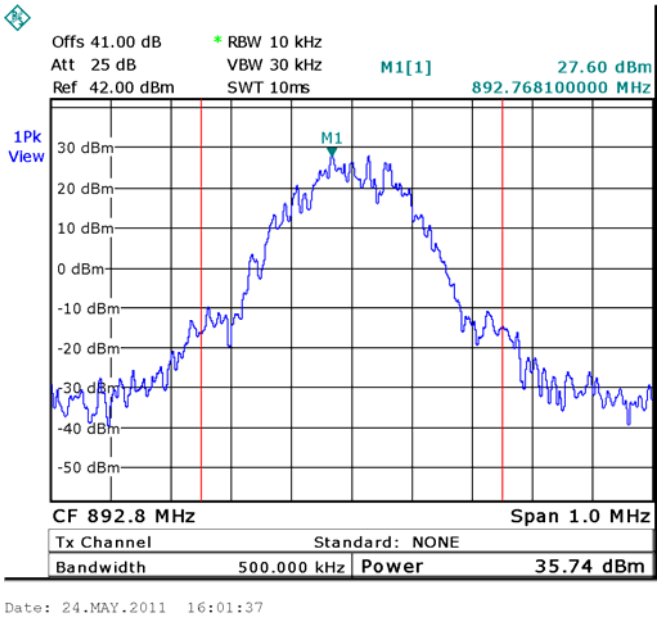

Figure 9.— 892.80 MHz

W-CDMA:

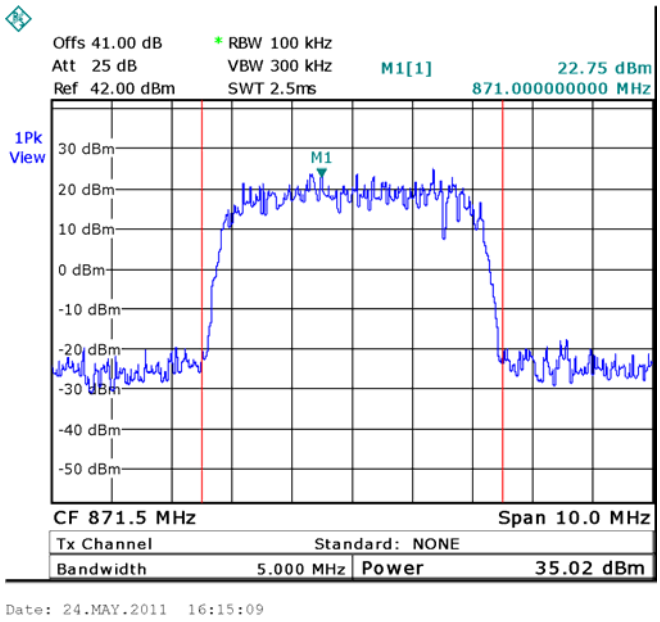

Figure 10.— 871.50 MHz

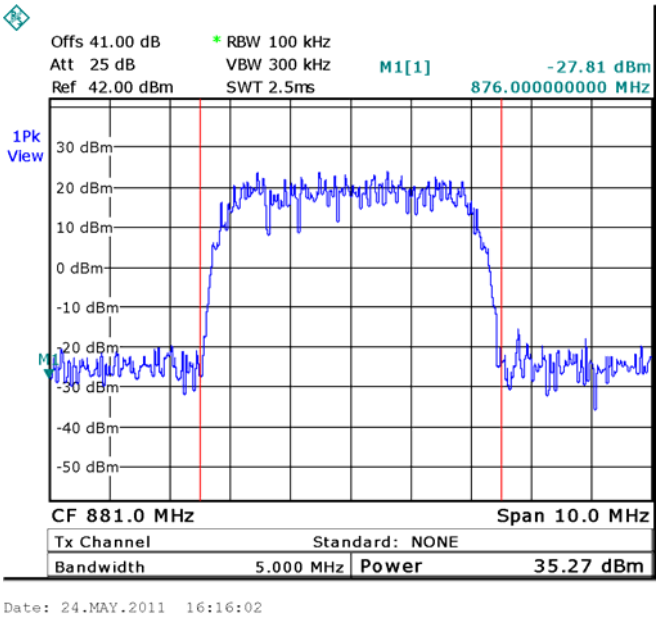

Figure 11.— 881.00 MHz

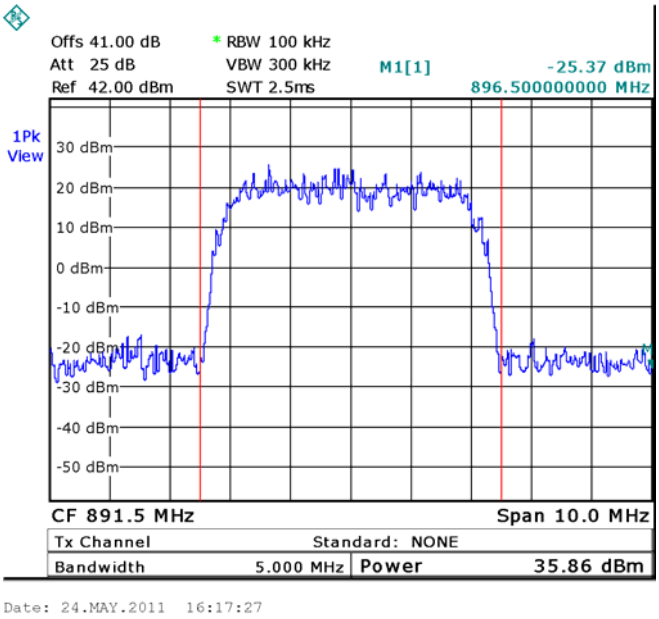

Figure 12.— 891.50 MHz

4.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 22 Section 913, FCC Part 2, Section 1046

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	870.20	35.12	57.0	-21.88
	881.00	35.40	57.0	-21.60
	892.80	35.24	57.0	-21.76
GSM	870.20	35.61	57.0	-21.39
	881.00	35.42	57.0	-21.58
	892.80	35.74	57.0	-21.26
W-CDMA	871.50	35.02	57.0	-21.98
	881.50	35.27	57.0	-21.73
	891.50	35.86	57.0	-21.14

Figure 13 Peak Output Power CELL

JUDGEMENT: Passed by 21.14 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

4.4 Test Equipment Used.

Peak Output Power CELL

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

Figure 14 Test Equipment Used

5. Occupied Bandwidth CELL

5.1 Test Specification

FCC Part 2, Section 1049

5.2 Test Procedure

The E.U.T. was set to the applicable test frequency with 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 100 kHz 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.
The occupied bandwidth of the E.U.T. at the points of 20 dB below maximum peak power was measured and recorded.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

CDMA

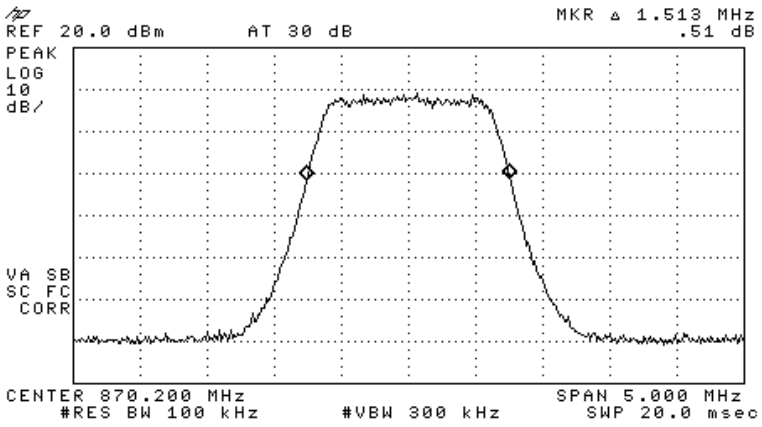

Figure 15.— Input 870.20

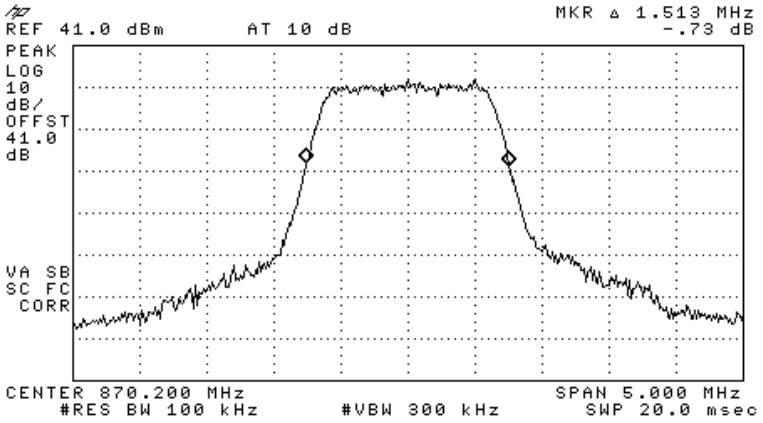

Figure 16.— Output 870.20

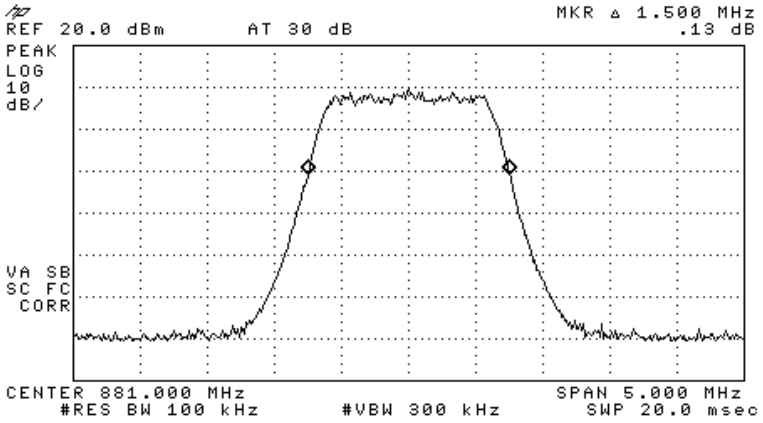

Figure 17.— Input 881.0 MHz.

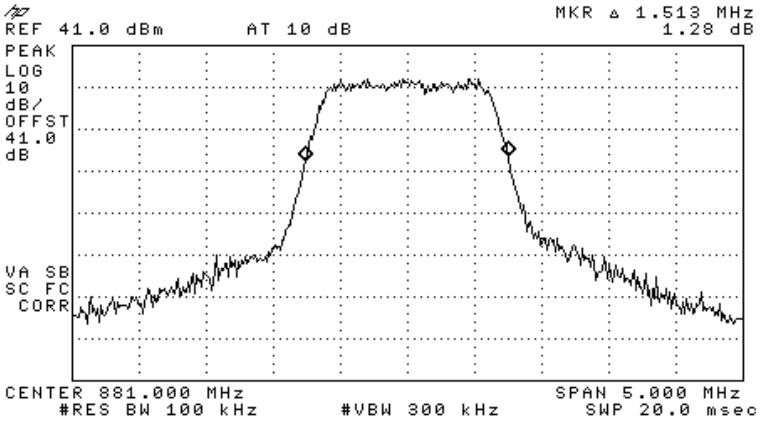

Figure 18.—Output 881.0Hz.

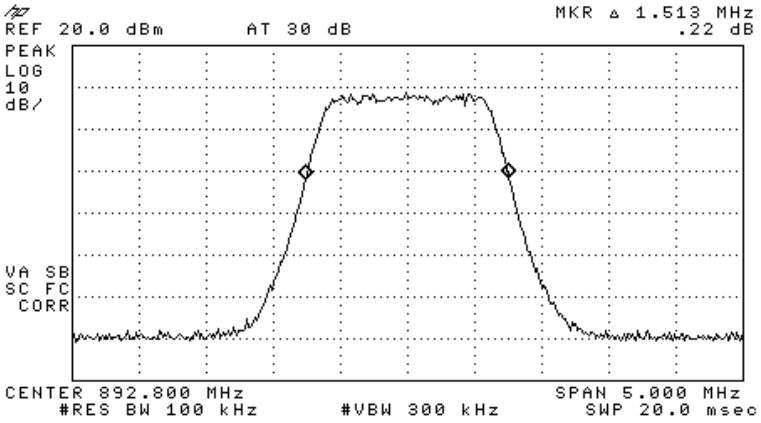

Figure 19.— Input 892.80 MHz.

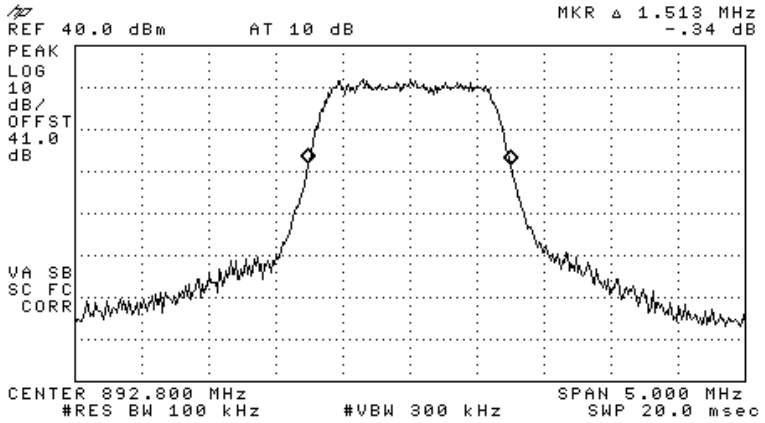

Figure 20.— Output 892.80 MHz.

GSM:

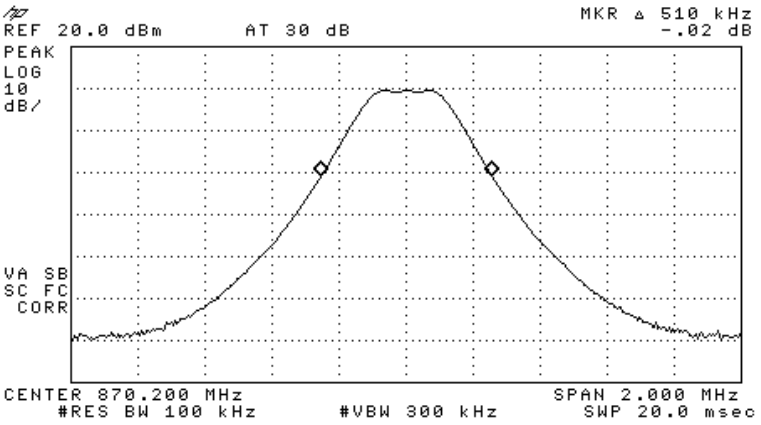

Figure 21.— Input 870.20

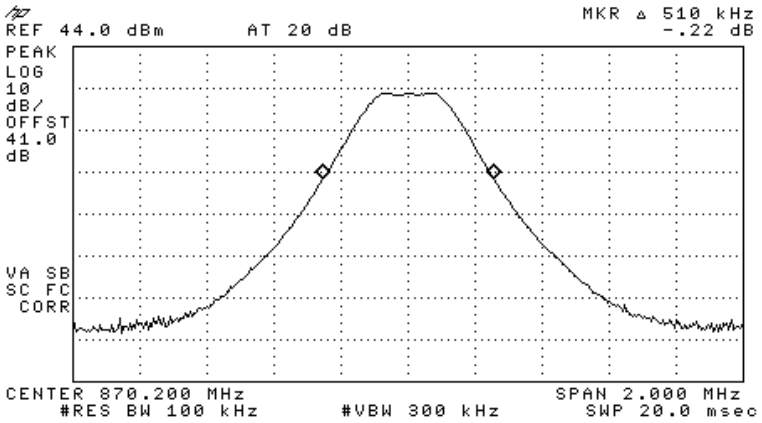

Figure 22.— Output 870.20

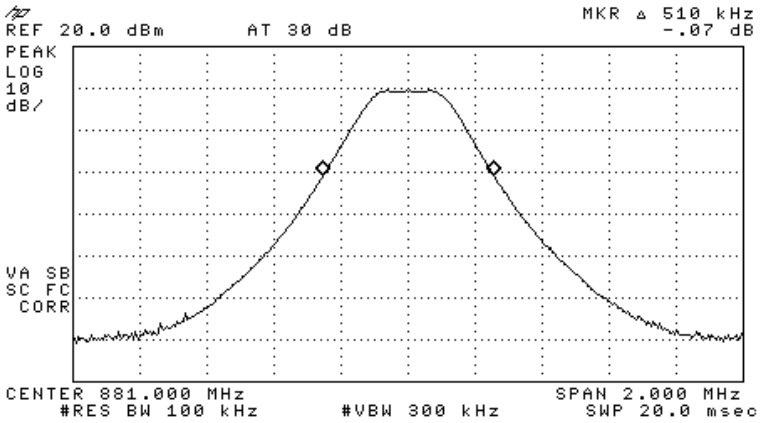

Figure 23.— Input 881.0 MHz.

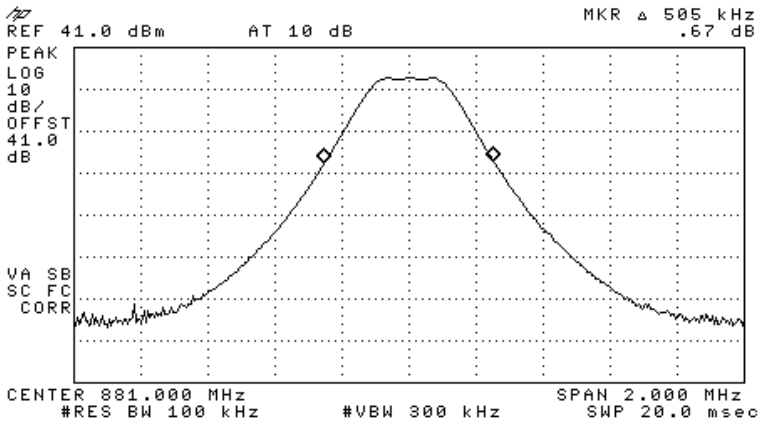

Figure 24.—Output 881.0Hz.

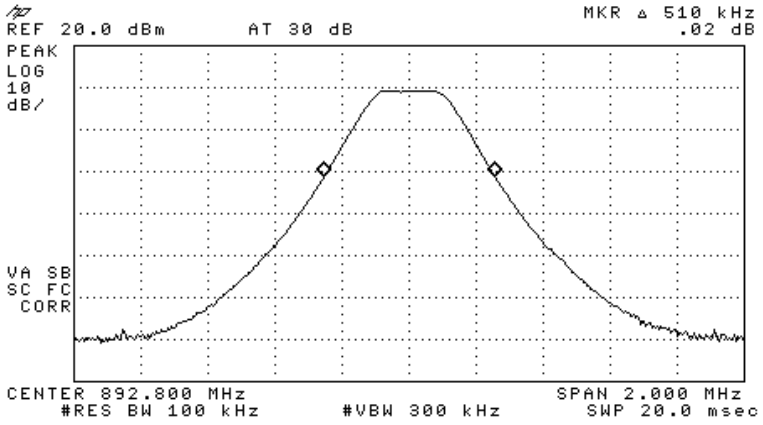

Figure 25.— Input 892.8 MHz.

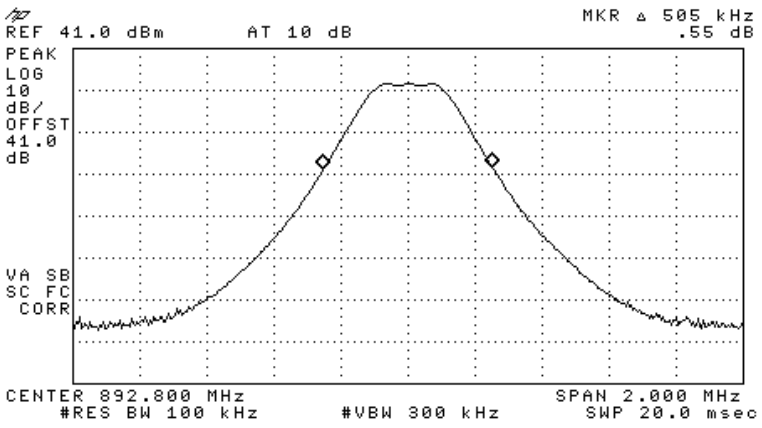

Figure 26.— Output 892.8 MHz.

W-CDMA:

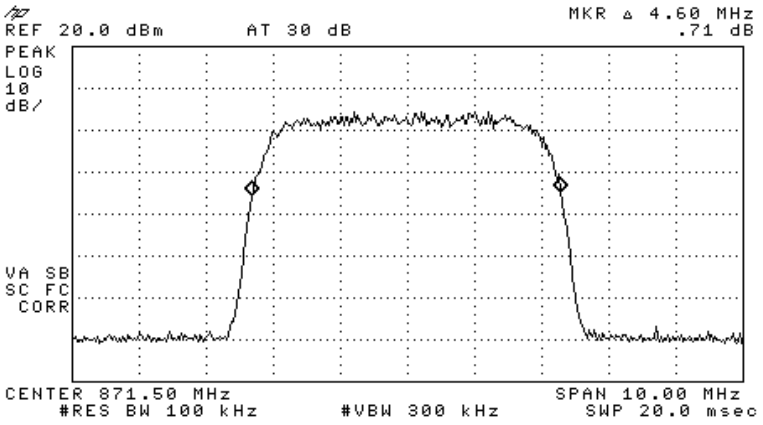

Figure 27.— Input 871.50

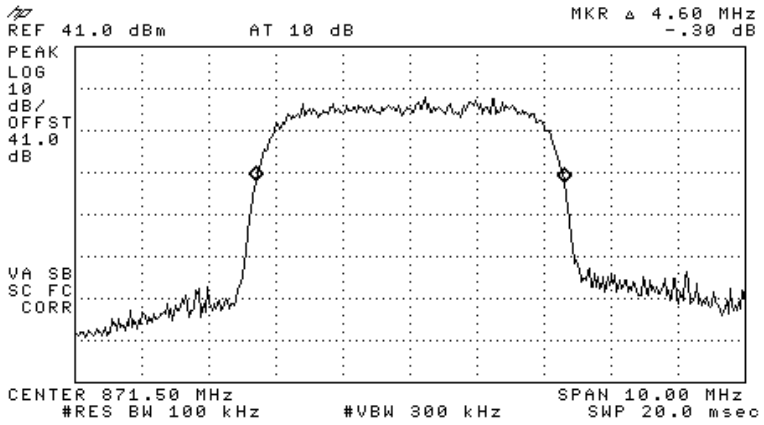

Figure 28.— Output 871.50

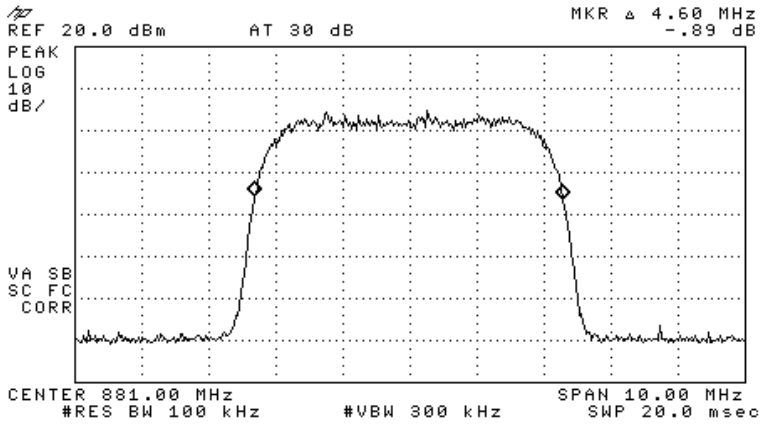

Figure 29.— Input 881.0 MHz.

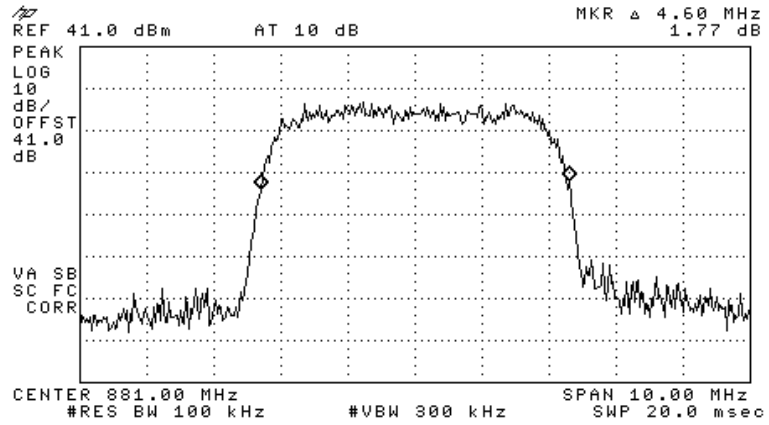

Figure 30.—Output 881.0Hz.

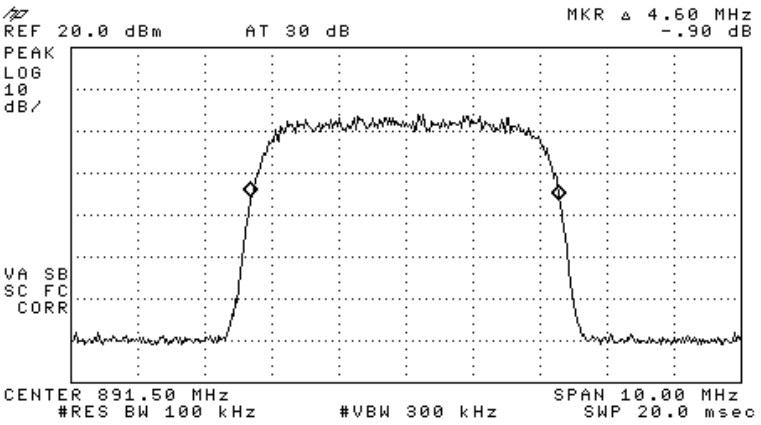

Figure 31.— Input 891.50 MHz.

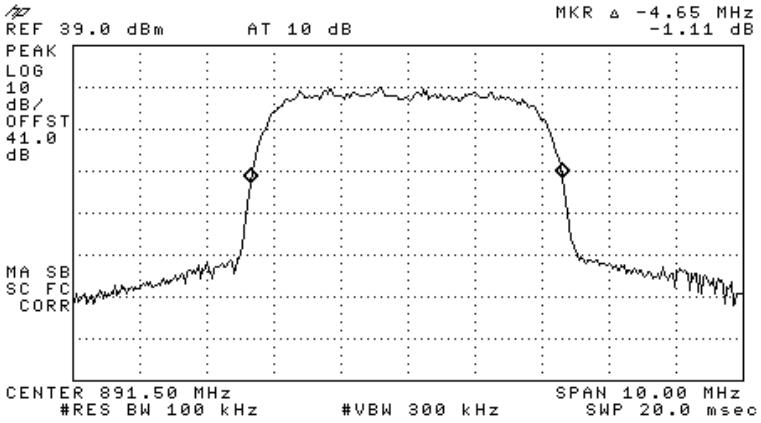

Figure 32.— Output 891.50 MHz.

5.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (MHz)
CDMA	Input	870.20	1.513
CDMA	Output	870.20	1.513
CDMA	Input	881.00	1.500
CDMA	Output	881.00	1.513
CDMA	Input	892.80	1.513
CDMA	Output	892.80	1.513
GSM	Input	870.20	0.510
GSM	Output	870.20	0.510
GSM	Input	881.00	0.510
GSM	Output	881.00	0.505
GSM	Input	892.80	0.510
GSM	Output	892.80	0.505
W-CDMA	Input	871.50	4.600
W-CDMA	Output	871.50	4.600
W-CDMA	Input	881.00	4.600
W-CDMA	Output	881.00	4.600
W-CDMA	Input	891.50	4.600
W-CDMA	Output	891.50	4.650

Figure 33 Occupied Bandwidth CELL

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

5.4 Test Equipment Used.

Occupied Bandwidth CELL

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

Figure 34 Test Equipment Used

6. Out of Band Emissions at Antenna Terminals CELL

6.1 Test Specification

FCC Part 22, Section 917; FCC Part 2.1051

6.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges (869 - 894 MHz) 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 dB).
The spectrum analyzer was set to 1.0 kHz R.B.W. for the frequency range of 9.0 – 150 kHz, 10 kHz for the frequency range of 150 kHz – 1 MHz, and 100 kHz for the frequency range of 1 MHz – 10 GHz.

CDMA:

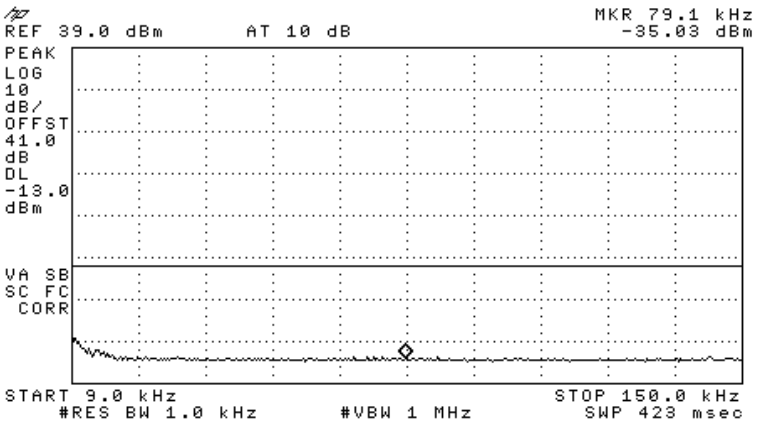

Figure 35.— 870.20 MHz

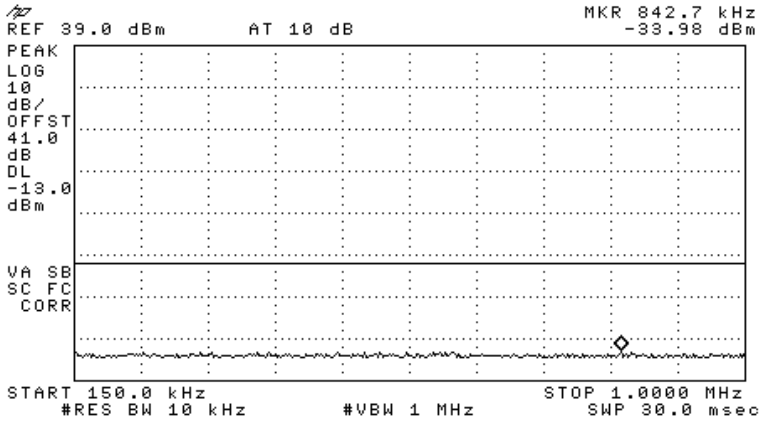

Figure 36.— 870.20 MHz

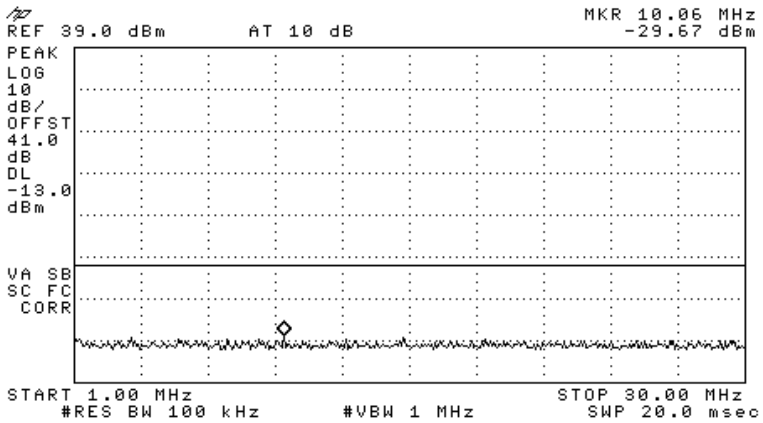

Figure 37.— 870.20 MHz

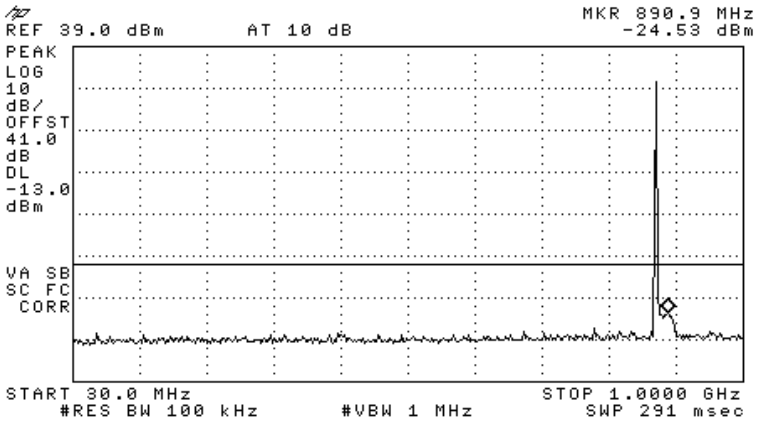

Figure 38.— 870.20 MHz

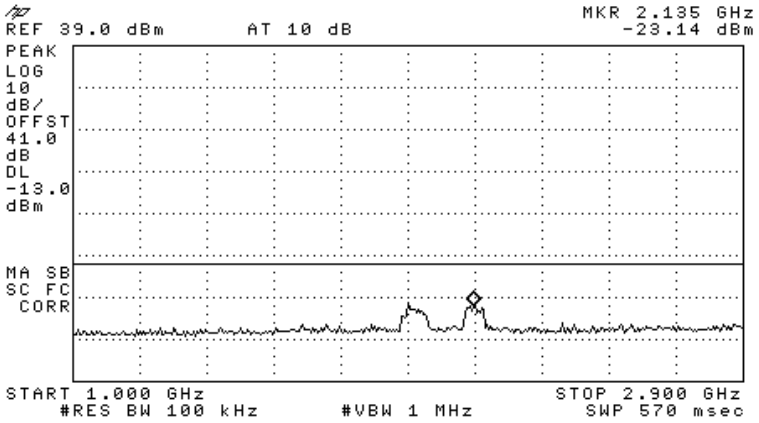

Figure 39.— 870.20 MHz

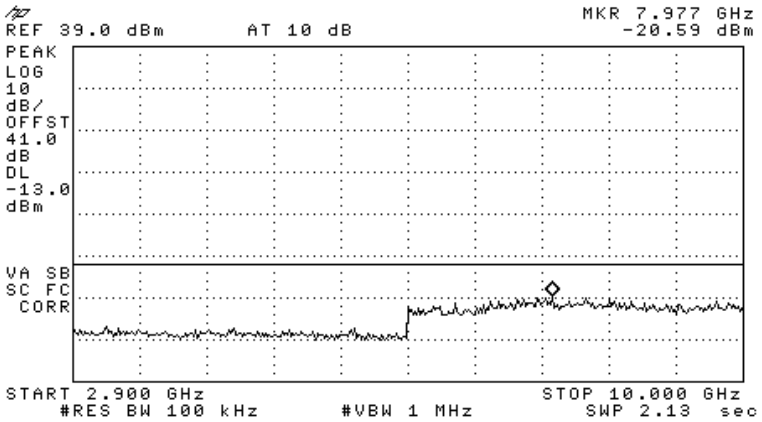

Figure 40.— 870.20 MHz

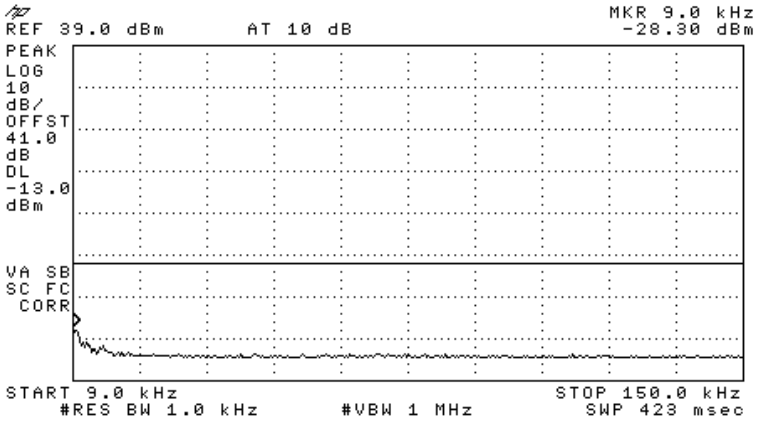

Figure 41.— 881.00 MHz

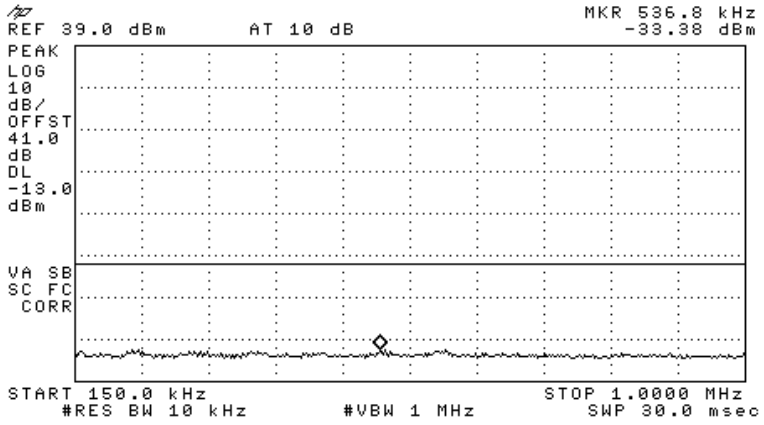

Figure 42.— 881.00 MHz

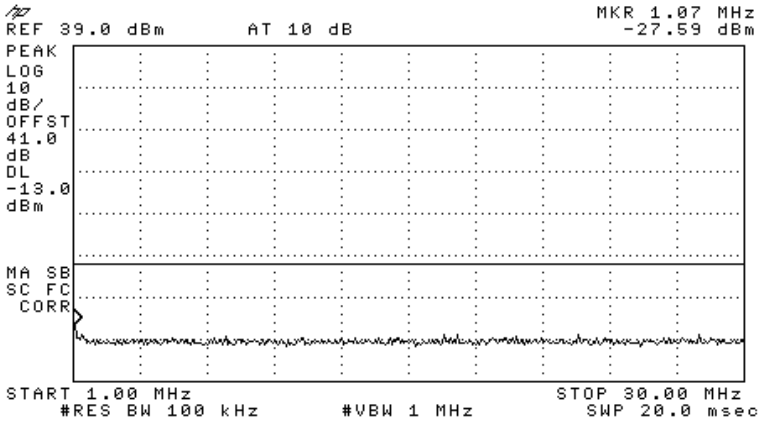

Figure 43.— 881.00 MHz

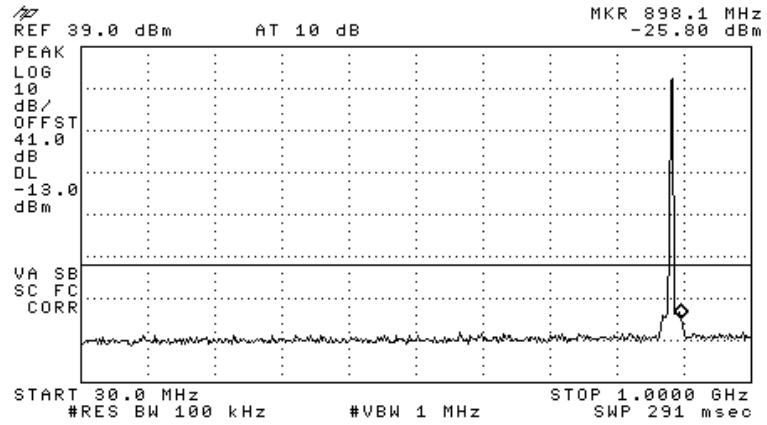

Figure 44.— 881.00 MHz

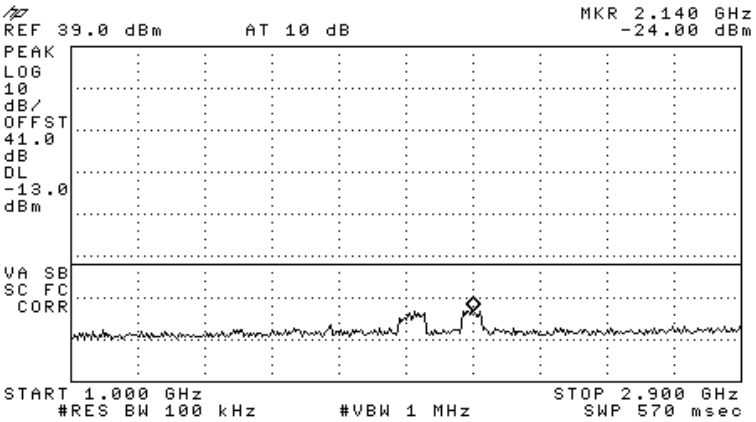

Figure 45.— 881.00 MHz

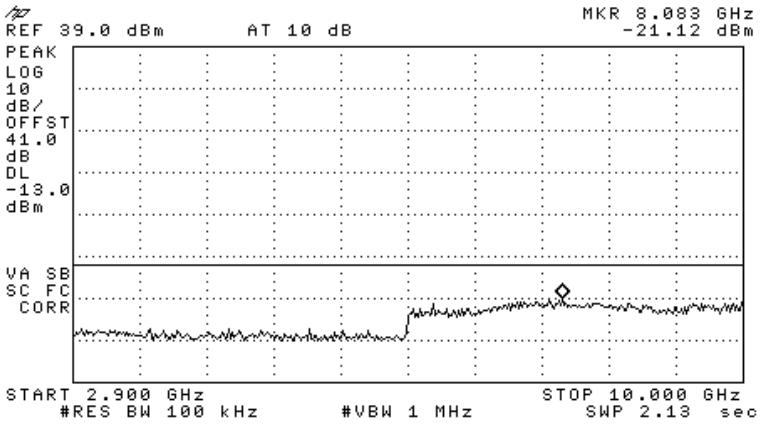

Figure 46.— 881.00 MHz

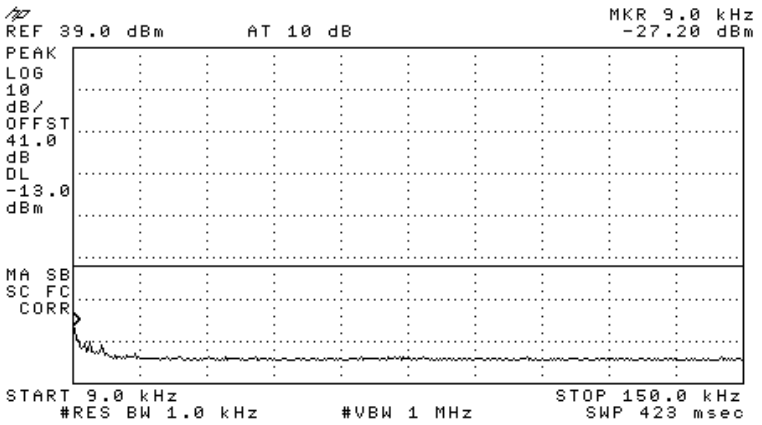

Figure 47.— 892.80 MHz

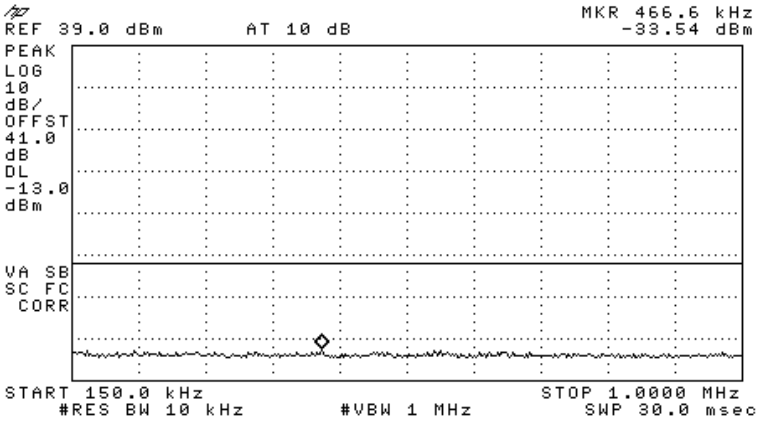

Figure 48.— 892.80 MHz

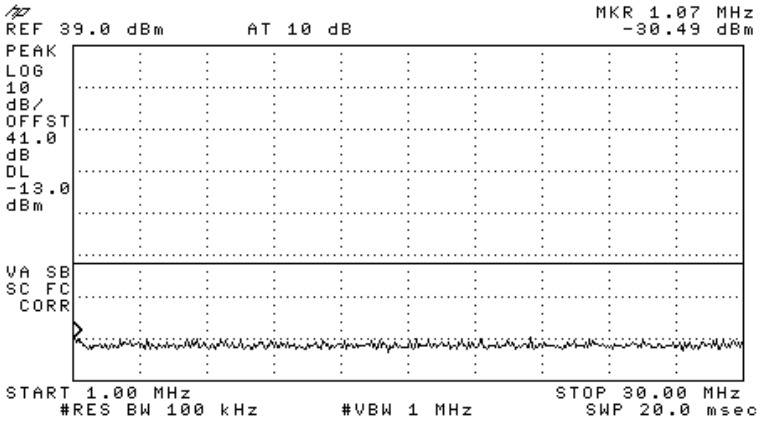

Figure 49.— 892.80 MHz

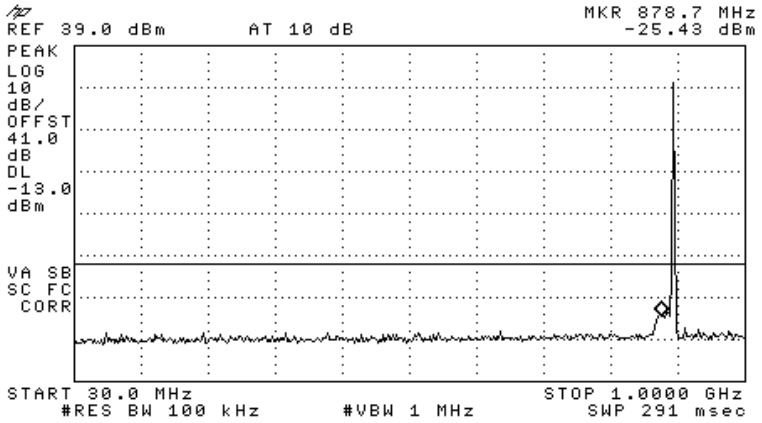

Figure 50.— 892.80 MHz

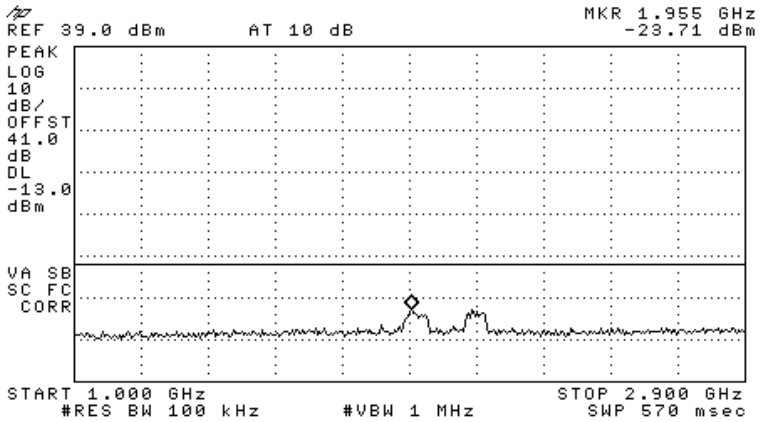

Figure 51.— 892.80 MHz

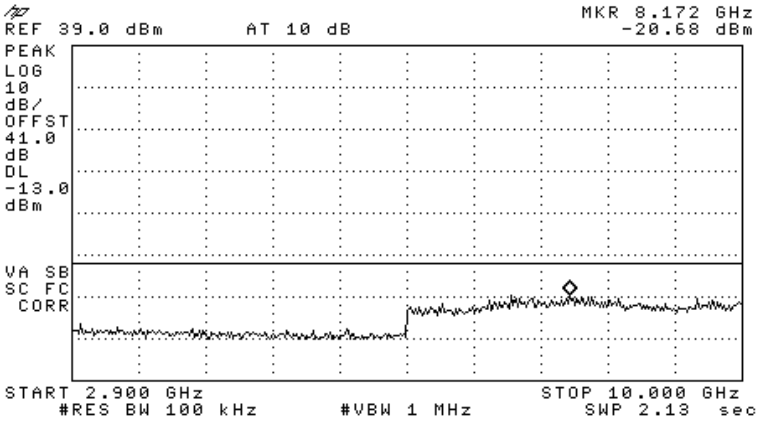

Figure 52.— 892.80 MHz

GSM:

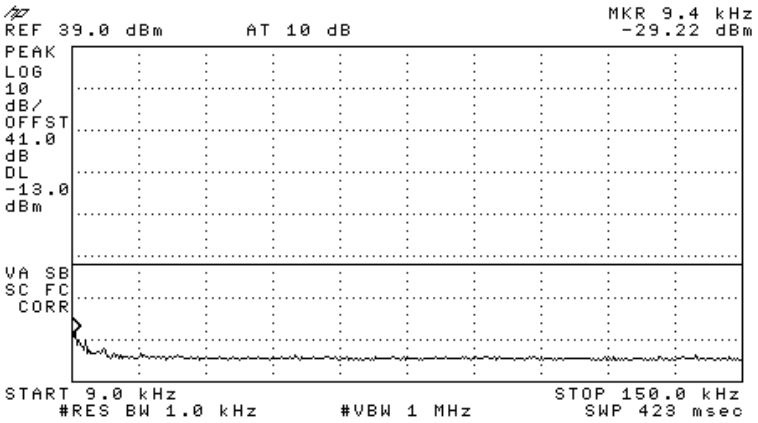

Figure 53.— 870.20 MHz

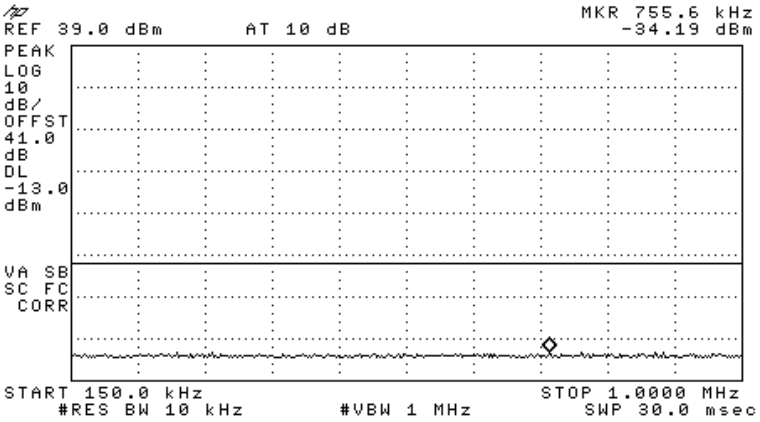

Figure 54.— 870.20 MHz

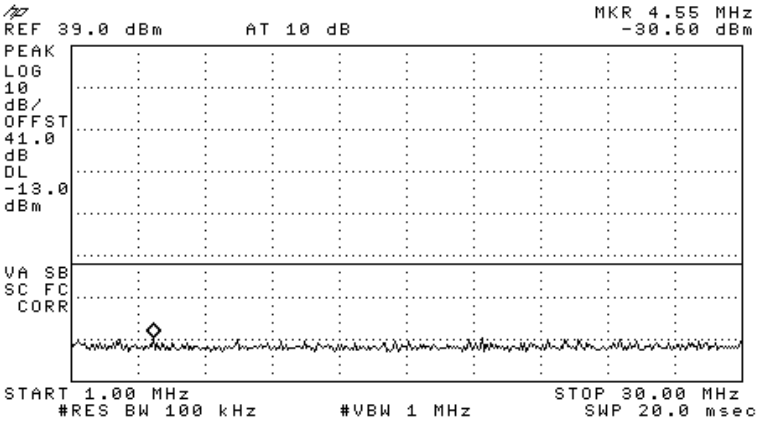

Figure 55.— 870.20 MHz

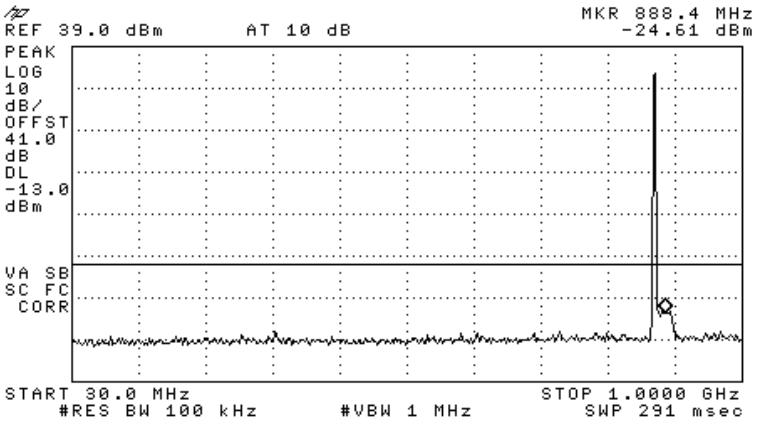

Figure 56.— 870.20 MHz

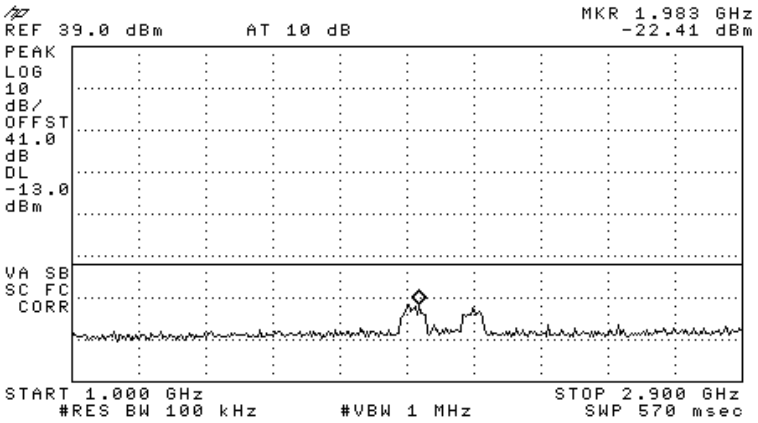

Figure 57.— 870.20 MHz

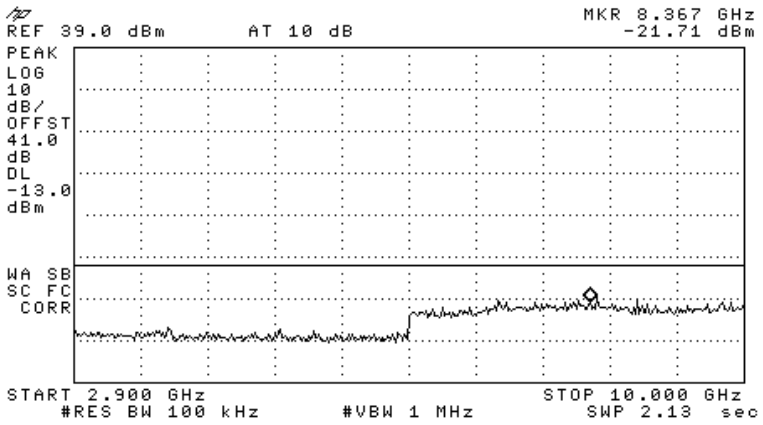

Figure 58.— 870.20 MHz

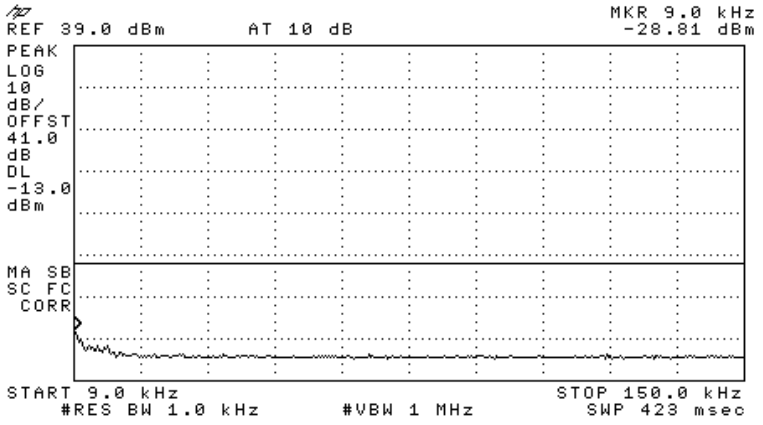

Figure 59.— 881.00 MHz

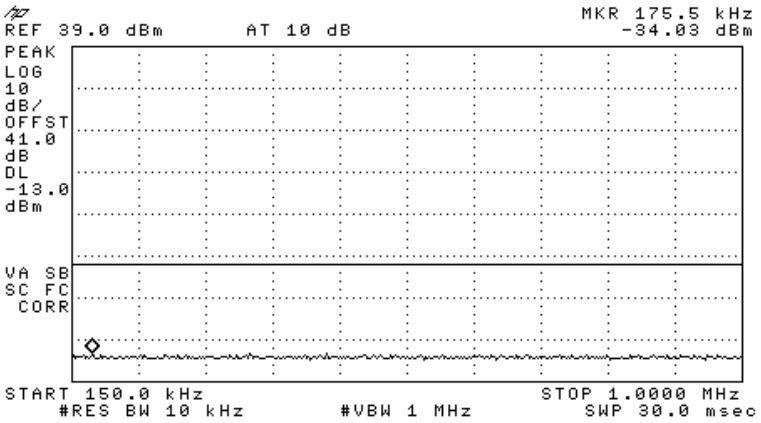

Figure 60.— 881.00 MHz

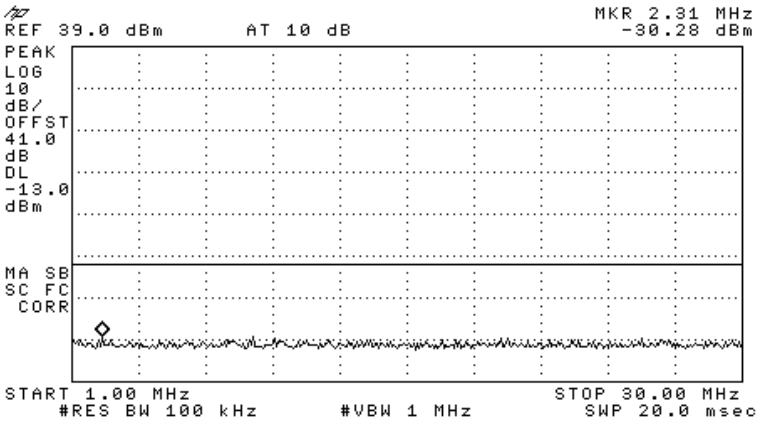

Figure 61.— 881.00 MHz

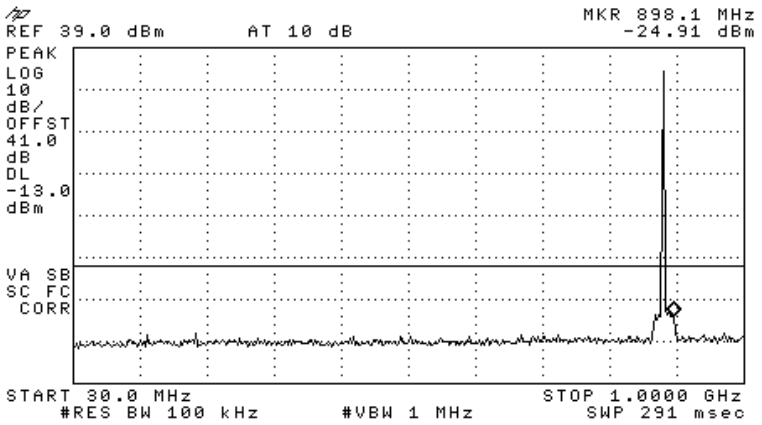

Figure 62.— 881.00 MHz

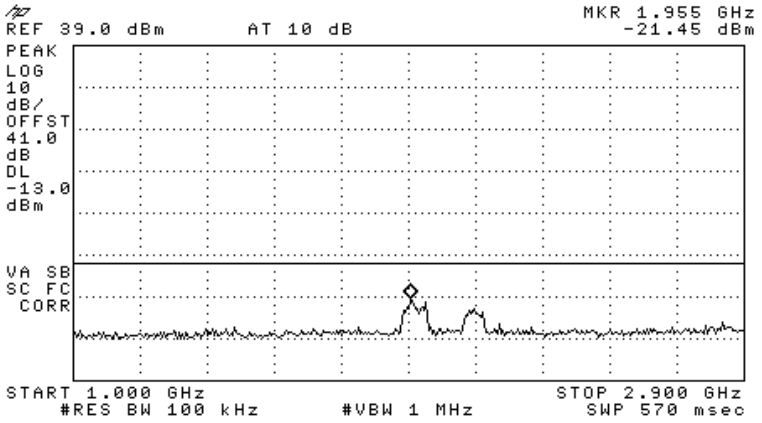

Figure 63.— 881.00 MHz

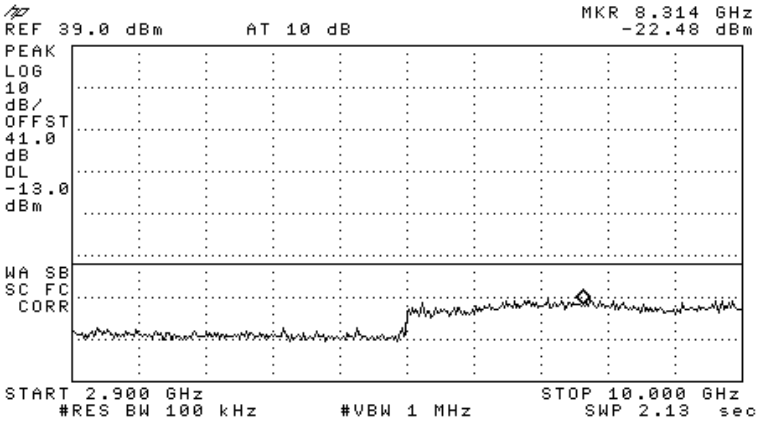

Figure 64.— 881.00 MHz

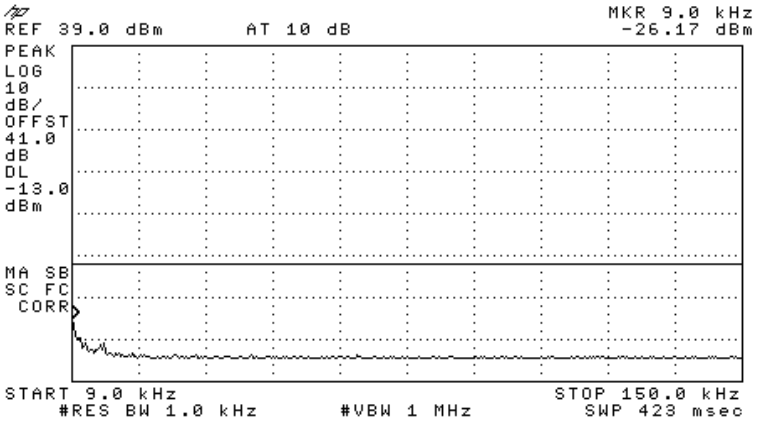

Figure 65.— 892.80 MHz

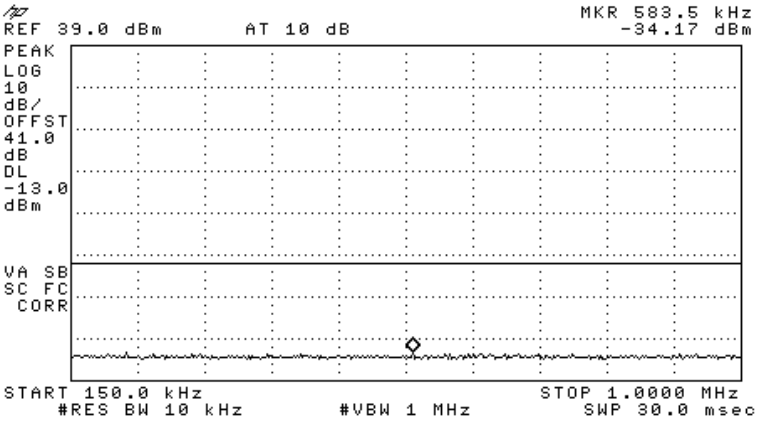

Figure 66.— 892.80 MHz

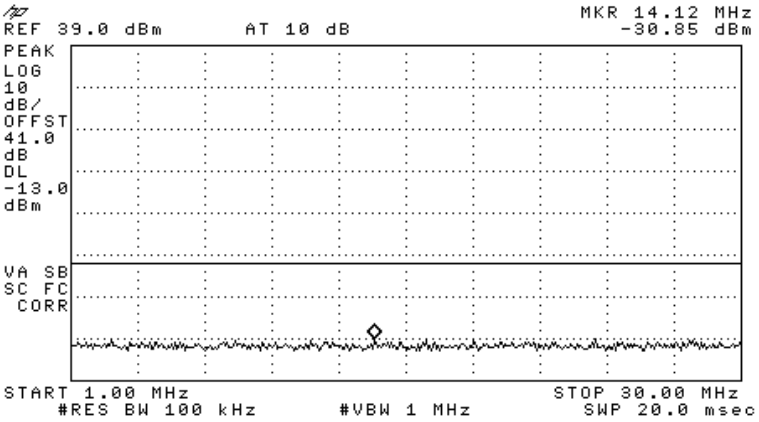

Figure 67.— 892.80 MHz

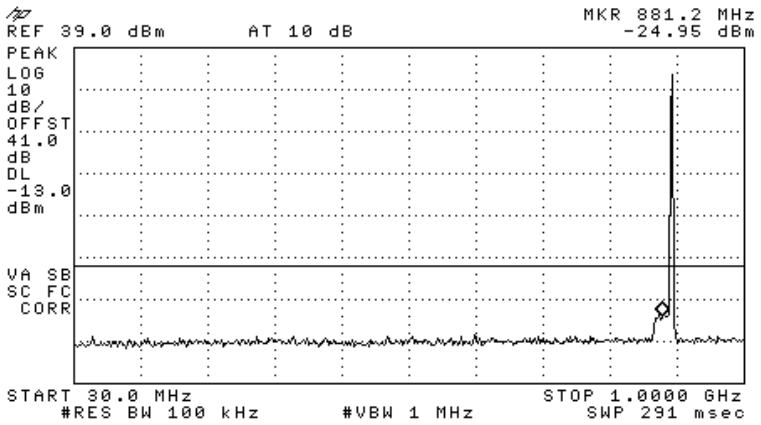

Figure 68.— 892.80 MHz

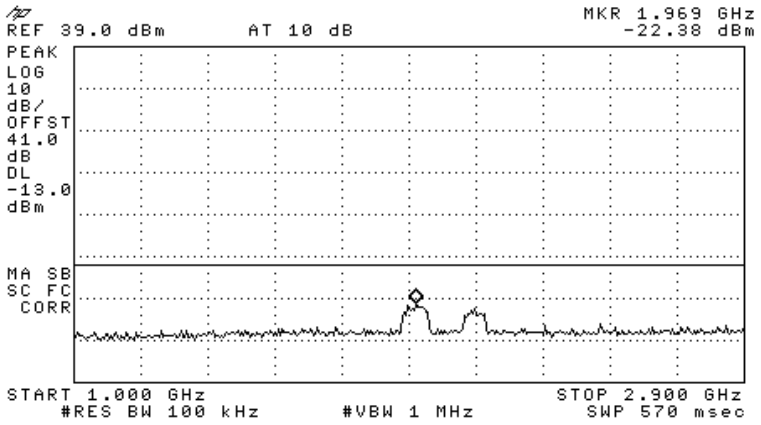

Figure 69.— 892.80 MHz

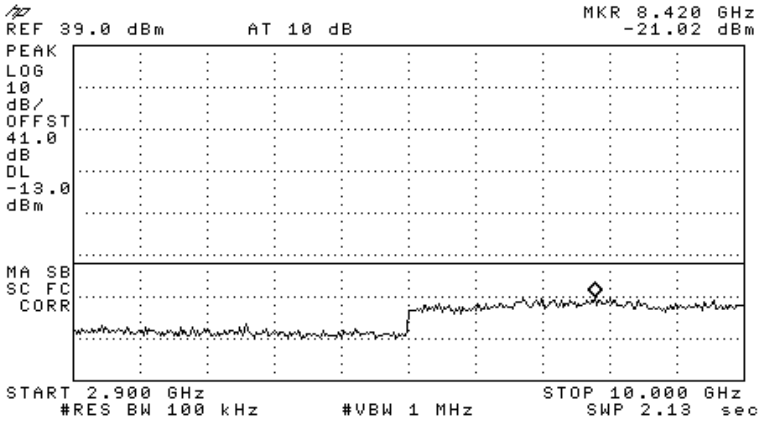

Figure 70.— 892.80 MHz

W-CDMA:

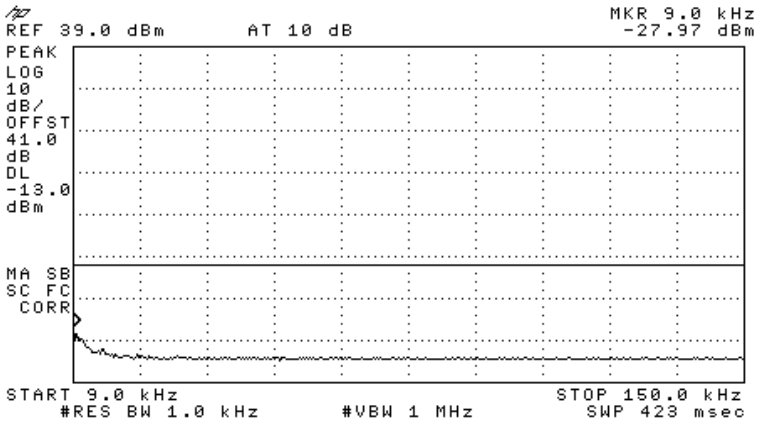

Figure 71.— 871.50 MHz

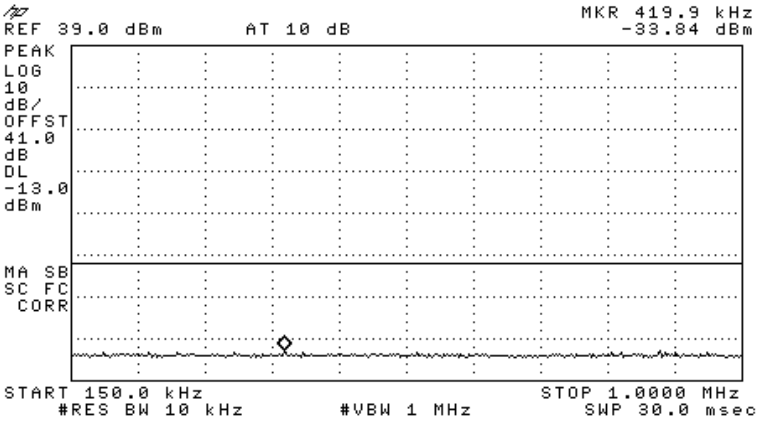

Figure 72.— 871.50 MHz

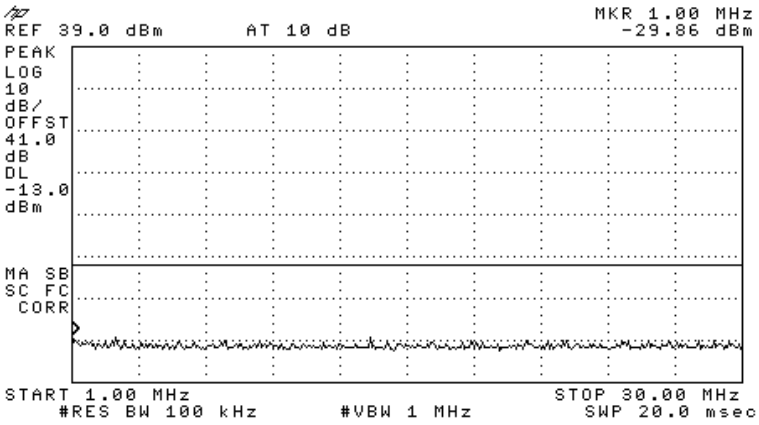

Figure 73.— 871.50 MHz

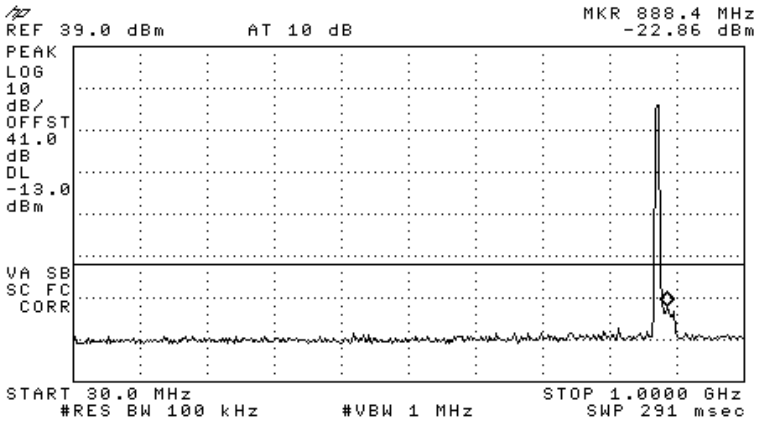

Figure 74.— 871.50 MHz

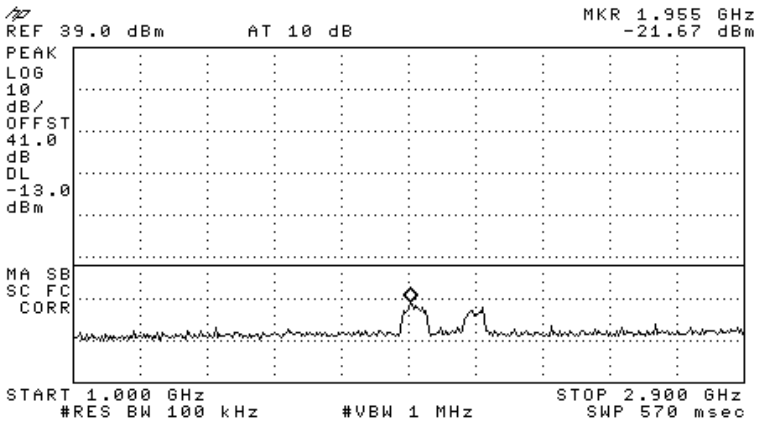

Figure 75.— 871.50 MHz

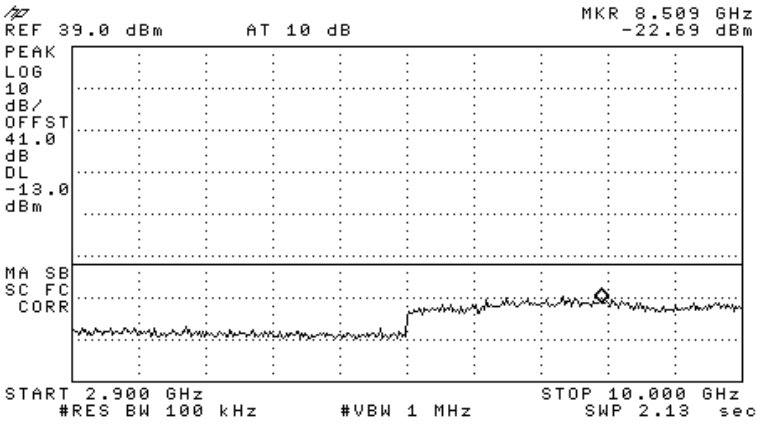

Figure 76.— 871.50 MHz

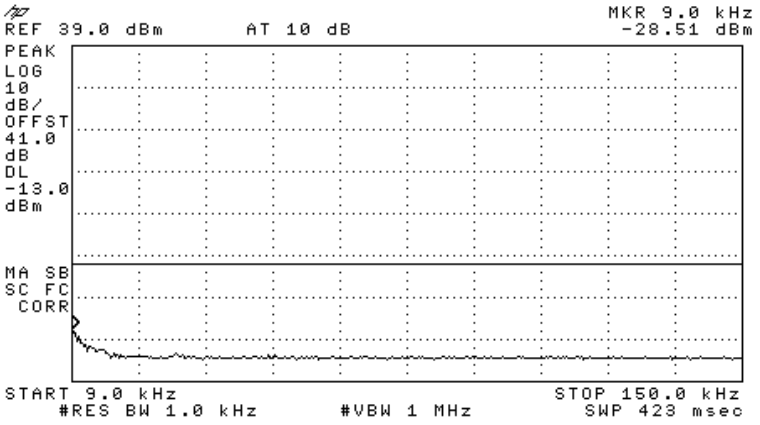

Figure 77.— 881.00 MHz

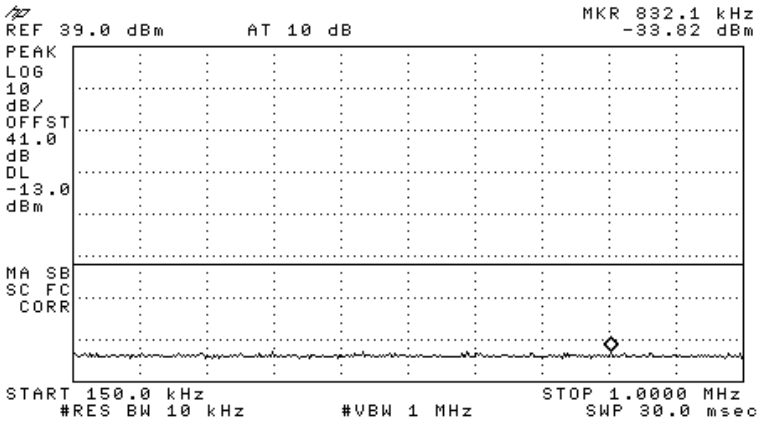

Figure 78.— 881.00 MHz

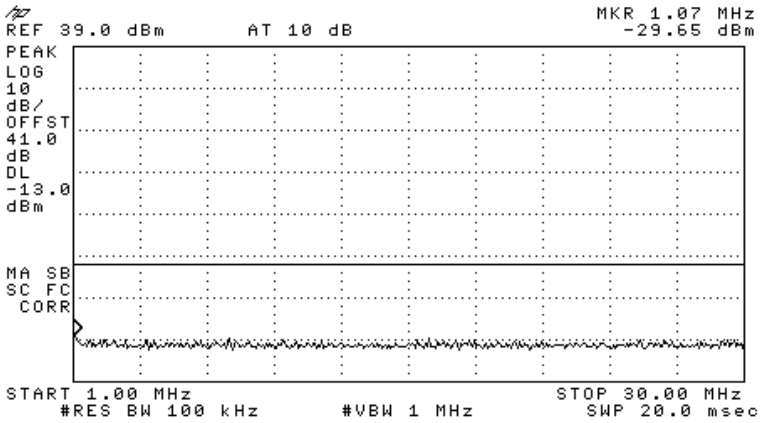

Figure 79.— 881.00 MHz

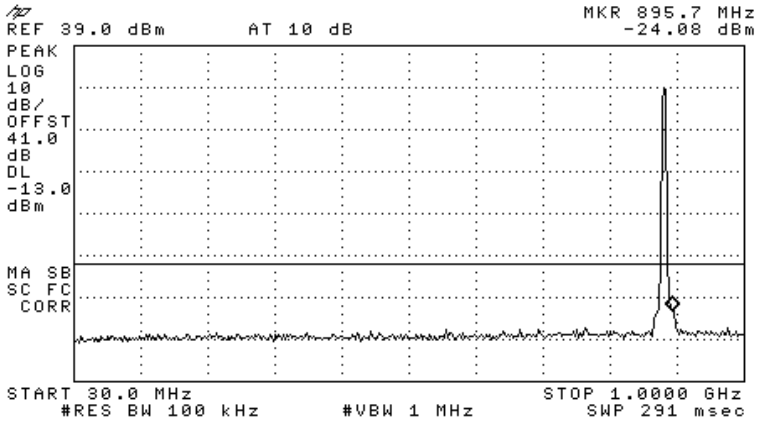

Figure 80.— 881.00 MHz

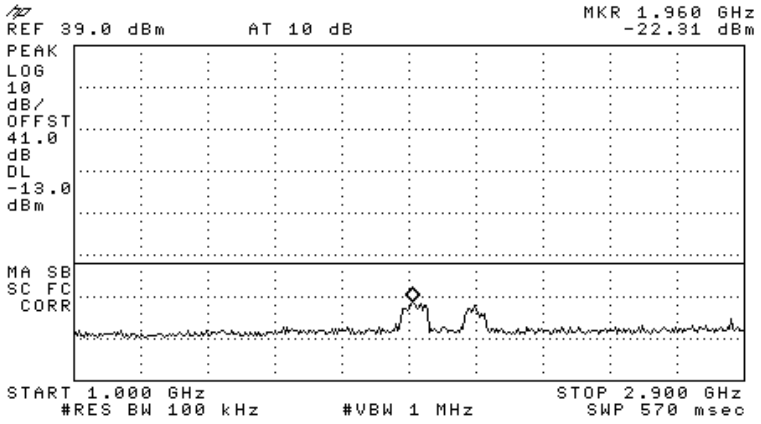

Figure 81.— 881.00 MHz

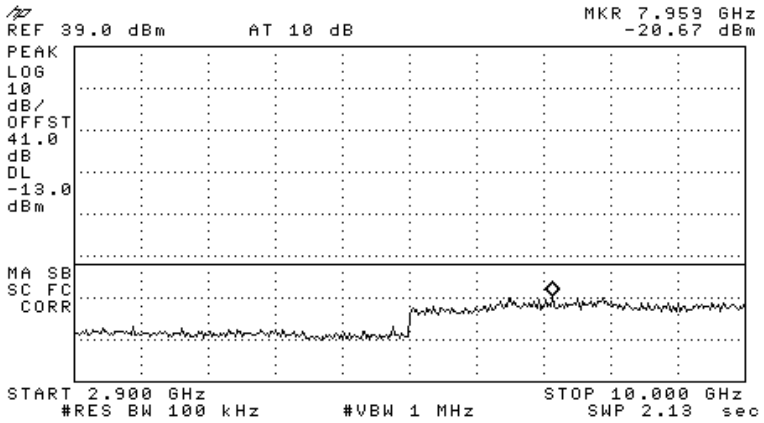

Figure 82.— 881.00 MHz

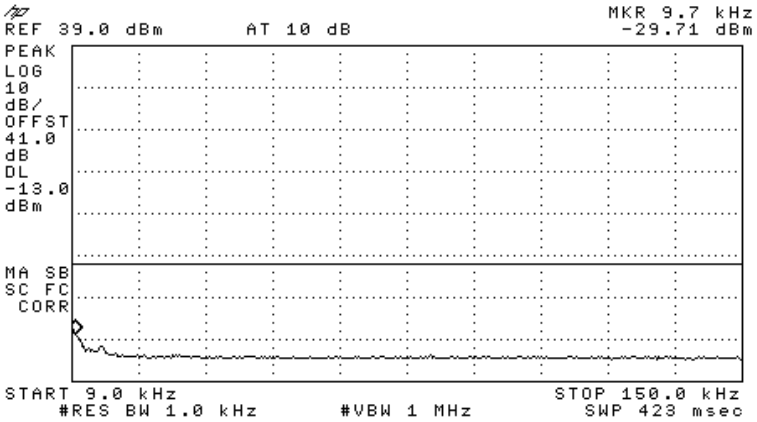

Figure 83.— 891.50 MHz

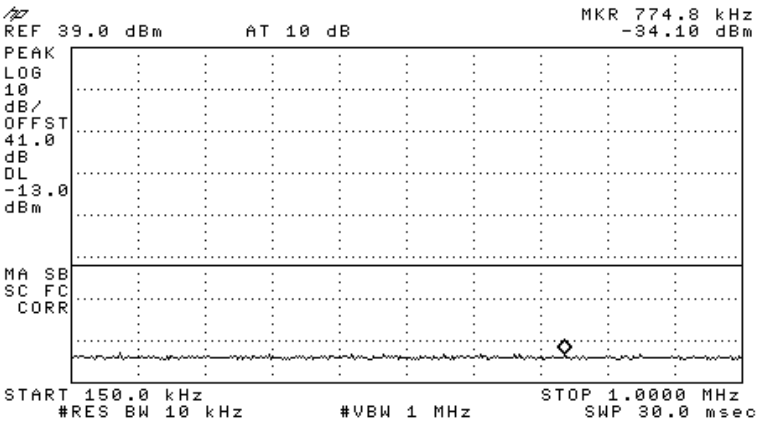

Figure 84.— 891.50 MHz

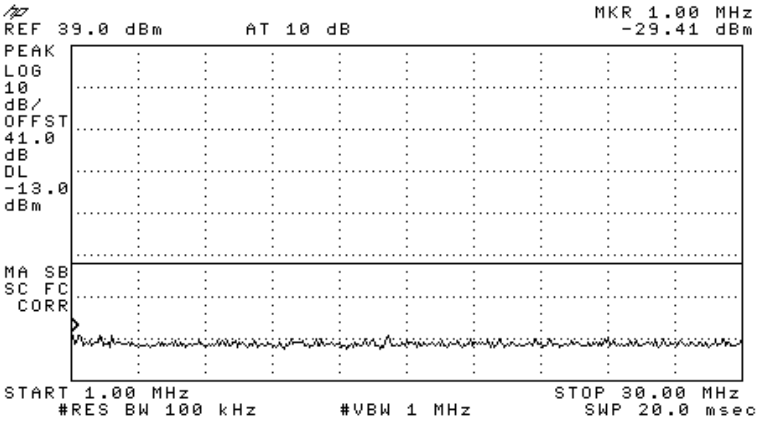

Figure 85.— 891.50 MHz

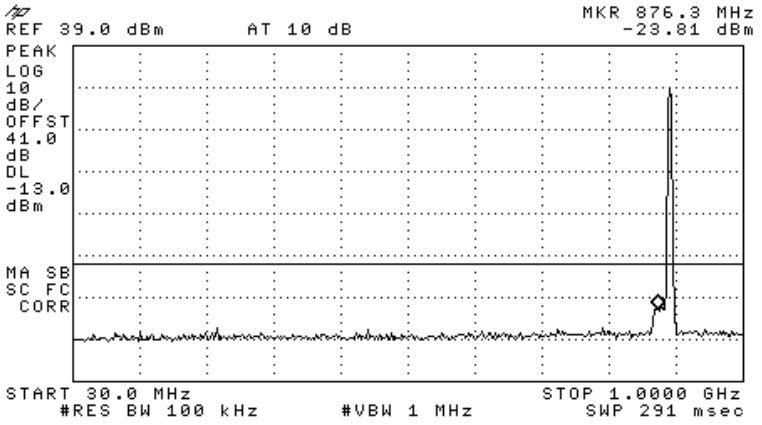

Figure 86.— 891.50 MHz

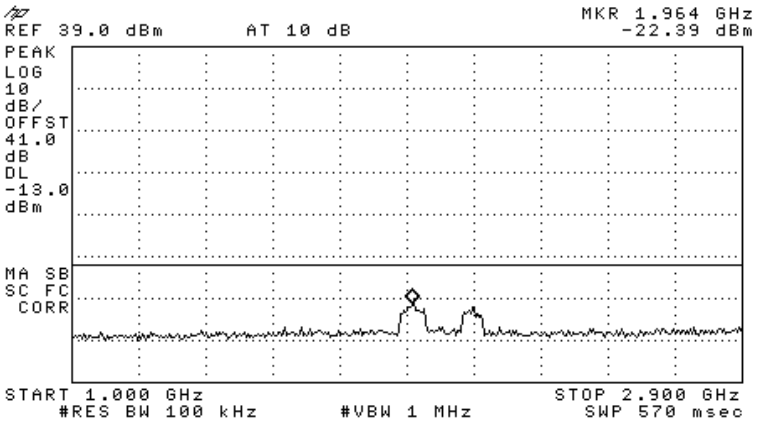

Figure 87.— 891.50 MHz

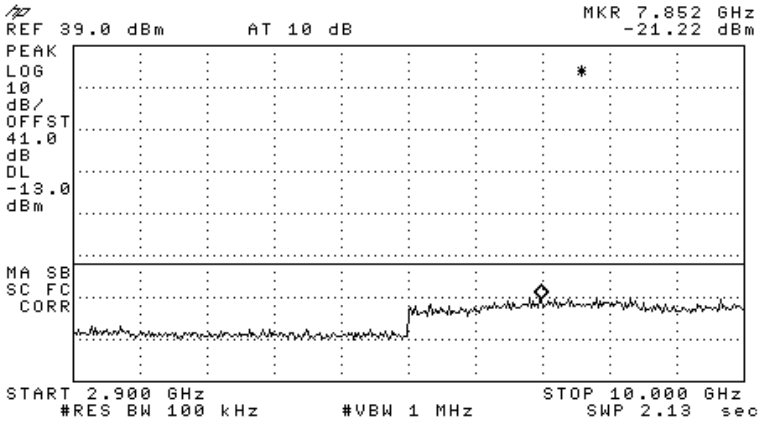

Figure 88.— 891.50 MHz

6.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
FCC Part 22, Section 917; FCC Part 2.1051

Modulation	Operation Frequency (MHz)	Frequency (GHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	870.20	7.977	-20.59	-13.0	-7.59
	881.00	8.083	-21.12	-13.0	-8.12
	892.80	8.172	-20.68	-13.0	-7.98
GSM	870.20	8.367	-21.71	-13.0	-8.71
	881.00	1.955	-21.45	-13.0	-8.45
	892.80	8.420	-21.02	-13.0	-8.02
W-CDMA	871.50	1.955	-21.67	-13.0	-8.67
	881.00	7.959	-20.67	-13.0	-7.67
	891.50	7.852	-21.22	-13.0	-8.22

Figure 89 Out of Band Emission Results CELL

JUDGEMENT: Passed by 7.59 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

6.4 Test Equipment Used.

Out of Band Emission at Antenna Terminals CELL

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

Figure 90 Test Equipment Used

7. Band Edge Spectrum CELL

7.1 Test Specification

FCC Part 22, FCC Part 2.1051

7.2 Test procedure

For CDMA and GSM:

Enclosed are spectrum analyzer plots for the lowest operation frequency (870.20 MHz) and the highest operation frequency (892.8 MHz) in which the E.U.T. is planned to be used.

For W-CDMA:

Enclosed are spectrum analyzer plots for the lowest operation frequency (871.50 MHz) and the highest operation frequency (891.5 MHz) in which the E.U.T. is planned to be used.

The power of any emission outside of the authorized operating frequency ranges (869 - 894 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (21 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

CDMA:

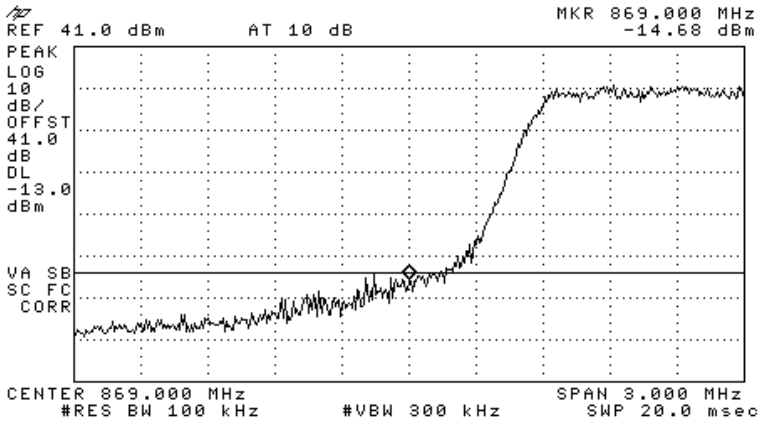

Figure 91.— 870.20 MHz

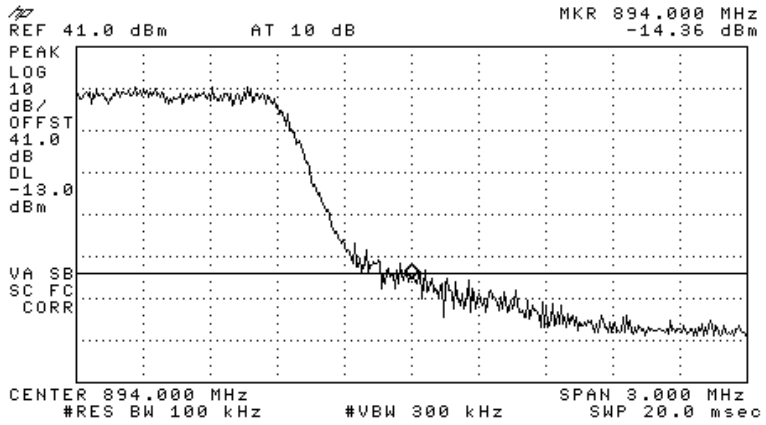

Figure 92.— 892.80 MHz

GSM:

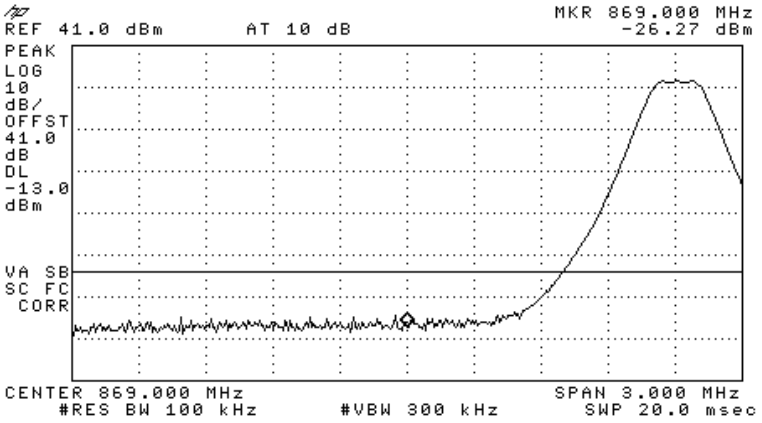

Figure 93.— 870.20 MHz

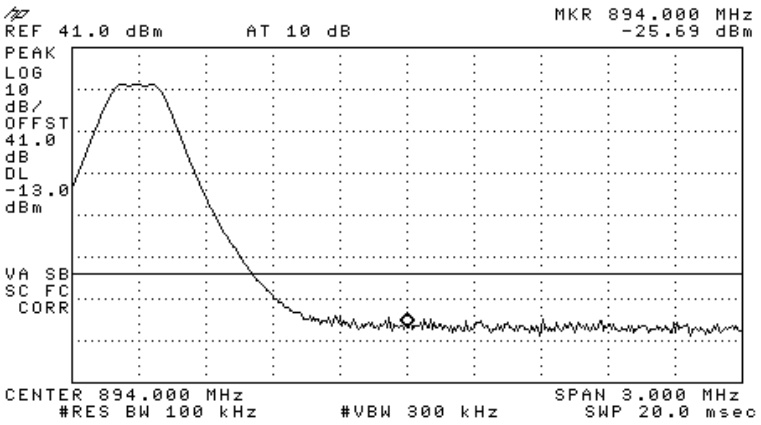

Figure 94.— 892.80 MHz

W-CDMA:

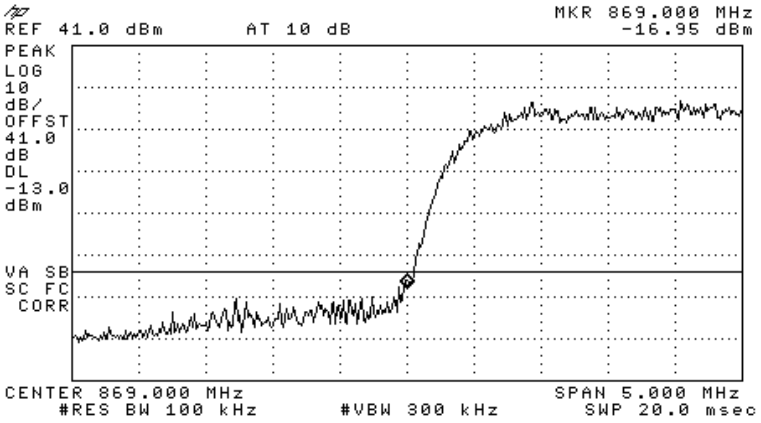

Figure 95.— 871.50 MHz

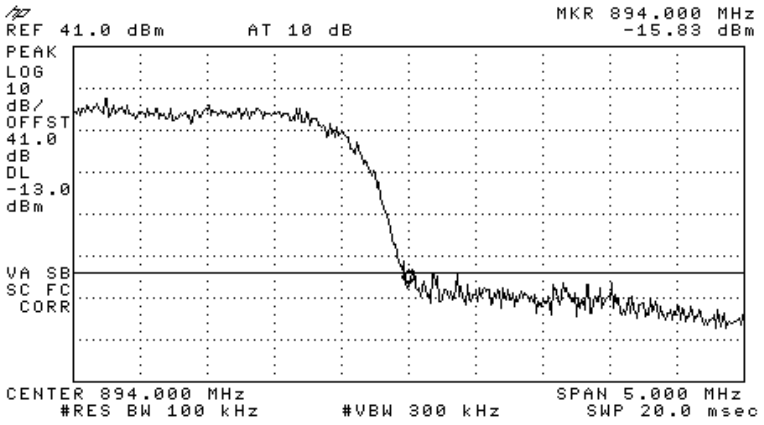

Figure 96.— 891.50 MHz

7.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 24, Subpart E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	870.20	869.00	-14.68	-13.0	-1.68
	892.80	894.00	-14.36	-13.0	-1.36
GSM	870.20	869.00	-26.27	-13.0	-13.27
	892.80	894.00	-25.69	-13.0	-12.69
W-CDMA	871.50	869.00	-16.95	-13.0	-3.95
	891.50	894.00	-15.83	-13.0	-2.83

Figure 97 Band Edge Spectrum Results CELL

JUDGEMENT: Passed by dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

7.4 Test Equipment Used.

Band Edge Spectrum CELL

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

Figure 98 Test Equipment Used

8. Out of Band Emissions (Radiated) CELL

8.1 Test Specification

FCC Part 22, Section 917; FCC Part 2.1053

8.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (869 - 894 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, 1.5 meters above the ground. The configuration tested is shown in Figure 3.1.
The frequency range 9 kHz-20 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

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

8.3 Results Table

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)
870.20	1740.40	V	48.1	-52.71	5.45	7.64	-50.52	-13.0	-37.52
870.20	1740.40	H	48.2	-52.44	5.45	7.64	-50.25	-13.0	-37.25
881.00	1762.00	V	49.55	-50.24	5.6	7.66	-48.18	-13.0	-35.18
881.00	1762.00	H	47.75	-52.3	5.6	7.66	-50.24	-13.0	-37.24
892.80	1785.60	V	50.6	-49.19	5.6	7.66	-47.13	-13.0	-34.13
892.80	1785.60	H	50.2	-49.85	5.6	7.66	-47.79	-13.0	-34.79

The E.U.T met the requirements of the FCC Part 22, Section 917;
FCC Part 2.1053 specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

8.4 Test Instrumentation Used, Radiated Measurements CELL

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

9. Peak Output Power PCS

9.1 Test Specification

FCC Part 24, Subpart E

9.2 Test procedure

Peak Power Output must not exceed 100 Watts (50dBm).

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (40 dB) and an appropriate coaxial cable (1dB). The E.U.T. RF output was W-CDMA and GSM and CDMA modulated. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz RBW.

CDMA

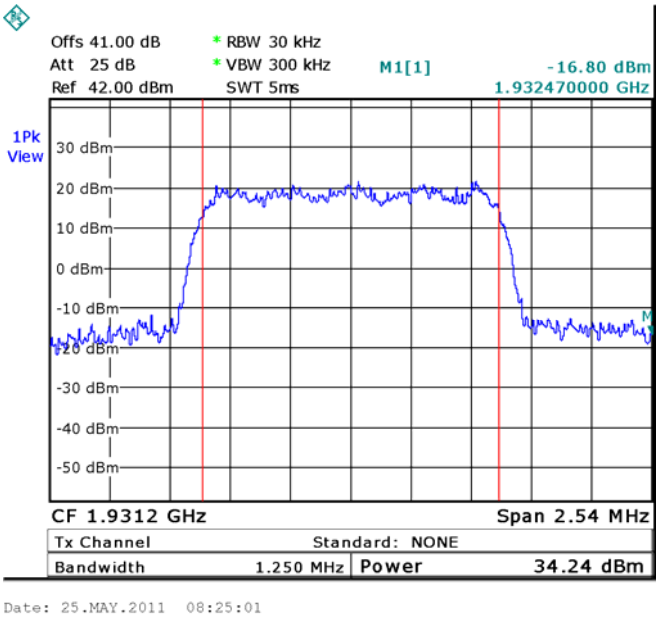

Figure 99.— 1931.20 MHz

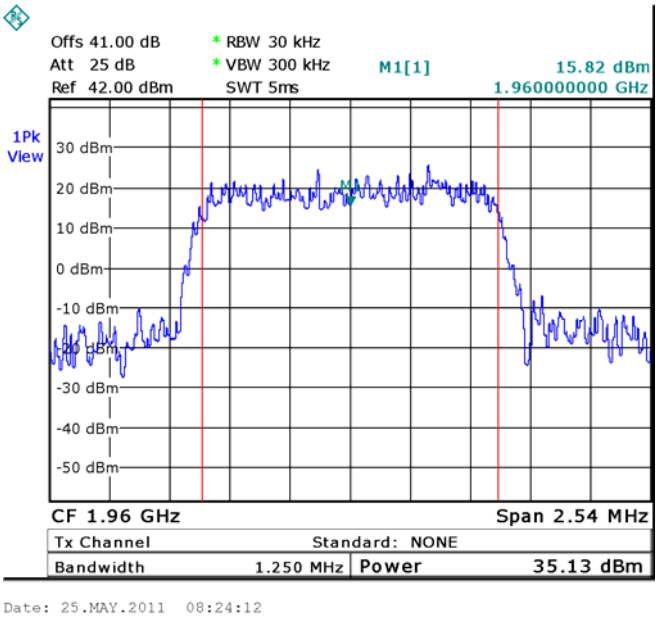

Figure 100.— 1960.00 MHz

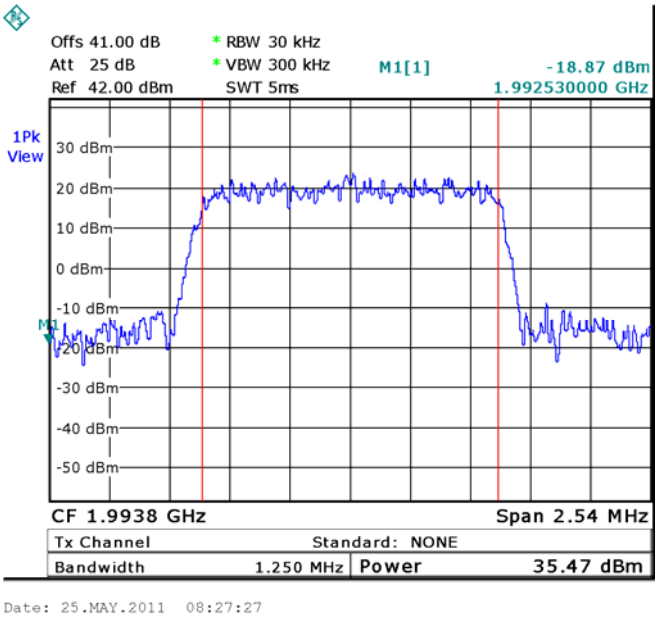

Figure 101.— 1993.80 MHz

GSM:

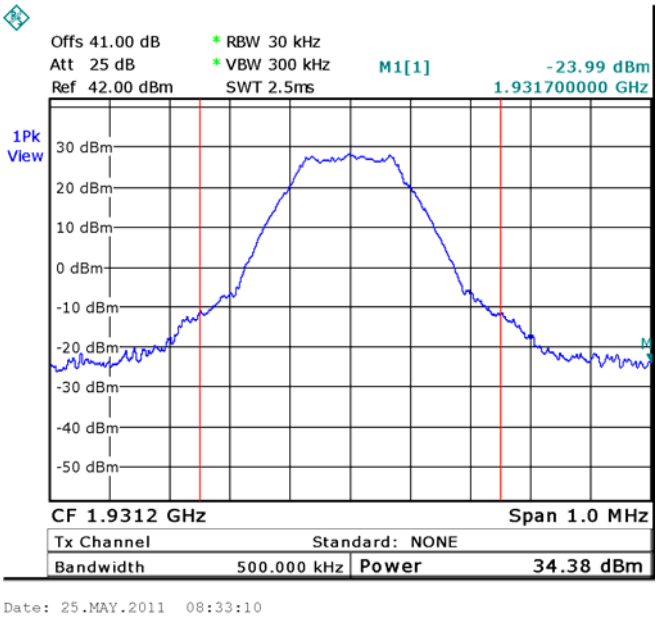

Figure 102.— 1931.20 MHz

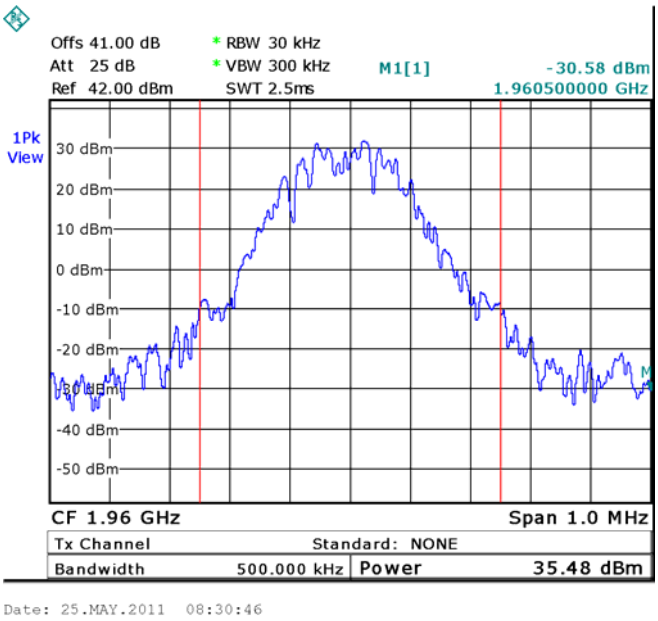

Figure 103.— 1960.00 MHz

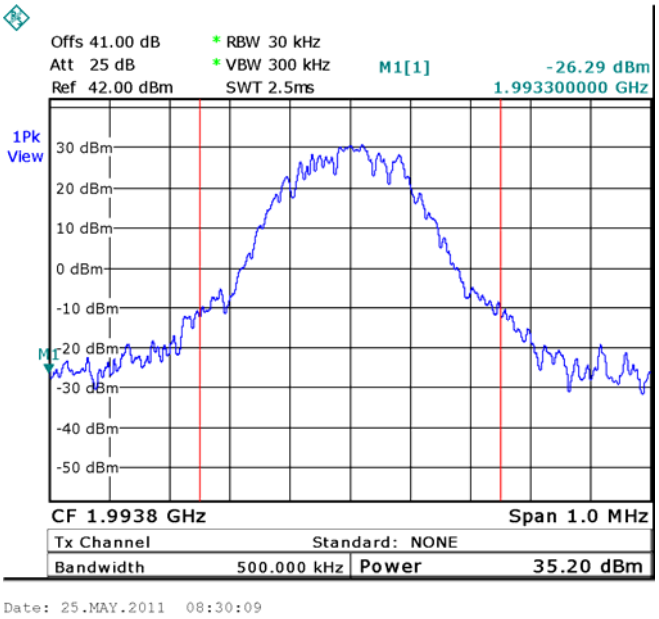

Figure 104.— 1993.80 MHz

W-CDMA:

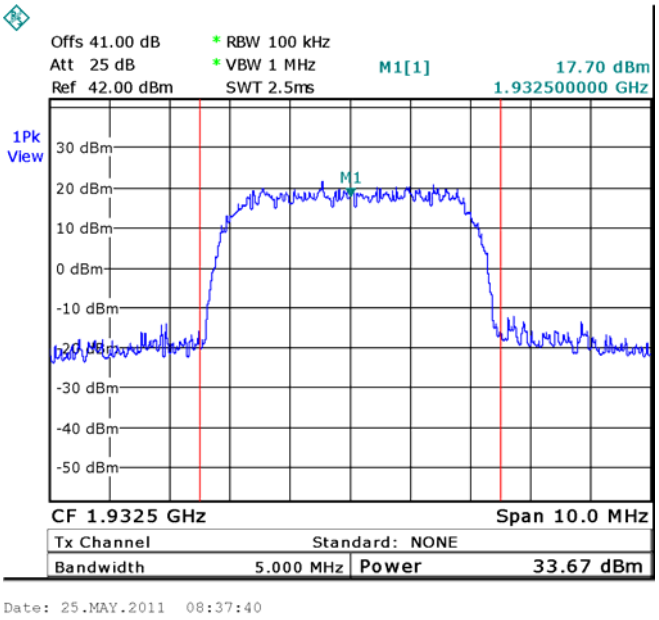

Figure 105.— 1932.50 MHz

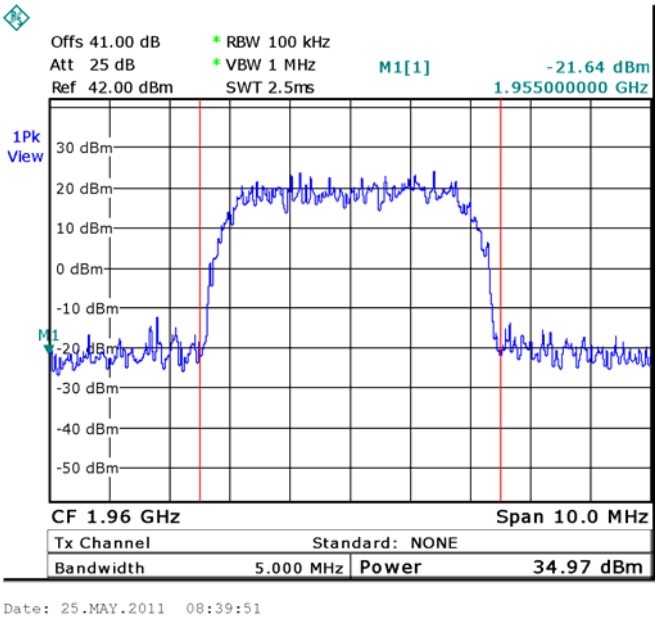

Figure 106.— 1960.00 MHz

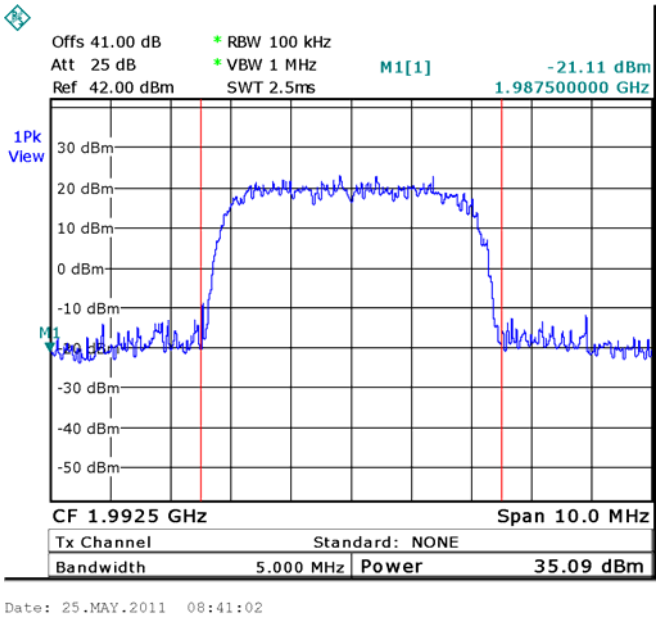

Figure 107.— 1992.50 MHz

9.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 24, Subpart E, Section 232, FCC Part 2, Section 1046

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	1931.20	34.24	50.0	-15.76
	1960.00	35.13	50.0	-14.87
	1993.80	35.47	50.0	-14.53
GSM	1931.20	34.38	50.0	-15.62
	1960.00	35.48	50.0	-14.52
	1993.80	35.20	50.0	-14.80
W-CDMA	1932.50	33.67	50.0	-16.33
	1960.00	34.97	50.0	-15.03
	1992.50	35.09	50.0	-14.91

Figure 108 Peak Output Power PCS

JUDGEMENT: Passed by 14.52 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

9.4 Test Equipment Used.

Peak Output Power PCS

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

Figure 109 Test Equipment Used

10. Occupied Bandwidth PCS

10.1 Test Specification

FCC Part 2, Section 1049

10.2 Test Procedure

The E.U.T. was set to the applicable test frequency with CDMA, GSM and W-CDMA 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 100 kHz 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.
The occupied bandwidth of the E.U.T. at the points of 20 dB below maximum peak power was measured and recorded.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

CDMA

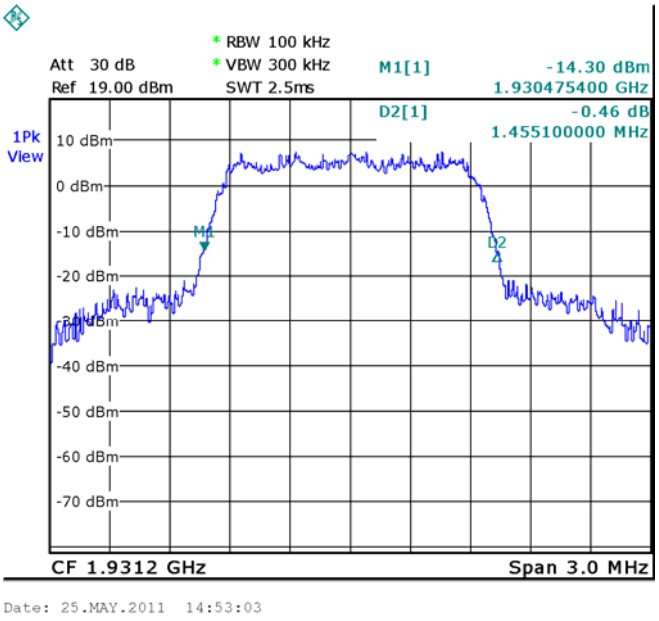

Figure 110.— Input 1931.20 MHz

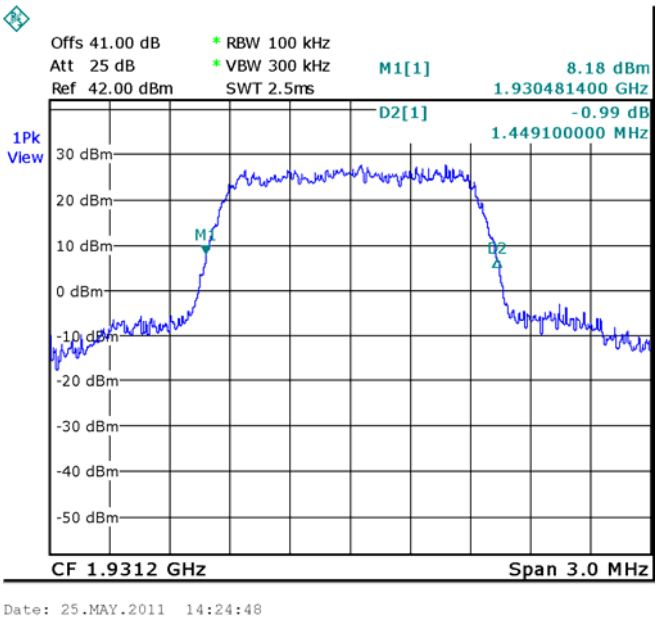

Figure 111.— Output 1931.20 MHz

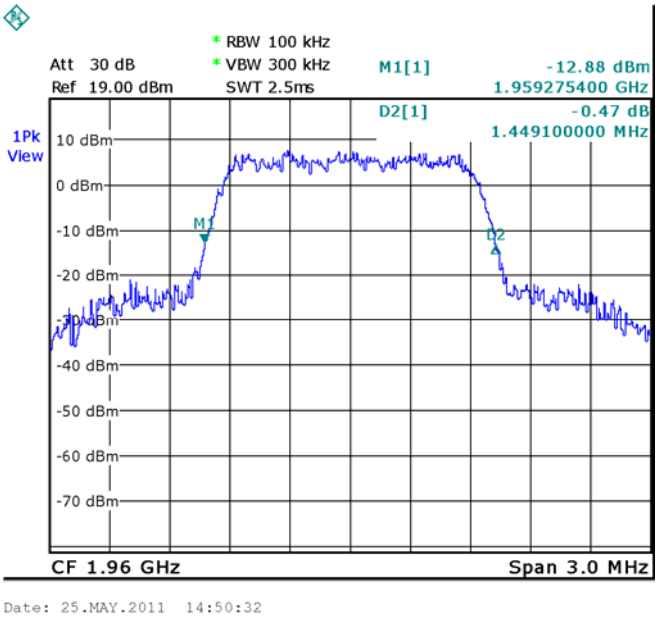

Figure 112.— Input 1960.00 MHz

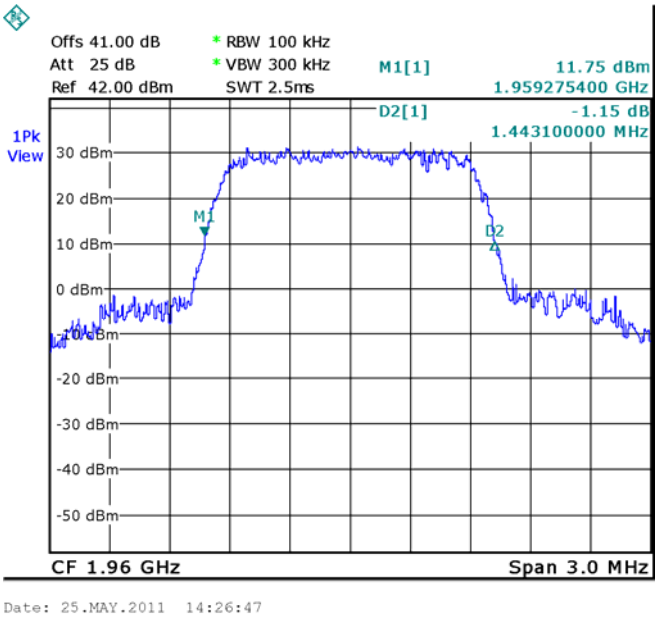

Figure 113.— Output 1960.00 MHz

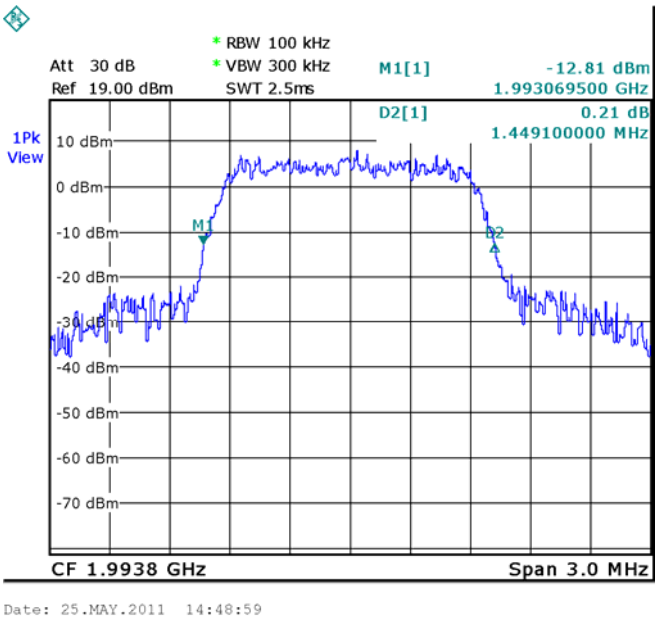

Figure 114.— Input 1993.80 MHz

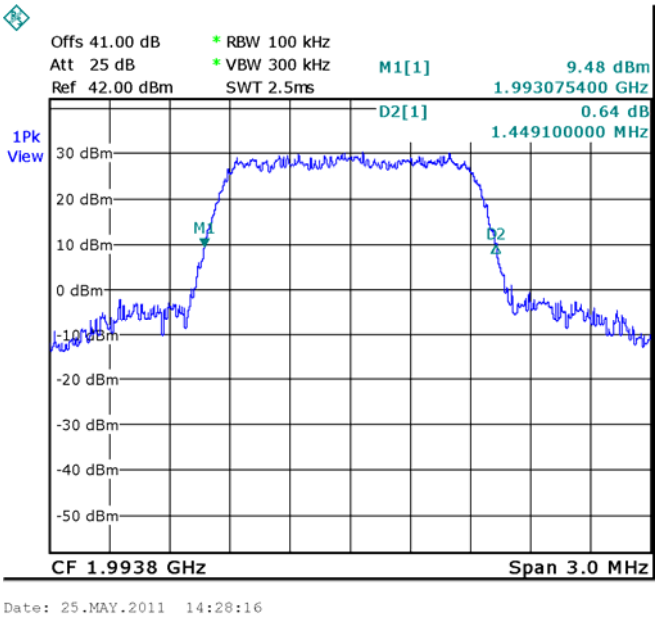

Figure 115.— Output 1993.80 MHz

GSM:

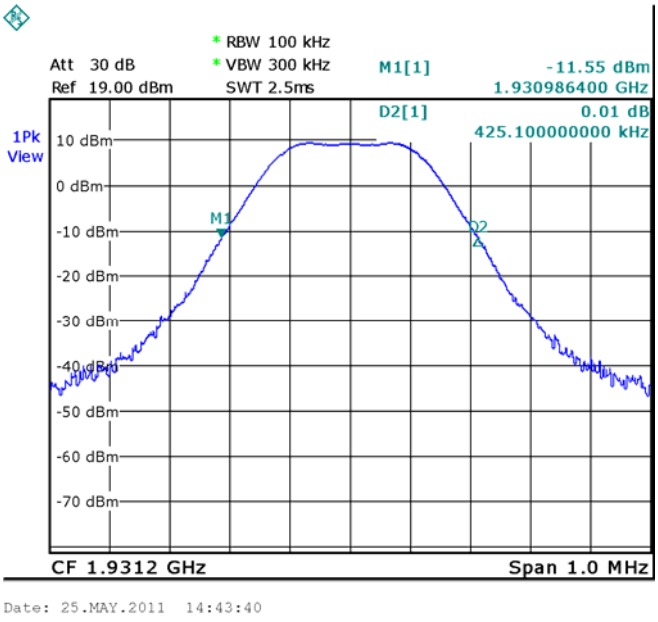

Figure 116.— Input 1931.20 MHz

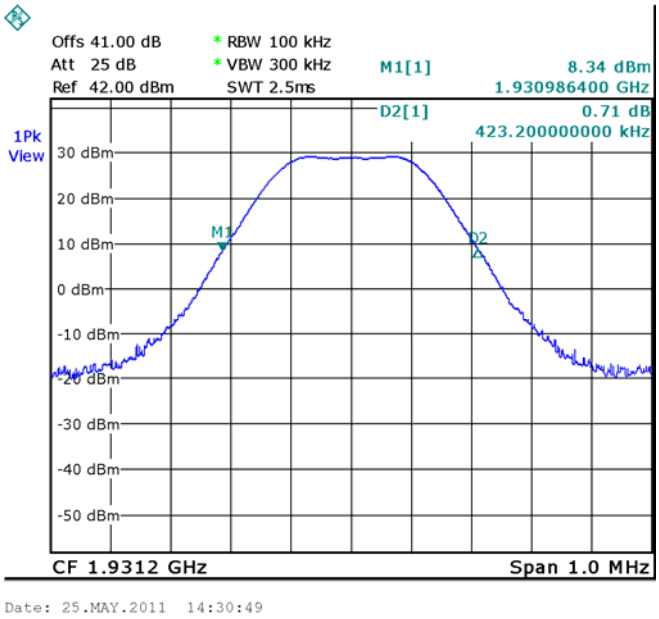

Figure 117.— Output 1931.20 MHz

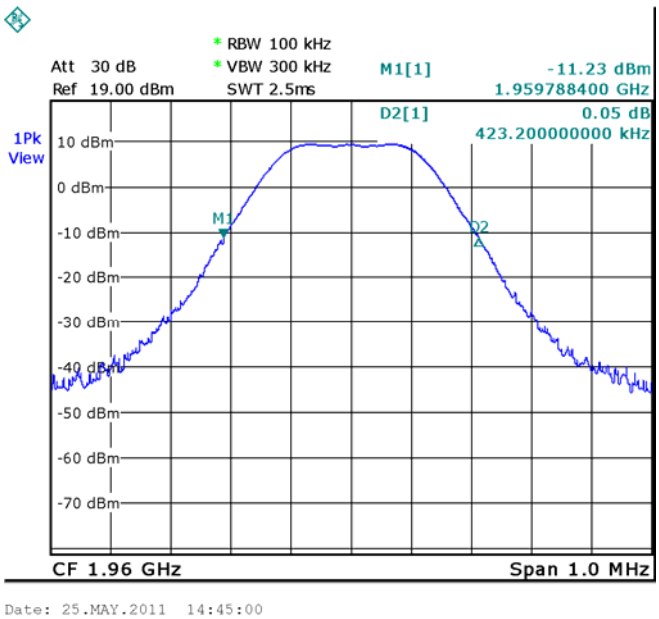

Figure 118.— Input 1960.00 MHz

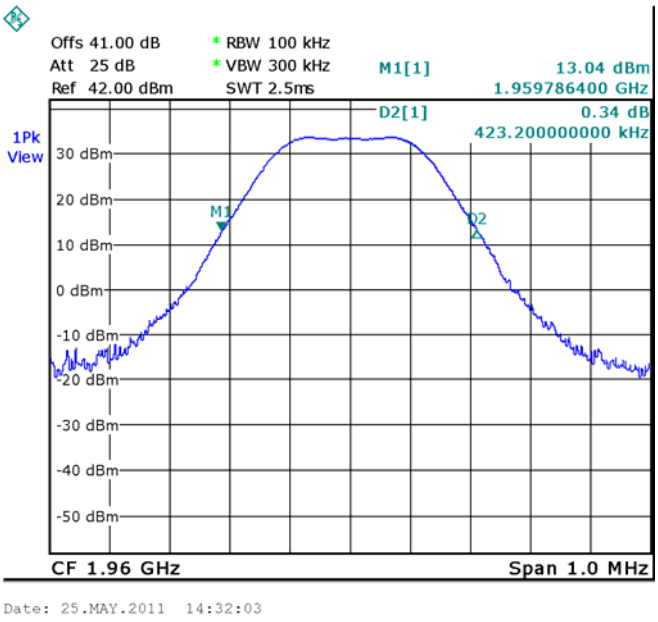

Figure 119.— Output 1960.00 MHz

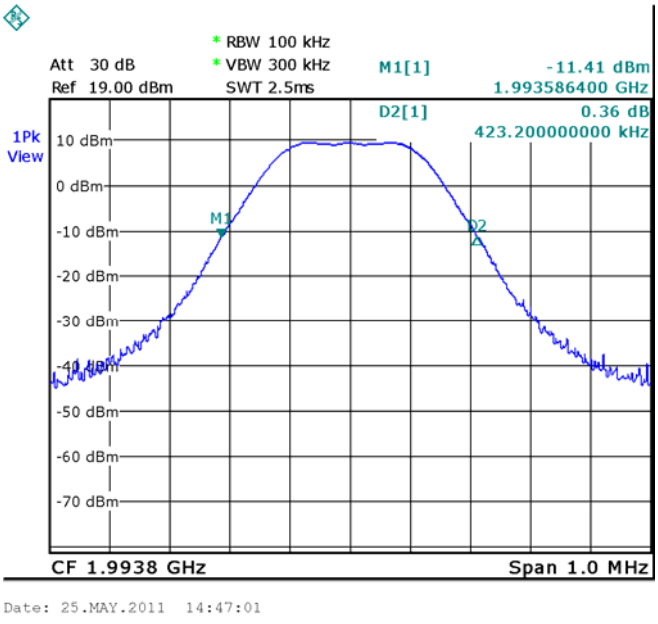

Figure 120.— Input 1993.80 MHz

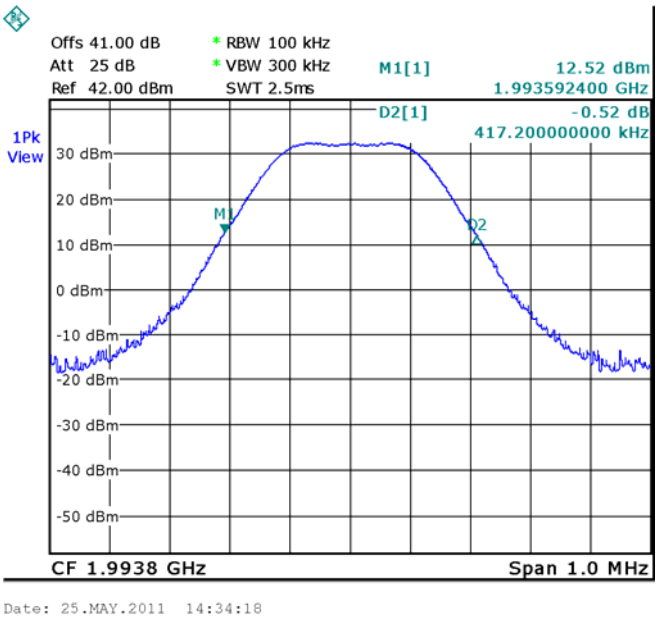

Figure 121.— Output 1993.80 MHz

W-CDMA:

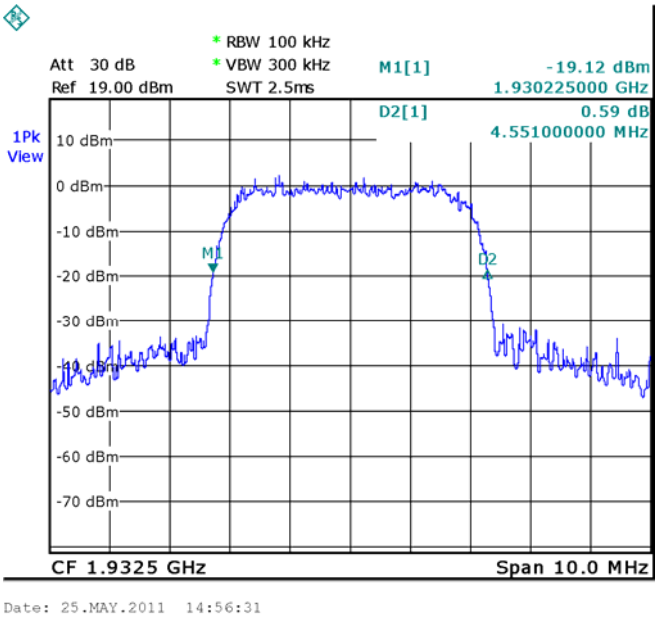

Figure 122.— Input 1932.50 MHz

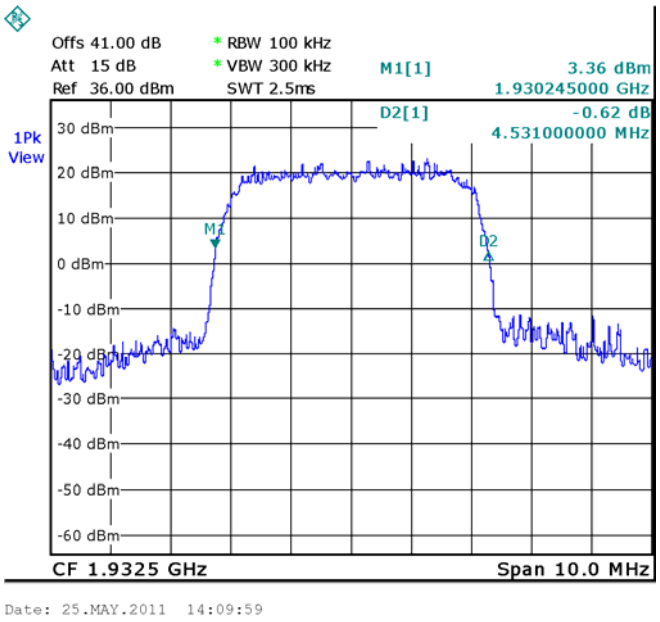

Figure 123.— Output 1932.50 MHz

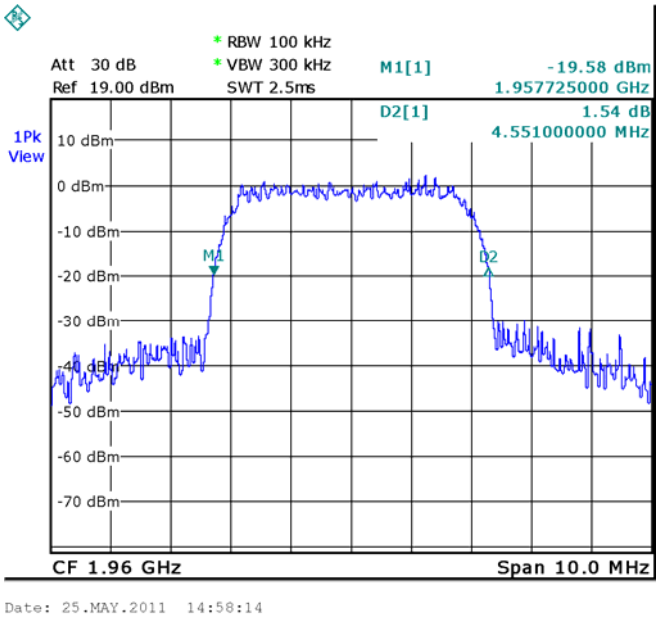

Figure 124.— Input 1960.00 MHz

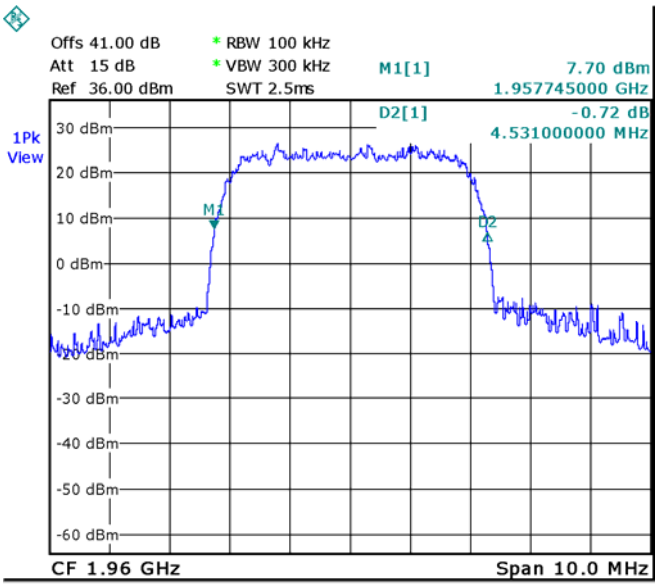

Figure 125.— Output 1960.00 MHz

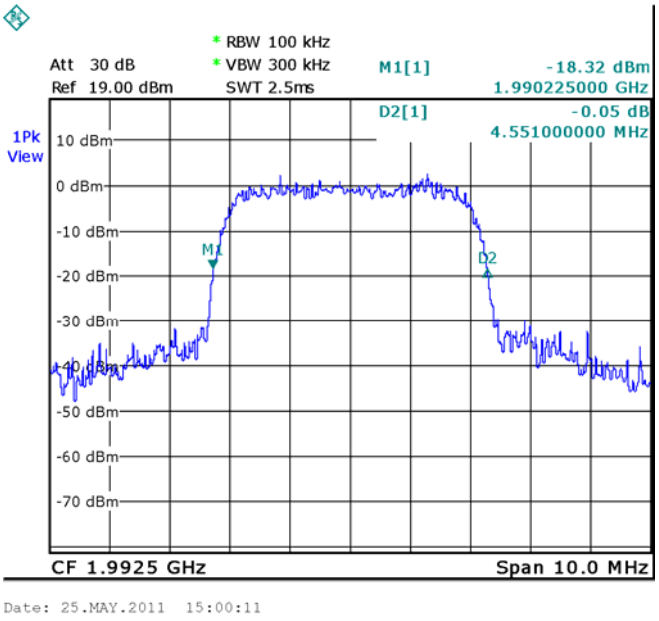

Figure 126.— Input 1992.50 MHz

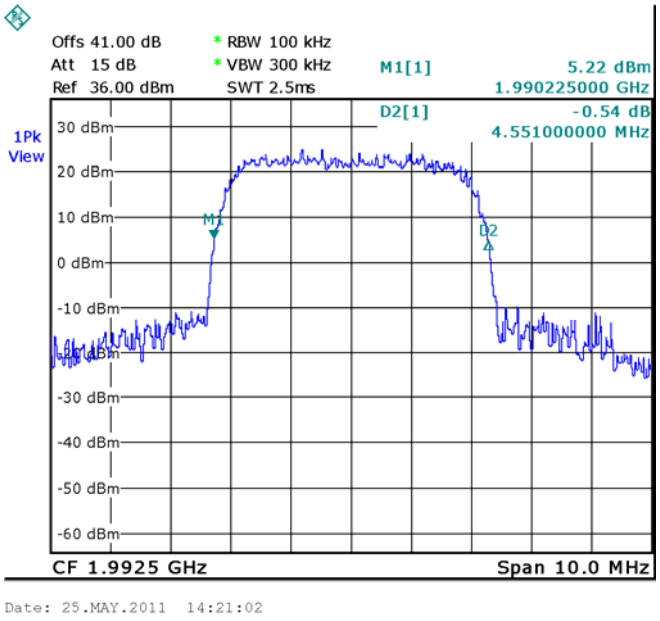

Figure 127.— Output 1992.50 MHz

10.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (MHz)
CDMA	Input	1931.20	1.455
	Output	1931.20	1.449
	Input	1960.00	1.449
	Output	1960.0	1.443
	Input	1993.80	1.449
	Output	1993.80	1.449
GSM	Input	1931.20	0.425
	Output	1931.20	0.423
	Input	1960.00	0.423
	Output	1960.00	0.423
	Input	1993.80	0.423
	Output	1993.80	0.417
W-CDMA	Input	1932.50	4.551
	Output	1932.50	4.531
	Input	1960.00	4.551
	Output	1960.00	4.531
	Input	1992.50	4.551
	Output	1992.50	4.551

Figure 128 Occupied Bandwidth PCS

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

10.4 Test Equipment Used.

Occupied Bandwidth PCS

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

Figure 129 Test Equipment Used

11. Out of Band Emissions at Antenna Terminals PCS

11.1 Test Specification

FCC Part 24, Subpart E, Section 238; FCC Part 2.1051

11.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges (1930-1990 MHz) 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 dB).
The spectrum analyzer was set to 1 kHz RBW for the frequency range of 9 – 150 kHz, 10 kHz RBW for the frequency range of 150 kHz – 1 MHz, and 100 kHz RBW for the frequency range of 1 MHz – 20 GHz.
Signal power was +10 dBm to EUT.

CDMA:

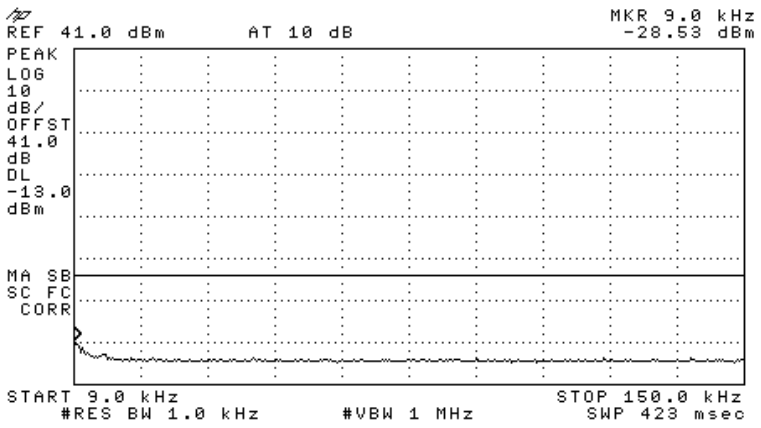

Figure 130.— 1931.20 MHz

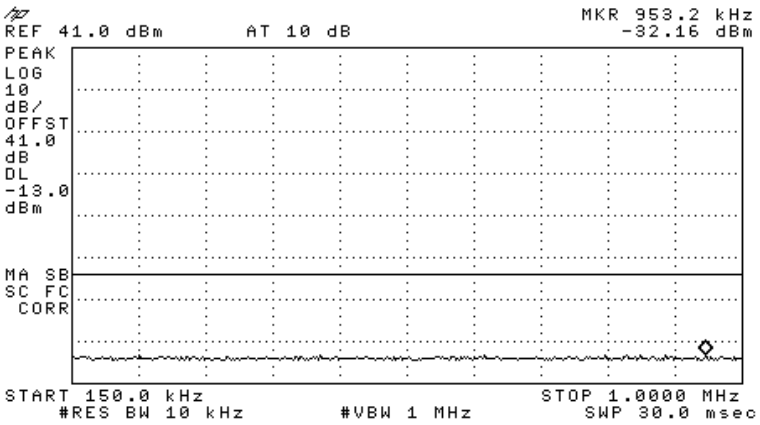

Figure 131.— 1931.20 MHz

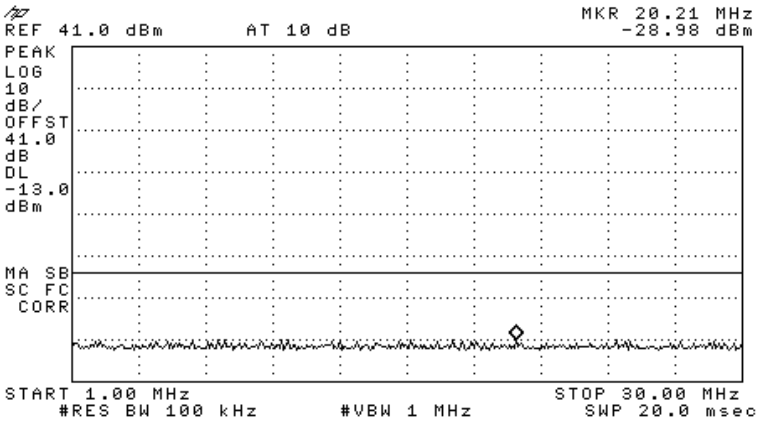

Figure 132.— 1931.20 MHz

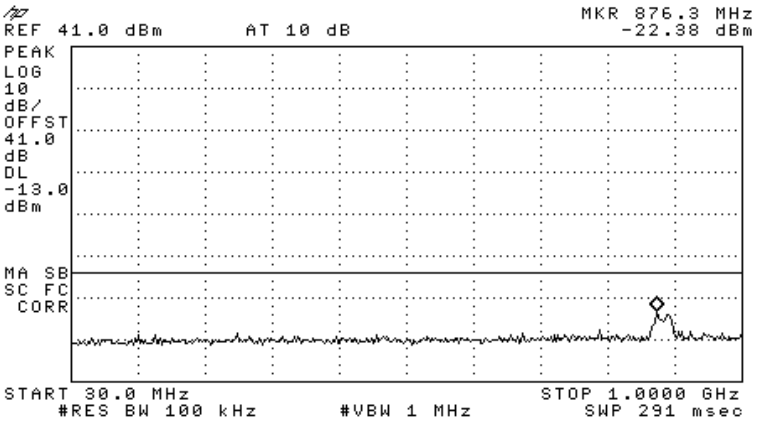

Figure 133.— 1931.20 MHz

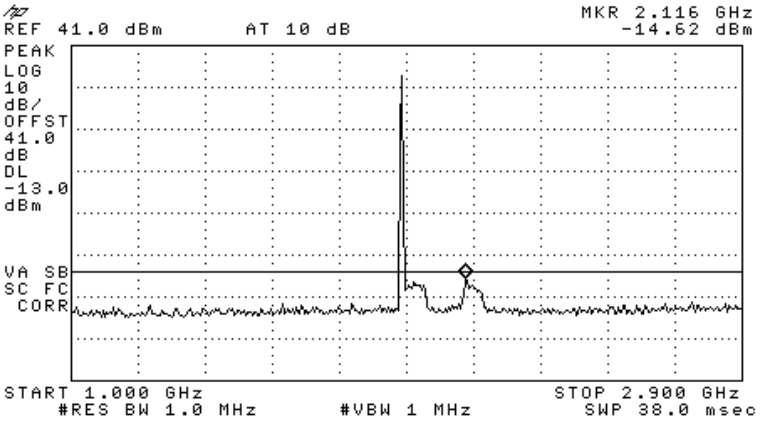

Figure 134.— 1931.20 MHz

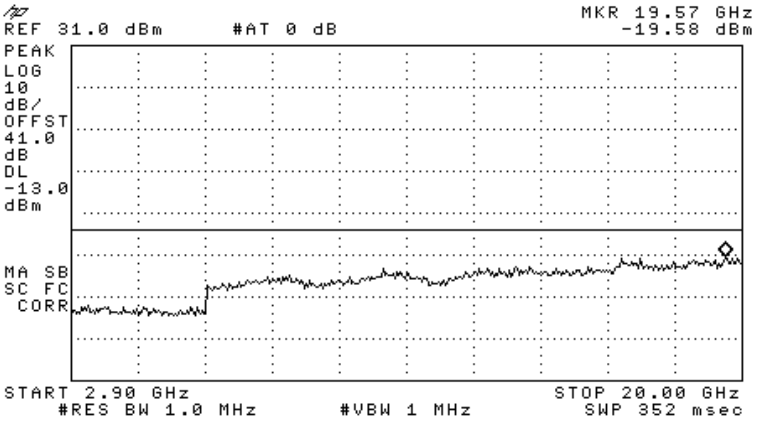

Figure 135.— 1931.20 MHz

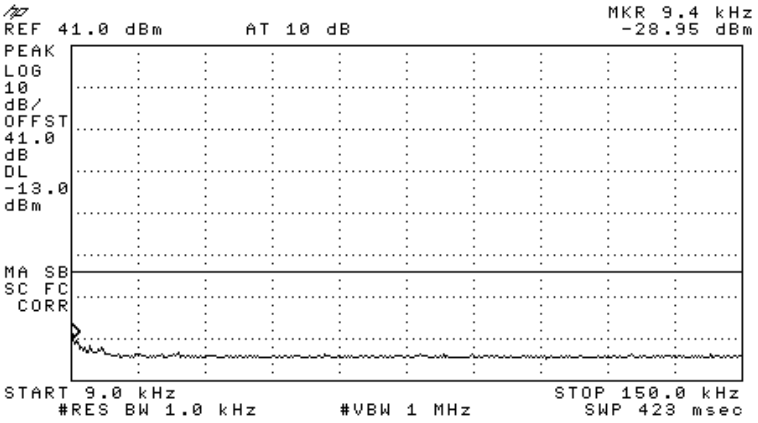

Figure 136.— 1960.00 MHz

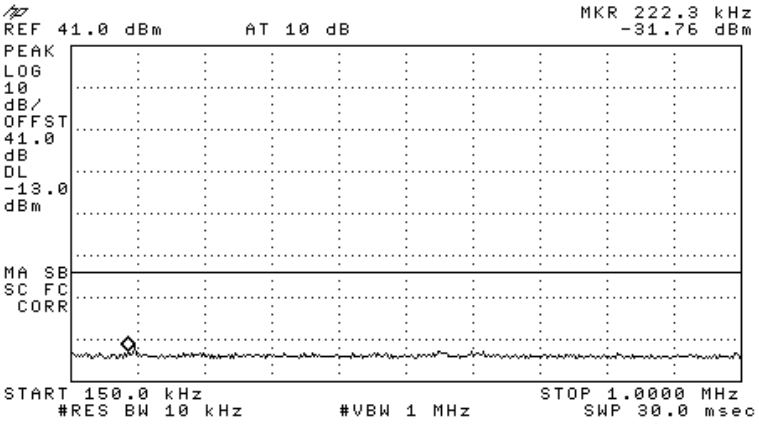

Figure 137.— 1960.00 MHz

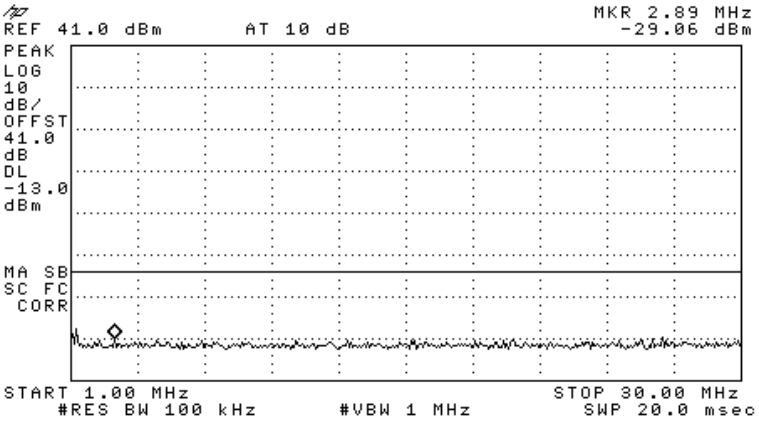

Figure 138.— 1960.00 MHz

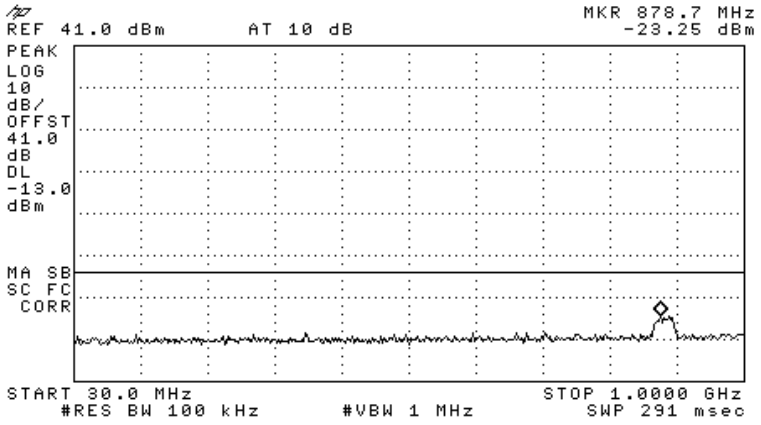

Figure 139.— 1960.00 MHz

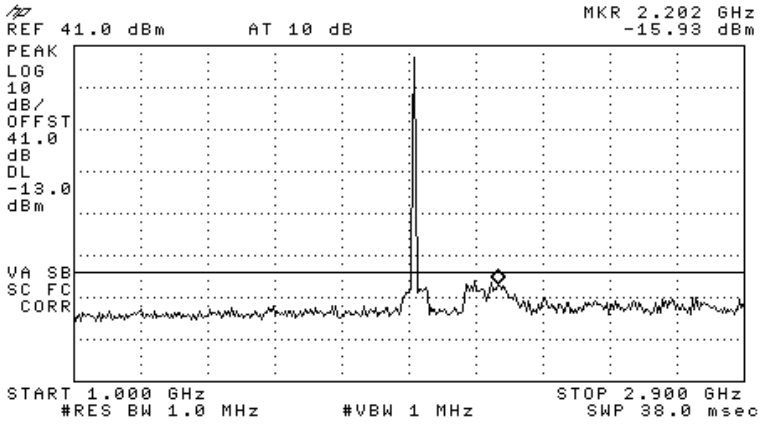

Figure 140.— 1960.00 MHz

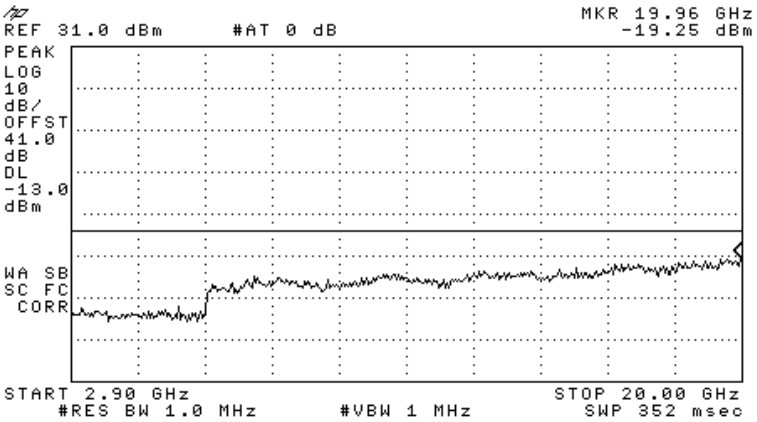

Figure 141.— 1960.00 MHz

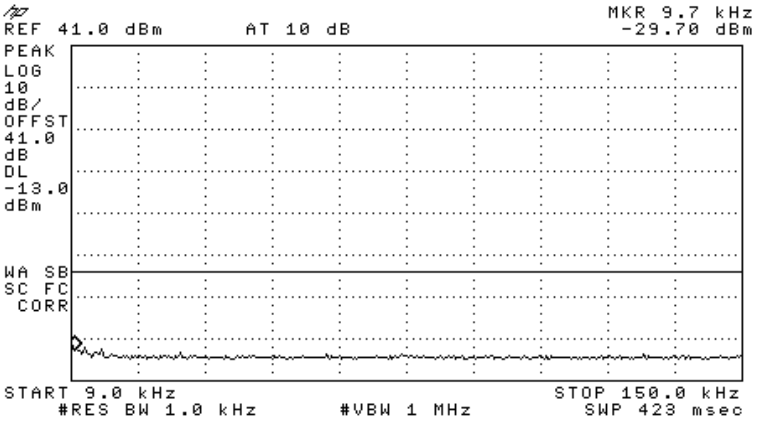

Figure 142.— 1993.80 MHz

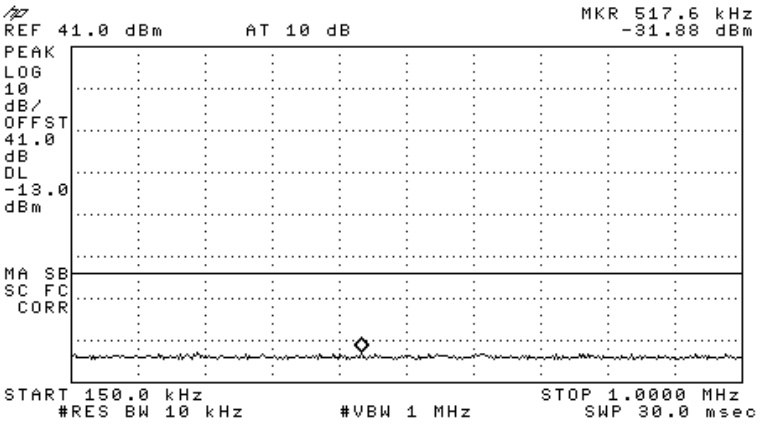

Figure 143.— 1993.80 MHz

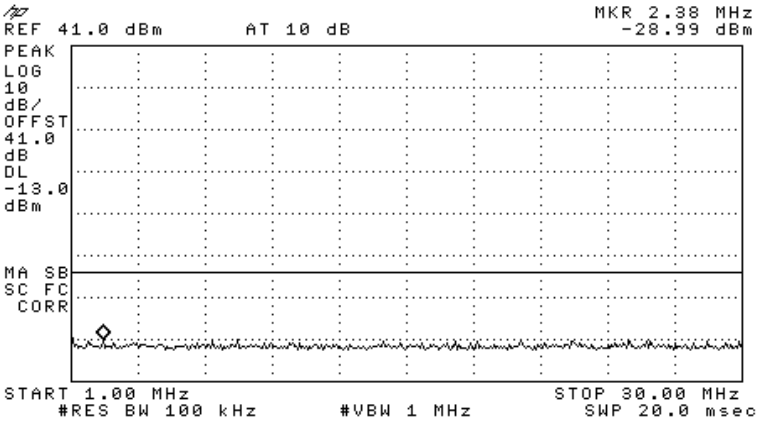

Figure 144.— 1993.80 MHz

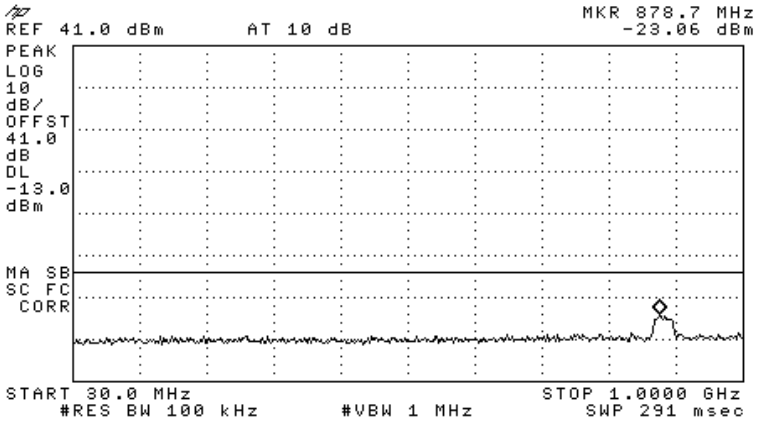

Figure 145.— 1993.80 MHz

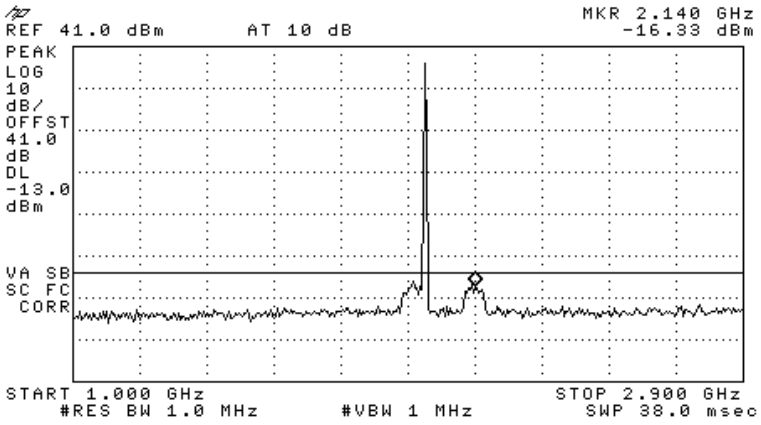

Figure 146.— 1993.80 MHz

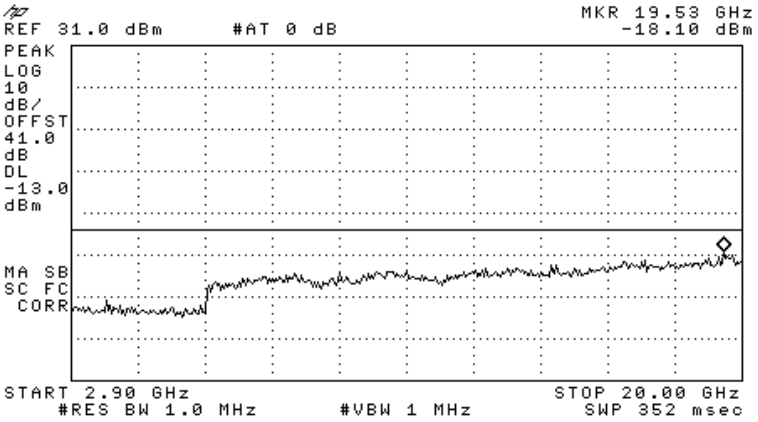

Figure 147.— 1993.80 MHz

GSM:

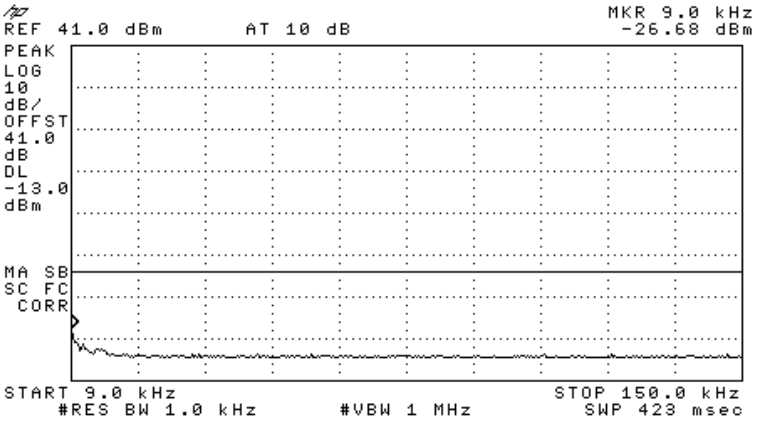

Figure 148.— 1931.20 MHz

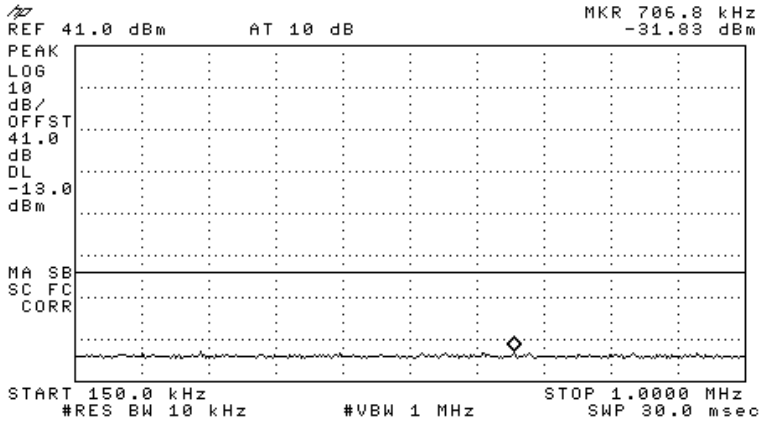

Figure 149.— 1931.20 MHz

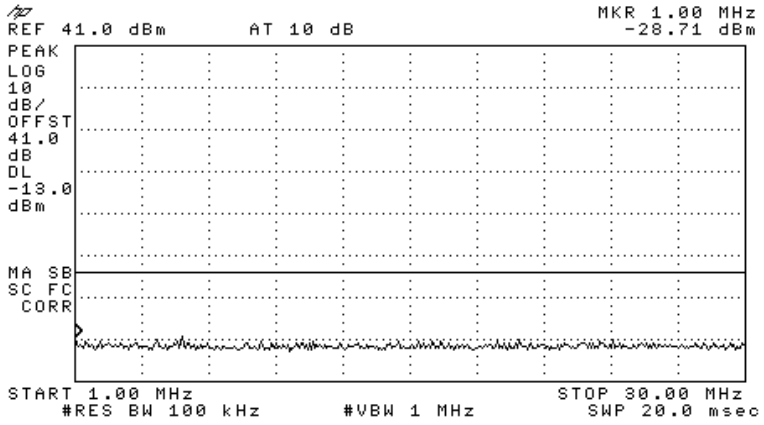

Figure 150.— 1931.20 MHz

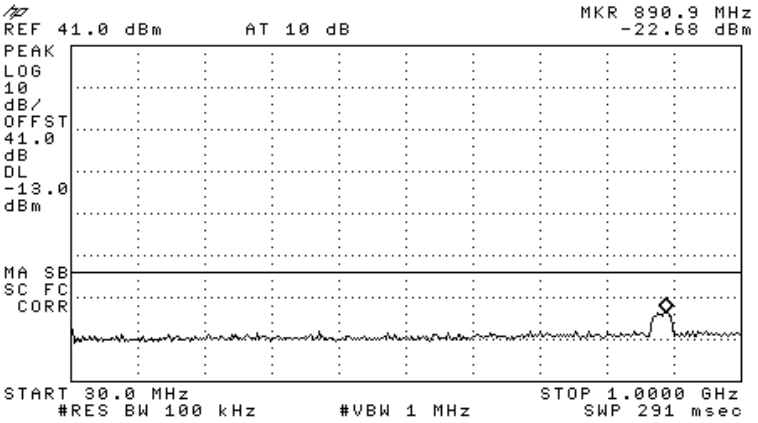

Figure 151.— 1931.20 MHz

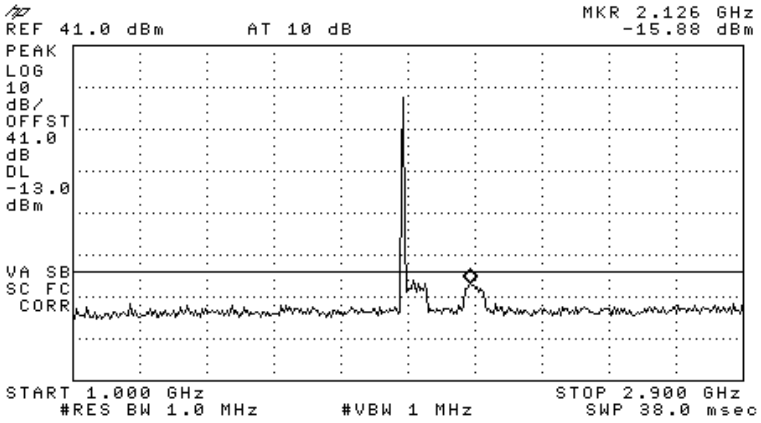

Figure 152.— 1931.20 MHz

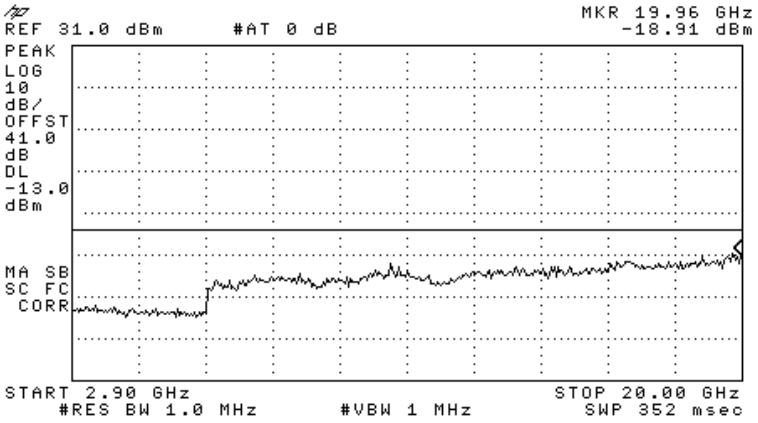

Figure 153.— 1931.20 MHz

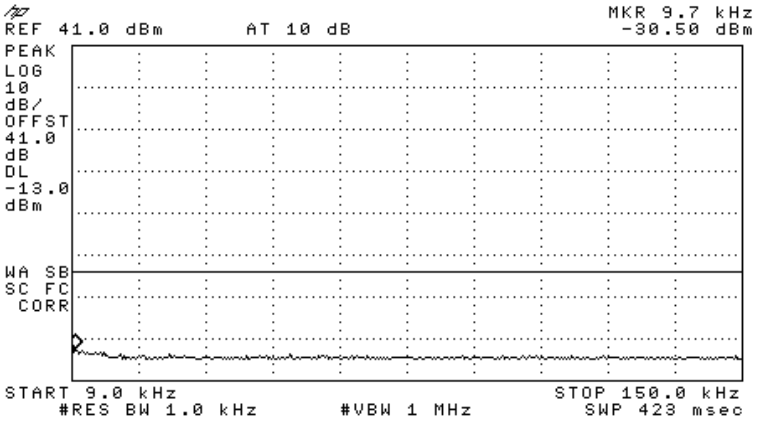

Figure 154.— 1960.00 MHz

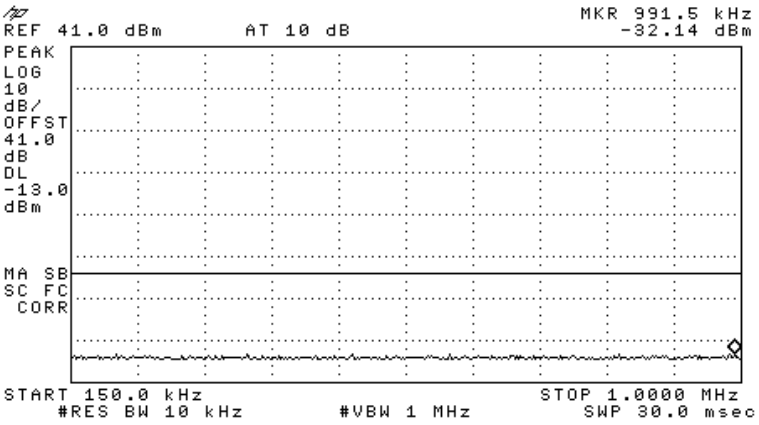

Figure 155.— 1960.00 MHz

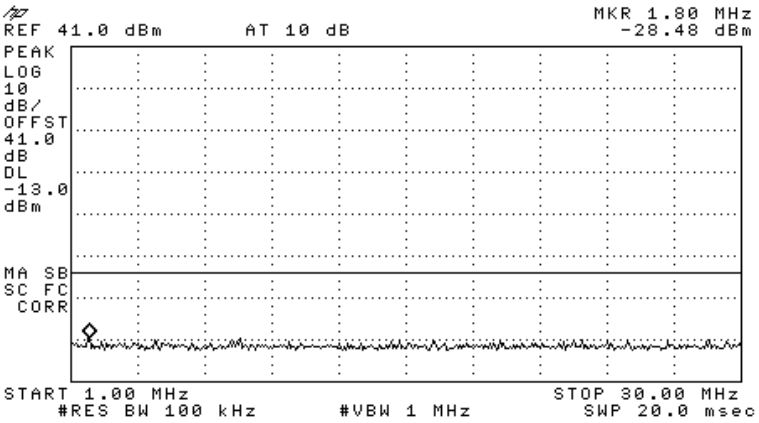

Figure 156.— 1960.00 MHz

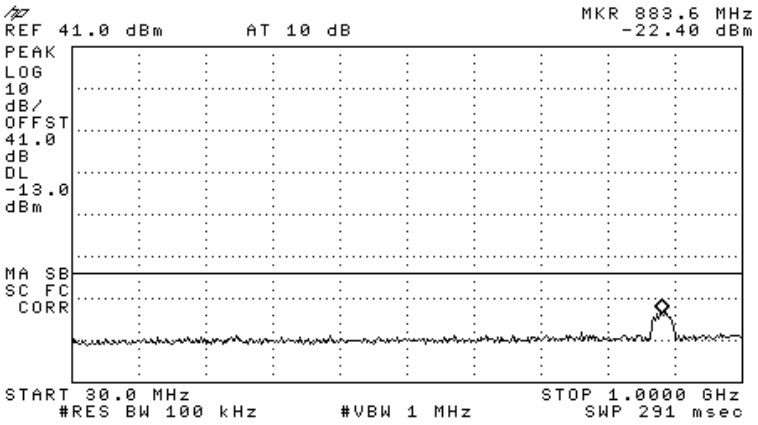

Figure 157.— 1960.00 MHz

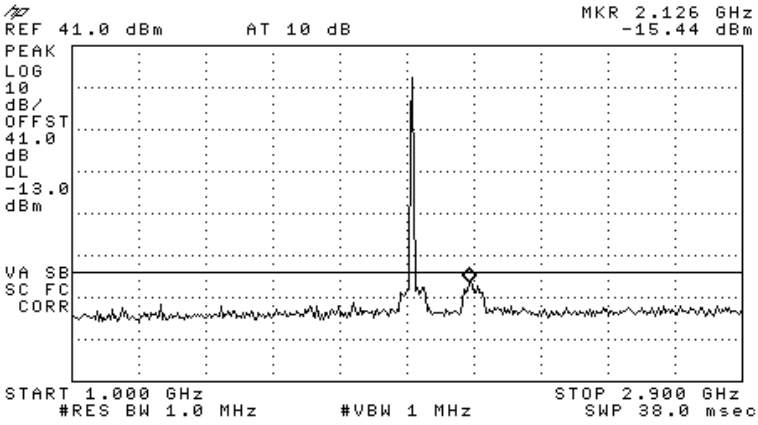

Figure 158.— 1960.00 MHz

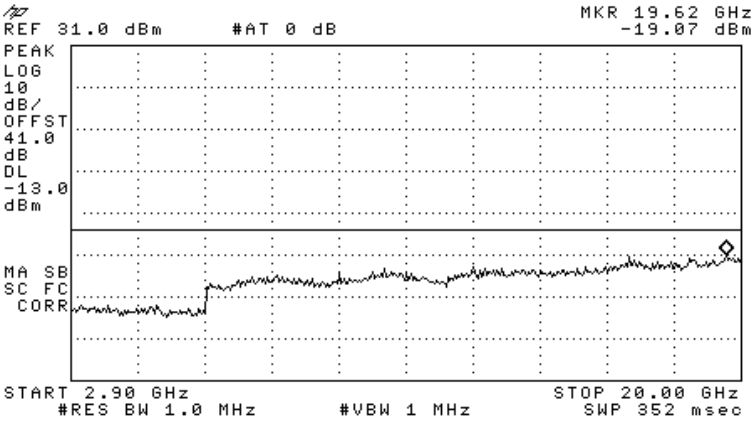

Figure 159.— 1960.00 MHz

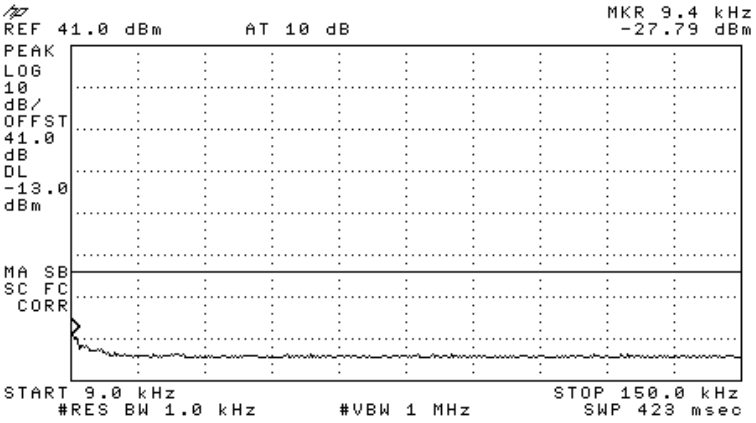

Figure 160.— 1993.80 MHz

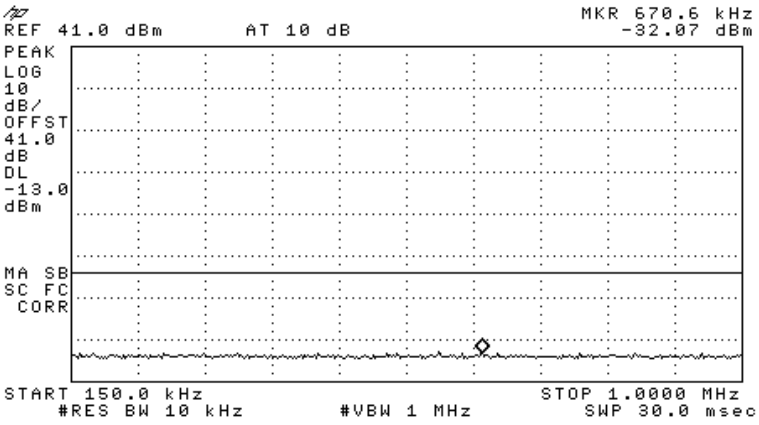

Figure 161.— 1993.80 MHz

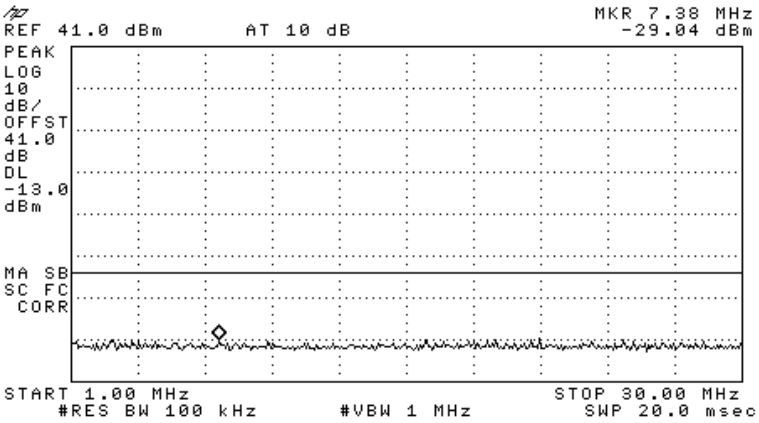

Figure 162.— 1993.80 MHz

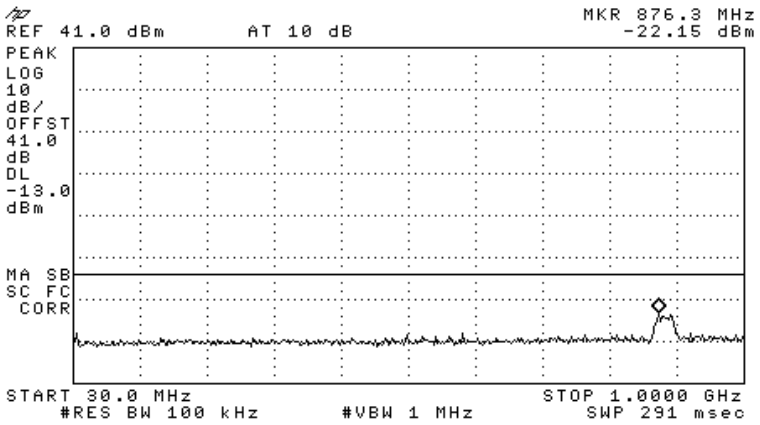

Figure 163.— 1993.80 MHz

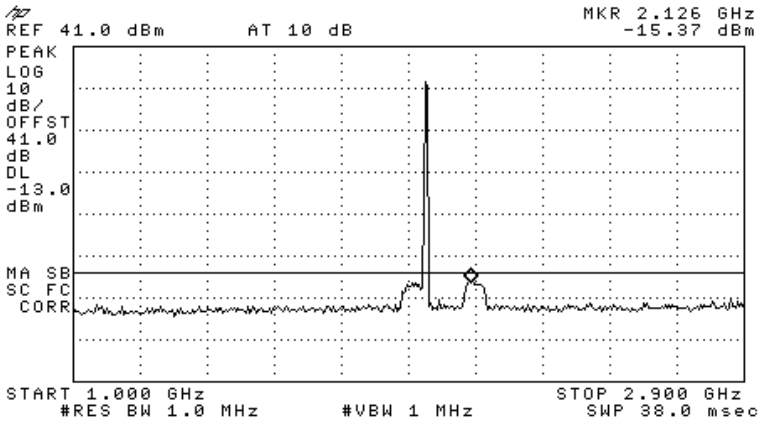

Figure 164.— 1993.80 MHz

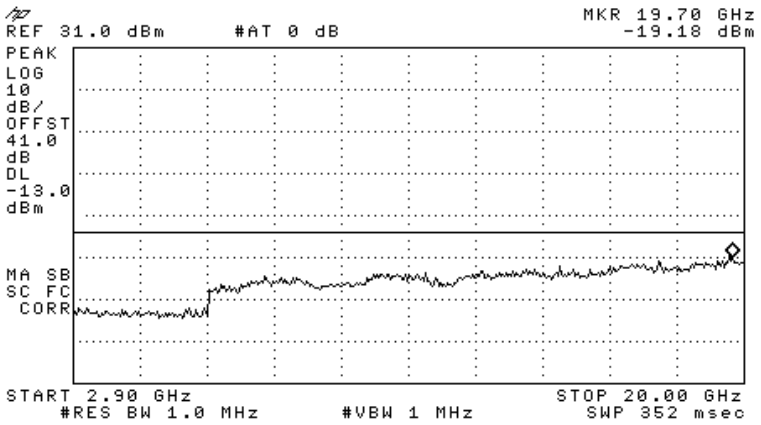

Figure 165.— 1993.80 MHz

W-CDMA:

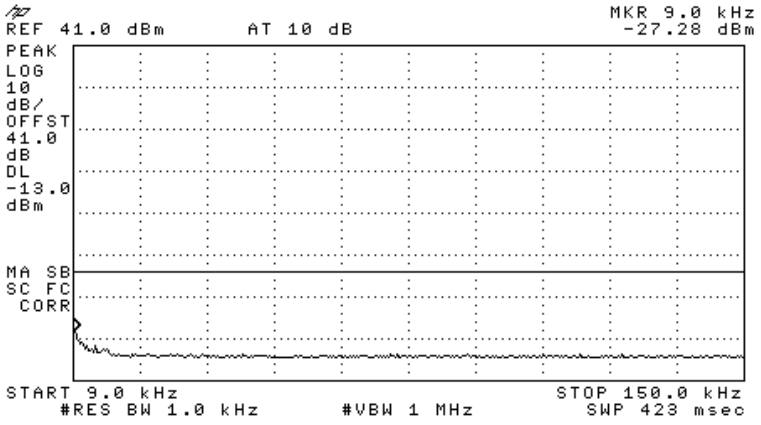

Figure 166.— 1932.50 MHz

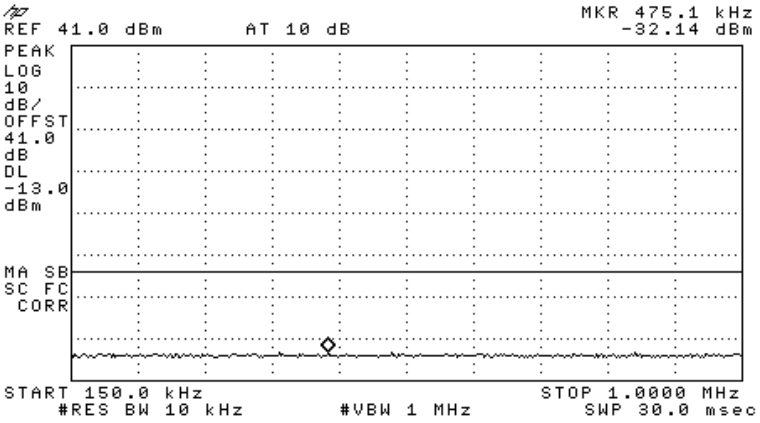

Figure 167.— 1932.50 MHz

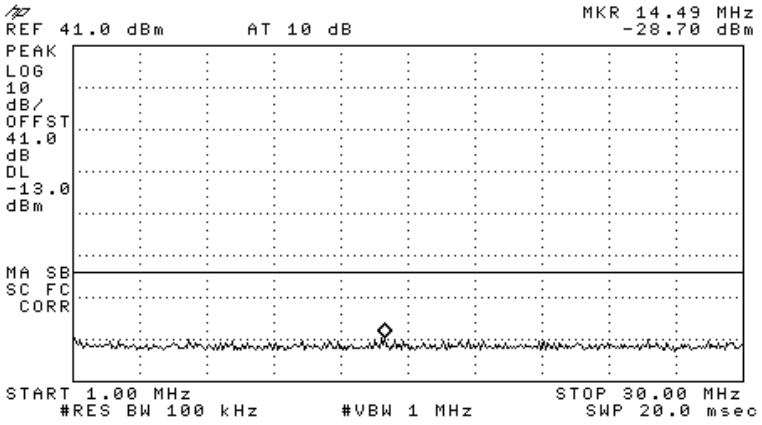

Figure 168.— 1932.50 MHz

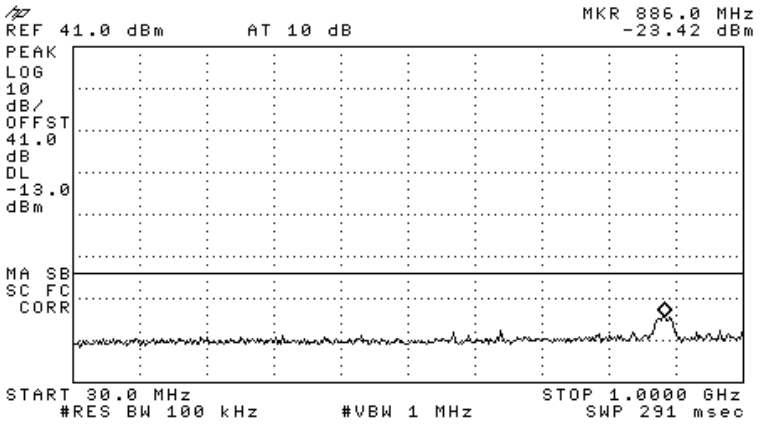

Figure 169.— 1932.50 MHz

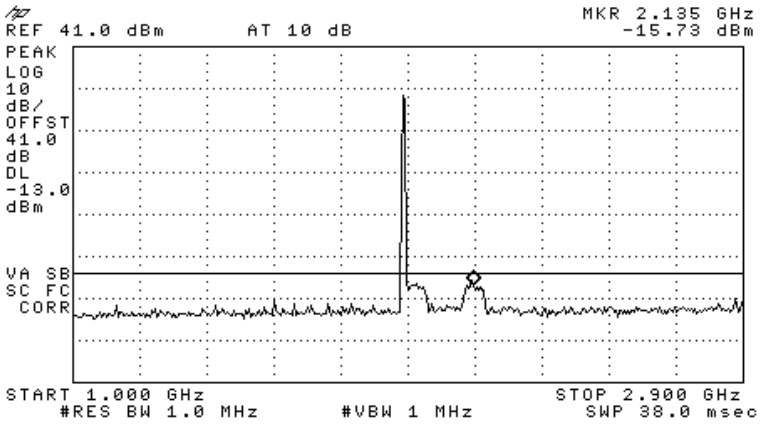

Figure 170.— 1932.50 MHz

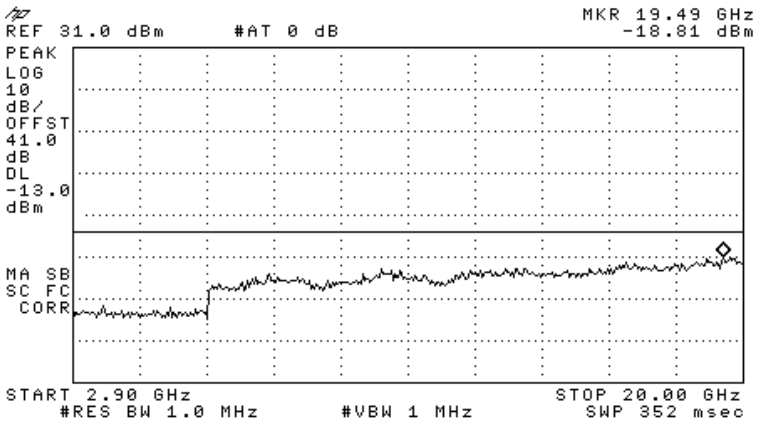

Figure 171.— 1932.50 MHz

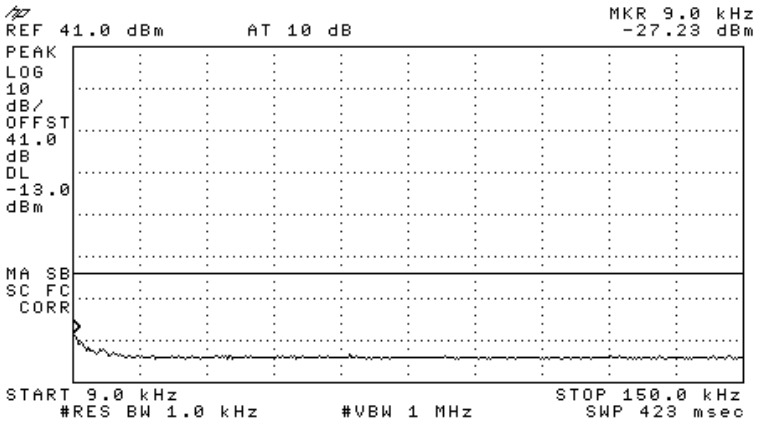

Figure 172.— 1960.00 MHz

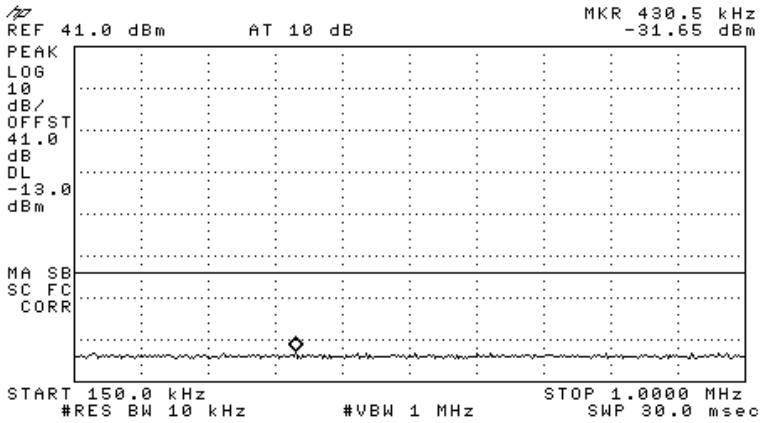

Figure 173.— 1960.00 MHz

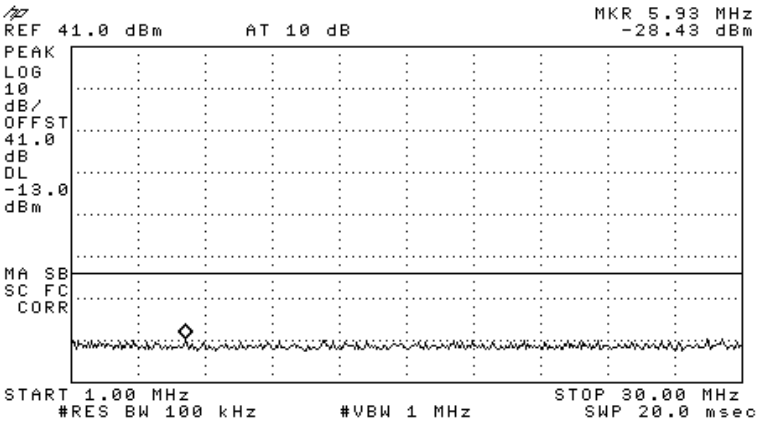

Figure 174.— 1960.00 MHz

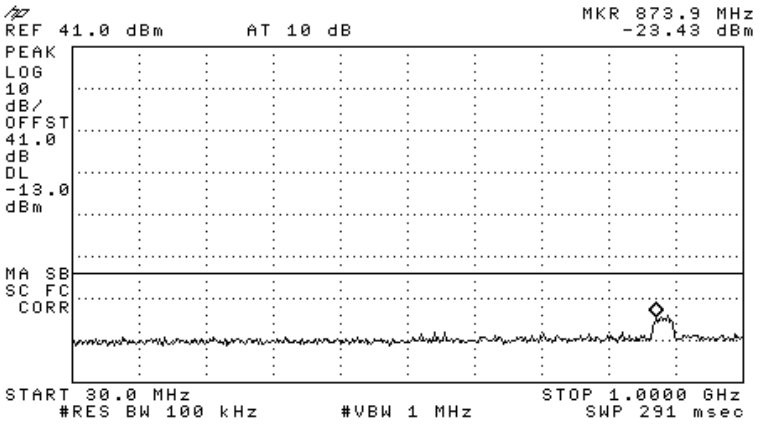

Figure 175.— 1960.00 MHz

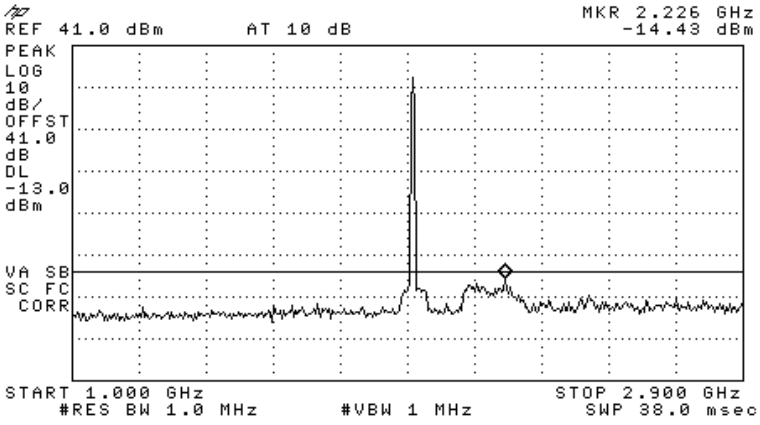

Figure 176.— 1960.00 MHz

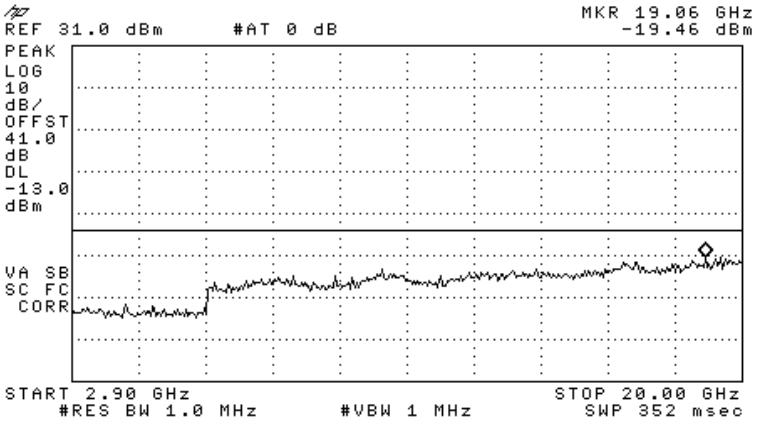

Figure 177.— 1960.00 MHz

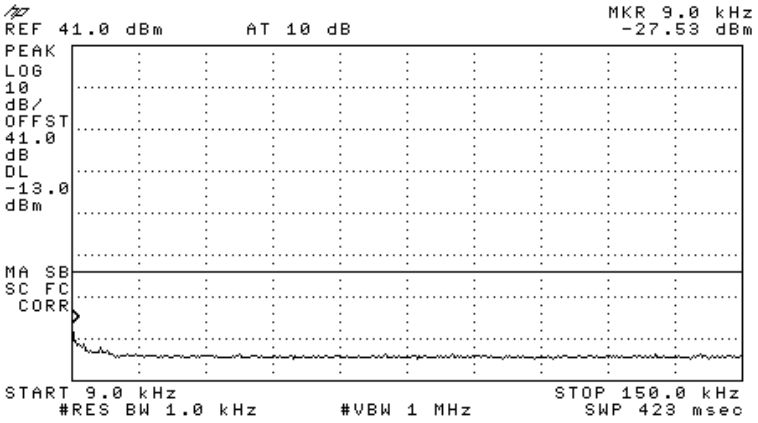

Figure 178.— 1992.50 MHz

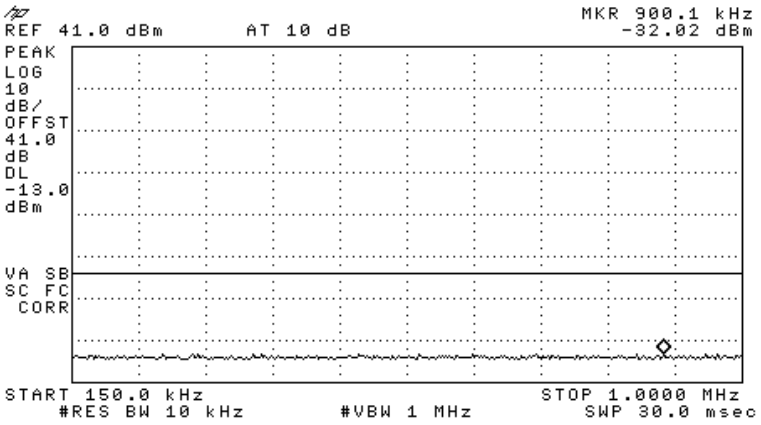

Figure 179.— 1992.50 MHz

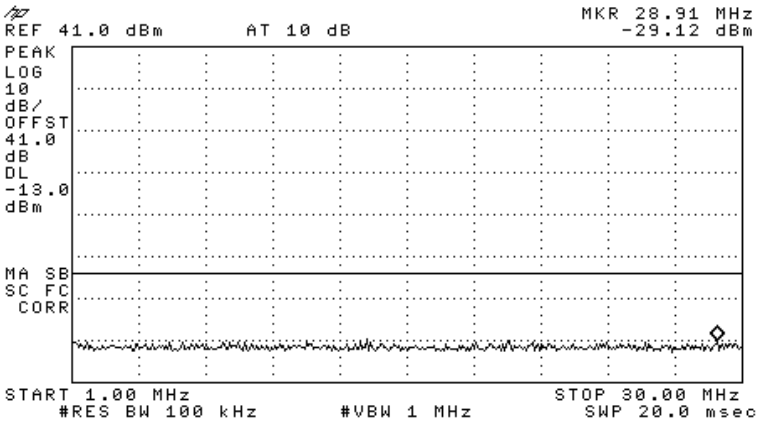

Figure 180.— 1992.50 MHz

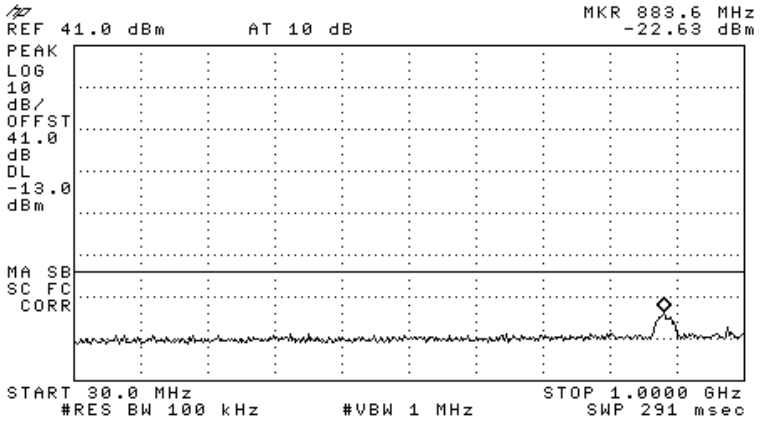

Figure 181.— 1992.50 MHz

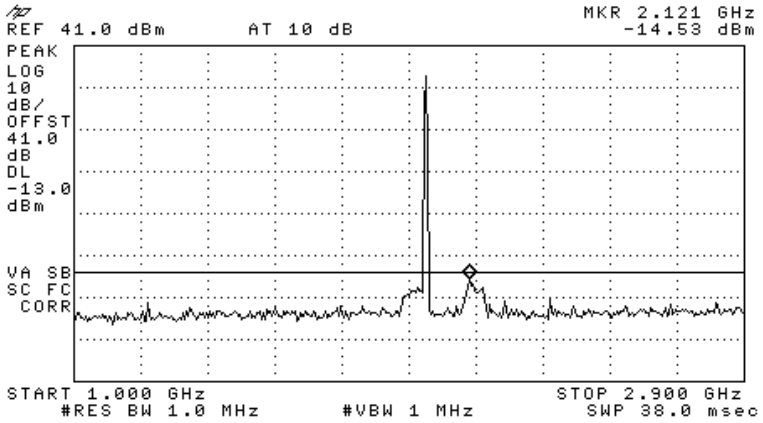

Figure 182.— 1992.50 MHz

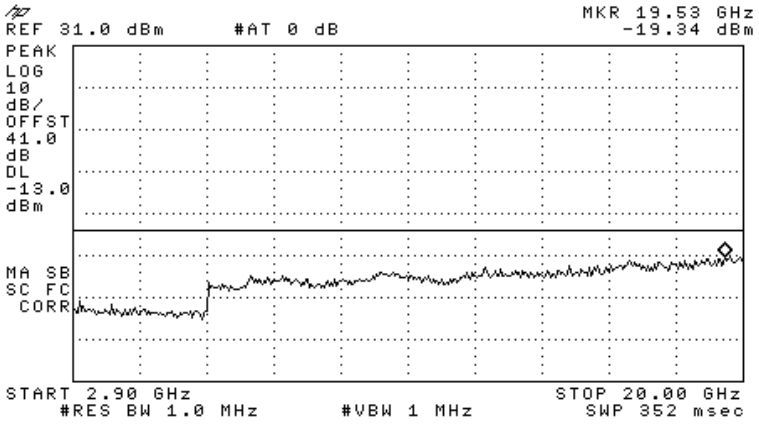

Figure 183.— 1992.50 MHz

11.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 24, Subpart E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Frequency (GHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	1931.20	2.116	-14.62	-13.0	-1.62
	1960.00	2.202	-15.93	-13.0	-2.93
	1993.80	2.140	-16.33	-13.0	-3.33
GSM	1931.20	2.126	-15.88	-13.0	-2.88
	1960.00	2.126	-15.44	-13.0	-2.44
	1993.80	2.126	-15.37	-13.0	-2.37
W-CDMA	1932.50	2.135	-15.73	-13.0	-2.73
	1960.00	2.226	-14.43	-13.0	-1.43
	1992.50	2.121	-14.53	-13.0	-1.53

Figure 184 Out of Band Emission Results PCS

JUDGEMENT: Passed by 1.43 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

11.4 Test Equipment Used.

Out of Band Emission at Antenna Terminals PCS

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

Figure 185 Test Equipment Used

12. Band Edge Spectrum PCS

12.1 Test Specification

FCC Part 24, Subpart E, Section 238; FCC Part 2.1051

12.2 Test procedure

For CDMA and GSM:

Enclosed are spectrum analyzer plots for the lowest operation frequency (1931.2 MHz) and the highest operation frequency (1993.8 MHz) in which the E.U.T. is planned to be used.

For WCDMA:

Enclosed are spectrum analyzer plots for the lowest operation frequency (1932.5 MHz) and the highest operation frequency (1992.5 MHz) in which the E.U.T. is planned to be used.

The power of any emission outside of the authorized operating frequency ranges (1930.00-1990.00 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (21 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

CDMA:

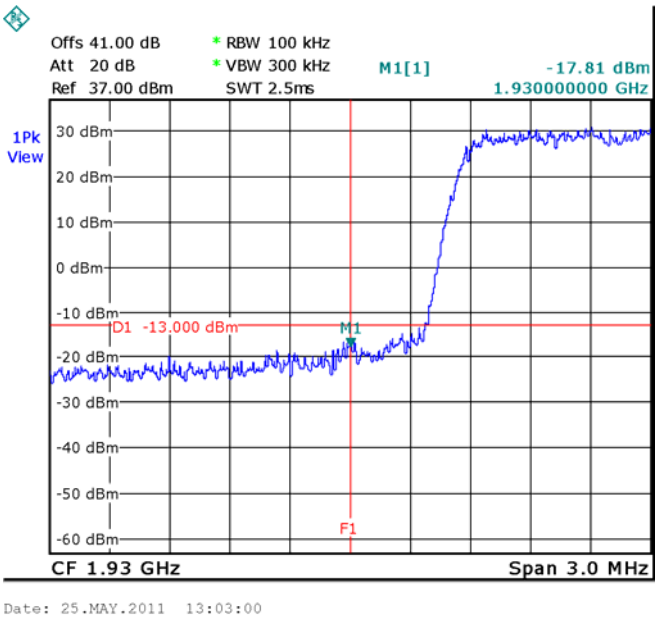

Figure 186.— 1931.20 MHz

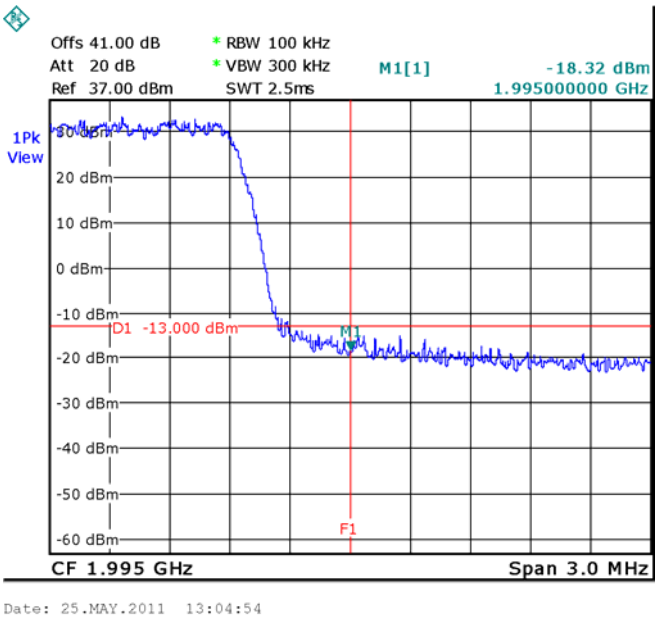

Figure 187.— 1993.80 MHz

GSM:

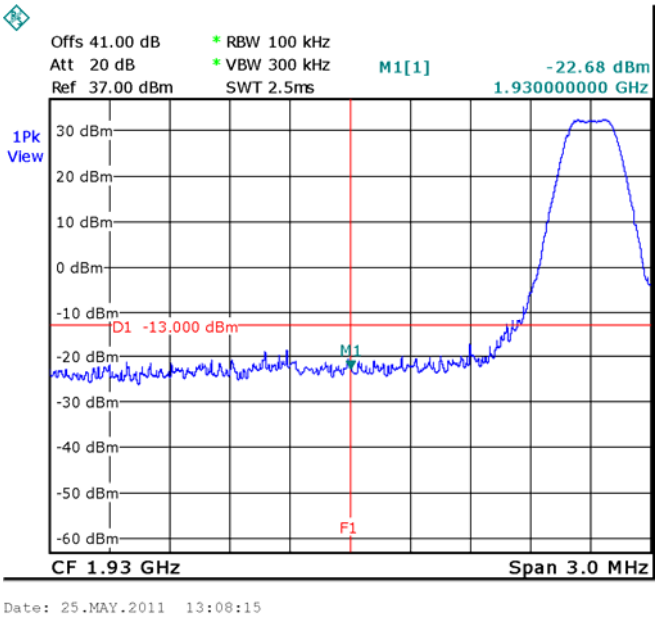

Figure 188.— 1931.20 MHz

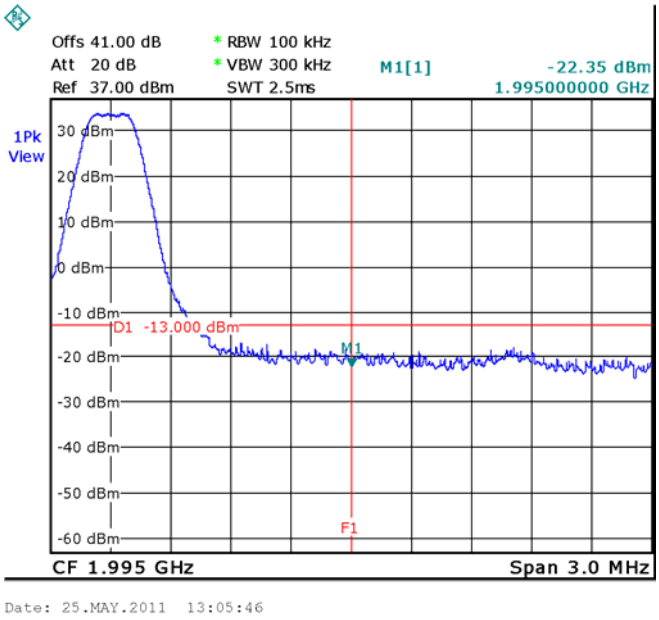

Figure 189.— 1993.80 MHz

W-CDMA:

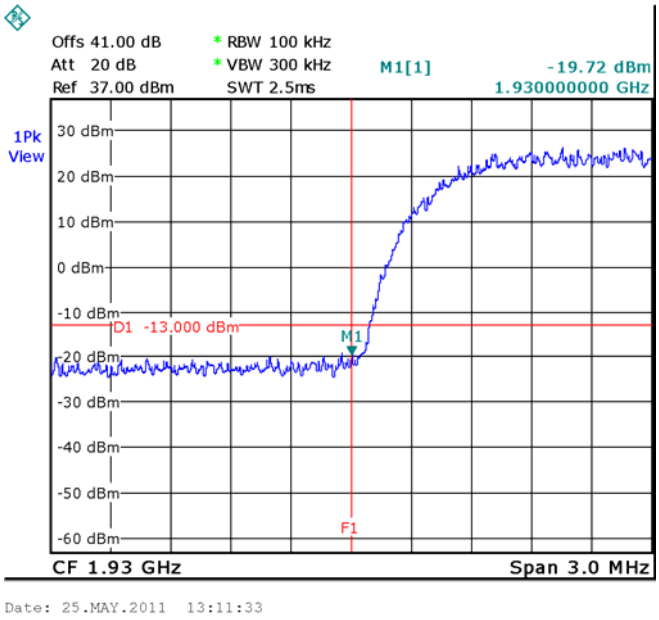

Figure 190.— 1932.50 MHz

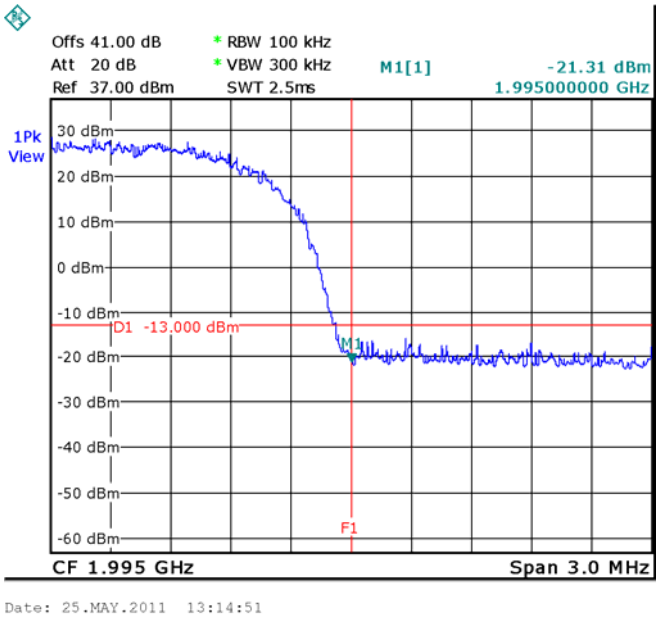

Figure 191.— 1992.50 MHz

12.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 24, Subpart E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	1931.20	1930.00	-17.81	-13.0	-4.81
	1993.80	1995.00	-18.32	-13.0	-5.32
GSM	1931.20	1930.00	-22.68	-13.0	-9.68
	1993.80	1995.00	-22.35	-13.0	-9.35
W-CDMA	1932.50	1930.00	-19.72	-13.0	-6.72
	1992.50	1995.00	-21.31	-13.0	-8.31

Figure 192 Band Edge Spectrum Results PCS

JUDGEMENT: Passed by 4.81 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

12.4 Test Equipment Used.

Band Edge Spectrum PCS

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

Figure 193 Test Equipment Used

13. Out of Band Emissions (Radiated) PCS

13.1 Test Specification

FCC, Part 24, Subpart E Section 238, FCC Part 2.1053

13.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (1930-1990 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, 1.5 meters above the ground. The configuration tested is shown in Figure 3.1.
The frequency range 9 kHz-20 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

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

13.3 Results Table

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)
1931.20	3862.40	V	51.1	-50.72	4.3	8.62	-46.4	-13.0	-33.40
1931.20	3862.40	H	50.5	-50.46	4.3	8.62	-46.14	-13.0	-33.14
1960.00	3920.00	V	50.7	-51.12	4.3	8.62	-46.8	-13.0	-33.80
1960.00	3920.00	H	51.2	-49.76	4.3	8.62	-45.44	-13.0	-32.44
1993.80	3987.60	V	51.3	-51	4.3	8.6	-46.7	-13.0	-33.70
1993.80	3987.60	H	51.6	-49.75	4.3	8.6	-45.45	-13.0	-32.45

The E.U.T met the requirements of the FCC, Part 24, Subpart E, Section 238; FCC Part 2.1053 specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

13.4 Test Instrumentation Used, Radiated Measurements

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

14. RF Power Output LTE

14.1 Test Specification

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

14.2 Test procedure

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

Signal generator output power was 0dBm.

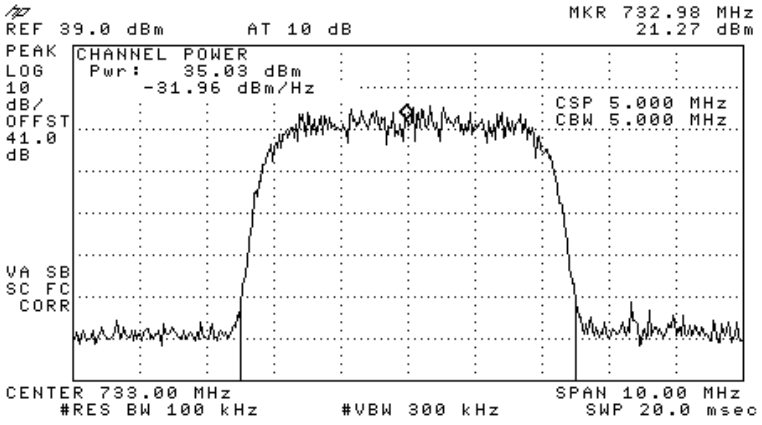

Figure 194.— W-CDMA (733 MHz)

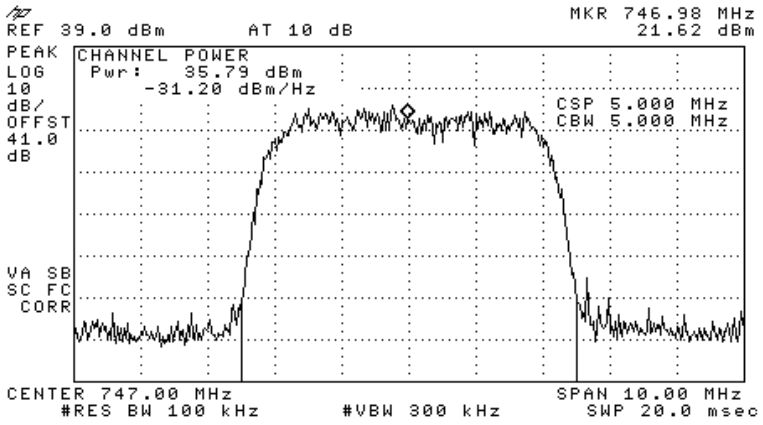

Figure 195.— W-CDMA (747 MHz)

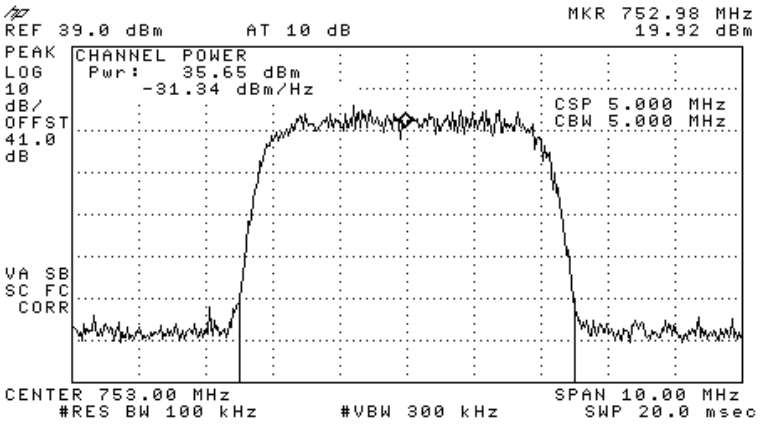

Figure 196.— W-CDMA (753 MHz)

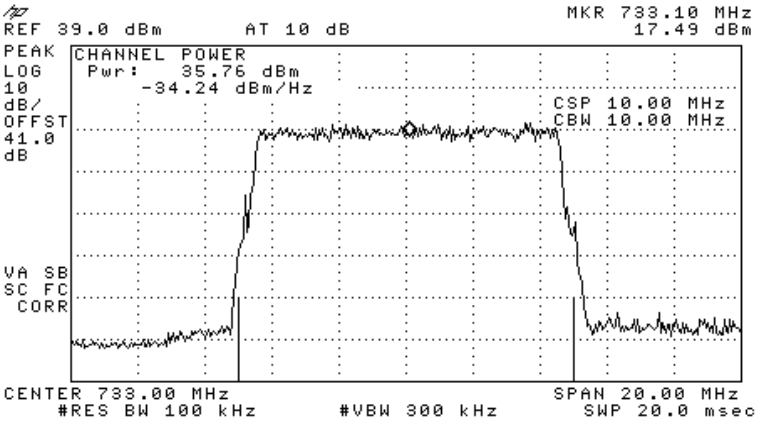

Figure 197.— QPSK (733 MHz)

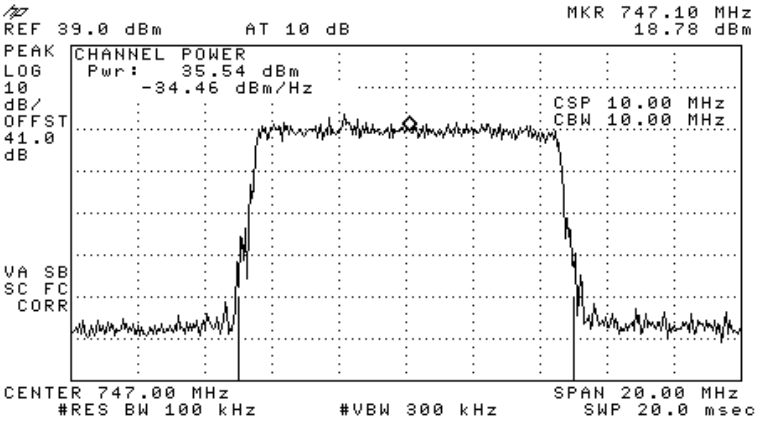

Figure 198.— QPSK (747 MHz)

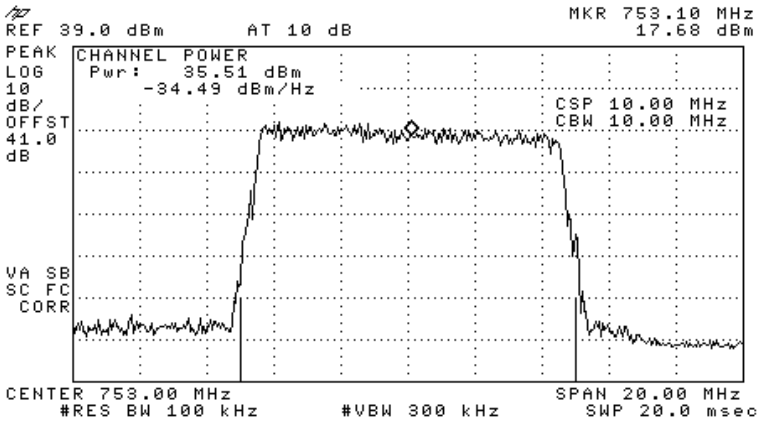

Figure 199.— QPSK (753 MHz)

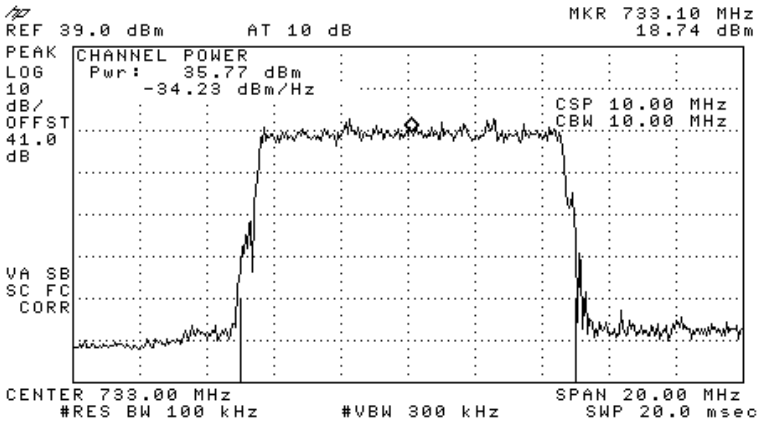

Figure 200.— 16QAM (733 MHz)

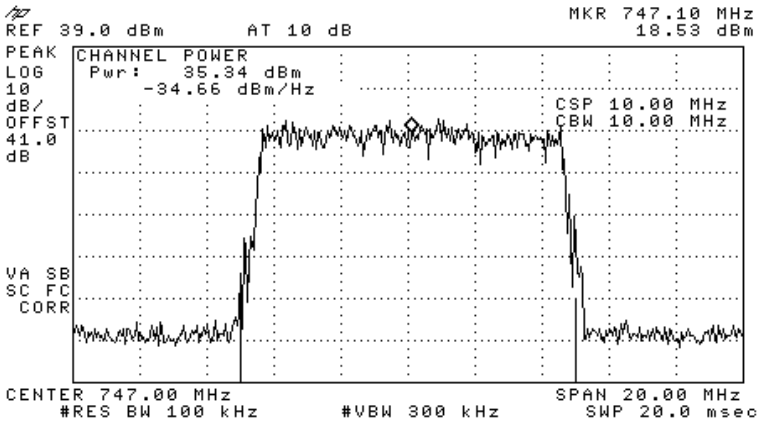

Figure 201.— 16QAM (747 MHz)

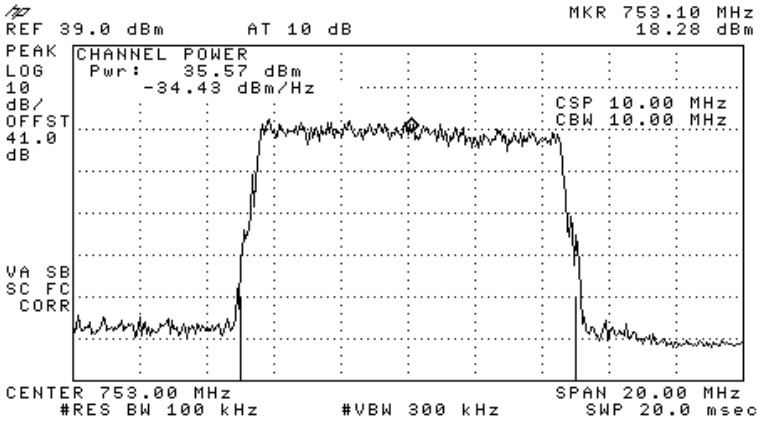

Figure 202.— 16QAM (753 MHz)

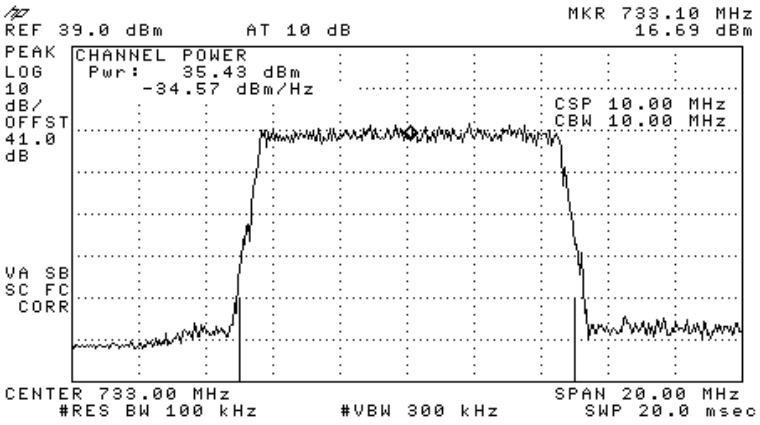

Figure 203.— 64QAM (733 MHz)

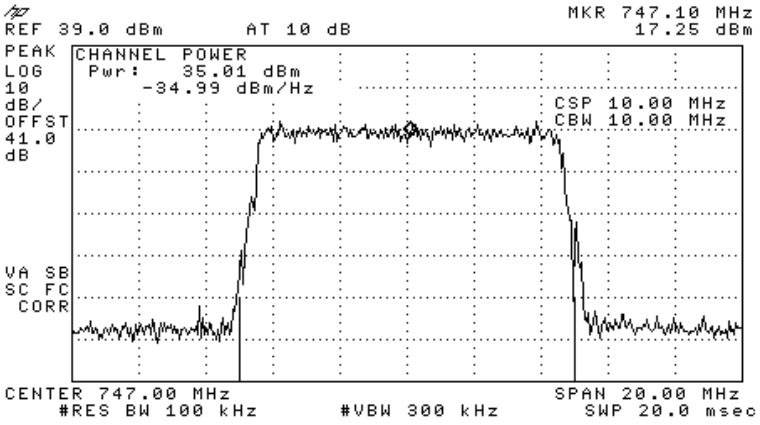

Figure 204.— 64QAM (747 MHz)

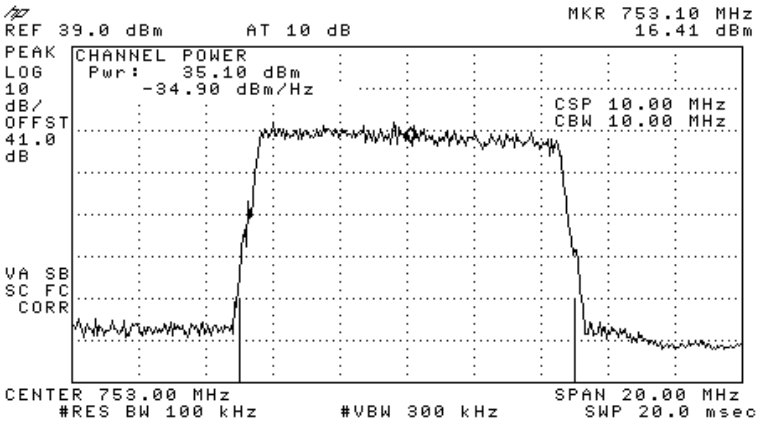

Figure 205.— 64QAM (753 MHz)

14.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Section 27.50 (d)

Modulation	Operation Frequency (MHz)	Reading (dBm)
WCDMA	733	35.03
WCDMA	747	35.79
WCDMA	753	35.65
QPSK	733	35.76
QPSK	747	35.54
QPSK	753	35.51
16QAM	733	35.77
16QAM	747	35.34
16QAM	753	35.57
64QAM	733	35.43
64QAM	747	35.01
64QAM	753	35.10

Figure 206 RF Power Output LTE

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

14.4 Test Equipment Used.

RF Power Output LTE

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	July 22, 2010	1 year
Signal Generator	HP	E4438C	MY42082734	July 21, 2010	1 year
Attenuator	Narda	MOD 766-10	9409	December 22, 2010	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	December 22, 2010	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 207 Test Equipment Used

15. Occupied Bandwidth LTE

15.1 Test Specification

FCC Part 2, Section 1049

15.2 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.

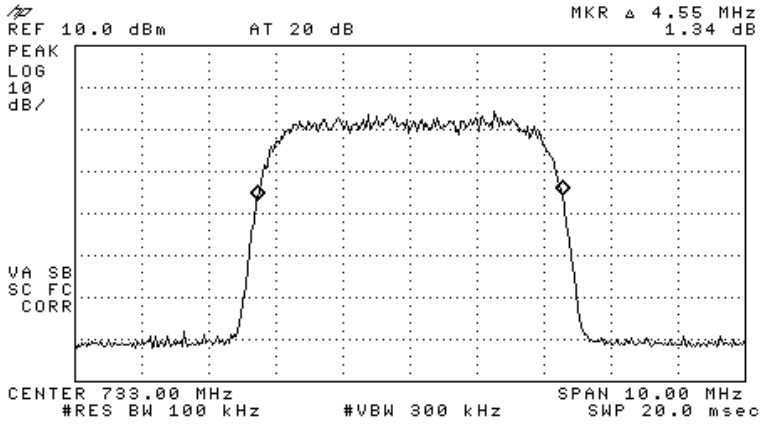

Figure 208.— W-CDMA (733 MHz) IN

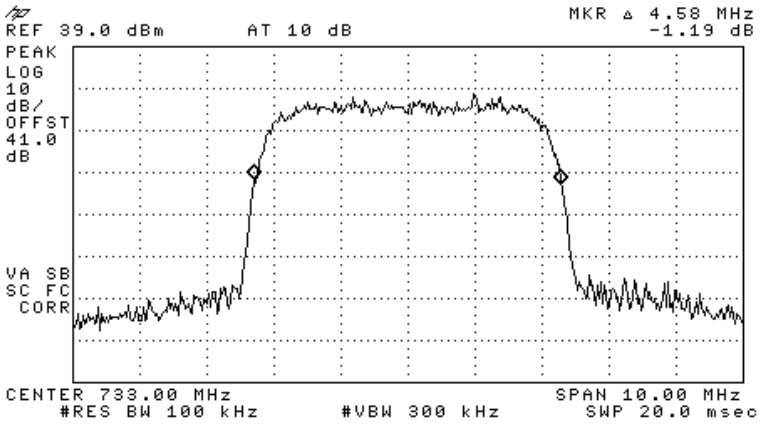

Figure 209.— W-CDMA (733 MHz) OUT

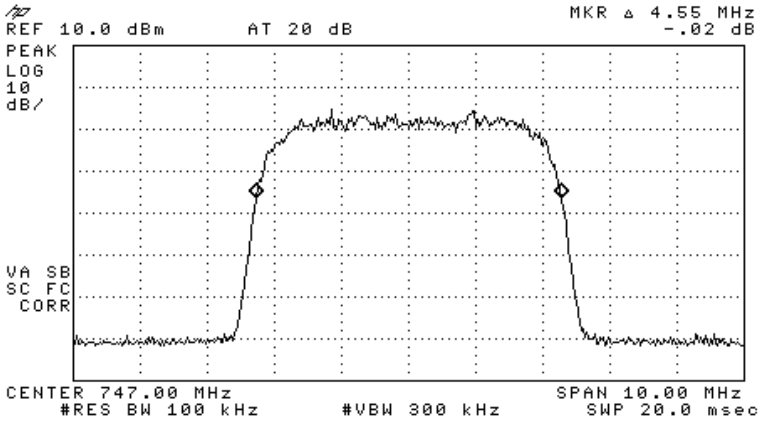

Figure 210.— W-CDMA (747 MHz) IN

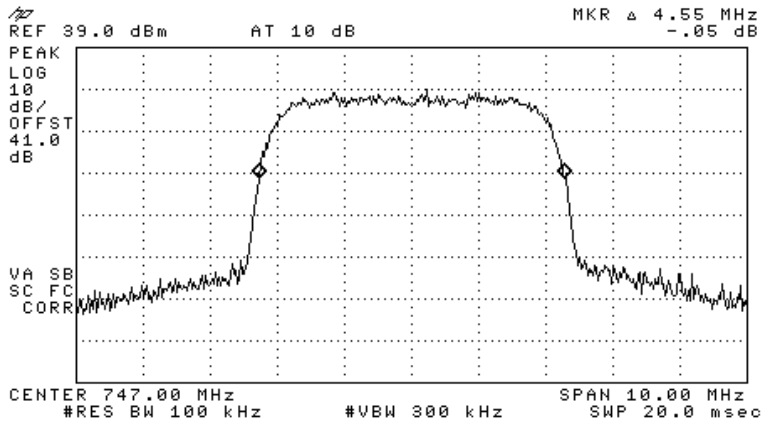

Figure 211.— W-CDMA (747 MHz) OUT

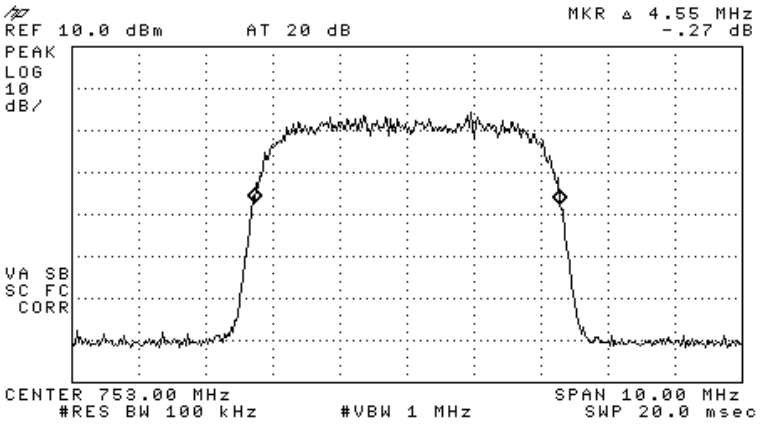

Figure 212.— W-CDMA (753 MHz) IN

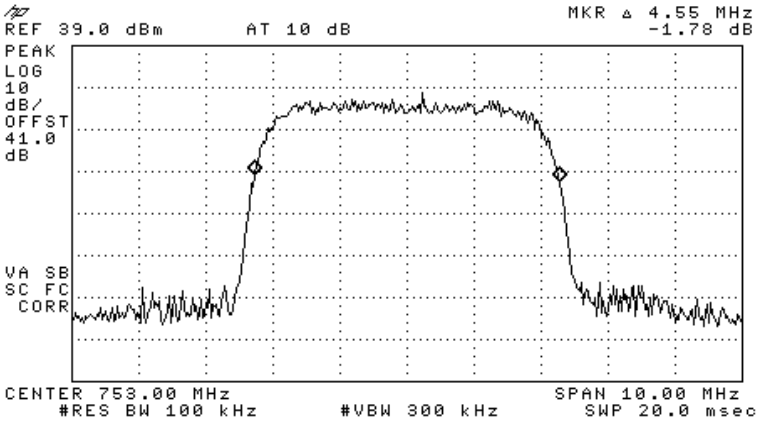

Figure 213.— W-CDMA (753 MHz) OUT

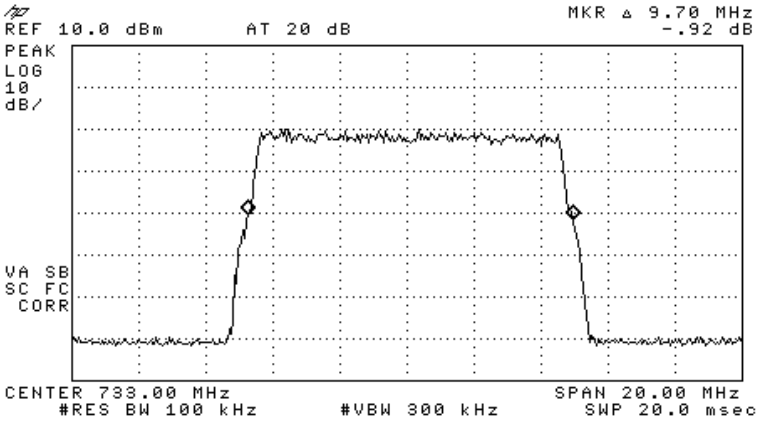

Figure 214.— QPSK (733 MHz) IN

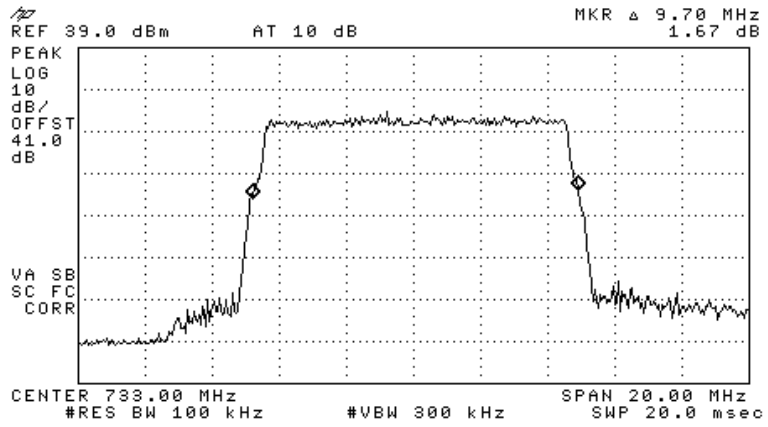

Figure 215.— QPSK (733 MHz) OUT

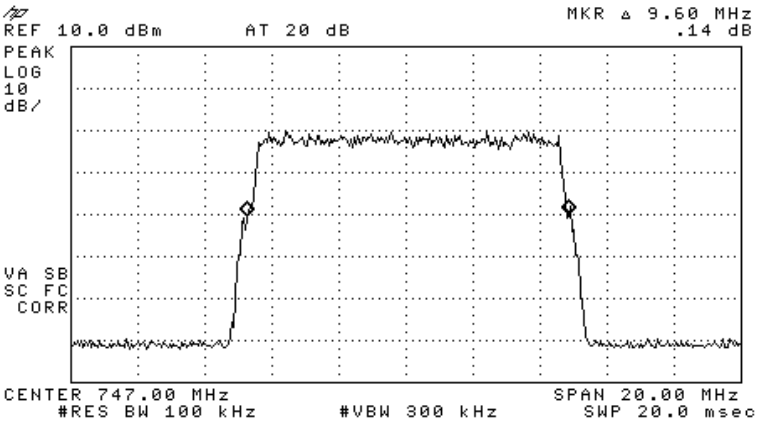

Figure 216.— QPSK (747 MHz) IN

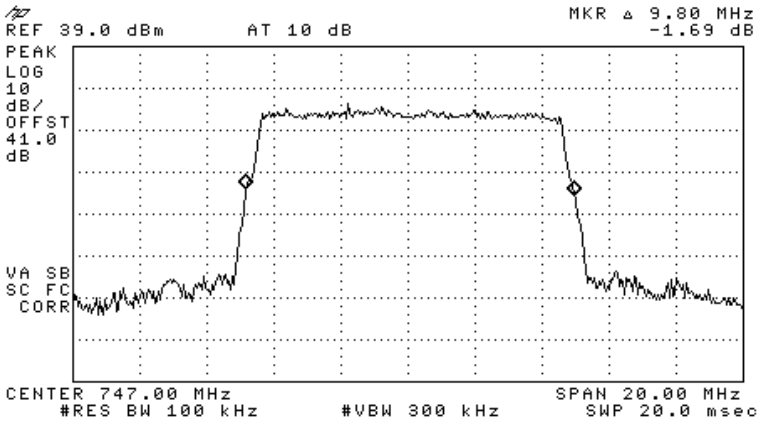

Figure 217.— QPSK (747 MHz) OUT

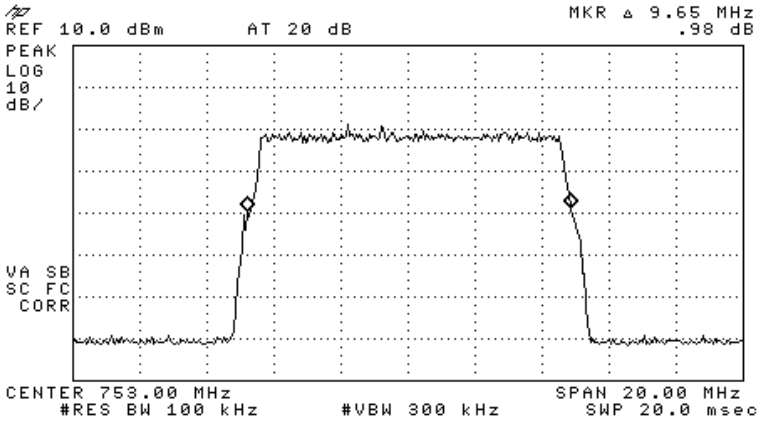

Figure 218.— QPSK (753 MHz) IN

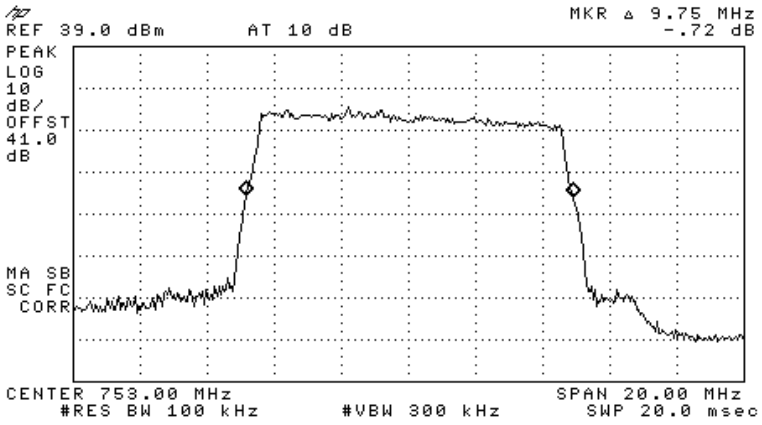

Figure 219.— QPSK (753 MHz) OUT

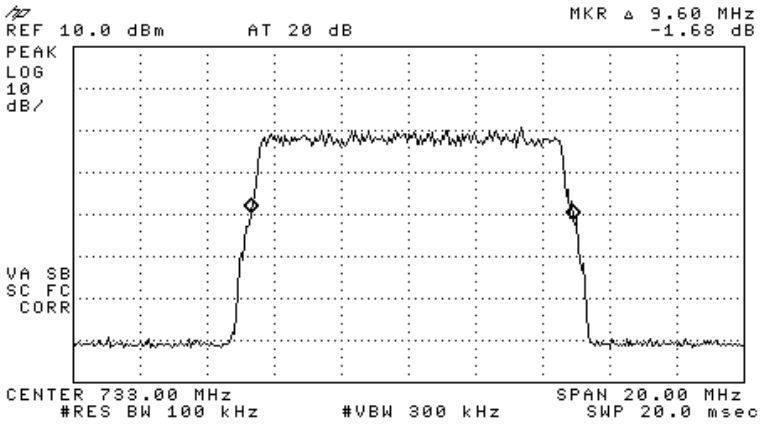

Figure 220.— 16QAM (733 MHz) IN

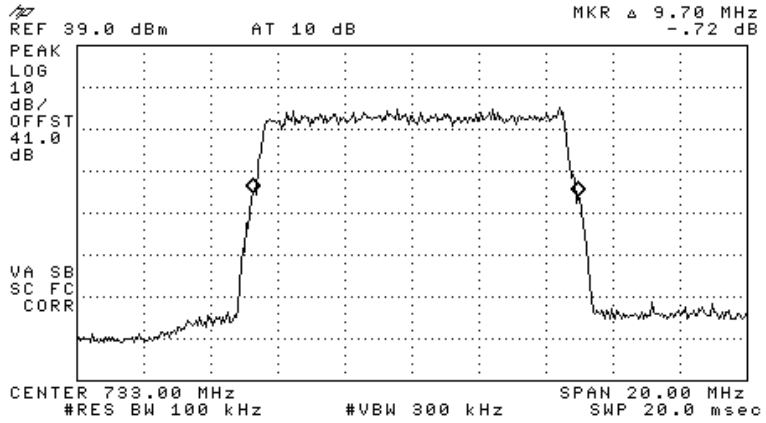

Figure 221.— 16QAM (733 MHz) OUT

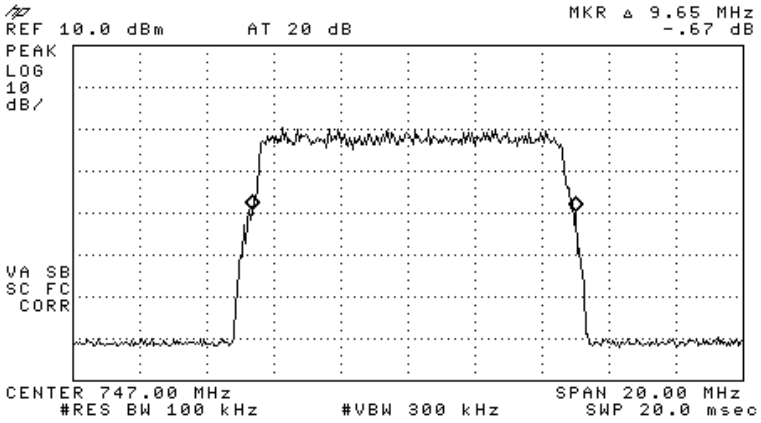

Figure 222.— 16QAM (747 MHz) IN

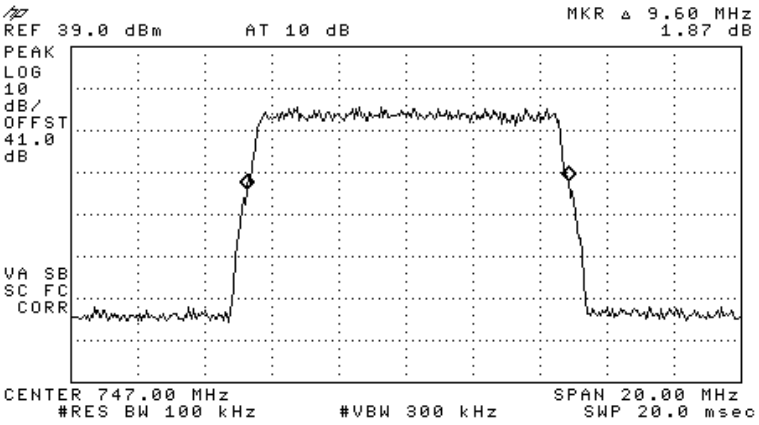

Figure 223.— 16QAM (747 MHz) OUT

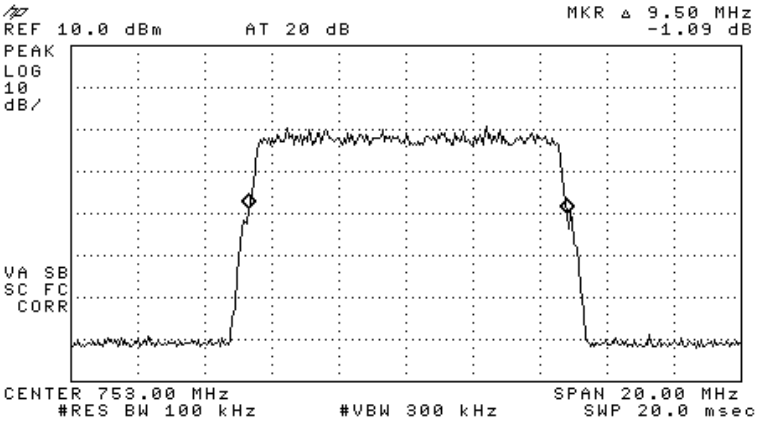

Figure 224.— 16QAM (753 MHz) IN

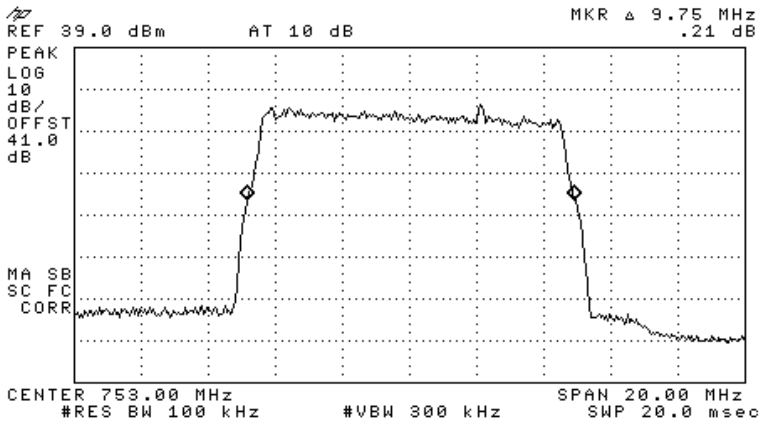

Figure 225.— 16QAM (753 MHz) OUT

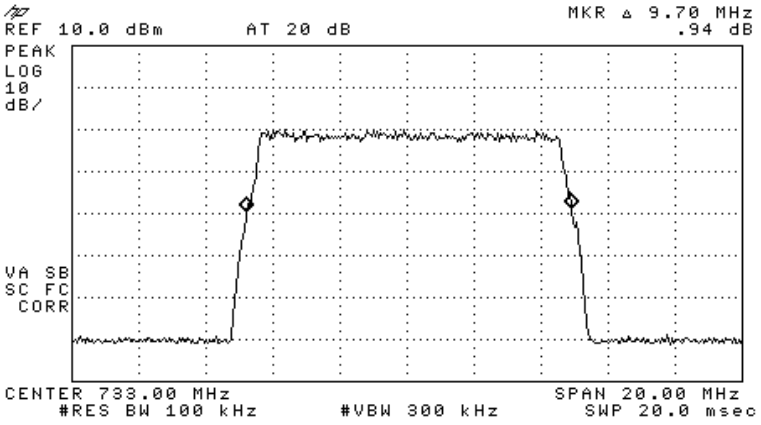

Figure 226.— 64QAM (733 MHz) IN

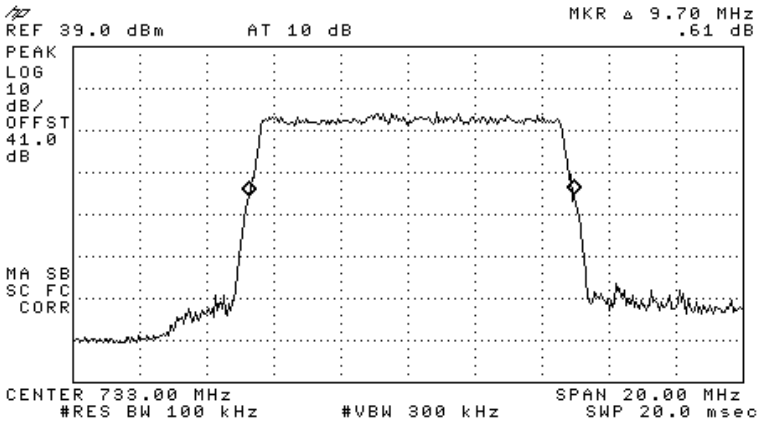

Figure 227.— 64QAM (733 MHz) OUT

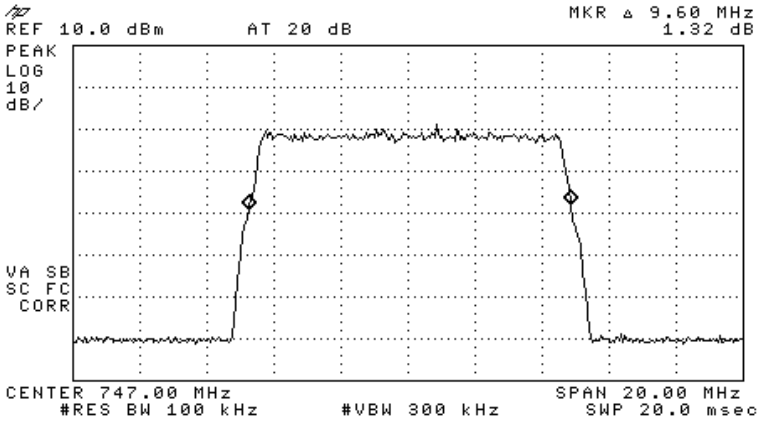

Figure 228.— 64QAM (747 MHz) IN

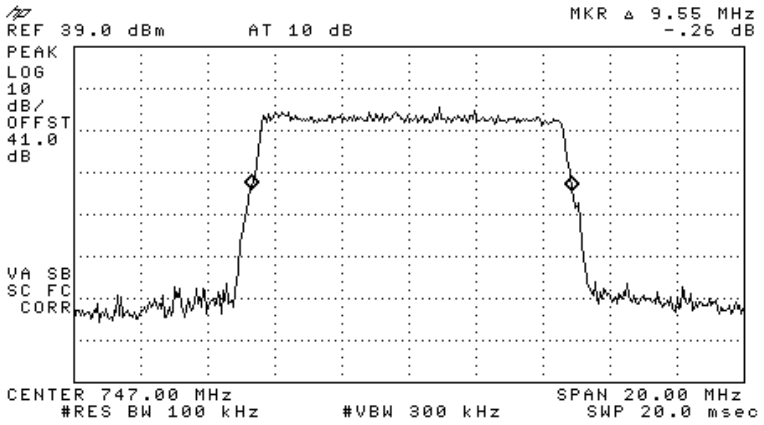

Figure 229.— 64QAM (747 MHz) OUT

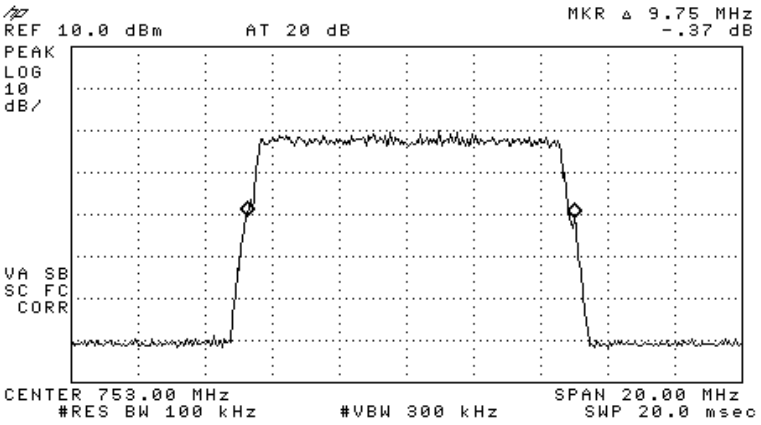

Figure 230.— 64QAM (753 MHz) IN

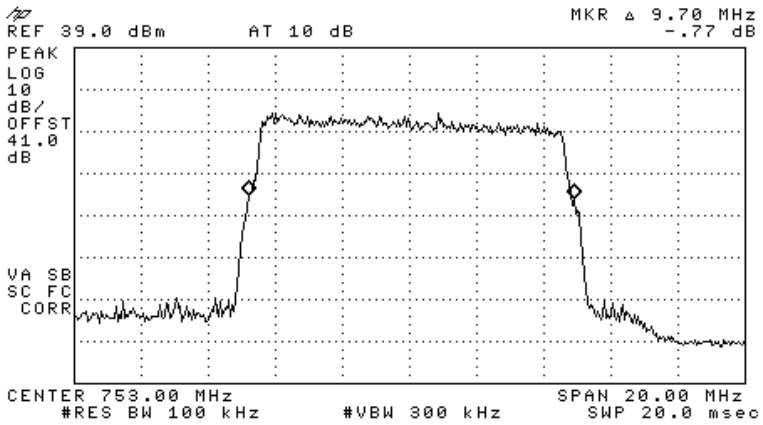

Figure 231.— 64QAM (753 MHz) OUT

15.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency (MHz)	Reading (MHz)
WCDMA	Input	733	4.55
	Output	733	4.58
	Input	747	4.55
	Output	747	4.55
	Input	753	4.55
	Output	753	4.55
QPSK	Input	733	9.70
	Output	733	9.70
	Input	747	9.60
	Output	747	9.80
	Input	753	9.65
	Output	753	9.75
16QAM	Input	733	9.60
	Output	733	9.70
	Input	747	9.65
	Output	747	9.60
	Input	753	9.50
	Output	753	9.75
64QAM	Input	733	9.70
	Output	733	9.70
	Input	747	9.60
	Output	747	9.55
	Input	753	9.75
	Output	753	9.70

Figure 232 Occupied Bandwidth LTE

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

15.4 Test Equipment Used.

Occupied Bandwidth LTE

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

Figure 233 Test Equipment Used

16. Spurious Emissions at Antenna Terminals LTE

16.1 Test Specification

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

16.2 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.

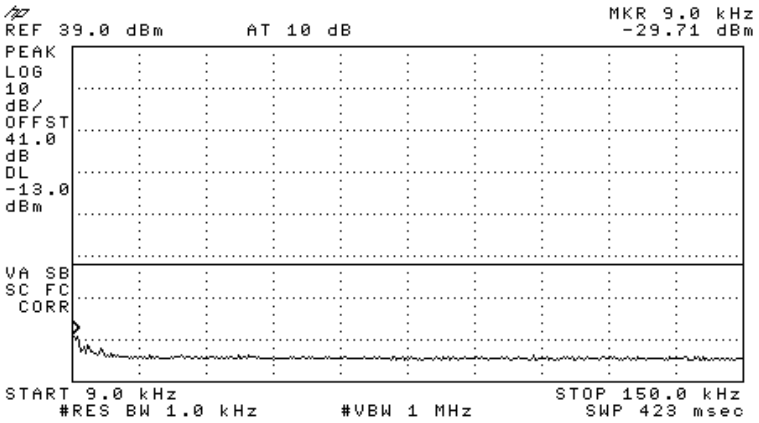

Figure 234.— 733 MHz W-CDMA

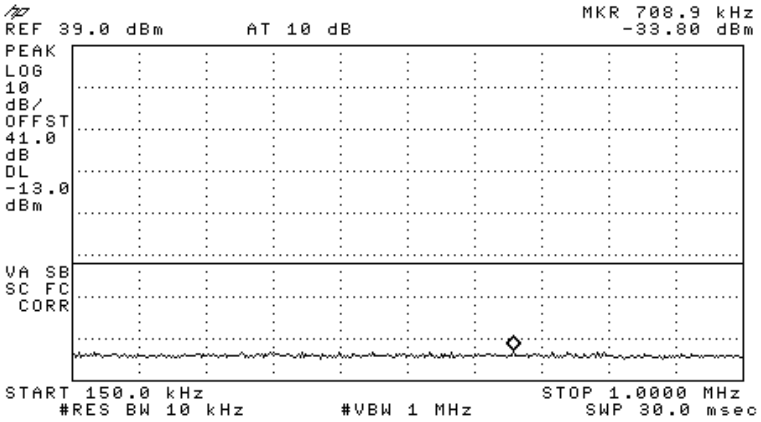

Figure 235.— 733 MHz W-CDMA

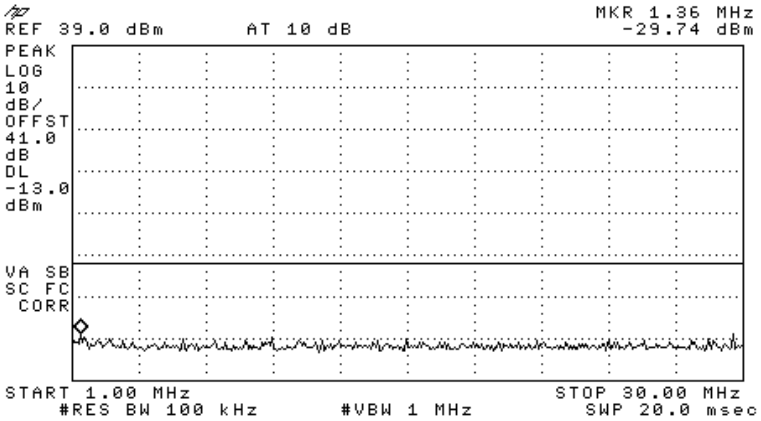

Figure 236.— 733 MHz W-CDMA

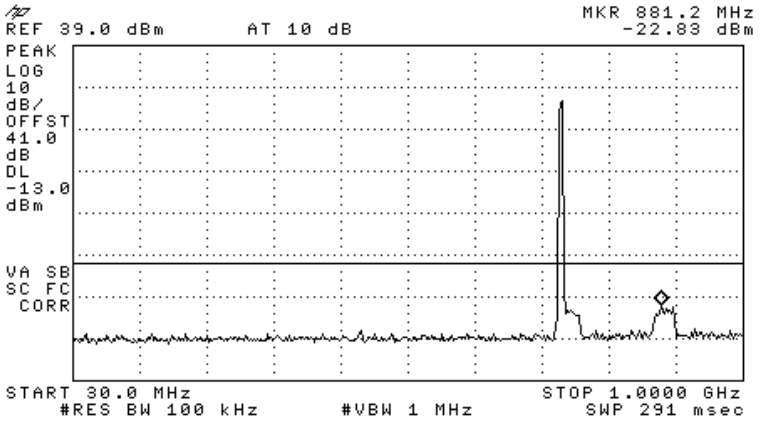

Figure 237.— 733 MHz W-CDMA

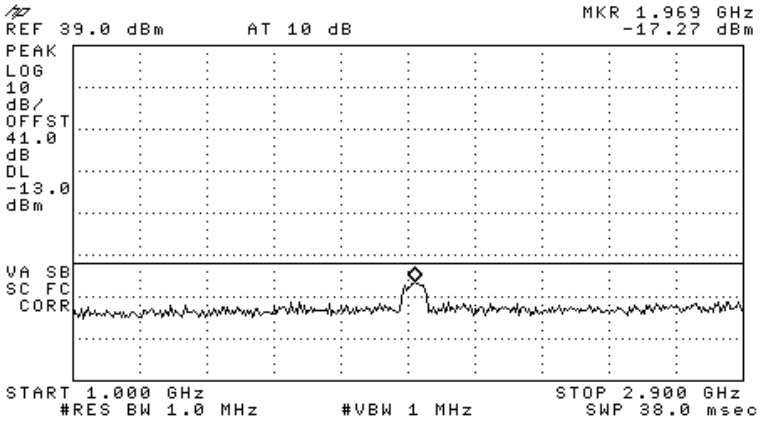

Figure 238.— 733 MHz W-CDMA

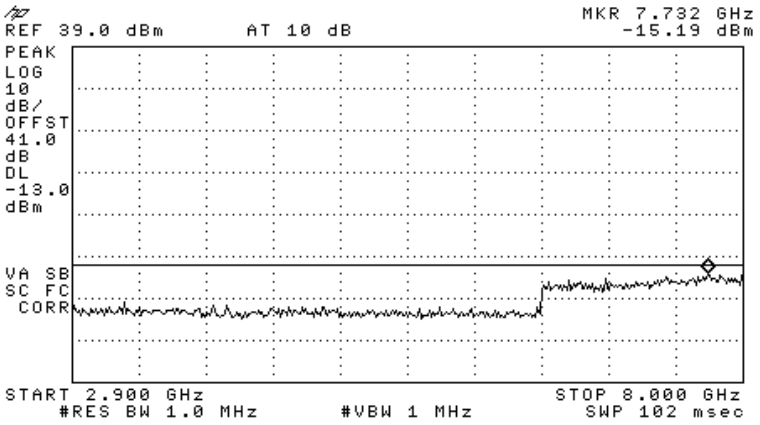

Figure 239.— 733 MHz W-CDMA

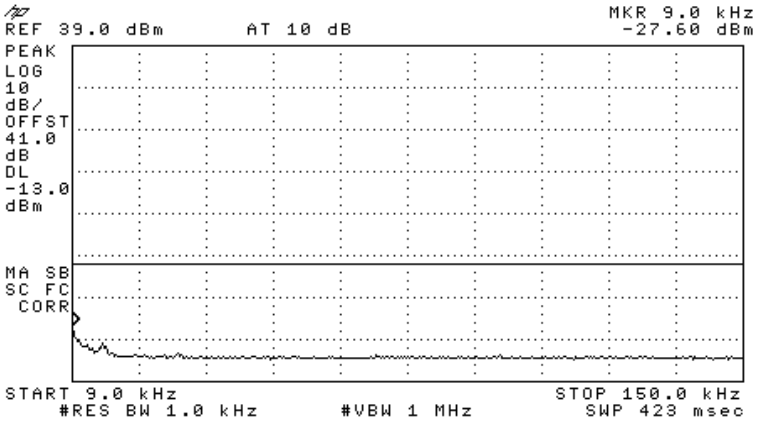

Figure 240.— 747 MHz W-CDMA

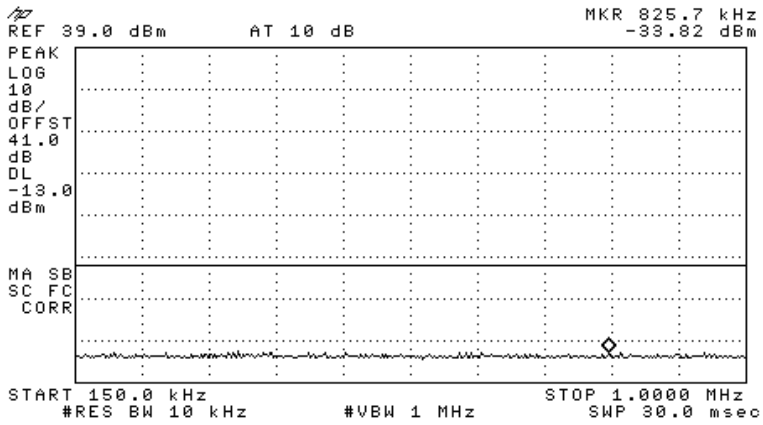

Figure 241.— 747 MHz W-CDMA

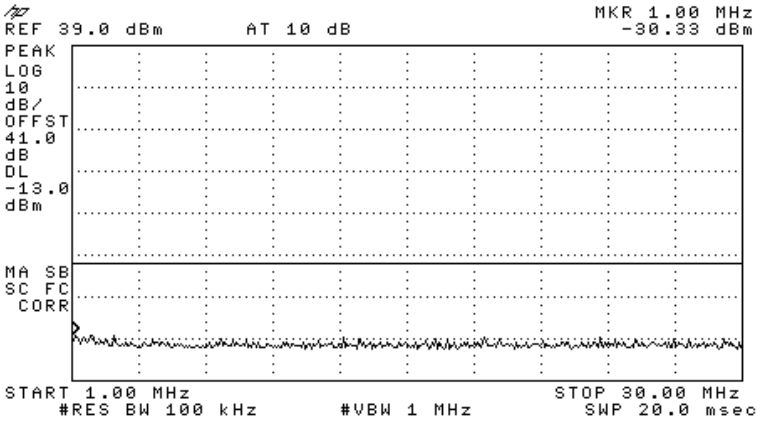

Figure 242.— 747 MHz W-CDMA

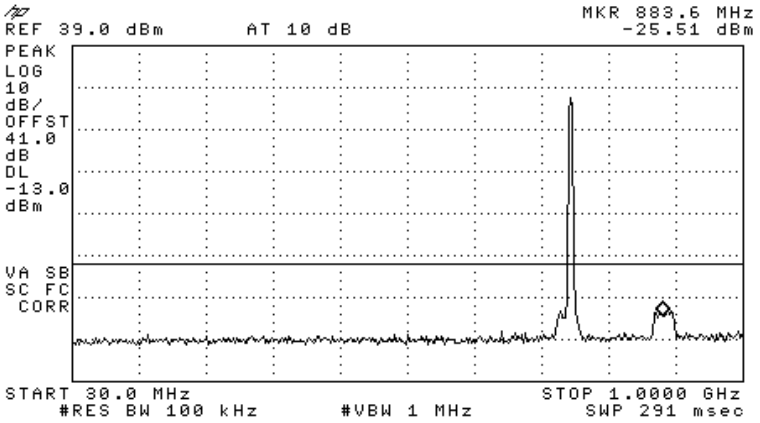

Figure 243.— 747 MHz W-CDMA

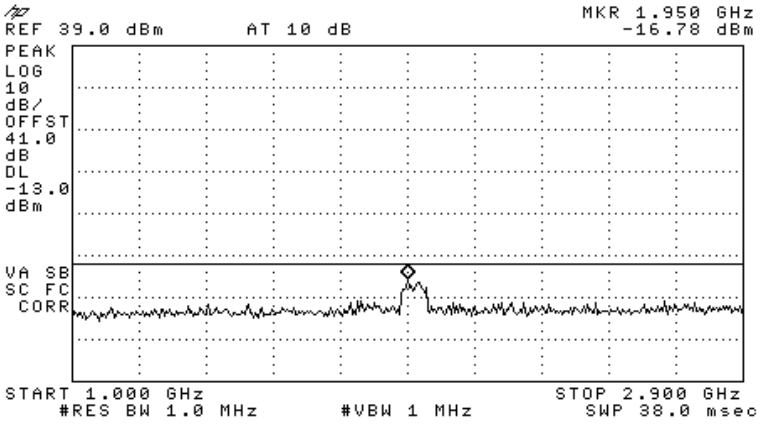

Figure 244.— 747 MHz W-CDMA

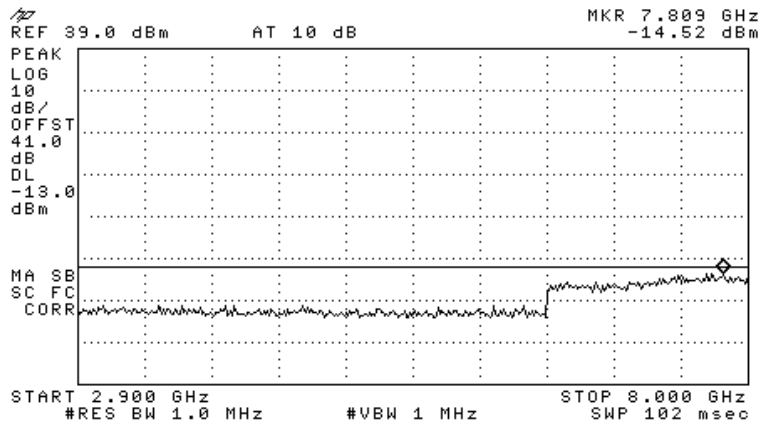

Figure 245.— 747 MHz W-CDMA

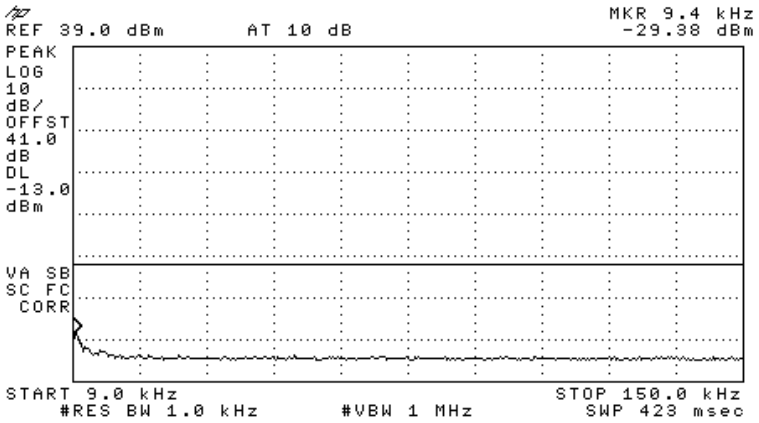

Figure 246.— 753 MHz W-CDMA

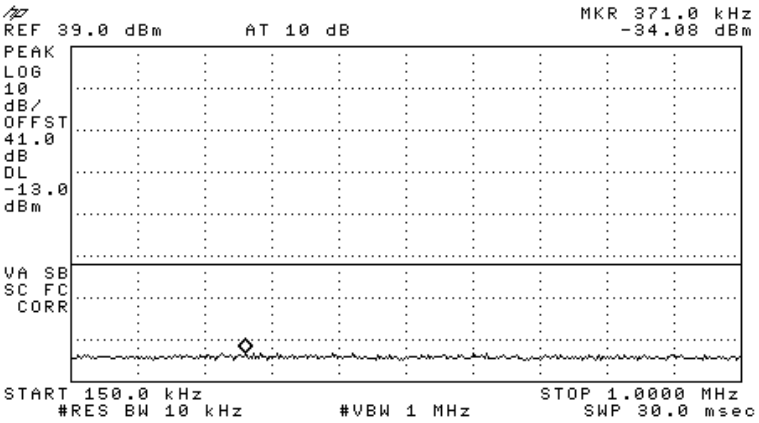

Figure 247.— 753 MHz W-CDMA

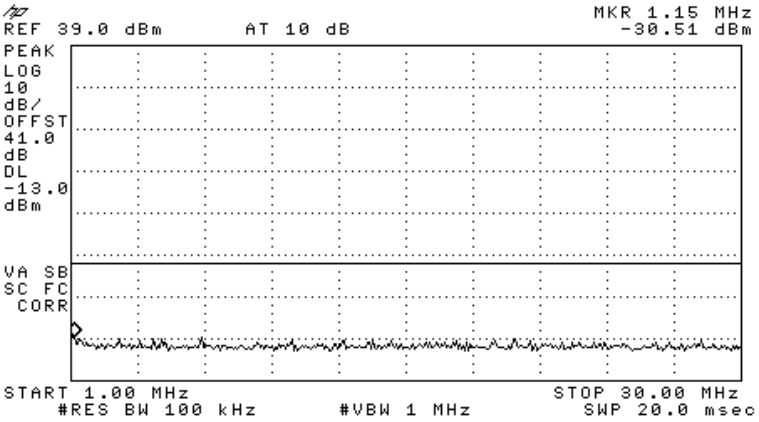

Figure 248.— 753 MHz W-CDMA

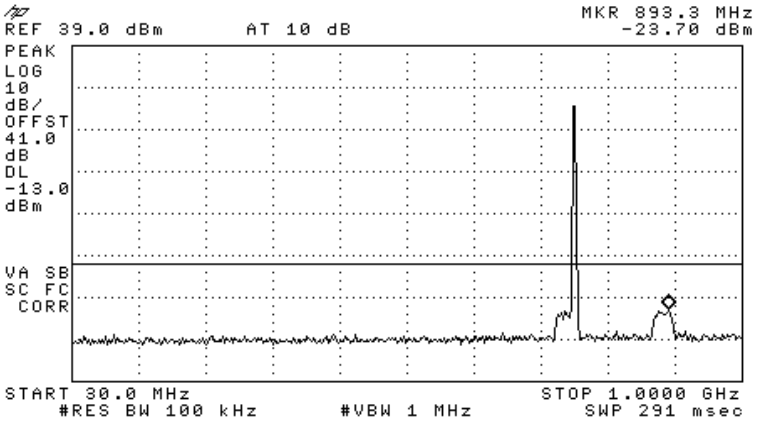

Figure 249.— 753 MHz W-CDMA

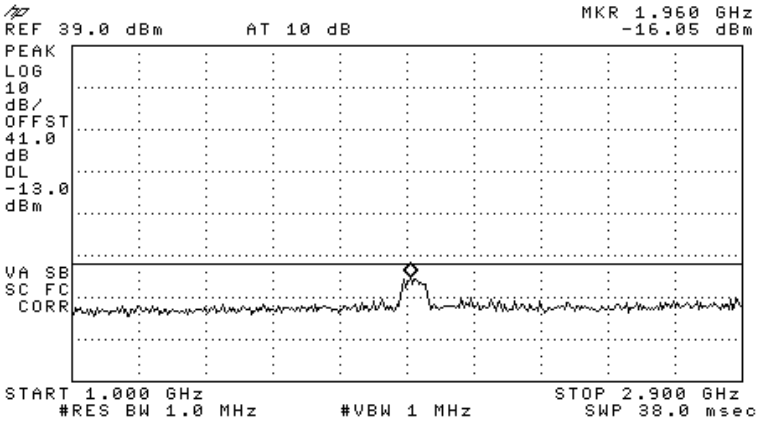

Figure 250.— 753 MHz W-CDMA

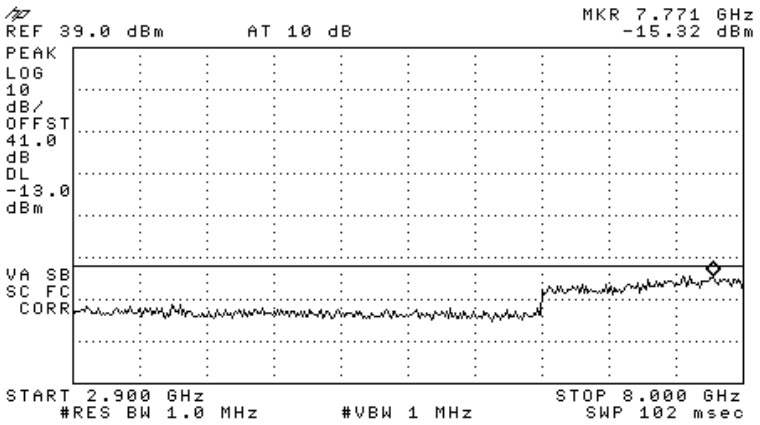

Figure 251.— 753 MHz W-CDMA

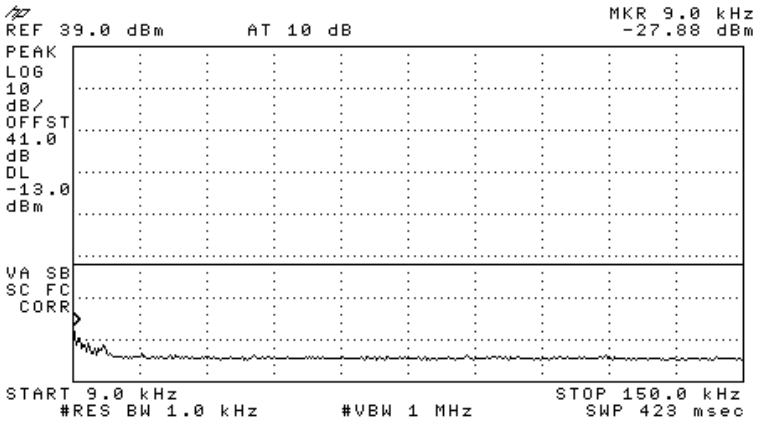

Figure 252.— 733 MHz QPSK

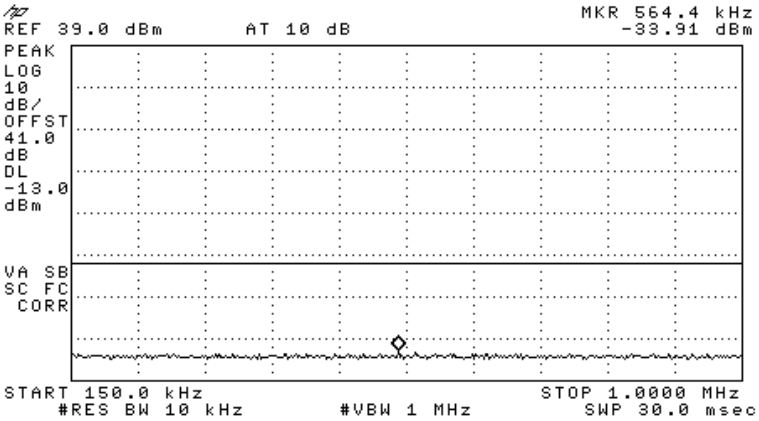

Figure 253.— 733 MHz QPSK

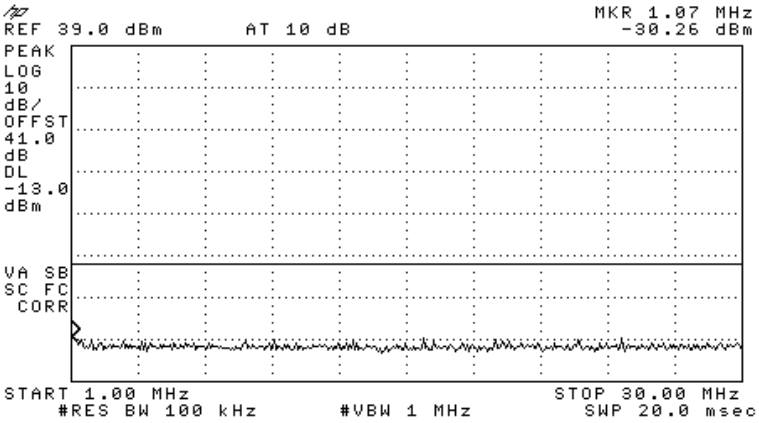

Figure 254.— 733 MHz QPSK

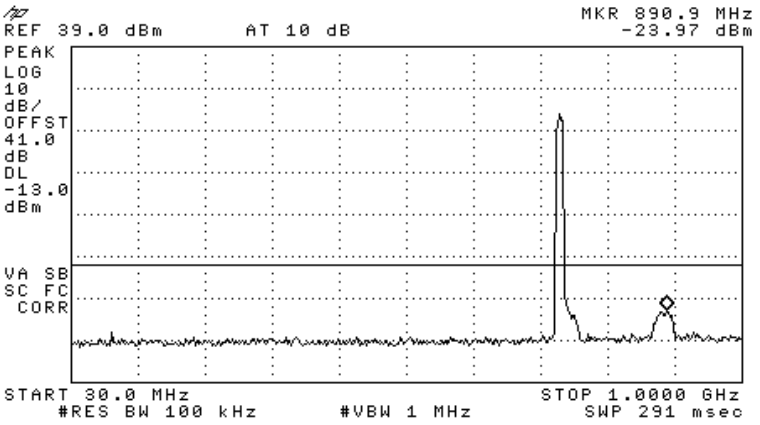

Figure 255.— 733 MHz QPSK

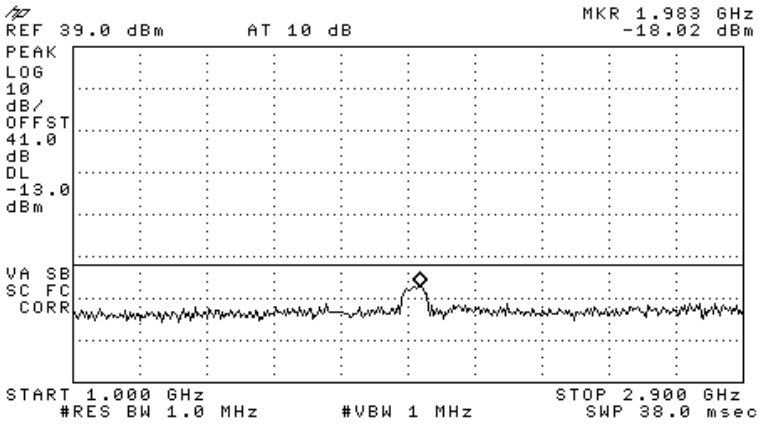

Figure 256.— 733 MHz QPSK

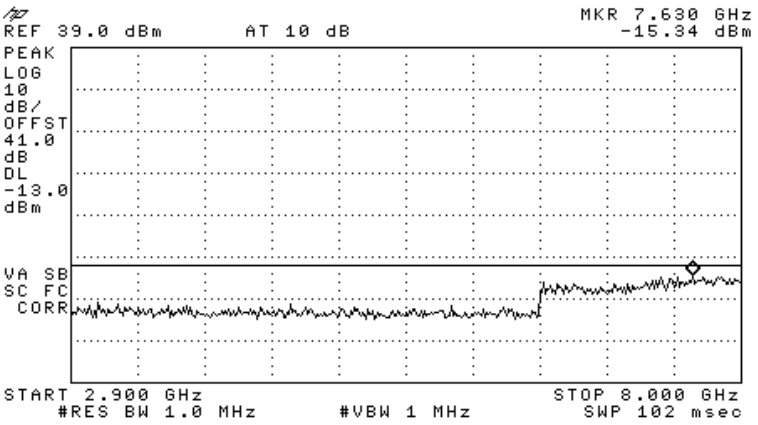

Figure 257.— 733 MHz QPSK

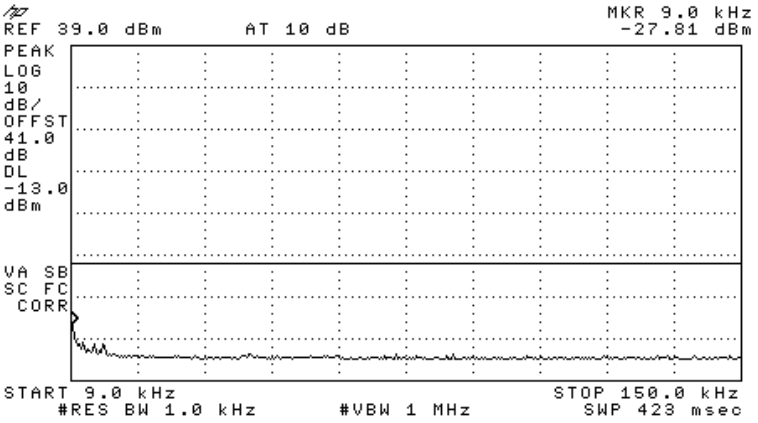

Figure 258.— 747 MHz QPSK

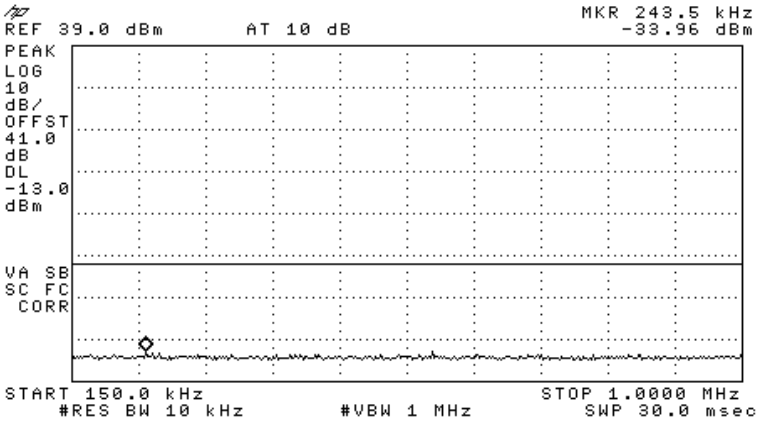

Figure 259.— 747 MHz QPSK

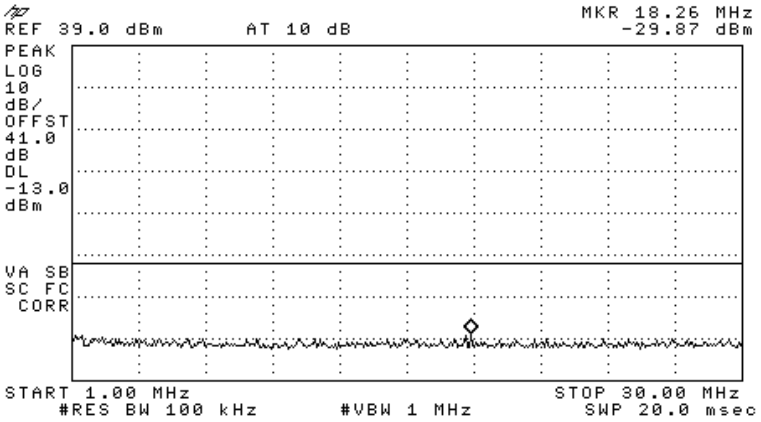

Figure 260.— 747 MHz QPSK

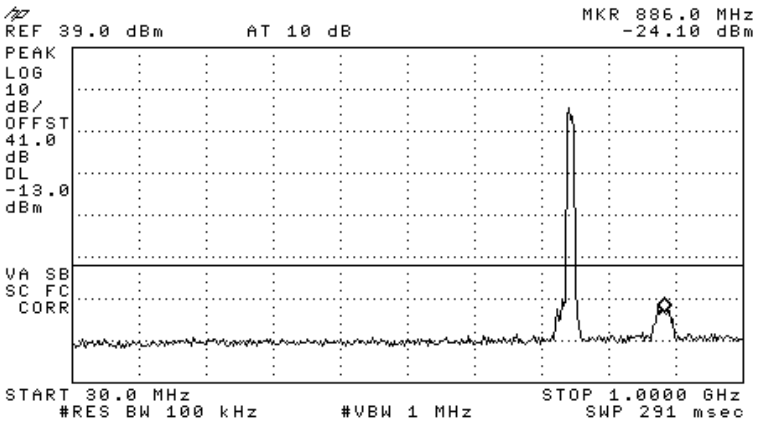

Figure 261.— 747 MHz QPSK

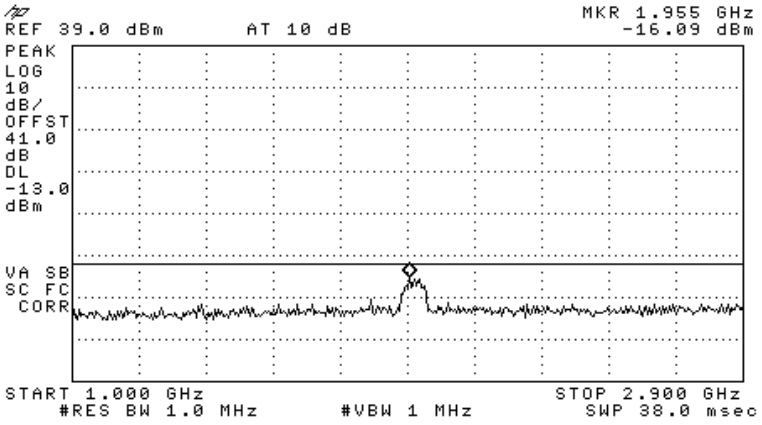

Figure 262.— 747 MHz QPSK

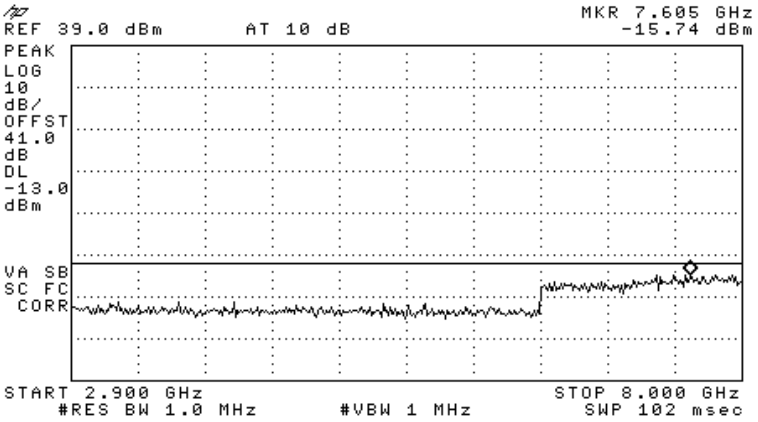

Figure 263.— 747 MHz QPSK

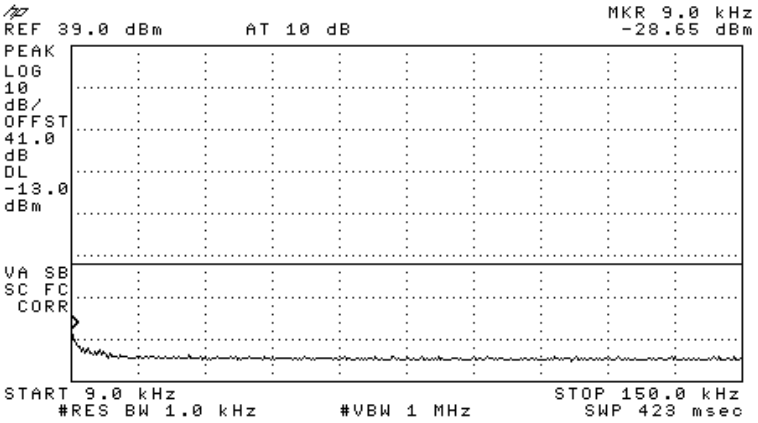

Figure 264.— 753 MHz QPSK

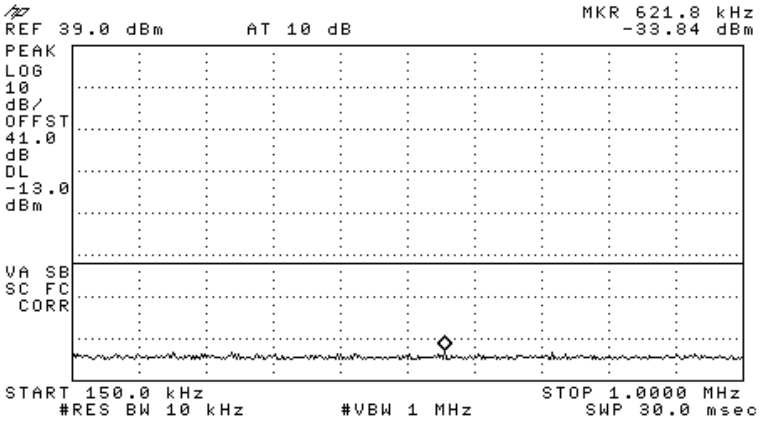

Figure 265.— 753 MHz QPSK

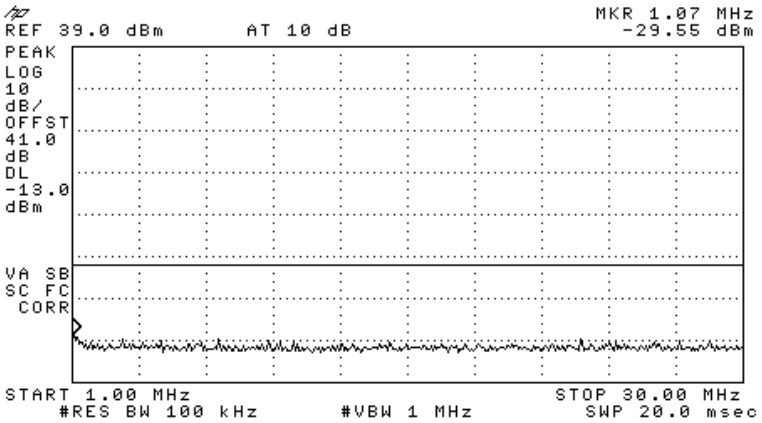

Figure 266.— 753 MHz QPSK

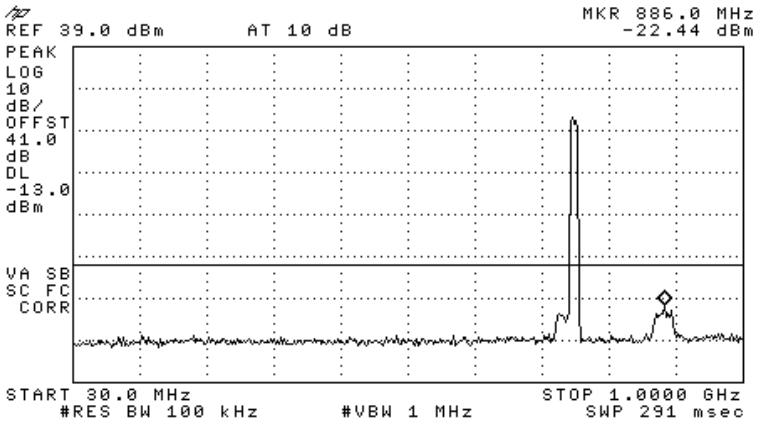

Figure 267.— 753 MHz QPSK

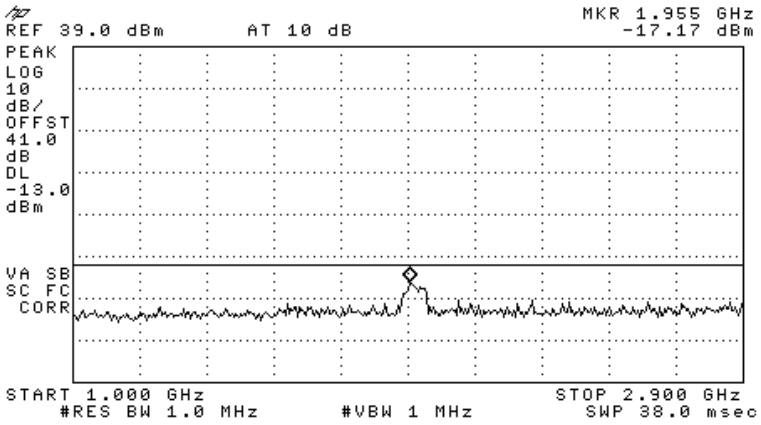

Figure 268.— 753 MHz QPSK

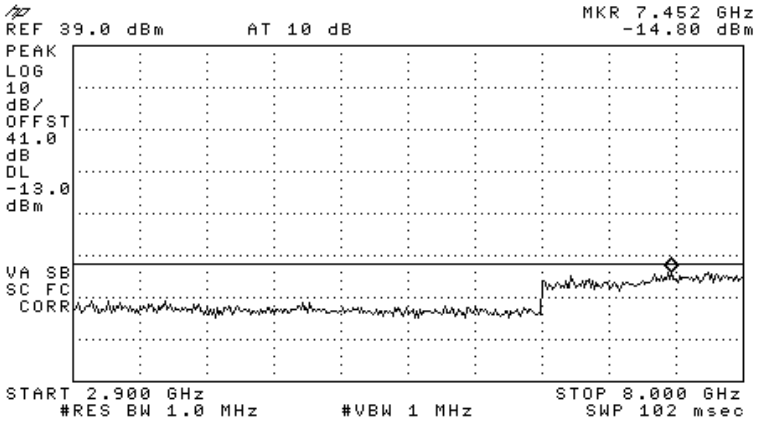

Figure 269.— 753 MHz QPSK

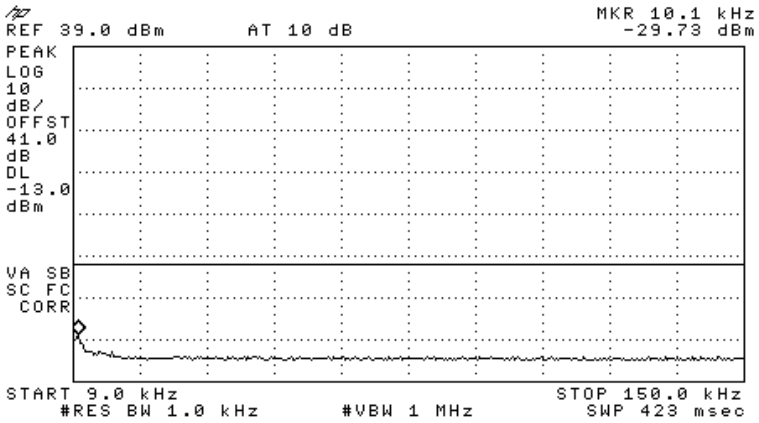

Figure 270.— 733 MHz 16QAM

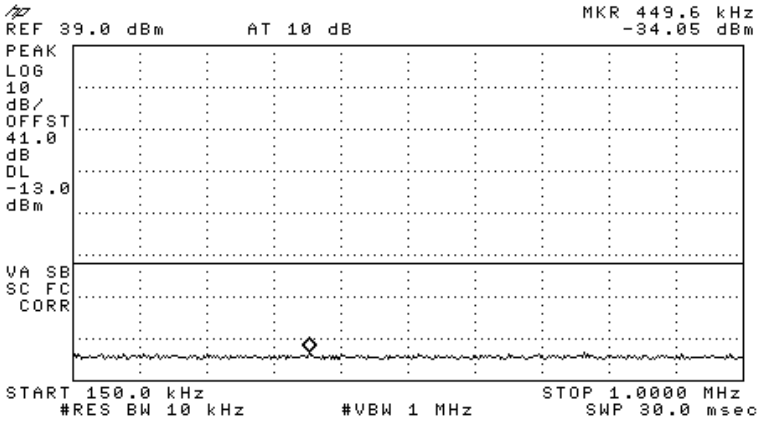

Figure 271.— 733 MHz 16QAM

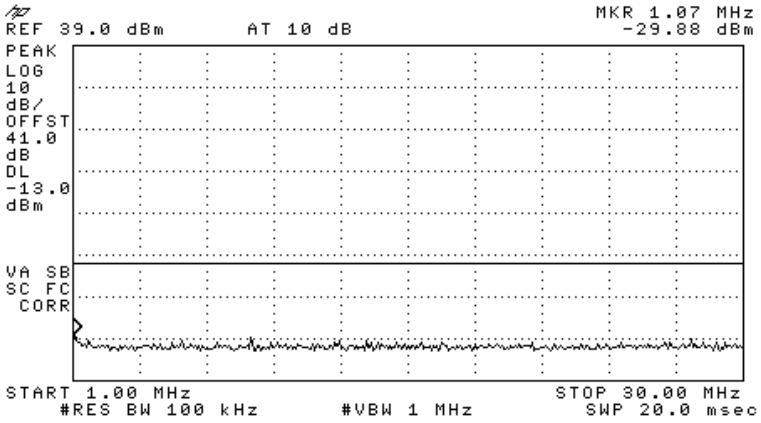

Figure 272.— 733 MHz 16QAM

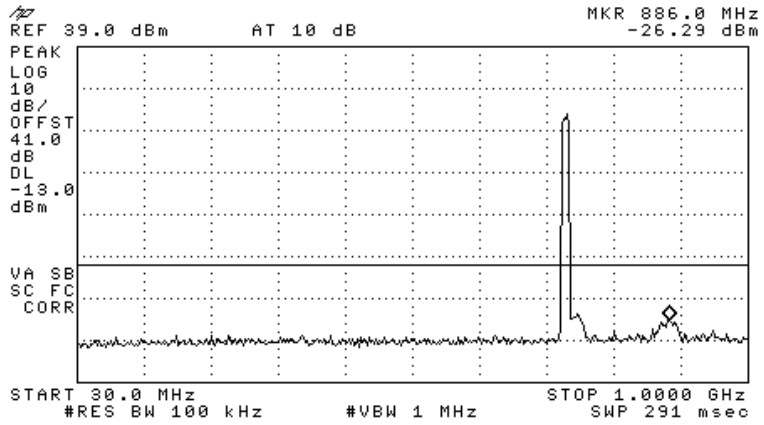

Figure 273.— 733 MHz 16QAM

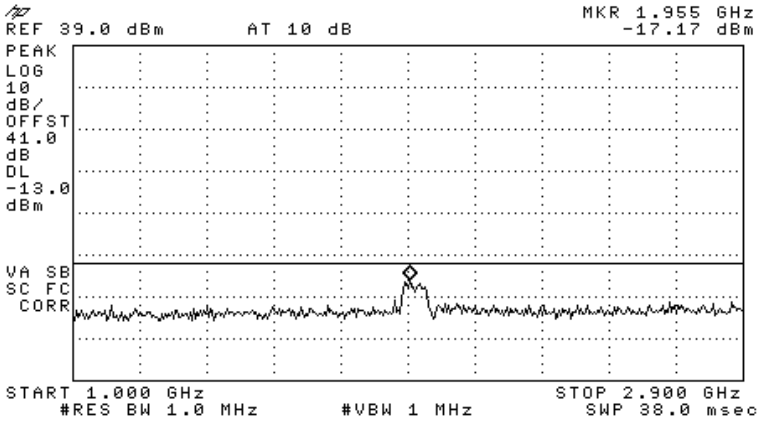

Figure 274.— 733 MHz 16QAM

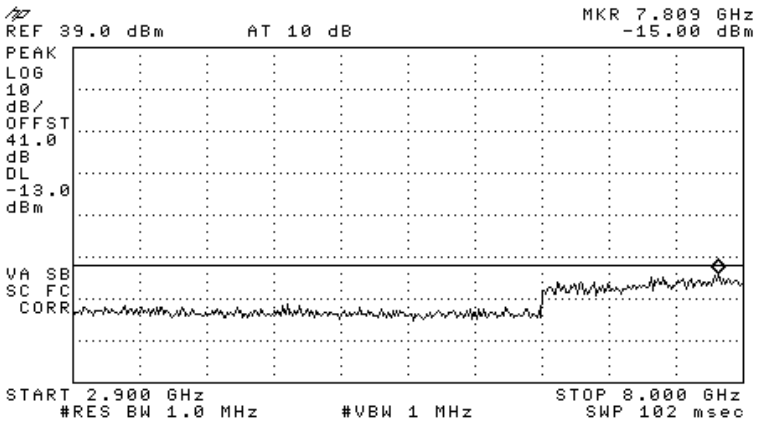

Figure 275.— 733 MHz 16QAM

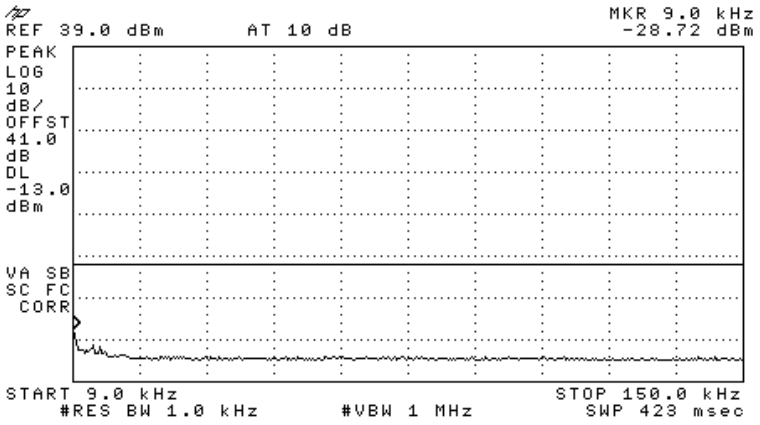

Figure 276.— 747 MHz 16QAM

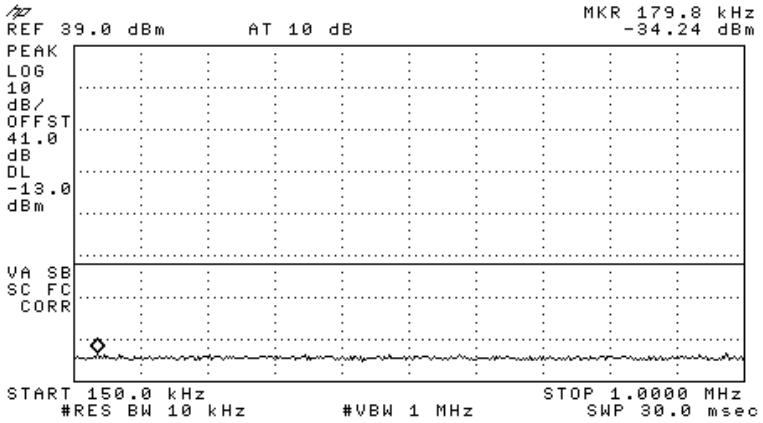

Figure 277.— 747 MHz 16QAM

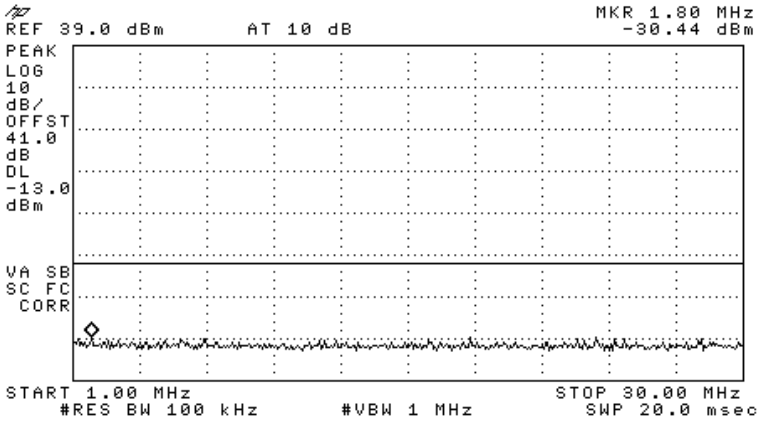

Figure 278.— 747 MHz 16QAM

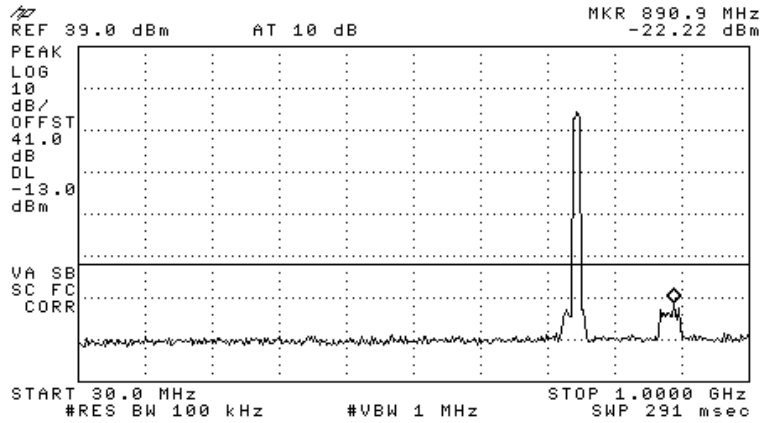

Figure 279.— 747 MHz 16QAM

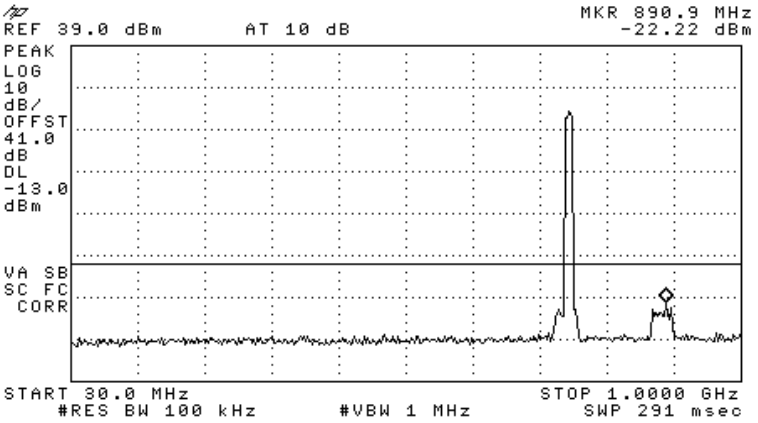

Figure 280.— 747 MHz 16QAM

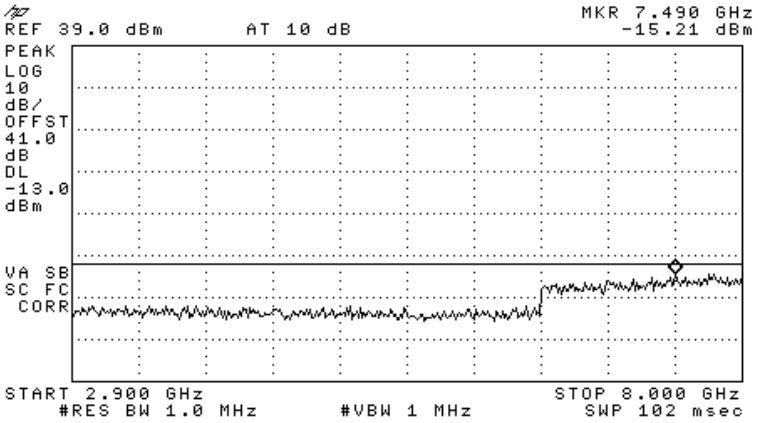

Figure 281.— 747 MHz 16QAM

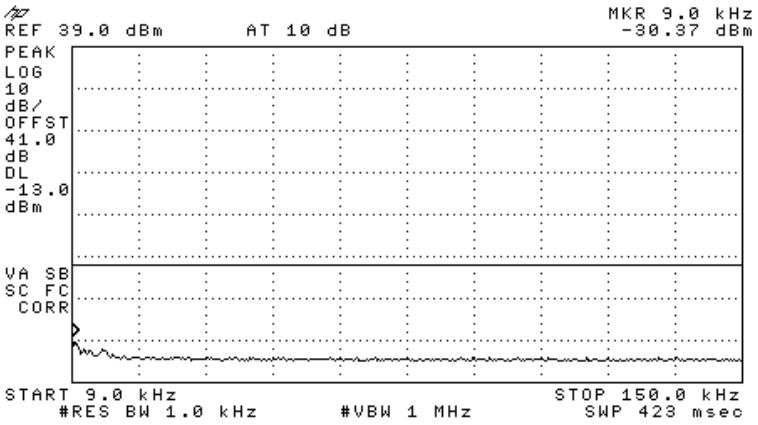

Figure 282.— 753 MHz 16QAM

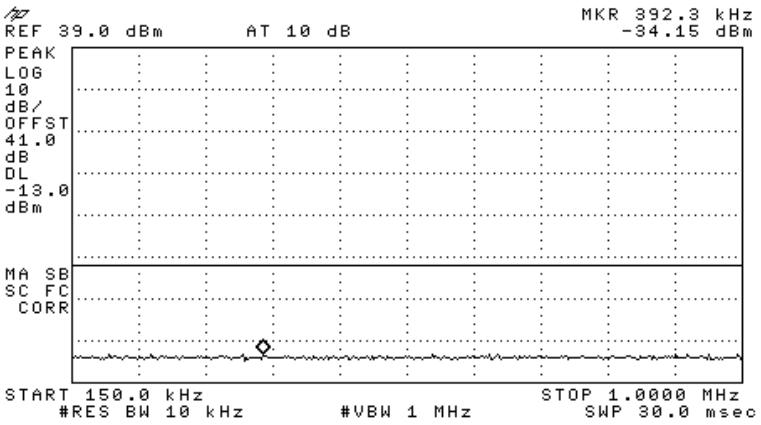

Figure 283.— 753 MHz 16QAM

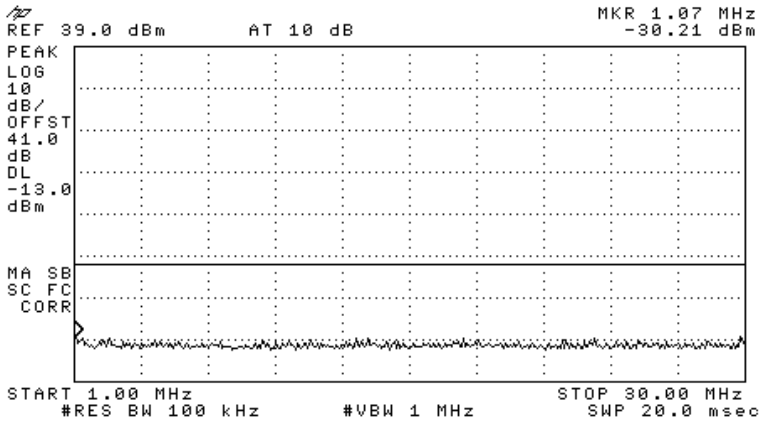

Figure 284.— 753 MHz 16QAM

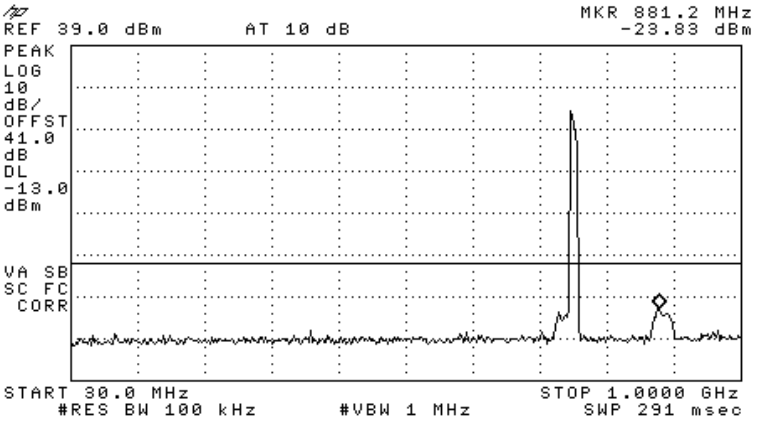

Figure 285.— 753 MHz 16QAM

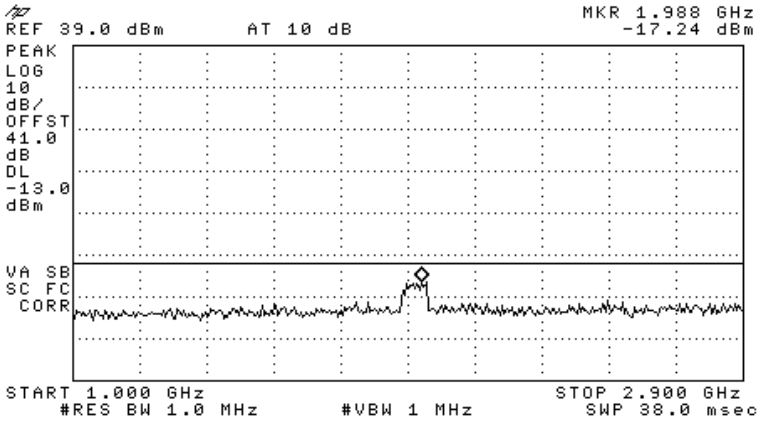

Figure 286.— 753 MHz 16QAM

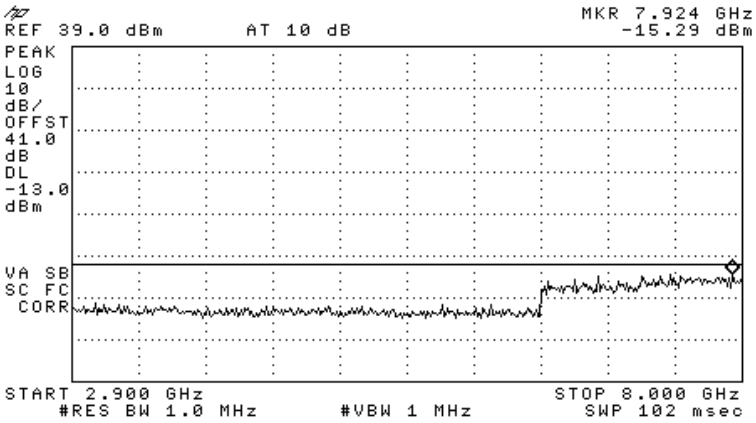

Figure 287.— 753 MHz 16QAM

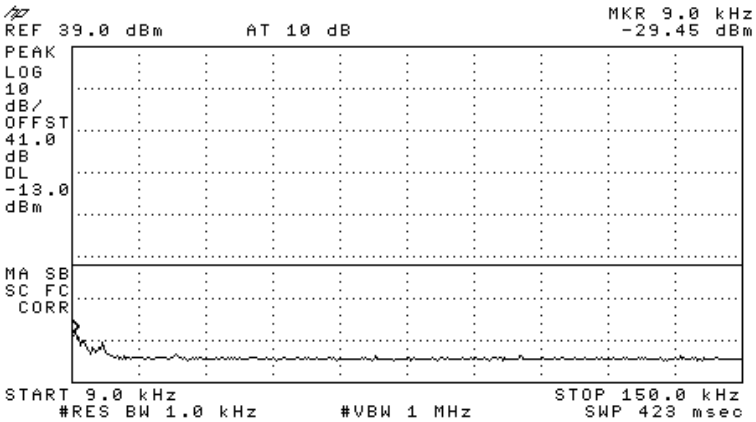

Figure 288.— 733 MHz 64QAM

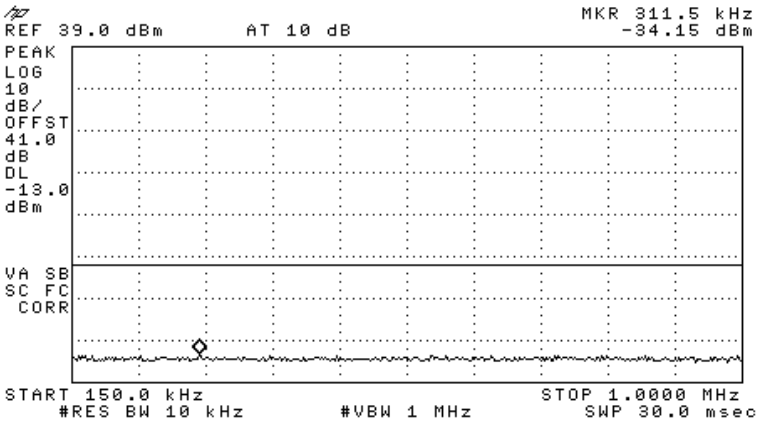

Figure 289.— 733 MHz 64QAM

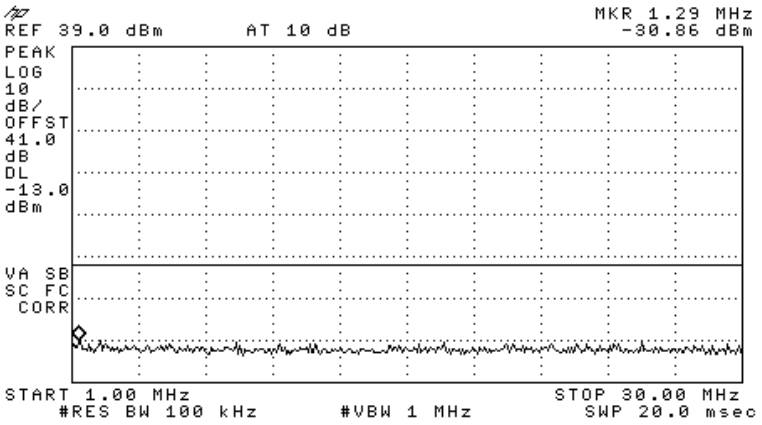

Figure 290.— 733 MHz 64QAM

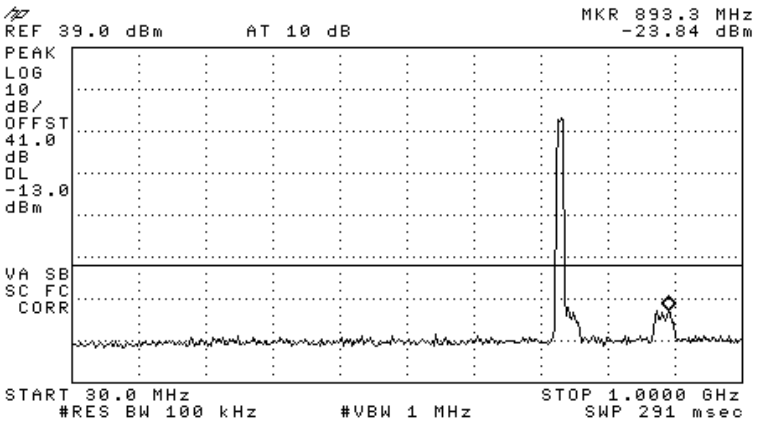

Figure 291.— 733 MHz 64QAM

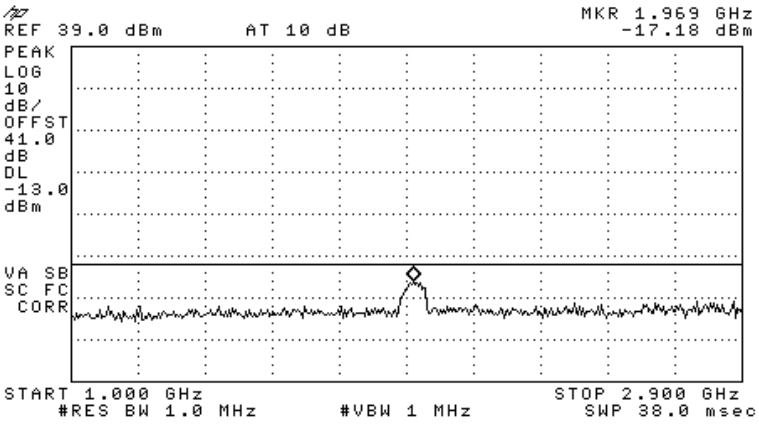

Figure 292.— 733 MHz 64QAM

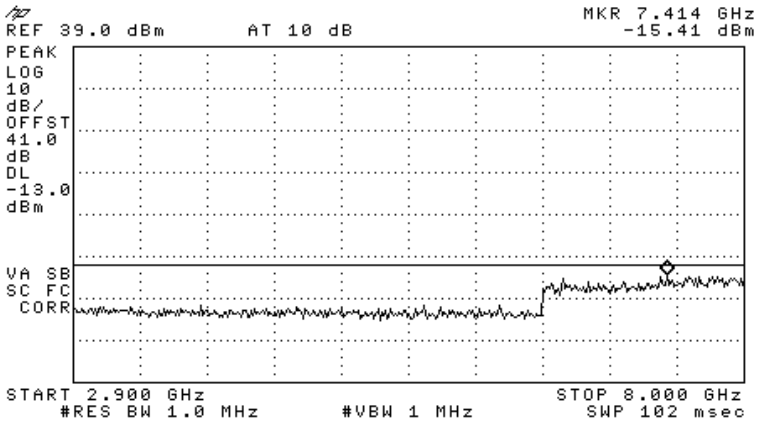

Figure 293.— 733 MHz 64QAM

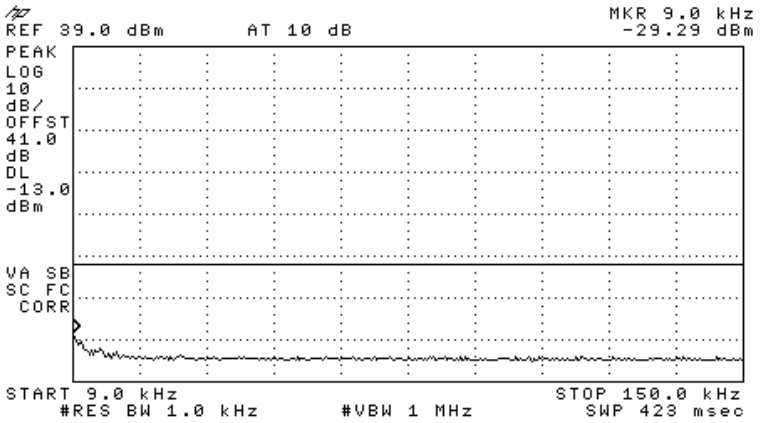

Figure 294.— 747 MHz 64QAM

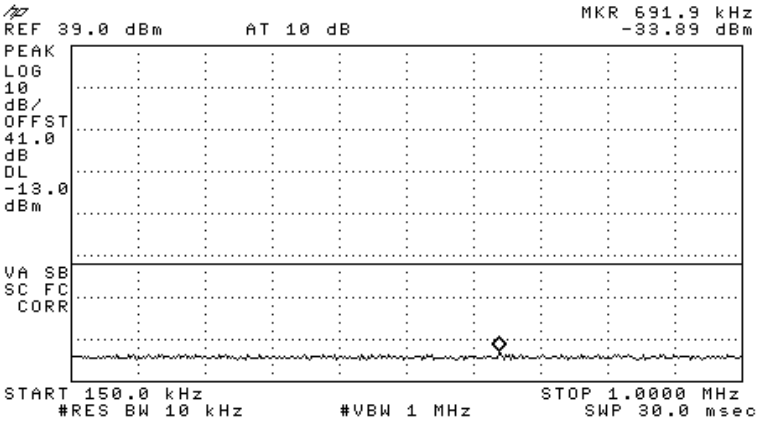

Figure 295.— 747 MHz 64QAM

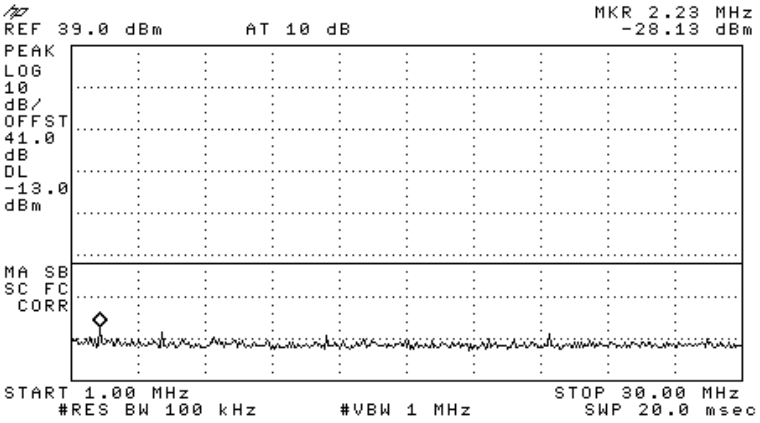

Figure 296.— 747 MHz 64QAM

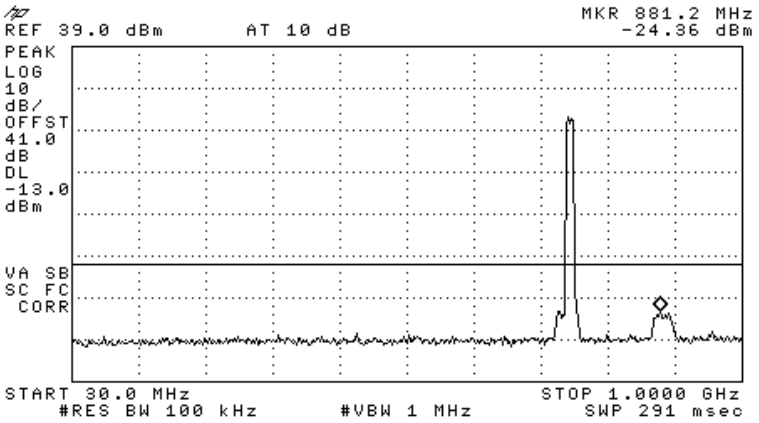

Figure 297.— 747 MHz 64QAM

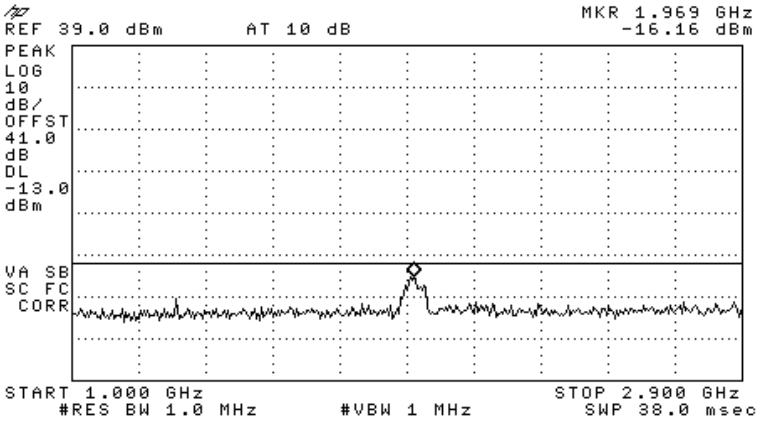

Figure 298.— 747 MHz 64QAM

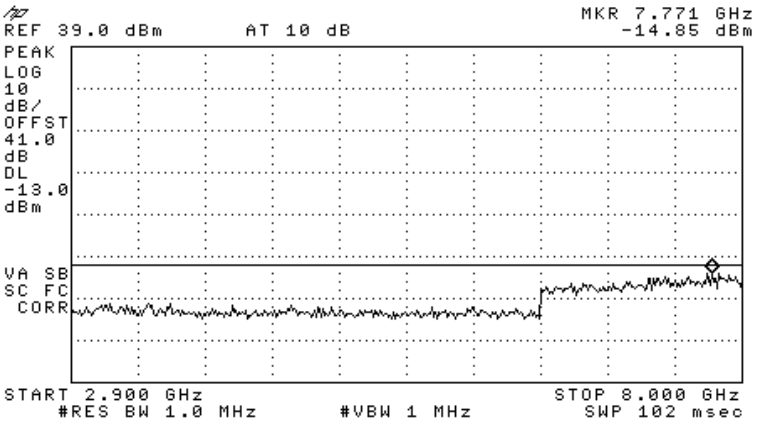

Figure 299.— 747 MHz 64QAM

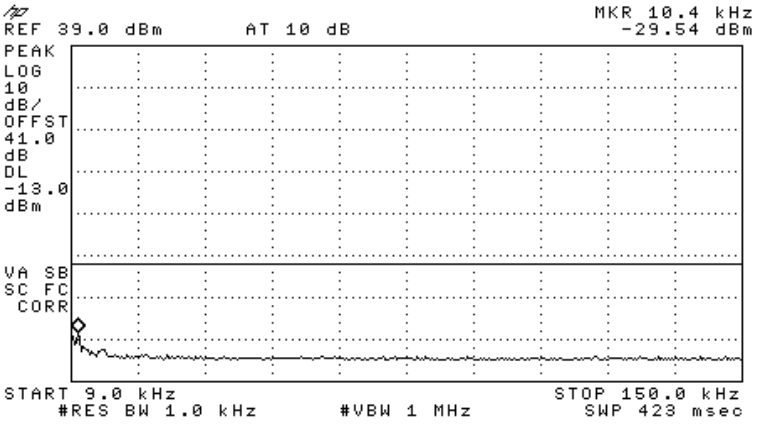

Figure 300.— 753 MHz 64QAM

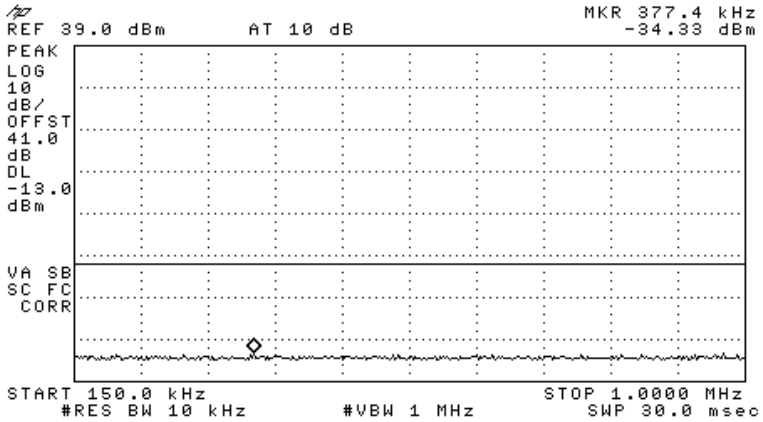

Figure 301.— 753 MHz 64QAM

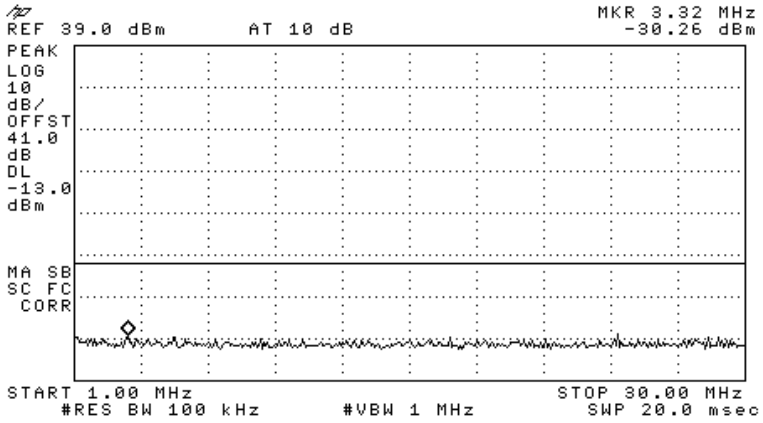

Figure 302.— 753 MHz 64QAM

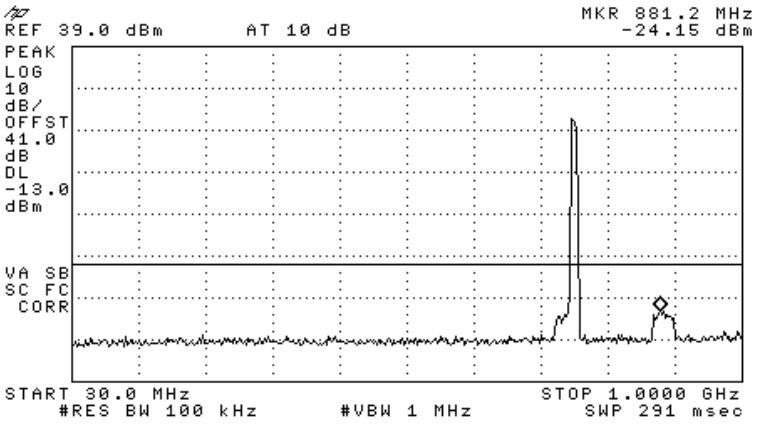

Figure 303.— 753 MHz 64QAM

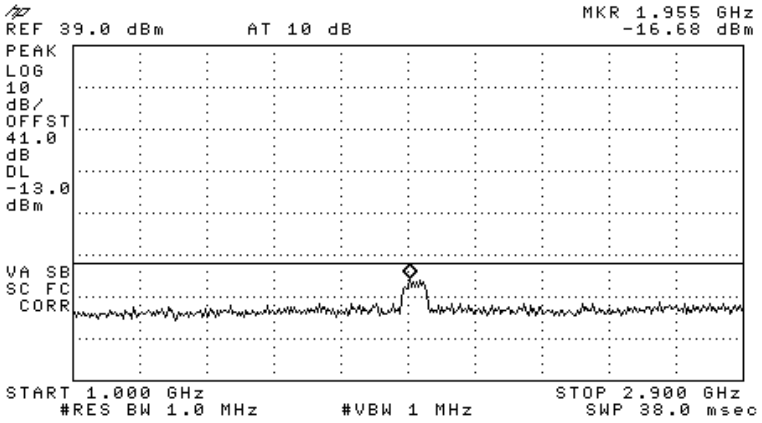

Figure 304.— 753 MHz 64QAM

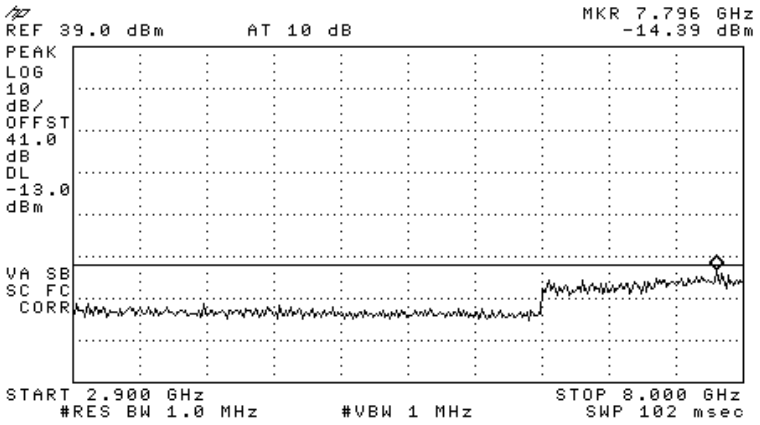

Figure 305.— 753 MHz 64QAM

16.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Sections 27.53(c)(1) (3) 27.53 (g)

	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
W-CDMA	733	-15.19	-13.0	-2.19
	747	-14.52	-13.0	-1.52
	753	-15.32	-13.0	-2.32
QPSK	733	-15.34	-13.0	-2.34
	747	-15.74	-13.0	-2.74
	753	-14.80	-13.0	-1.80
16QAM	733	-15.00	-13.0	-2.00
	747	-15.21	-13.0	-2.21
	753	-15.29	-13.0	-2.29
64QAM	733	-15.41	-13.0	-2.41
	747	-14.85	-13.0	-1.85
	753	-14.39	-13.0	-1.39

Figure 306 Spurious Emissions at Antenna Terminals Results LTE

JUDGEMENT: Passed by 1.39 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

16.4 Test Equipment Used.

Spurious Emissions at Antenna Terminals LTE

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

Figure 307 Test Equipment Used

17. Band Edge Spectrum LTE

17.1 Test Specification

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

17.2 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.

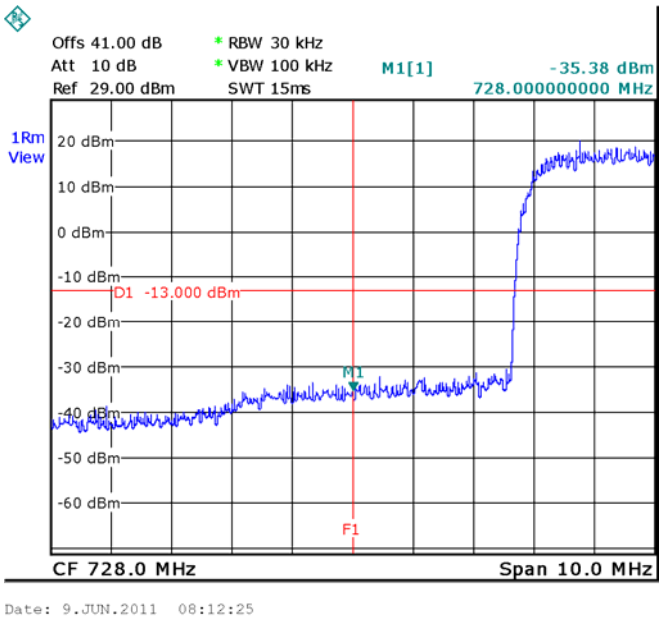

Figure 308.— W-CDMA 733.0 MHz

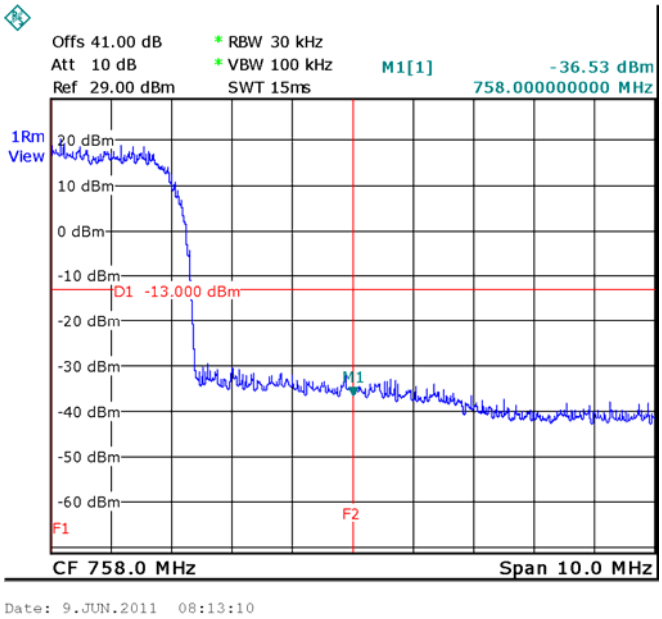

Figure 309.— W-CDMA 753.0 MHz

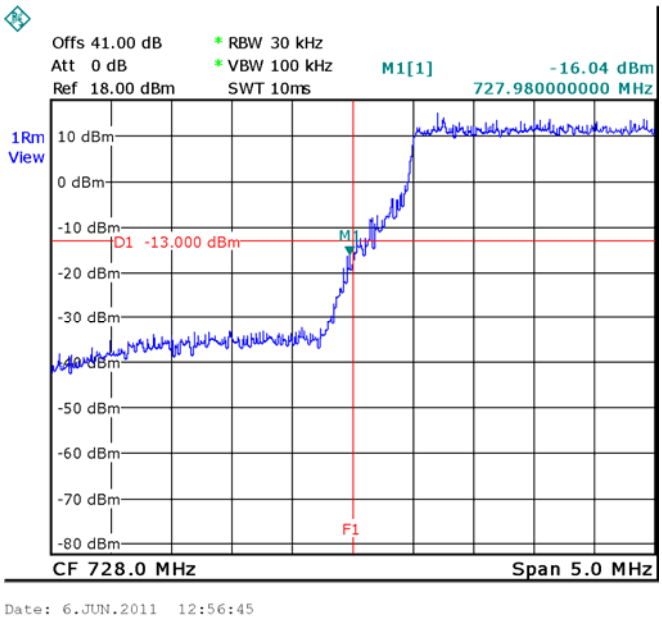

Figure 310.— QPSK 733.0 MHz

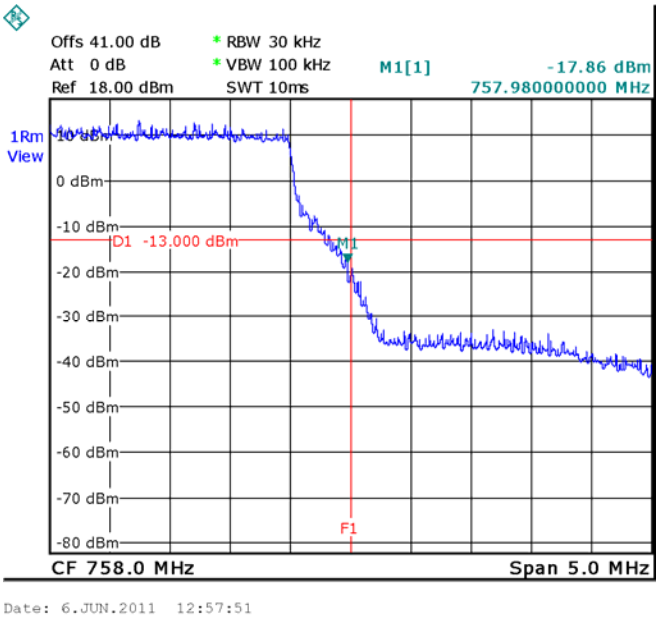

Figure 311.— QPSK 753.0 MHz

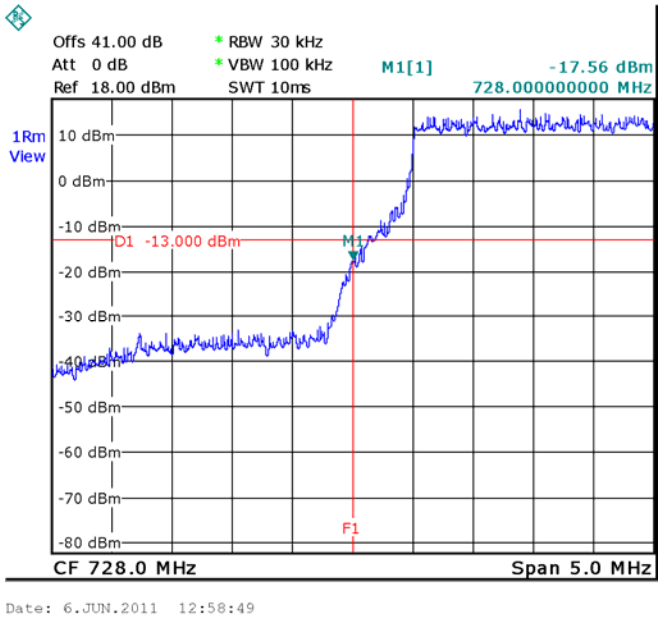

Figure 312.— 16QAM 733.0 MHz

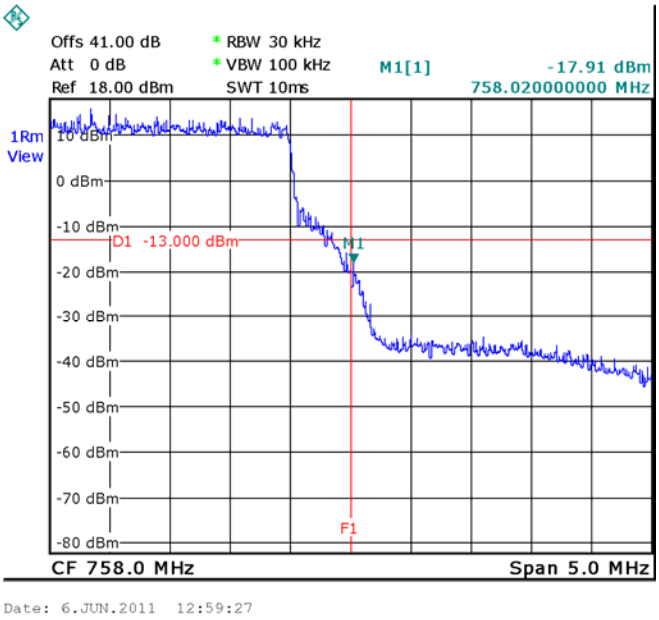

Figure 313.— 16QAM 753.0 MHz

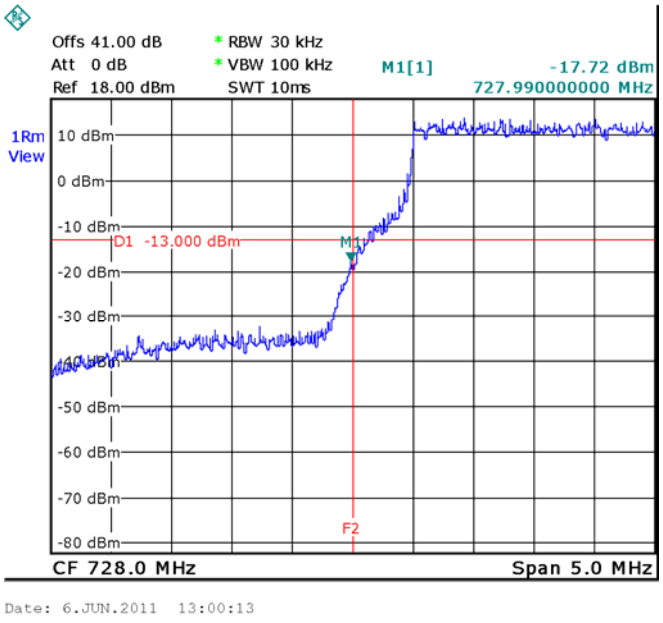

Figure 314.— 64QAM 733.0 MHz

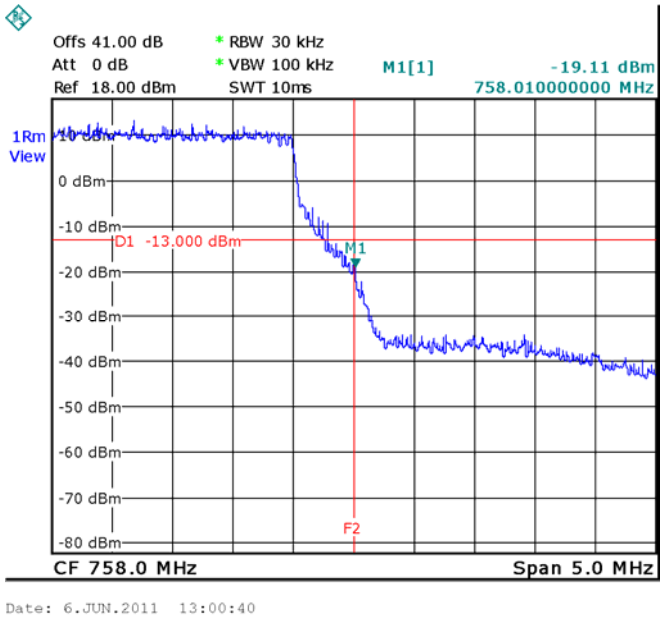

Figure 315.— 64QAM 753.0 MHz

17.3 Results

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit
Model No.: HX-C85P19L70-AC-A (C85=CELL; P19=PCS; L70=LTE)
Serial Number: Not Designated
Specification: FCC Part 27, Subpart C, Section 27.53 (m 4-6)

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)
WCDMA	733.00	728.00	-35.38	-13.0
WCDMA	753.00	758.00	-36.53	-13.0
QPSK	733.00	728.00	-16.04	-13.0
QPSK	753.00	758.00	-17.86	-13.0
16QAM	733.00	728.00	-17.56	-13.0
16QAM	753.00	758.00	-17.91	-13.0
64QAM	733.00	728.00	-17.72	-13.0
64QAM	753.00	758.00	-19.11	-13.0

Figure 316 Band Edge Spectrum Results LTE

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 09.06.11

Typed/Printed Name: A. Sharabi

17.4 Test Equipment Used.

Band Edge Spectrum

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

Figure 317 Test Equipment Used

18. Spurious Radiated Emission LTE

18.1 Test Specification

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

18.2 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 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.

18.3 Test Results

JUDGEMENT: Passed by 37.28 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: 09.06.11

Typed/Printed Name: A. Sharabi

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
733.00	1466.00	V	47.0	-54.29	5.15	7.6	-51.84	-13.0	-38.84
733.00	1466.00	H	48.7	-52.73	5.15	7.6	-50.28	-13.0	-37.28
747.00	1494.00	V	46.9	-54.39	5.15	7.6	-51.94	-13.0	-38.94
747.00	1494.00	H	47.8	-53.63	5.15	7.6	-51.18	-13.0	-38.18
753.00	1506.00	V	48.2	-53.09	5.15	7.6	-50.64	-13.0	-37.64
753.00	1506.00	H	47.5	-53.93	5.15	7.6	-51.48	-13.0	-38.48

18.4 Test Instrumentation Used, Radiated Measurements

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

19. Intermodulation Conducted

19.1 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, 10k Hz for the frequency range 10kHz–10.0MHz, 100kHz for the frequency range 10.0MHz-2.4385GHz, and 1MHz for the frequency range 2.4385-26.0GHz.

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

CELL 811 MHz CW 10 dBm

PCS 1960 MHz W-CDMA 10 dBm

LTE: 747 MHz QPSK 0 dBm

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

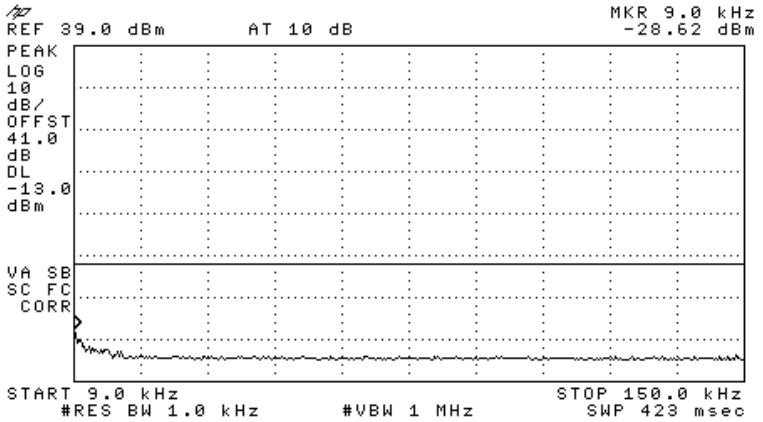

Figure 318 Intermodulation

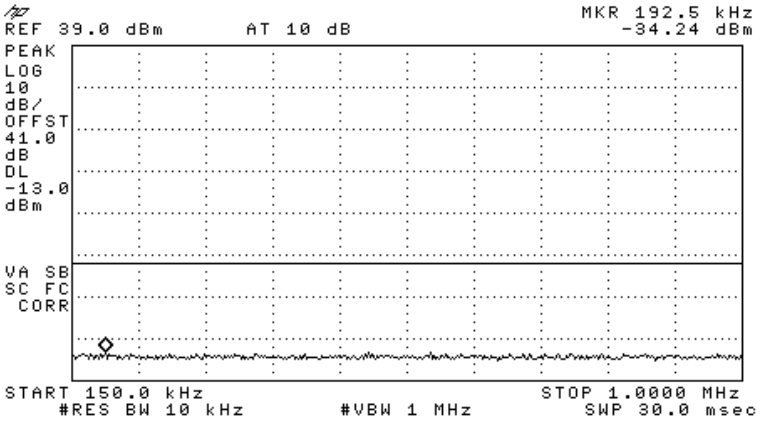

Figure 319 Intermodulation

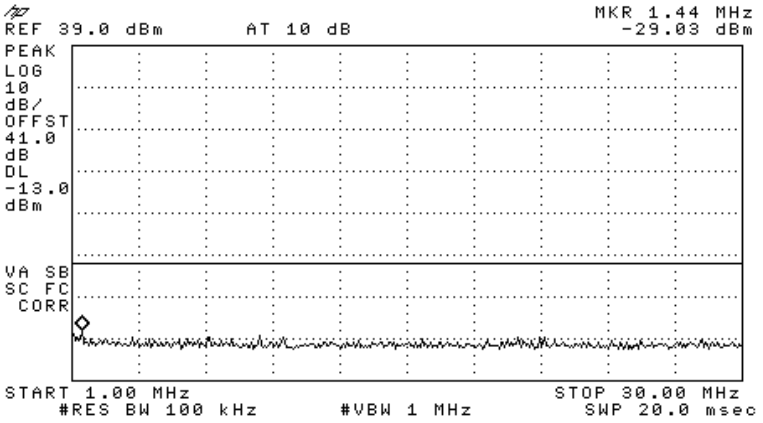

Figure 320 Intermodulation

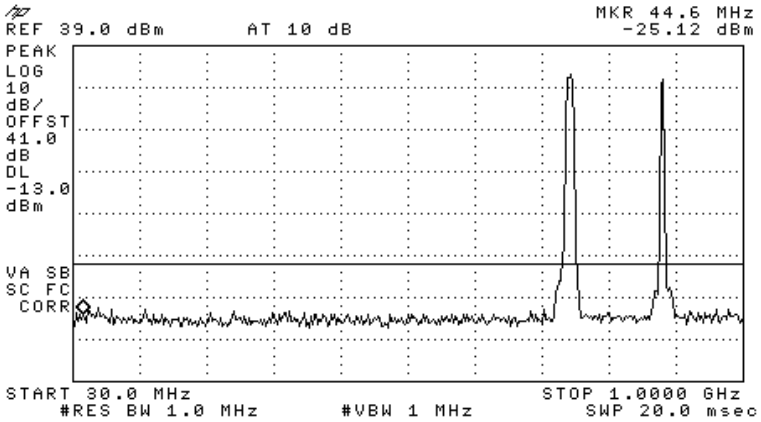

Figure 321 Intermodulation

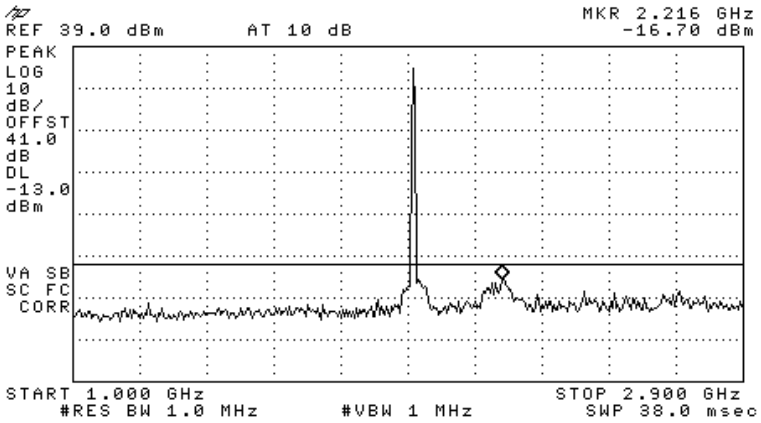

Figure 322 Intermodulation

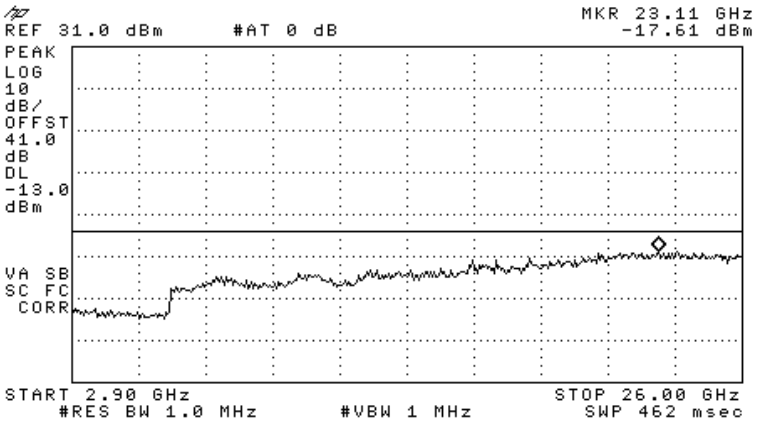

Figure 323 Intermodulation

19.2 Test Equipment Used.

Intermodulation Conducted

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

Figure 324 Test Equipment Used

20. Intermodulation Radiated

20.1 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; 1930 – 1990; 2110 - 2155 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, yielding –13dBm.

The E.U.T. was operated in Downlink mode at 3 different channels at center frequency of each band at the same time, transmitting at CW signal.

(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.

(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.

(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.

20.2 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	55.2	-45.49	7.4	8.26	-44.63	-13.0	-31.63
2*747+881	2375.00	H	54.8	-46.08	7.4	8.26	-45.22	-13.0	-32.22
2*747-881	613.00	V	34.7	-61.64	3.2	0.97	-63.87	-13.0	-50.87
2*747-881	613.00	H	35.6	-62.11	3.2	0.97	-64.34	-13.0	-51.34
2*881-747	1015.00	V	43.0	-58.79	4.2	5.4	-57.59	-13.0	-44.59
2*881-747	1015.00	H	44.06	-57.39	4.2	5.4	-56.19	-13.0	-43.19
2*881+747	2509.00	V	56.2	-44.56	7.7	8.4	-43.86	-13.0	-30.86
2*881+747	2509.00	H	54.5	-47.56	7.7	8.4	-46.86	-13.0	-33.86
3*747-2*881	579.00	V	34.8	-61.54	3.2	0.97	-63.77	-13.0	-50.77
3*747-2*881	579.00	H	35.6	-62.11	3.2	0.97	-64.34	-13.0	-51.34
3*881-2*747	1149.00	V	43.2	-58.29	4.45	5.84	-56.9	-13.0	-43.90
3*881-2*747	1149.00	H	43.0	-58.51	4.45	5.84	-57.12	-13.0	-44.12

20.3 Test Instrumentation Used, Radiated Measurements Intermodulation

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

21. APPENDIX A - CORRECTION FACTORS

21.1 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".

21.2 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.

21.3 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.

21.4 Correction factors for LOG PERIODIC ANTENNA

Type LPD 2010/A
at 3 and 10 meter ranges.

Distance of 3 meters

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

Distance of 10 meters

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

NOTES:

1. *Antenna serial number is 1038.*
2. *The above lists are located in file number 38M3O.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.*
3. *The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".*

21.5 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

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

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

NOTES:

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

21.6 Correction factors for BICONICAL ANTENNA

Type BCD-235/B, at 3 meter range

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

NOTES:

1. Antenna serial number is 1041.

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

21.7 Correction factors for Double-Ridged Waveguide Horn

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

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

21.8 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2