



DATE: 12 February 2012

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

FCC Radio Test Report

for

Mobile Access Networks

Equipment under test:

**Mobile AccessHX High-Power DAS Remote Unit
MIMO**

**HX-C85P19L70MA17M-AC-A
(CELL/PCS Section)**

Written by:

D. Shidlowsky, Documentation

Approved by:

I. Siboni, Test Engineer

Approved by:

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



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Measurement/Technical Report for Mobile Access Networks

Mobile AccessHX High-Power DAS Remote Unit MIMO

FCC ID: OJFHXCPL70MAM

This report concerns:

Original Grant: X

Class II change:

Class I change:

Equipment type:

PCS Licensed Transmitter

Limits used:

47CFR Parts 2, 22, 24

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
D.N. Shimshon 99780
Israel
e-mail sraz@itl.co.il

Applicant for this device:

(different from "prepared by")

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

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1. General Information

1.1 Administrative Information

Manufacturer:	Mobile Access Networks
Manufacturer's Address:	8391 Old Courthouse Rd. Suite #300 Vienna, VA 22182 U.S.A. Tel: +1-541-758-2880 Fax: +1-703-848-0260
Manufacturer's Representative:	Steve Blum
Equipment Under Test (E.U.T):	Mobile AccessHX High-Power DAS Remote Unit MIMO
Equipment Model No.:	HX-C85P19L70MA17M-AC-A
Equipment Serial No.:	0B422A0
Date of Receipt of E.U.T:	19.12.2011
Start of Test:	19.12.2011
End of Test:	01.01.2012
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Parts 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**

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

MobileAccess**HX** will support multiple wireless technologies and operator services over a single broadband infrastructure. Using low loss fiber optic cabling, remote units can cover distances of up to 2Km from the BTS signal sources at the head-end.

Alongside MA1000 and MA2000 deployments, MobileAccess**HX** provides a comprehensive indoor and outdoor coverage solution for varying site requirements, supporting everything from high-rise buildings and campus topologies, to stadiums and airports.

Features & Benefits:

Multi-Service Platform: Accommodates GSM, UMTS, HSPA, LTE, EDGE, EV-DO, AWS, and more. Provides MIMO configuration for LTE700, AWS and UMTS band.

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

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

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

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

Design and Deployment Flexibility: Remote unit supports both SM and MM fiber connections and are available in AC or DC power supply options. Antenna splitting schemes are possible due to the higher power output capability.

Backwards Compatible: Connects to an existing MobileAccess**1000** or MobileAccess**2000** deployment (Shares a common head-end and EMS in a single deployment).

System Architecture

MobileAccess**HX** provides a complete solution consisting of HX remote units at the remote locations, and head-end elements that are shared with any MA1000 or MA2000 system that is either installed or being installed at the site.

In the downlink, at the head-end, the BTS or BDA signal is conditioned by the **RIU**, ensuring a constant RF level. The conditioned signal is then converted by the Base Unit to an optical signal for transport over single or multi-mode fiber to the HX remote units, which are located at the remote locations. In the uplink, the process is reversed. The **SC-450 Controller** enables local and remote management, as well as controls all MA1000, MA2000, and HX elements from a single, centralized location.

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

1.4 Test Methodology

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

1.5 Test Facility

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

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

1.6 Measurement Uncertainty

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

0.15 – 30 MHz:

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

± 3.44 dB

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

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

± 4.96 dB

2. System Test Configuration

2.1 Justification

The test setup was configured to closely resemble the standard installation. The EUT consists of the HX (High Power Remote Module) which is connected with the head-end DAS equipment using fiber optic cable.

The RF source signals (CELL and PCS) 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 (dB μ V/m)	DC Configuration (dB μ V/m)
72.60	47.5	45.5
373.00	42.9	42.6
865.00	41.9	39.9
4270.00	43.4	43.6

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

2.2 EUT Exercise Software

The Element Management System EngGUI ver. 1.00 build 10 used for commands delivery.

These commands are used to enable / disable of EUT transmission.
EUT Embedded SW version 01.00 build 14

2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.

2.5 Configuration of Tested System

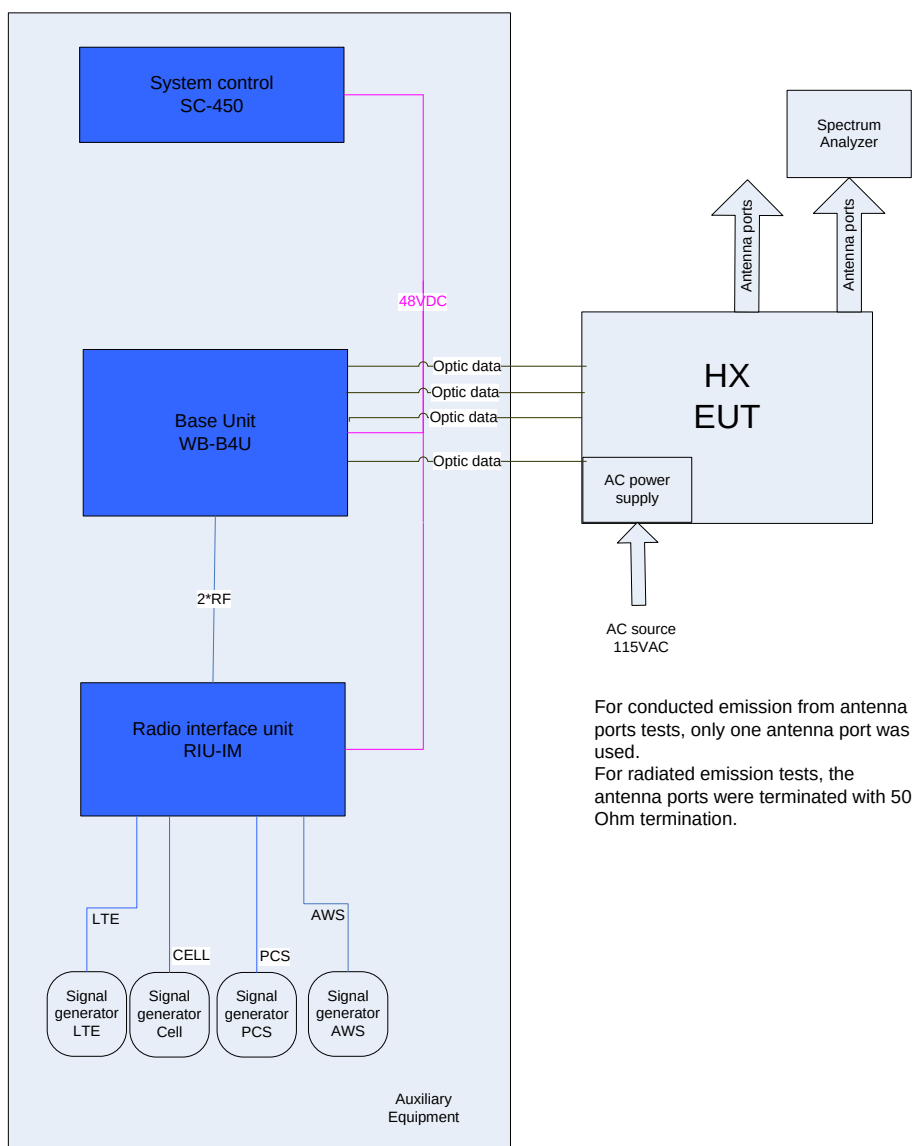


Figure 1. Tests Set-up

3. Conducted and Radiated Measurement Test Set-ups Photos



Figure 2. Conducted Emission From AC Mains Test



Figure 3. Conducted Emission From Antenna Ports Tests



Figure 4. Radiated Emission Test

4. Conducted Emission Data

4.1 Test Specification

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

4.2 Test Procedure

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

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

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

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

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

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

4.3 Results

JUDGEMENT: Passed by 2.7 dB

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

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

The details of the highest emissions are given in *Figure 5* to *Figure 8*.

TEST PERSONNEL:

Tester Signature:  Date: 13.02.12

Typed/Printed Name: I. Siboni

Conducted Emission

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

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

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.151625	57.2	50.5	-28.5	34.9	-31.1	0.0
2	0.169082	54.4	48.0	-31.0	26.8	-39.2	0.0
3	0.326575	47.4	41.4	-37.6	32.1	-33.9	0.0
4	0.553687	51.2	44.1	-28.9	27.1	-32.9	0.0
5	3.436953	47.7	44.2	-28.8	32.9	-27.1	0.0
6	11.614840	57.7	57.3	-15.7	57.3	-2.7	0.0

Figure 5. Detectors: Peak, Quasi-peak, AVERAGE .

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

Conducted Emission

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

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

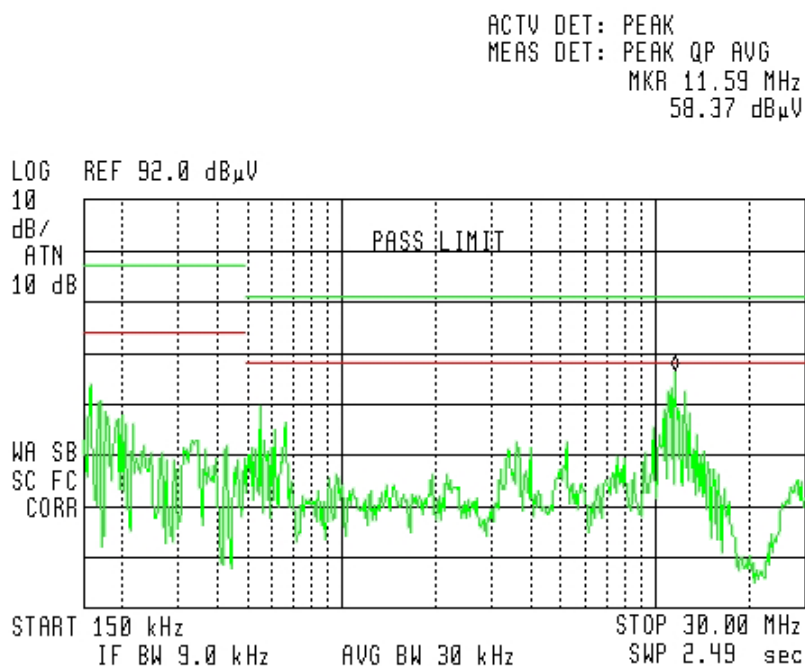


Figure 6. Detectors: Peak, Quasi-peak, Average

Conducted Emission

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

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

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.151639	57.3	49.8	-29.2	35.0	-31.0	0.0
2	0.220585	48.3	41.5	-37.5	25.5	-40.5	0.0
3	0.641202	44.1	38.5	-34.5	20.5	-39.5	0.0
4	3.657524	47.8	43.8	-29.2	31.7	-28.3	0.0
5	5.049944	48.3	43.2	-29.8	30.7	-29.3	0.0
6	11.623800	57.1	56.3	-16.7	56.2	-3.8	0.0

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

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

Conducted Emission

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

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



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 11.59 MHz
-50.16 dBm

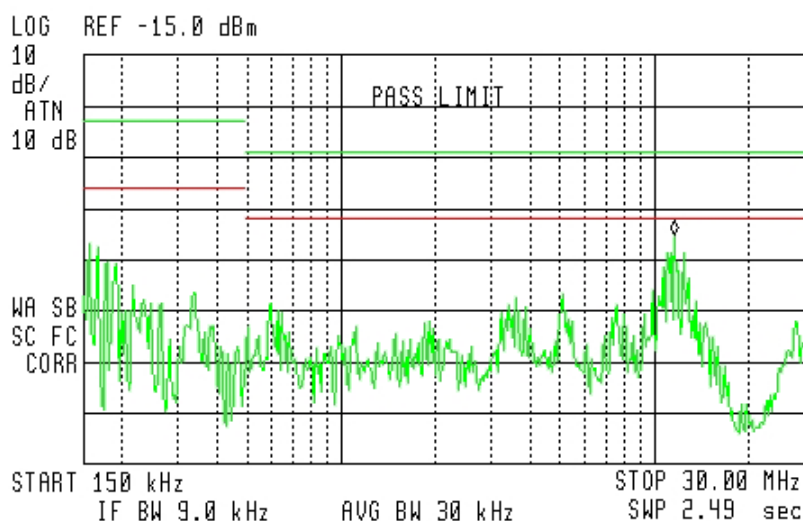


Figure 8 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average



4.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 3, 2011	1 Year
EMI Receiver	HP	85422E	3906A00276	December 12 2011	1Year
RF Filter Section	HP	85420E	3705A00248	December 12 2011	1Year
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

5. Peak Output Power CELL

5.1 Test Specification

FCC Part 22.913

5.2 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:

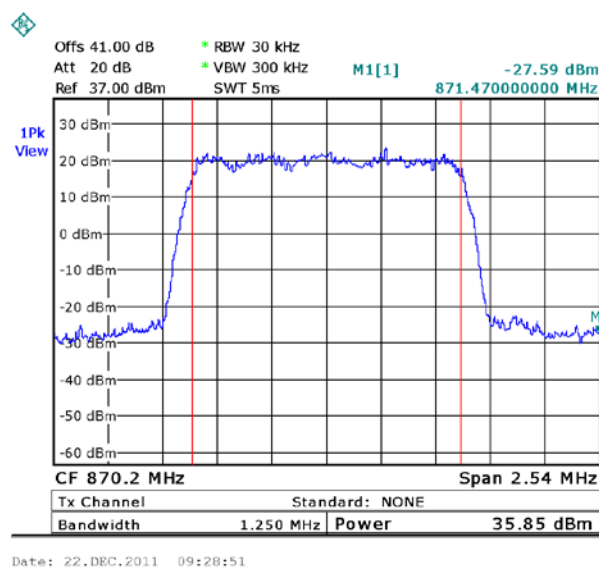


Figure 9.— 870.20 MHz

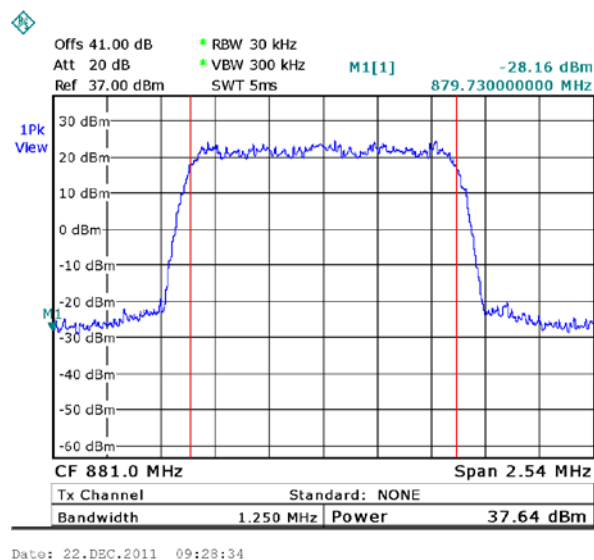


Figure 10.— 881.00 MHz

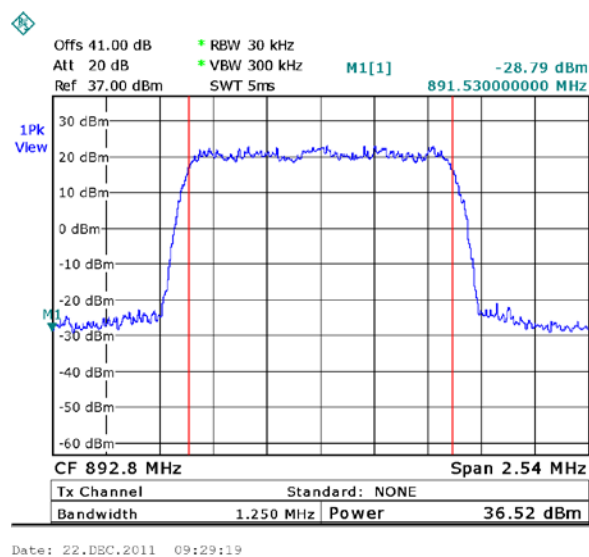


Figure 11.— 892.80 MHz



GSM:

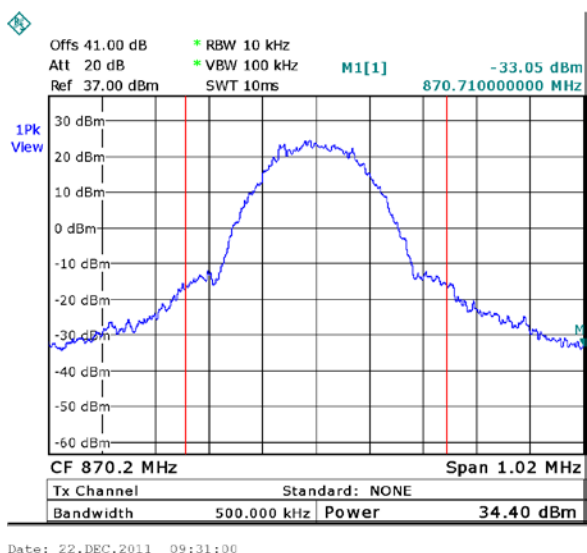


Figure 12.— 870.20 MHz

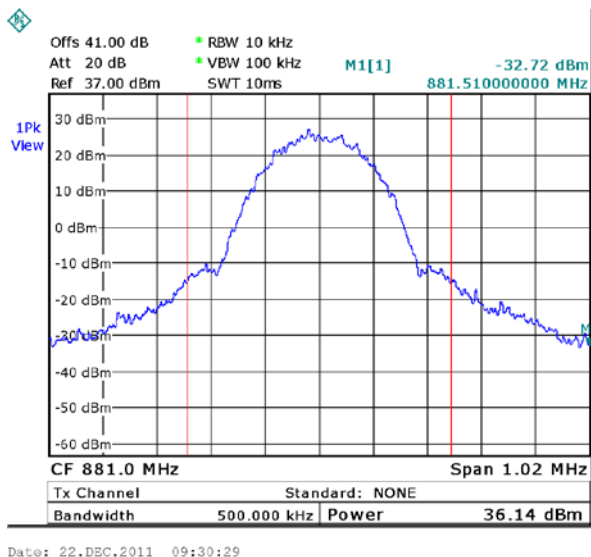


Figure 13.— 881.00 MHz

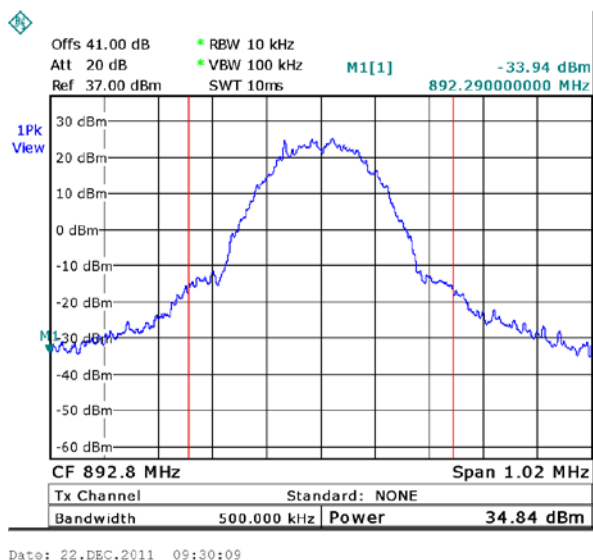


Figure 14.— 892.80 MHz

W-CDMA:

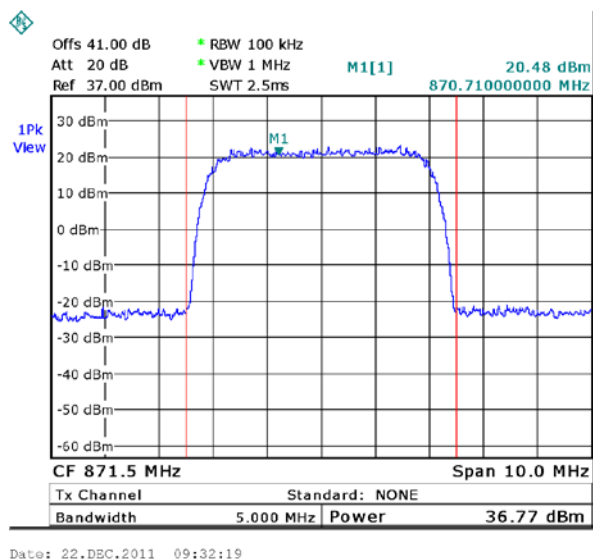


Figure 15.— 871.50 MHz

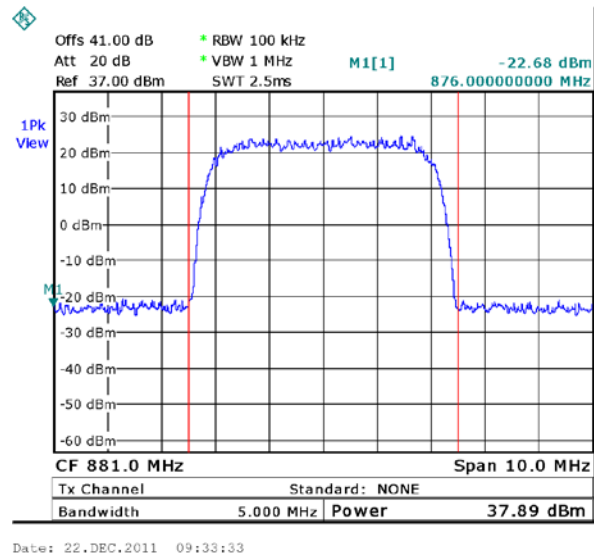


Figure 16.— 881.00 MHz

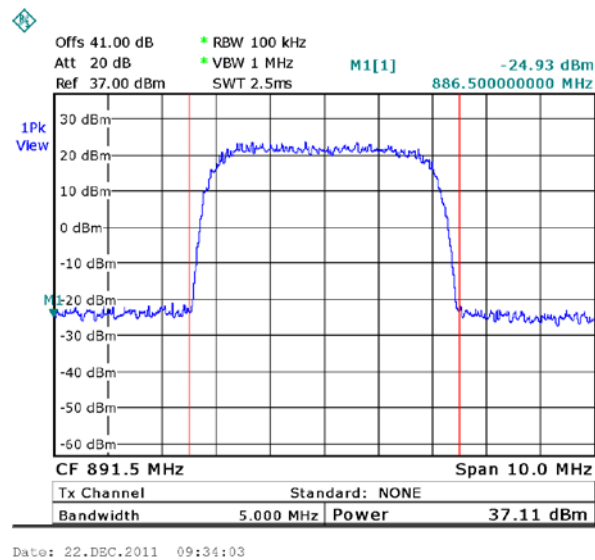


Figure 17.— 891.50 MHz

5.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO

Model No.: HX-C85P19L70MA17M-AC-A

Serial Number: 0B422A0

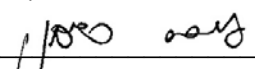
Specification: FCC Part 22 Section 913, FCC Part 2, Section 1046

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	870.2	35.85	57.0	-21.15
	881.0	37.64	57.0	-19.36
	892.8	36.52	57.0	-20.48
GSM	870.2	34.40	57.0	-22.60
	881.0	36.14	57.0	-20.86
	892.8	34.84	57.0	-22.16
W-CDMA	871.5	36.77	57.0	-20.23
	881.0	37.89	57.0	-19.11
	891.5	37.11	57.0	-19.89

Figure 18 Peak Output Power CELL

JUDGEMENT: Passed by 19.1 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni



5.4 Test Equipment Used.

Peak Output Power CELL

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

Figure 19 Test Equipment Used

6. Occupied Bandwidth CELL

6.1 Test Specification

FCC Part 2, Section 1049

6.2 Test Procedure

The E.U.T. was set to the applicable test frequency with 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

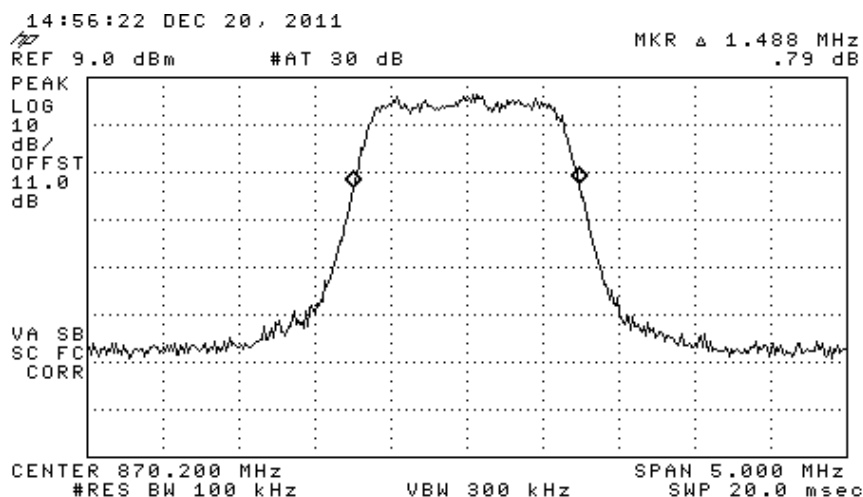


Figure 20.— Input 870.20

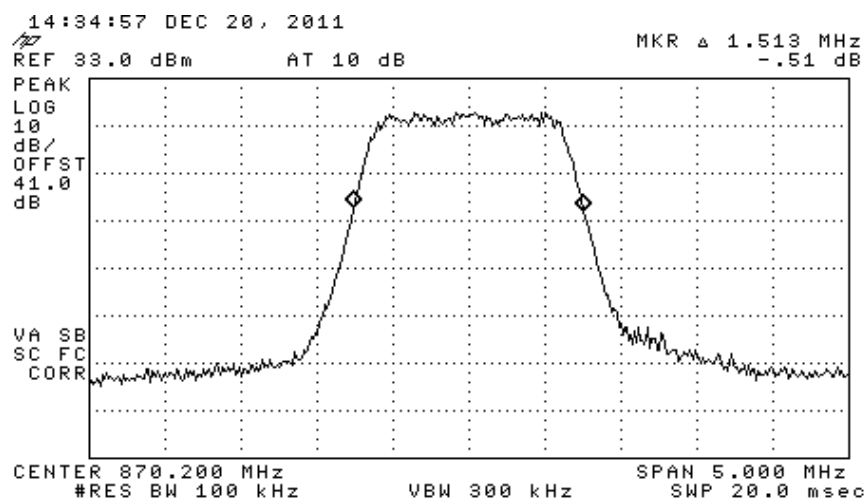


Figure 21.— Output 870.20

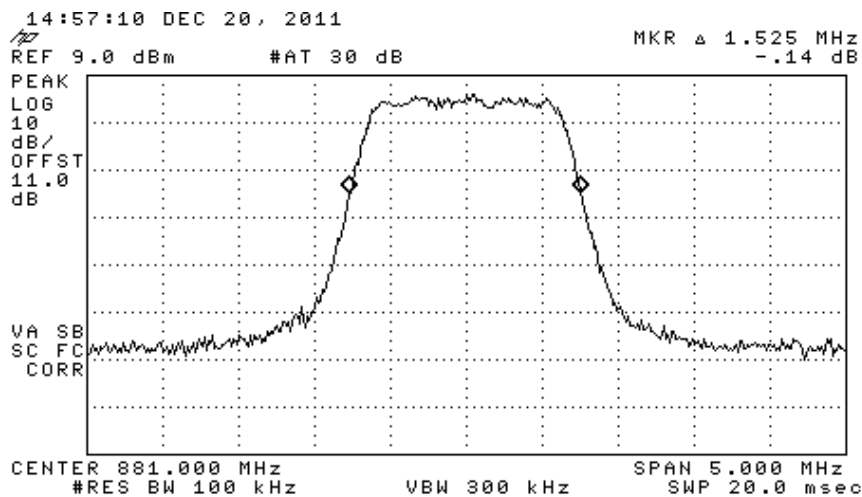


Figure 22.— Input 881.0 MHz.

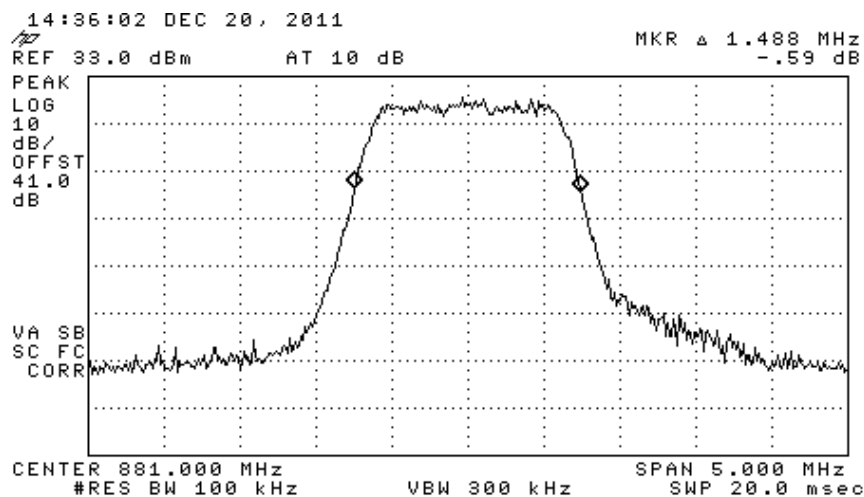


Figure 23.—Output 881.0Hz.

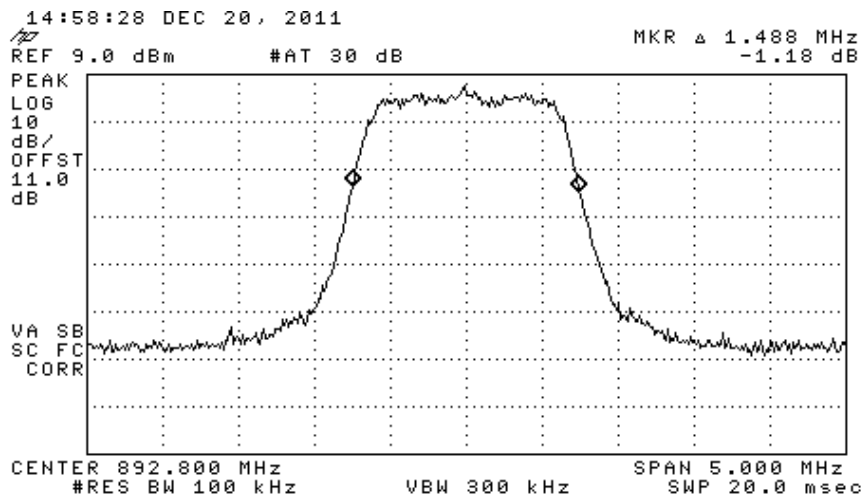


Figure 24.— Input 892.80 MHz.

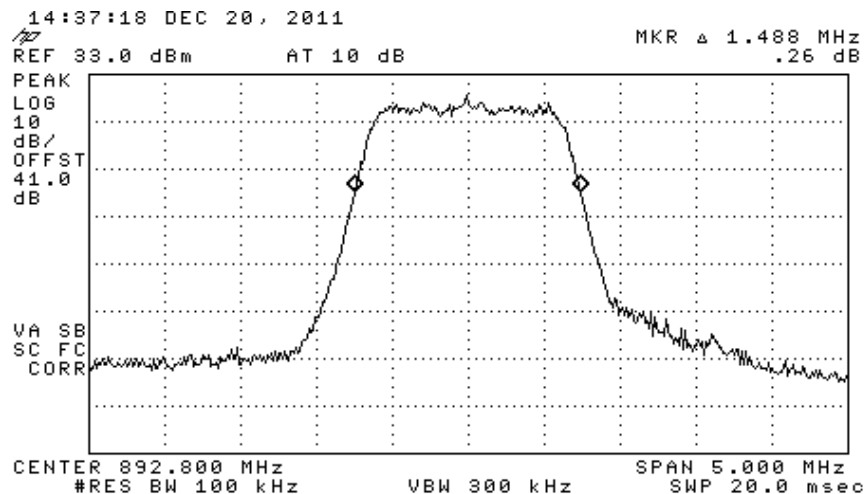


Figure 25.— Output 892.80 MHz.

GSM:

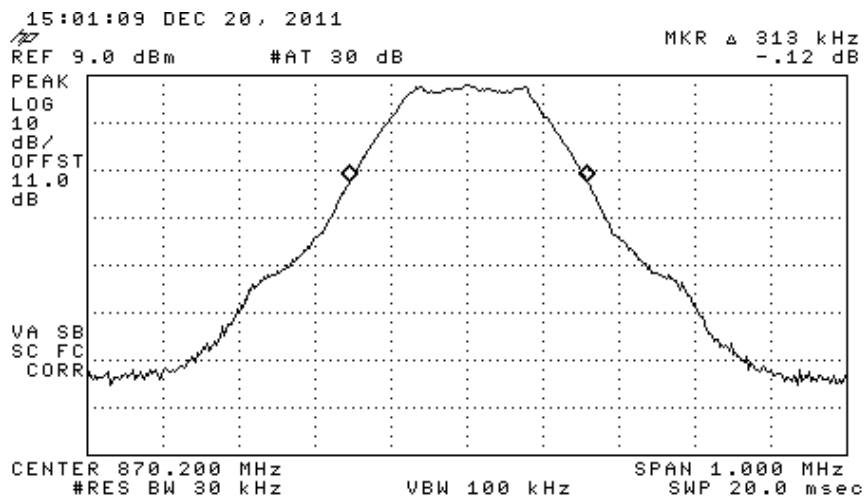


Figure 26.— Input 870.20

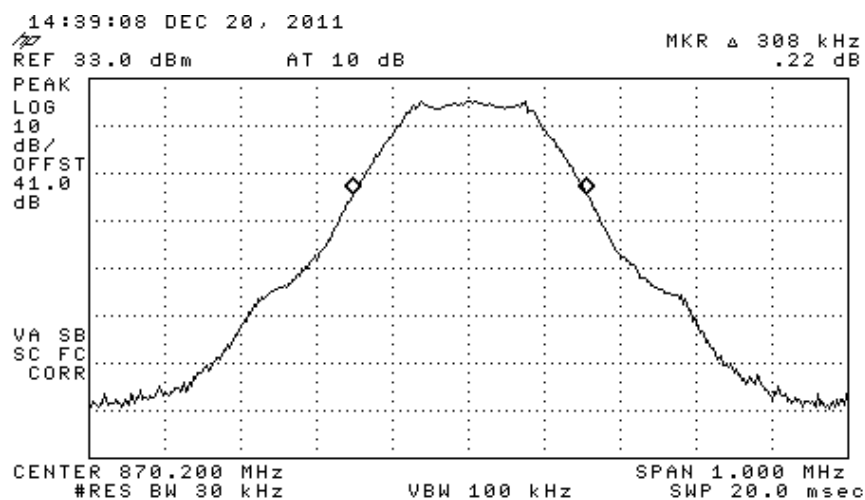


Figure 27.— Output 870.20

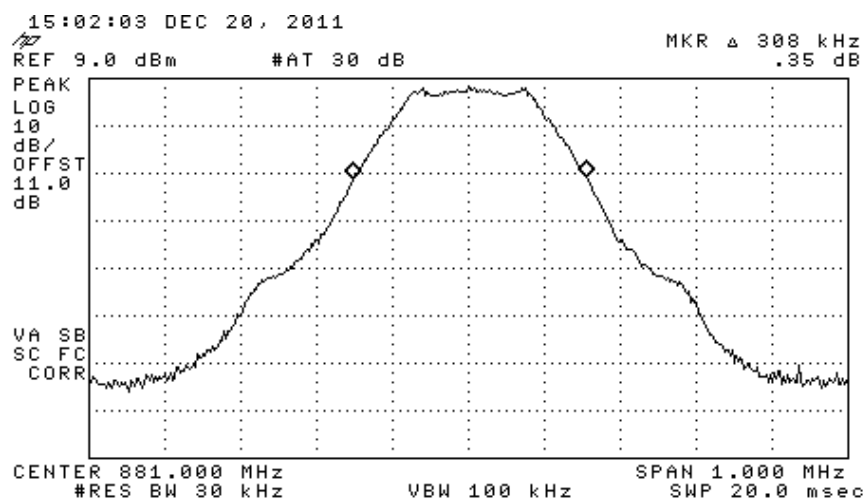


Figure 28.— Input 881.0 MHz.

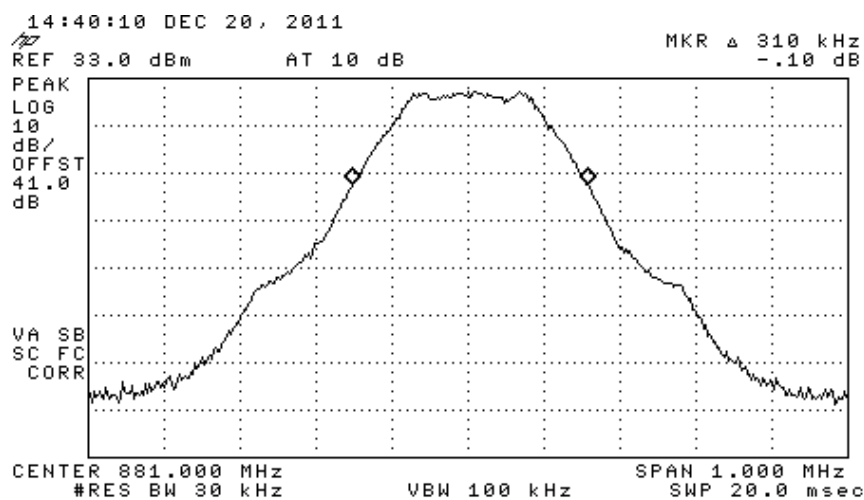


Figure 29.—Output 881.0Hz.

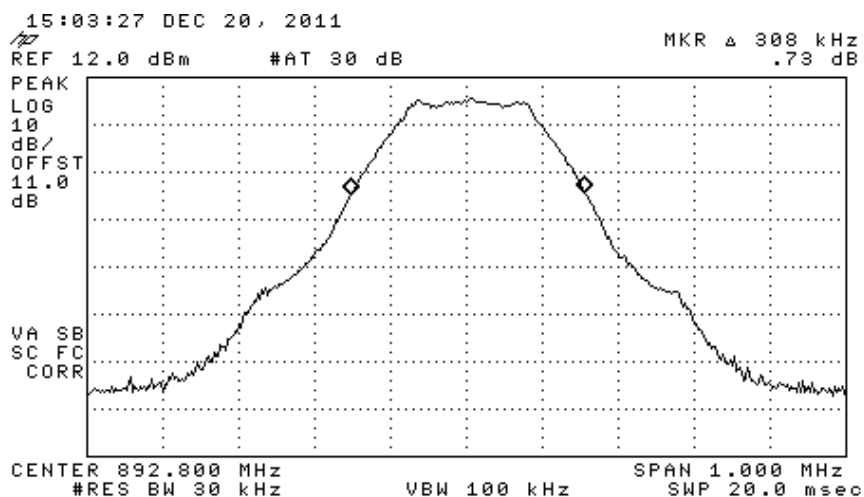


Figure 30.— Input 892.8 MHz.

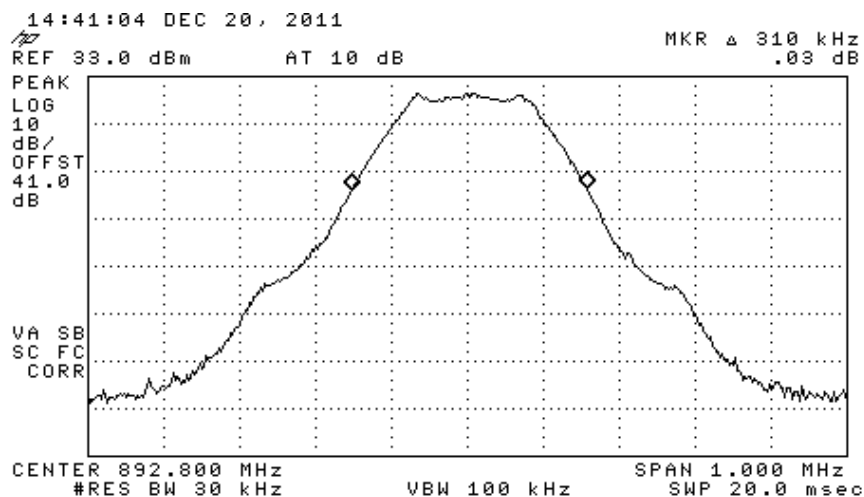


Figure 31.— Output 892.8 MHz.

W-CDMA:

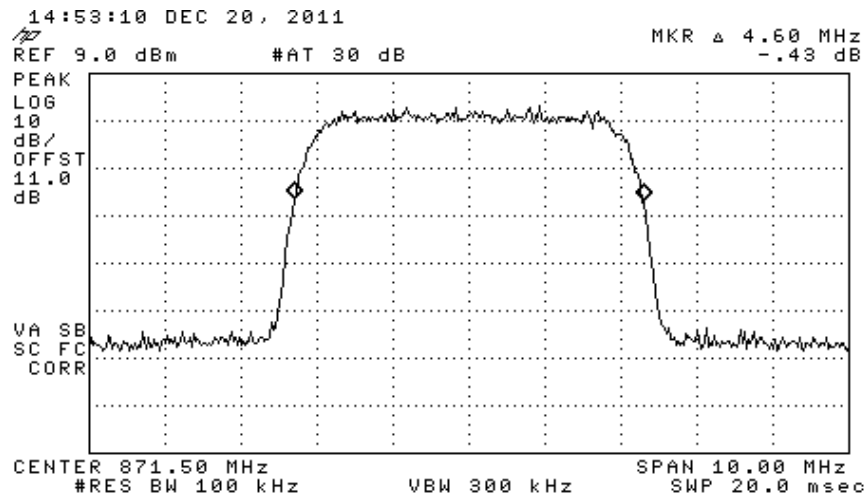


Figure 32.— Input 871.50

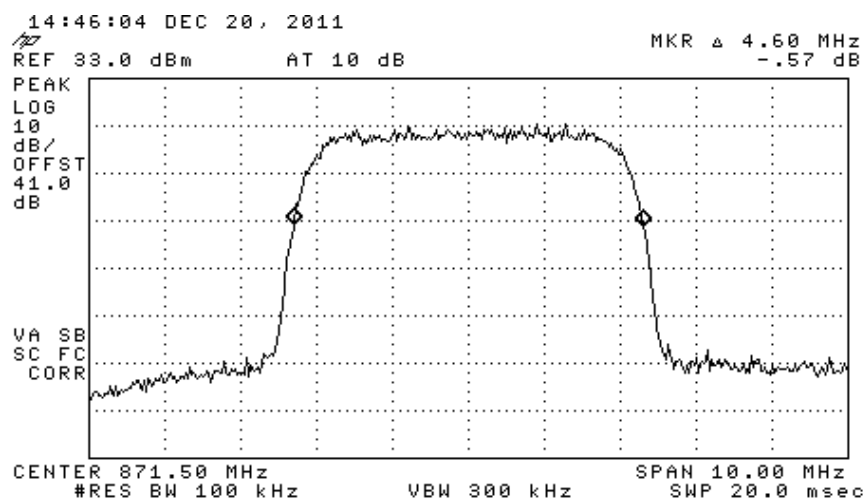


Figure 33.— Output 871.50

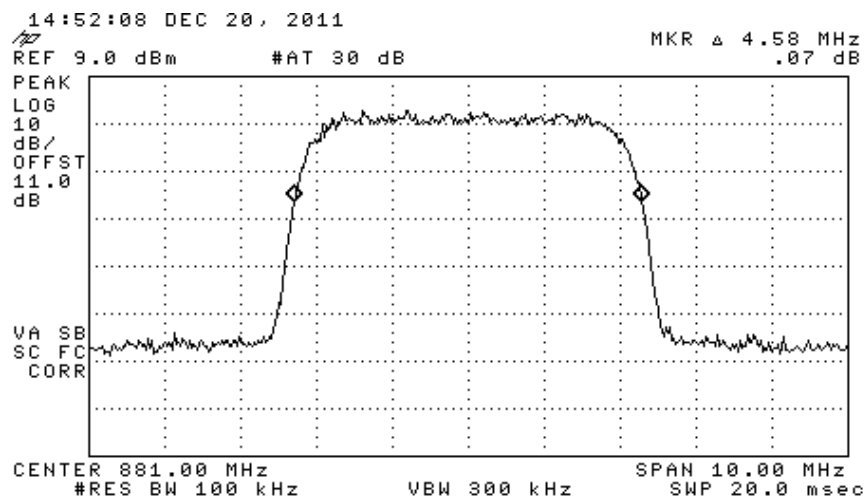


Figure 34.— Input 881.0 MHz.

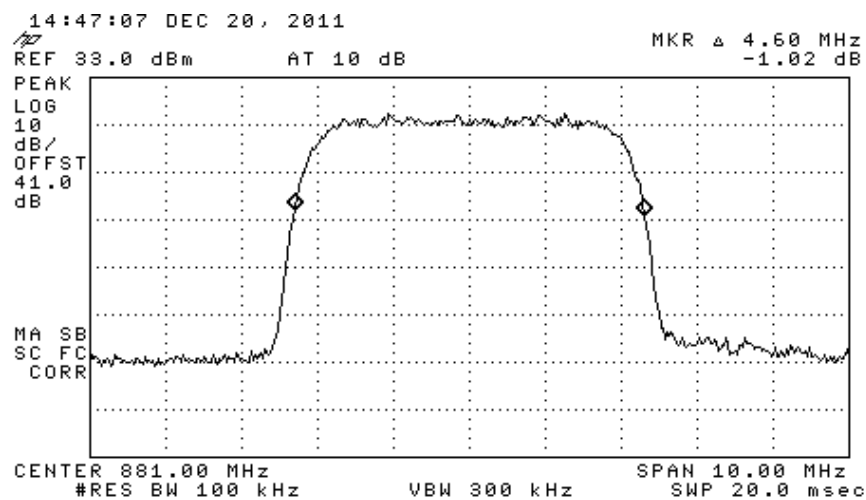


Figure 35.—Output 881.0Hz.

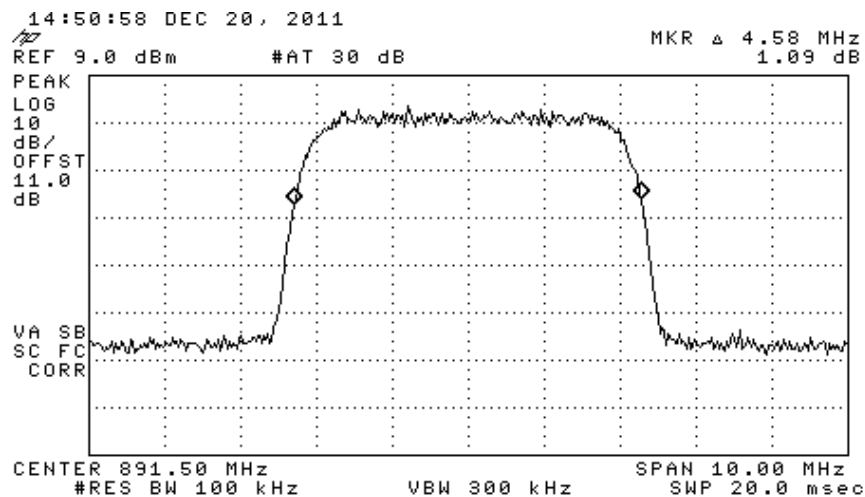


Figure 36.— Input 891.50 MHz.

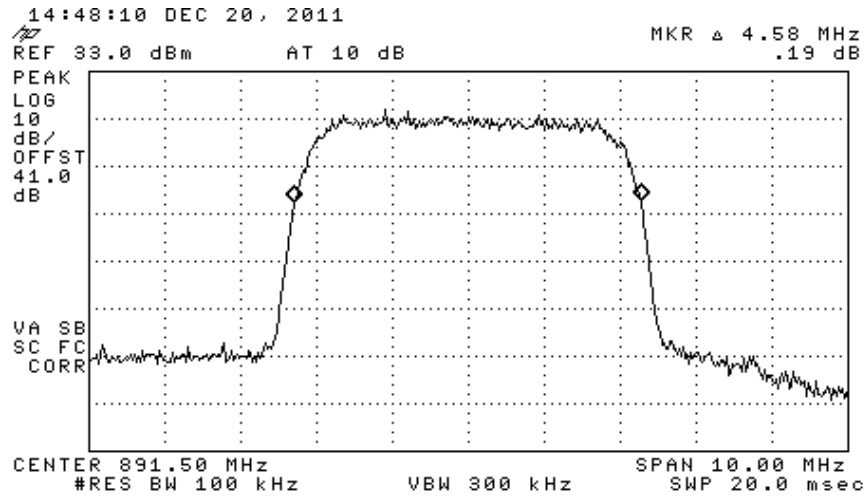


Figure 37.— Output 891.50 MHz.

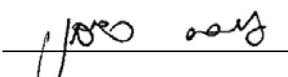
6.3 Results Table

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

Modulation		Operating Frequency (MHz)	Reading (MHz)
CDMA	Input	870.20	1.488
	Output	870.20	1.513
	Input	881.00	1.525
	Output	881.00	1.488
	Input	892.80	1.488
	Output	892.80	1.488
GSM	Input	870.20	0.313
	Output	870.20	0.308
	Input	881.00	0.308
	Output	881.00	0.310
	Input	892.80	0.308
	Output	892.80	0.310
W-CDMA	Input	871.50	4.600
	Output	871.50	4.600
	Input	881.00	4.580
	Output	881.00	4.600
	Input	891.5	4.580
	Output	891.5	4.580

Figure 38 Occupied Bandwidth CELL

TEST PERSONNEL:

Tester Signature: 
Typed/Printed Name: I. Siboni

Date: 13.02.12



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

Figure 39 Test Equipment Used

7. Out of Band Emissions at Antenna Terminals CELL

7.1 Test Specification

FCC Part 22, Section 917; FCC Part 2.1051

7.2 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 100 kHz R.B.W.

CDMA:

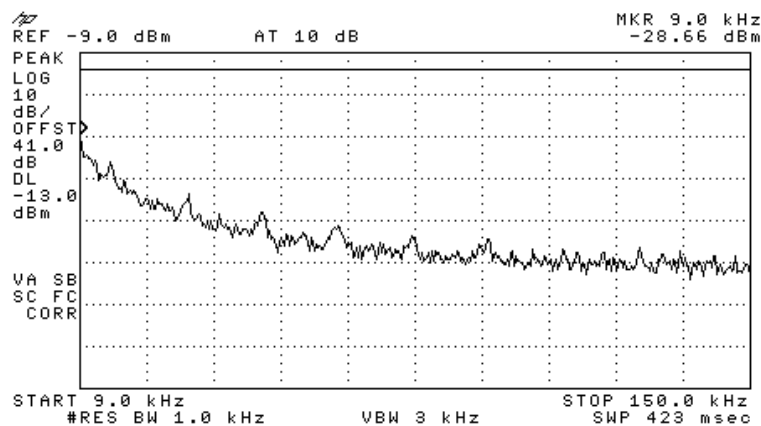


Figure 40.— 870.20 MHz

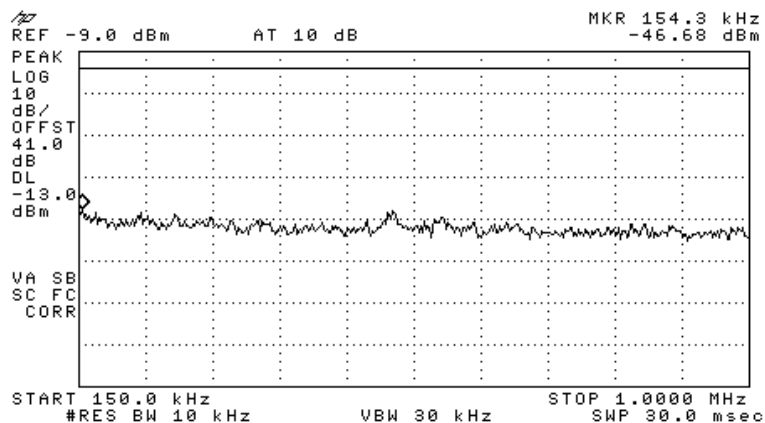


Figure 41.— 870.20 MHz

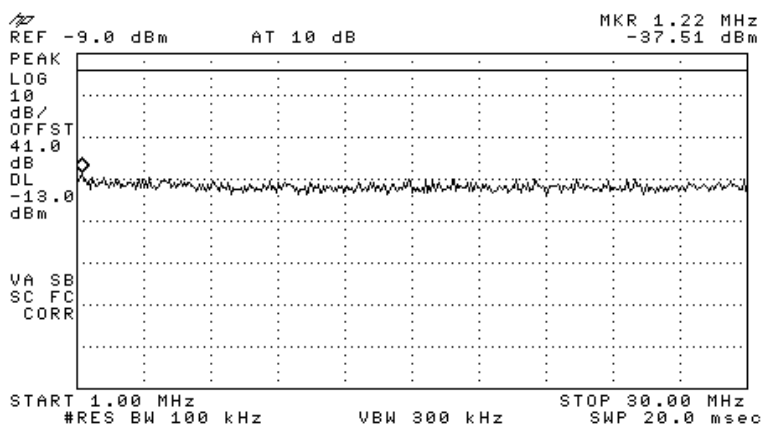


Figure 42.— 870.20 MHz

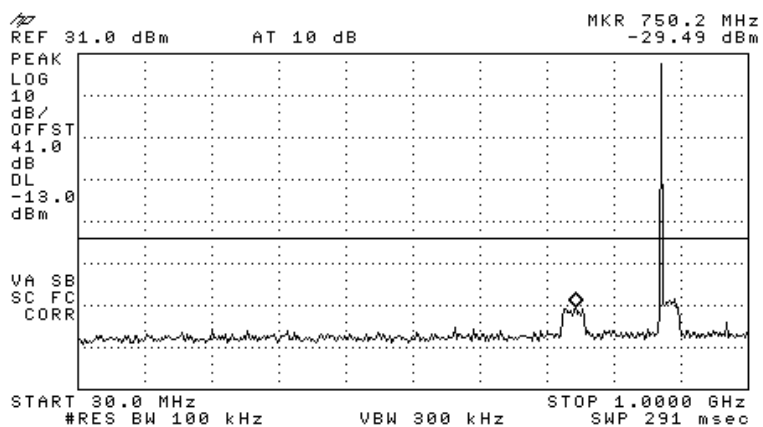


Figure 43.— 870.20 MHz

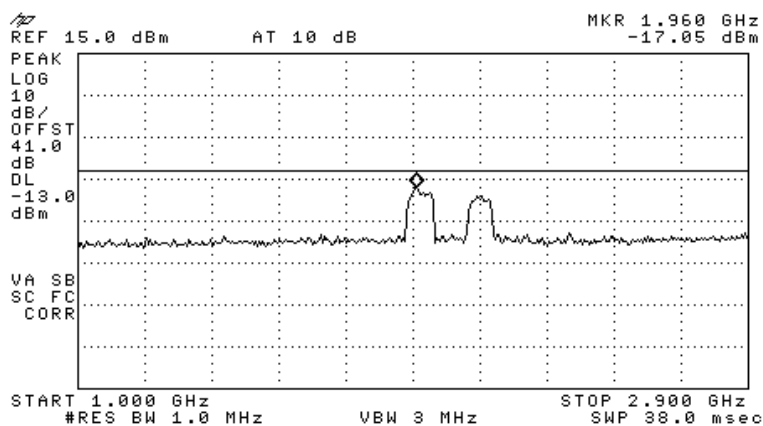


Figure 44.— 870.20 MHz

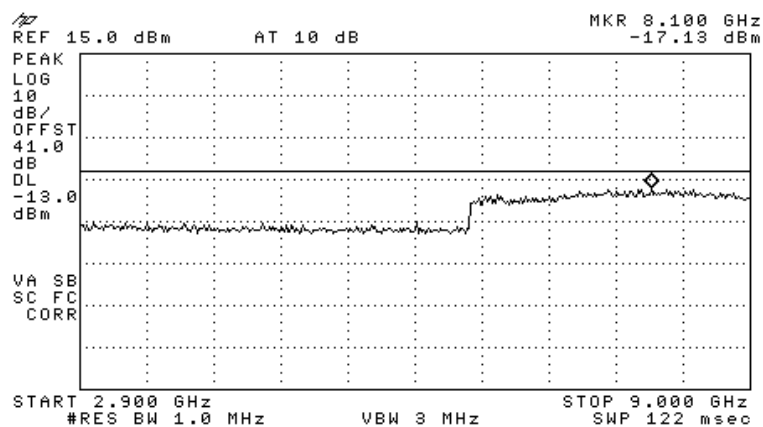


Figure 45.— 870.20 MHz

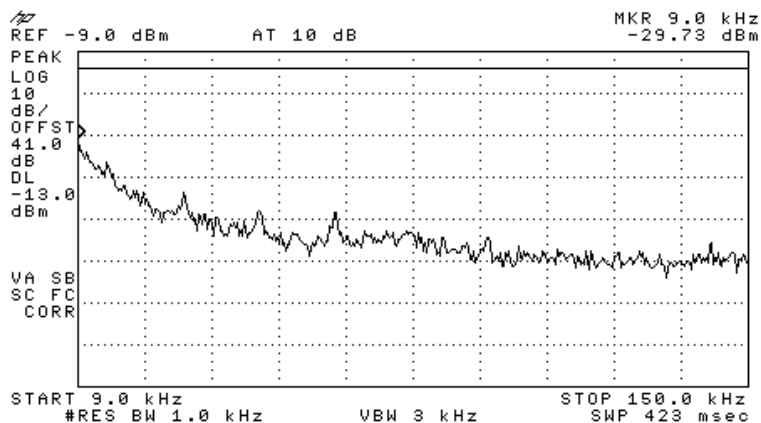


Figure 46.— 881.00 MHz

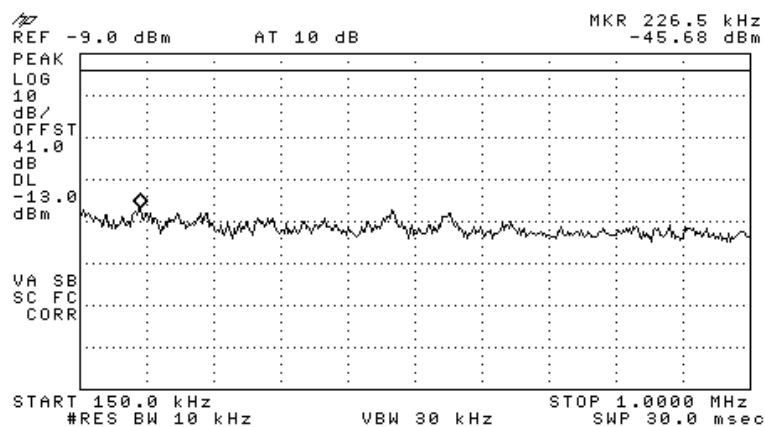


Figure 47.— 881.00 MHz

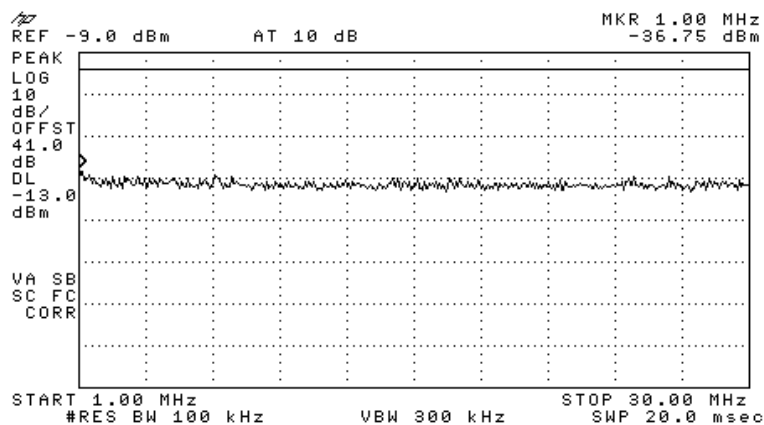


Figure 48.— 881.00 MHz

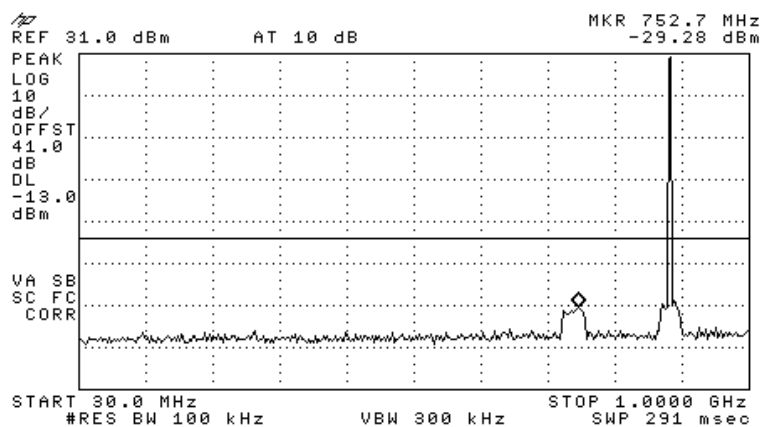


Figure 49.— 881.00 MHz

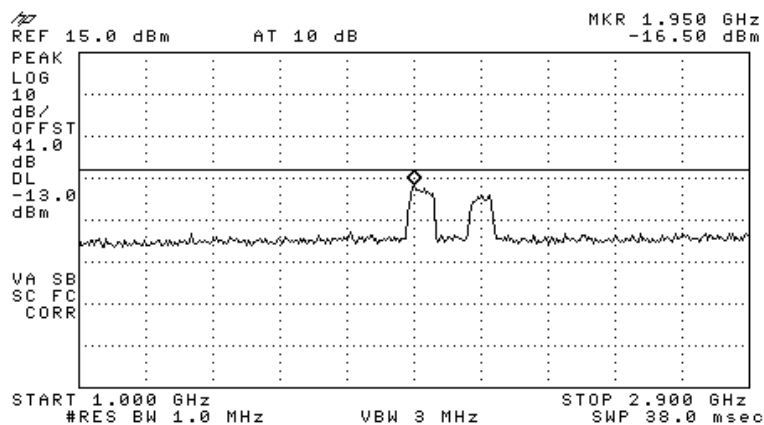


Figure 50.— 881.00 MHz

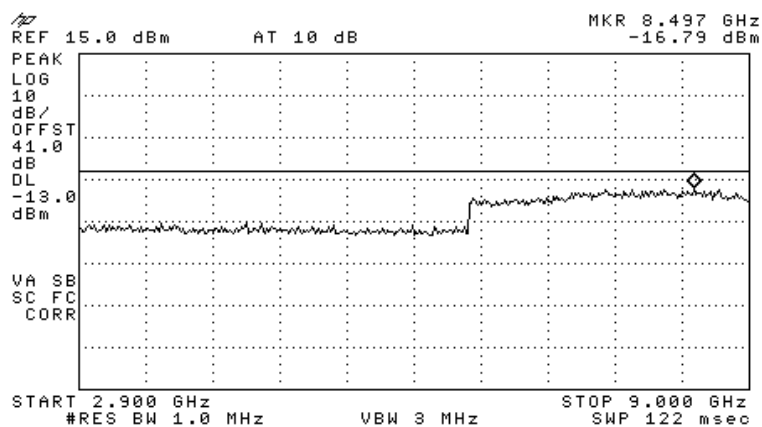


Figure 51.— 881.00 MHz

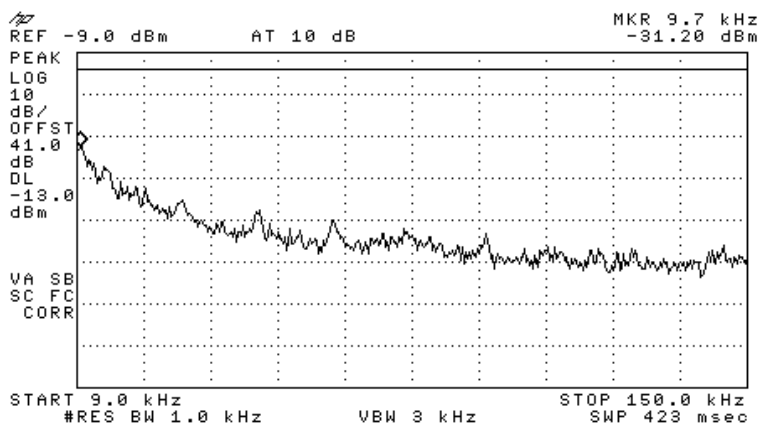


Figure 52.— 892.80 MHz

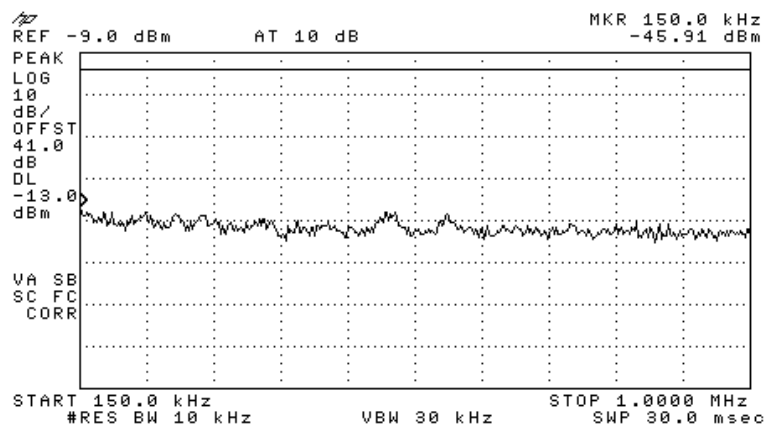


Figure 53.— 892.80 MHz

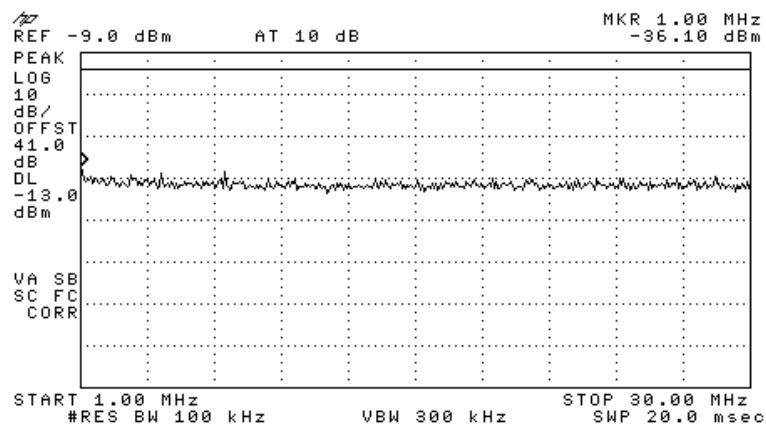


Figure 54.— 892.80 MHz

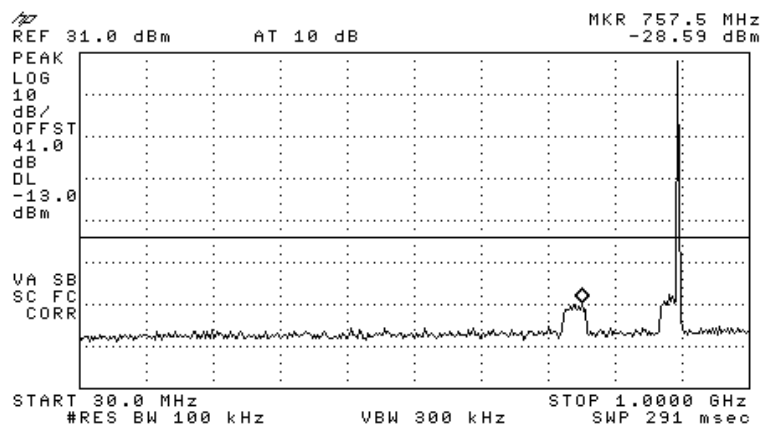


Figure 55.— 892.80 MHz

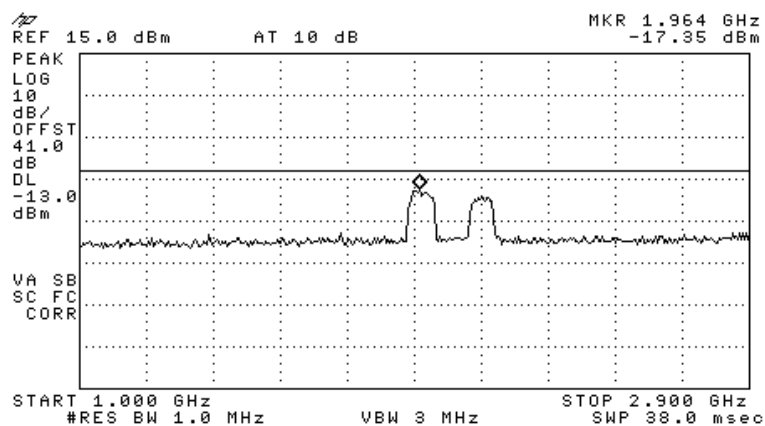


Figure 56.— 892.80 MHz

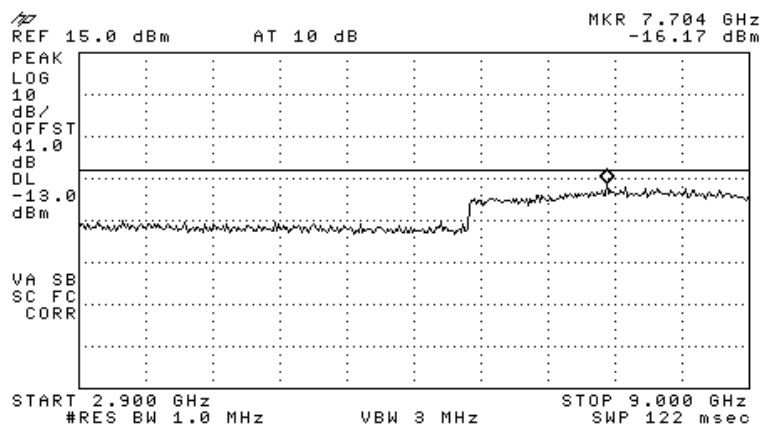


Figure 57.— 892.80 MHz

GSM:

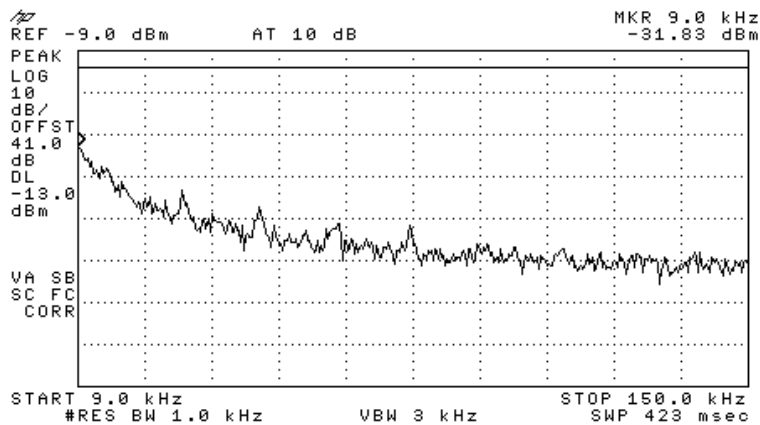


Figure 58.— 870.20 MHz

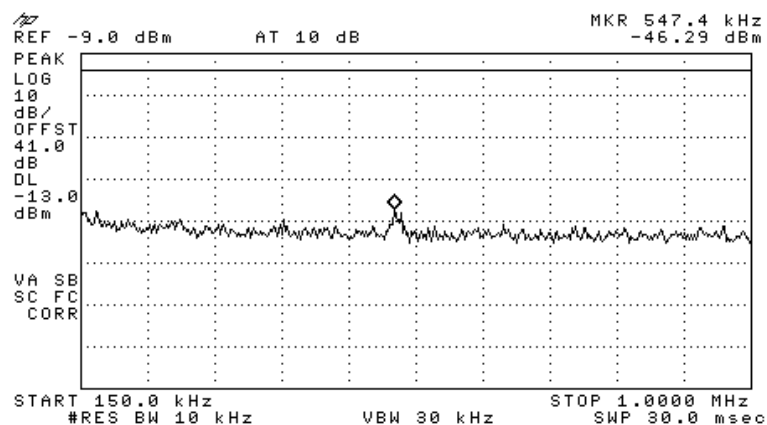


Figure 59.— 870.20 MHz

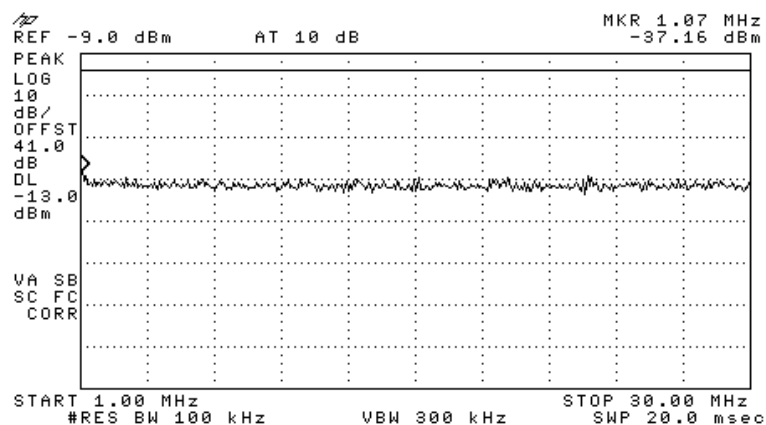


Figure 60.— 870.20 MHz

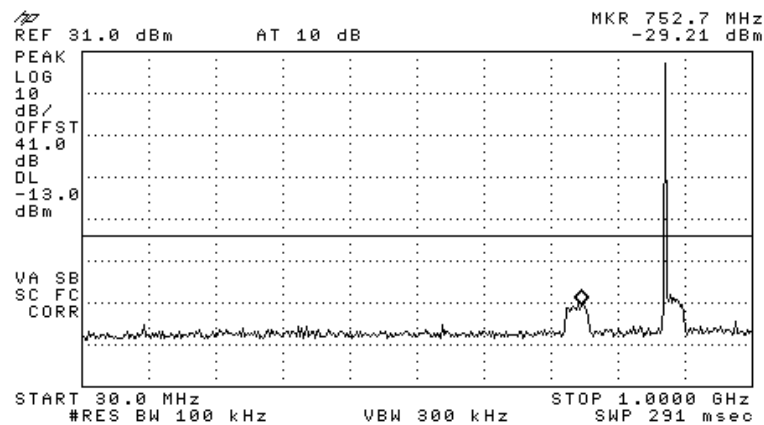


Figure 61.— 870.20 MHz

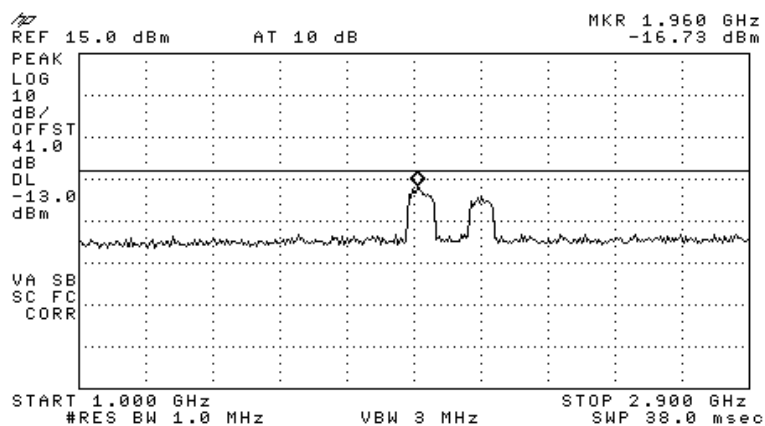


Figure 62.— 870.20 MHz

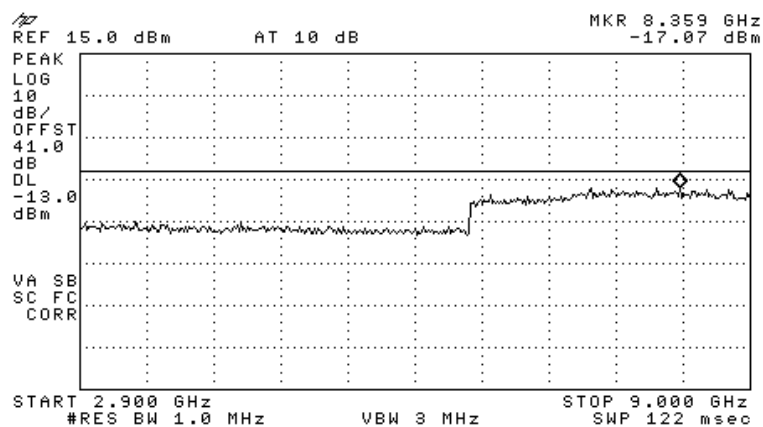


Figure 63.— 870.20 MHz

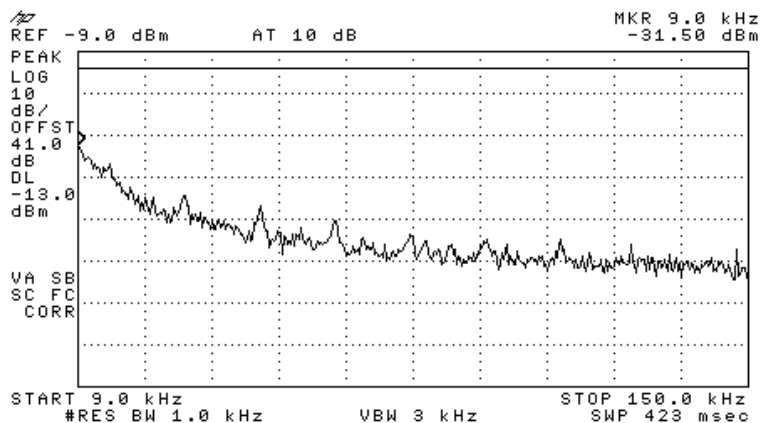


Figure 64.— 881.00 MHz

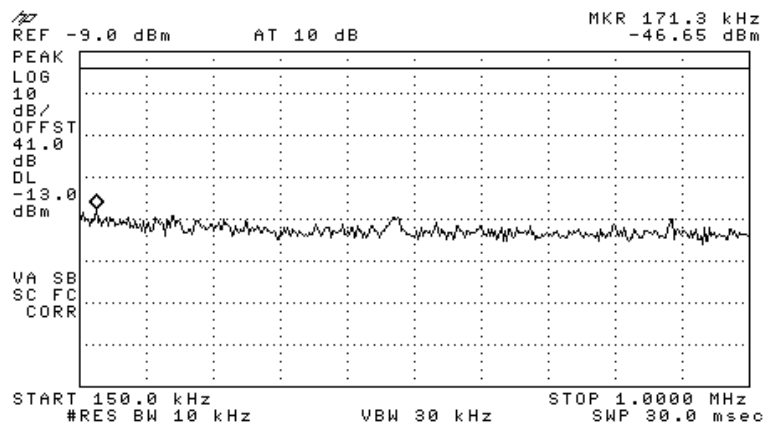


Figure 65.— 881.00 MHz

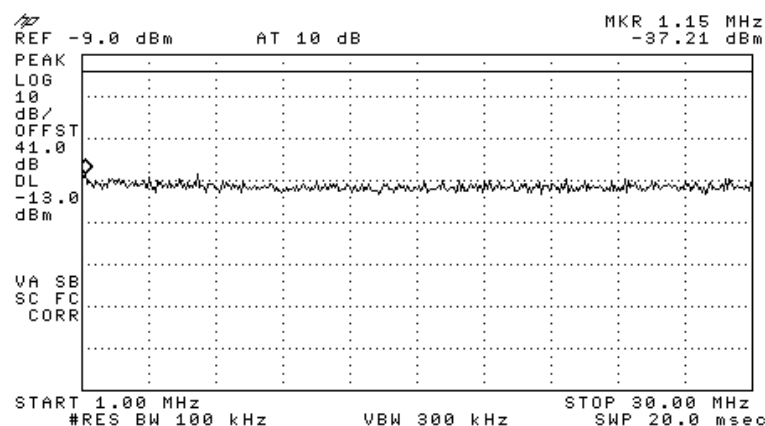


Figure 66.— 881.00 MHz

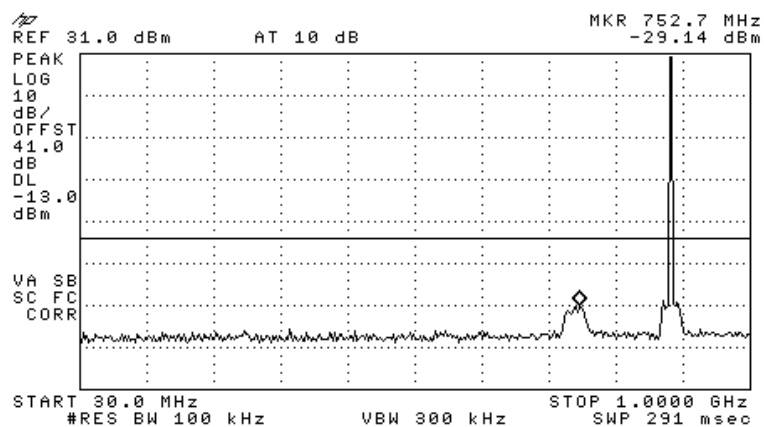


Figure 67.— 881.00 MHz

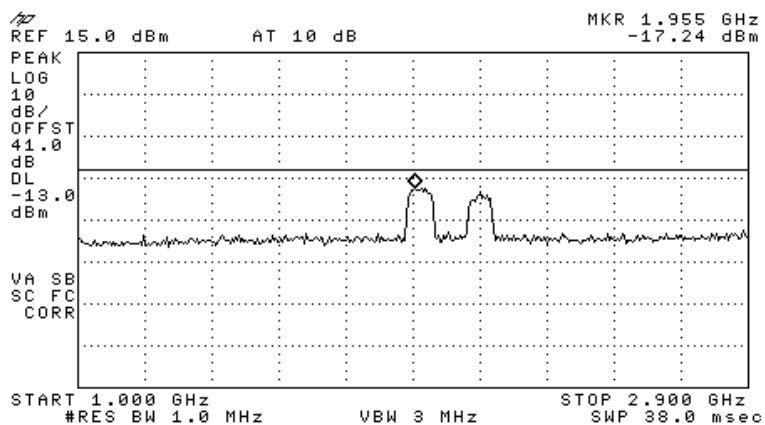


Figure 68.— 881.00 MHz

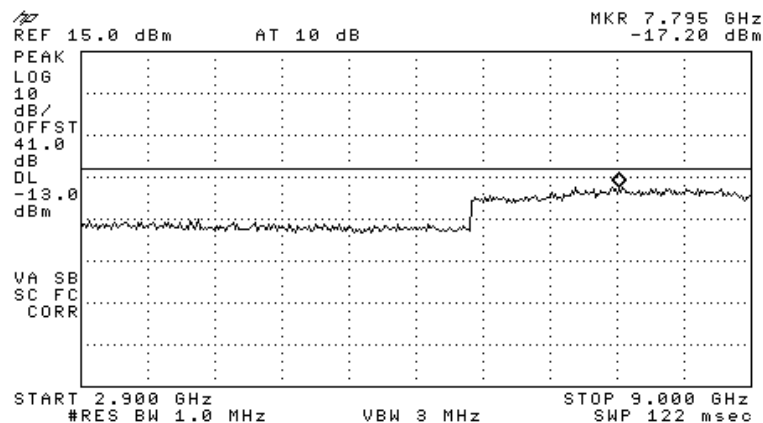


Figure 69.— 881.00 MHz

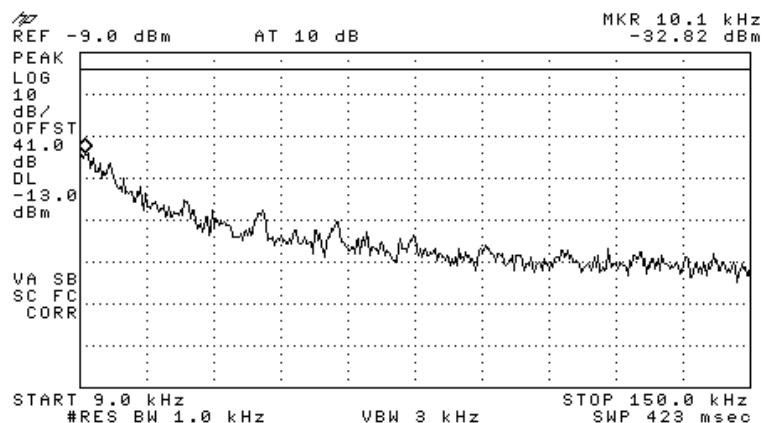


Figure 70.— 892.80 MHz

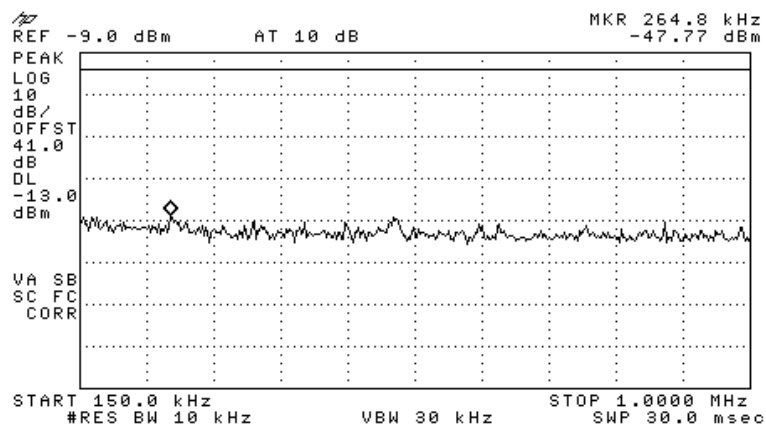


Figure 71.— 892.80 MHz

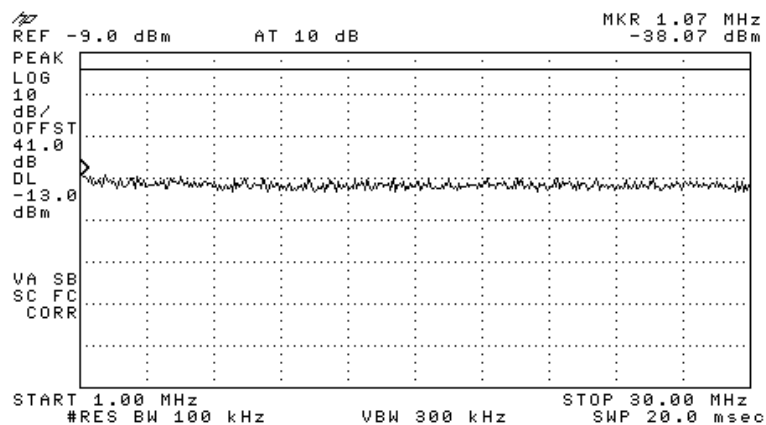


Figure 72.— 892.80 MHz

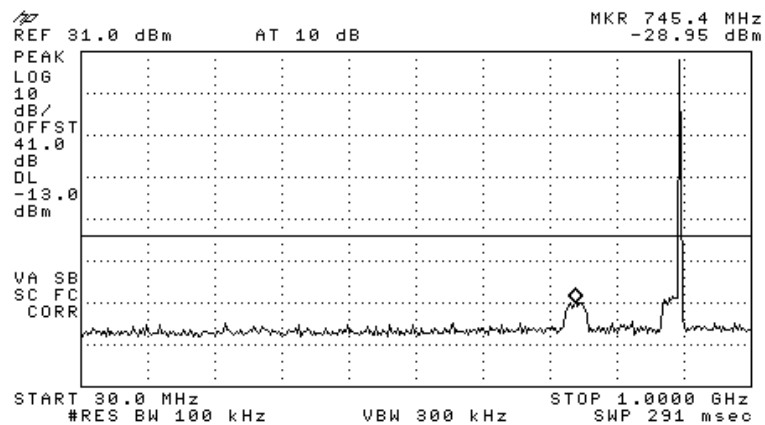


Figure 73.— 892.80 MHz

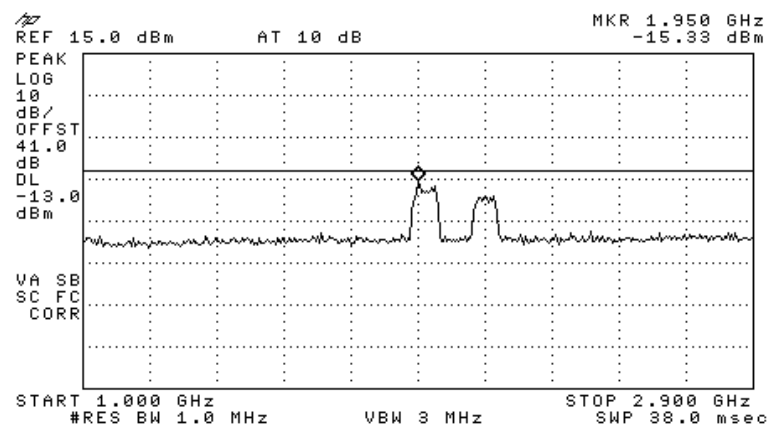


Figure 74.— 892.80 MHz

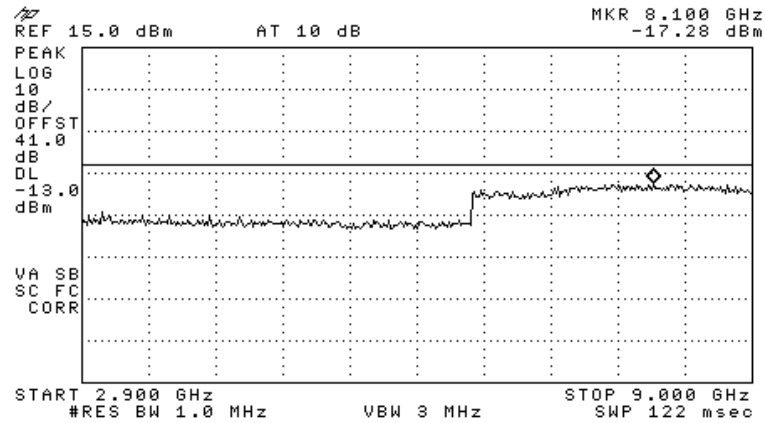


Figure 75.— 892.80 MHz

W-CDMA:

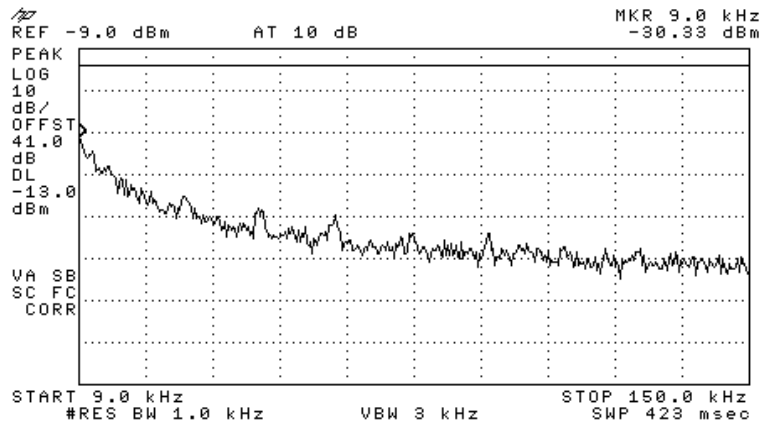


Figure 76.— 871.50 MHz

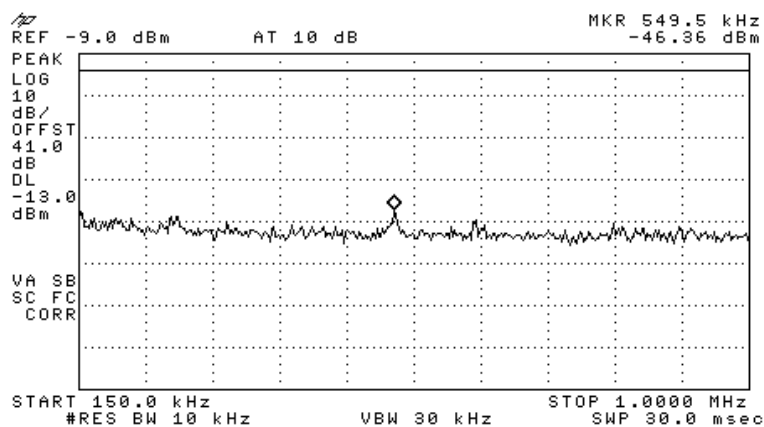


Figure 77.— 871.50 MHz

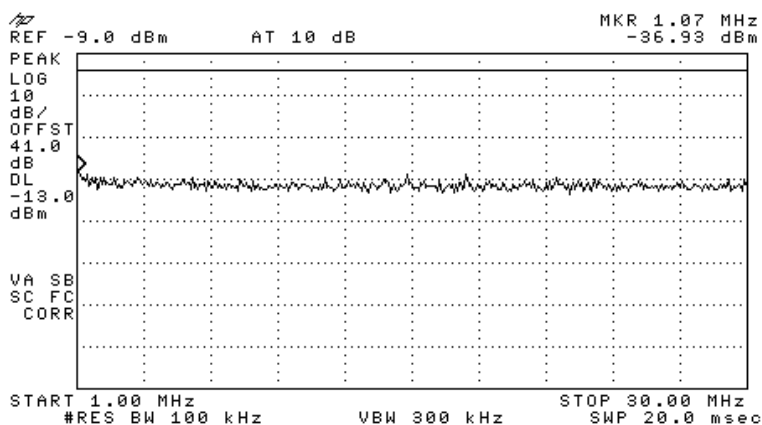


Figure 78.— 871.50 MHz

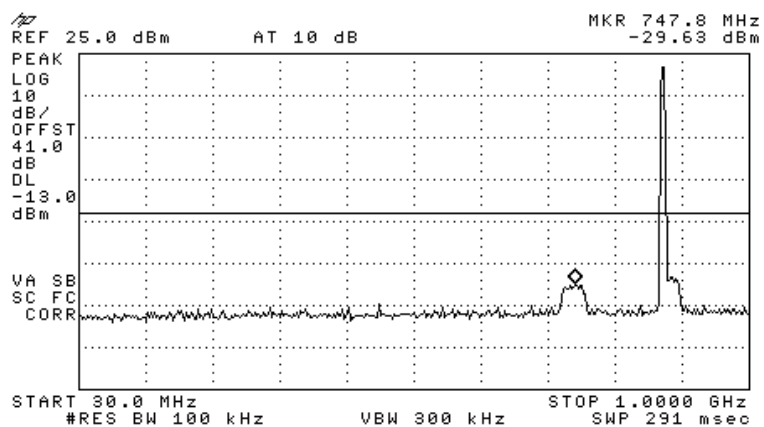


Figure 79.— 871.50 MHz

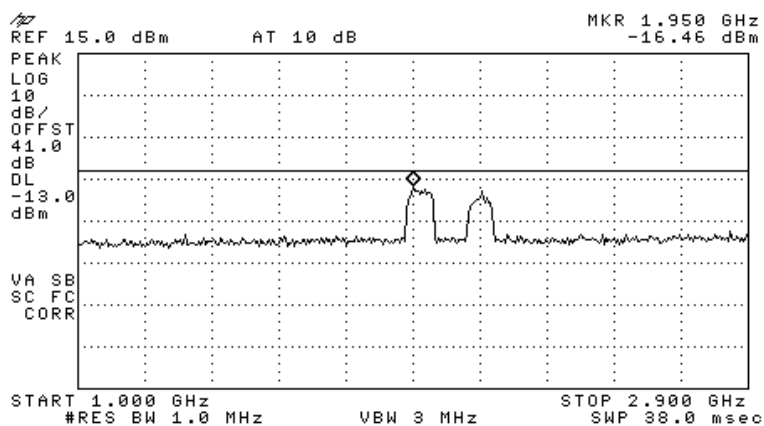


Figure 80.— 871.50 MHz

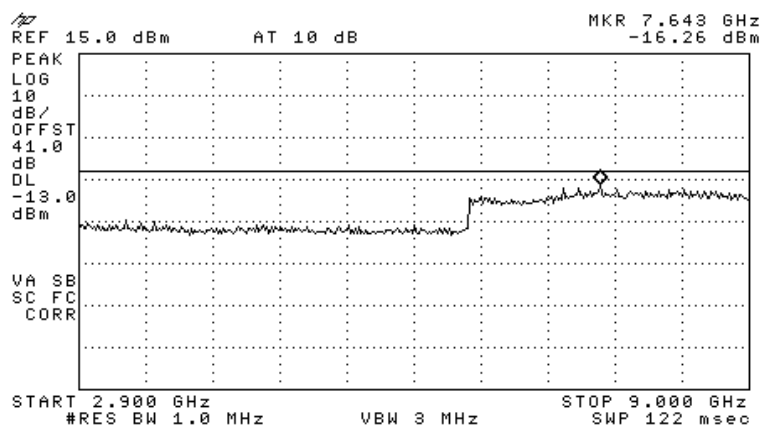


Figure 81.— 871.50 MHz

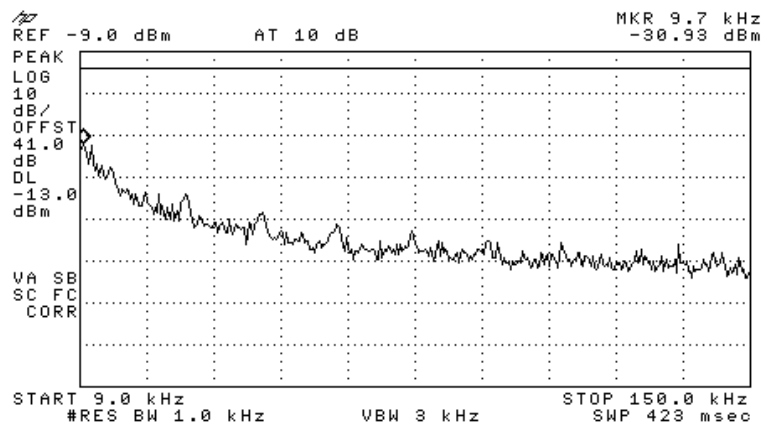


Figure 82.— 881.00 MHz

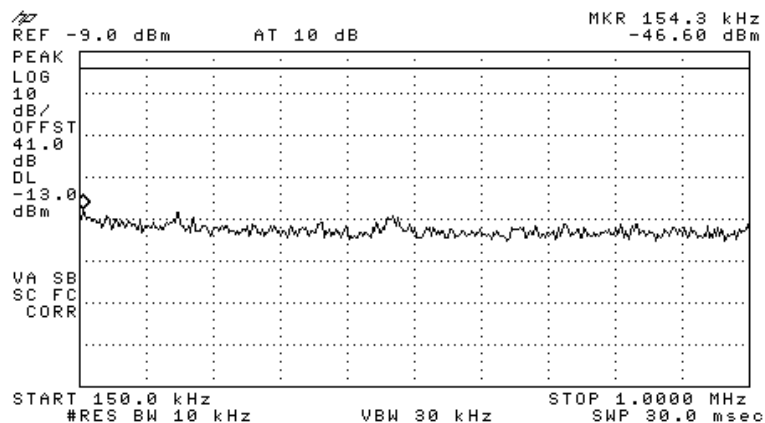


Figure 83.— 881.00 MHz

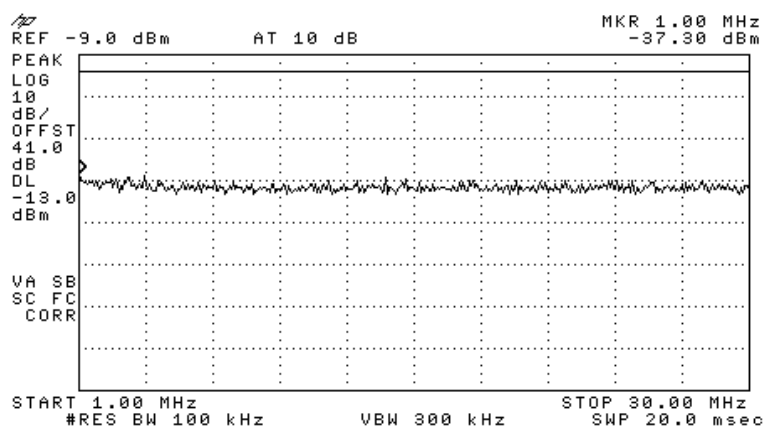


Figure 84.— 881.00 MHz

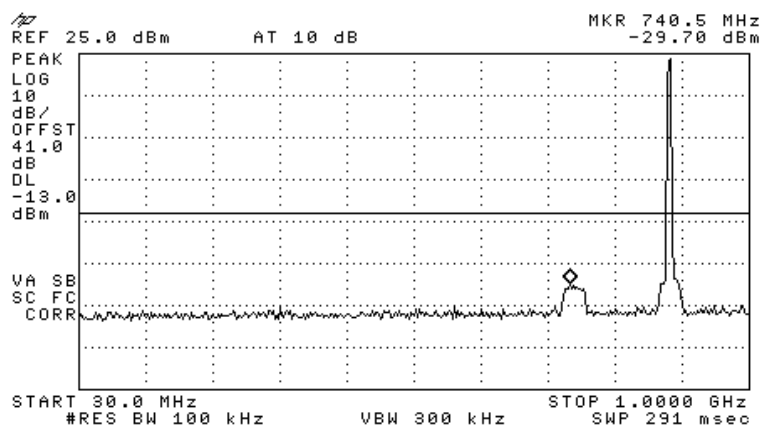


Figure 85.— 881.00 MHz

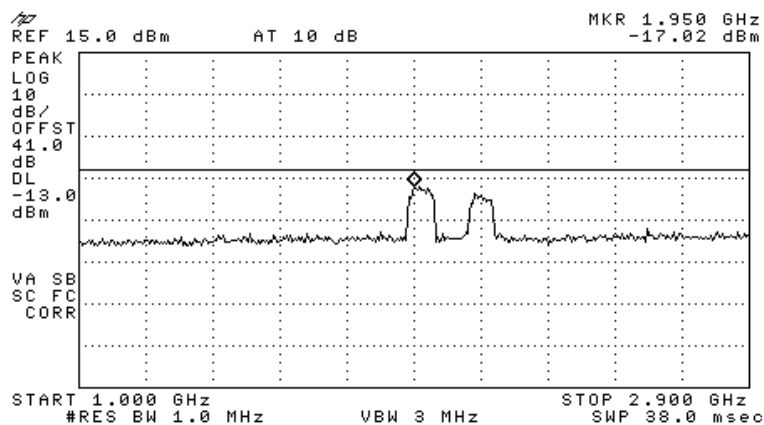


Figure 86.— 881.00 MHz

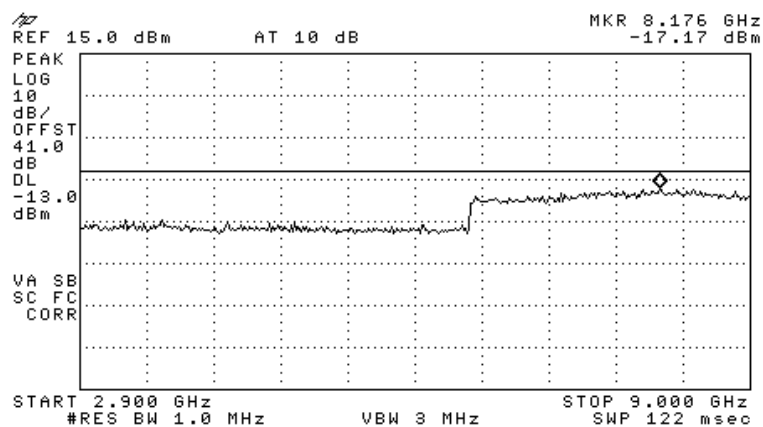


Figure 87.— 881.00 MHz

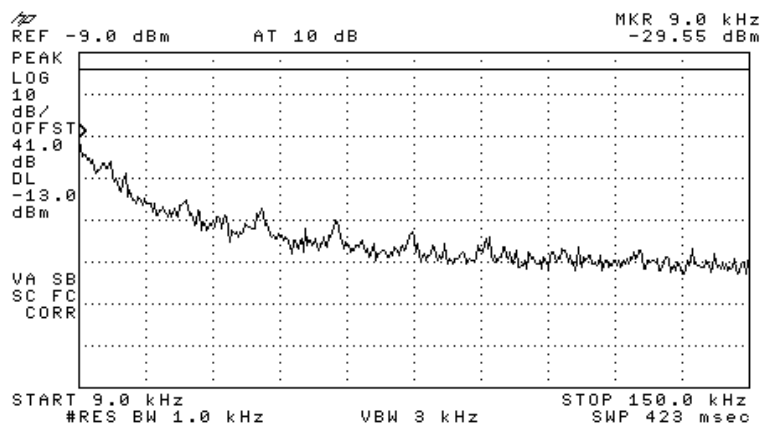


Figure 88.— 891.50 MHz

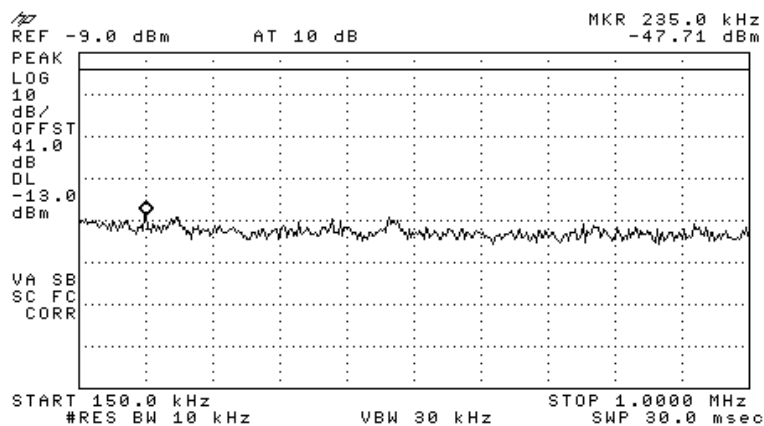


Figure 89.— 891.50 MHz

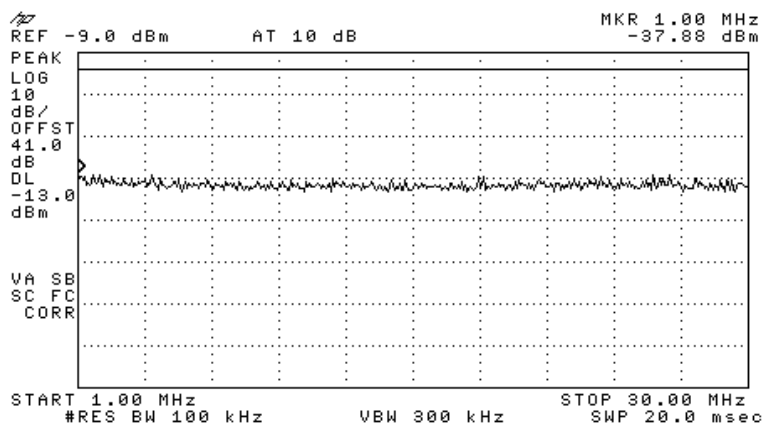


Figure 90.— 891.50 MHz

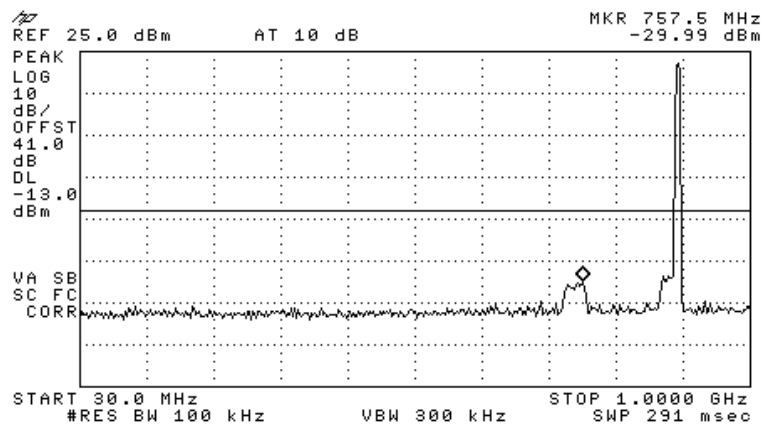


Figure 91.— 891.50 MHz

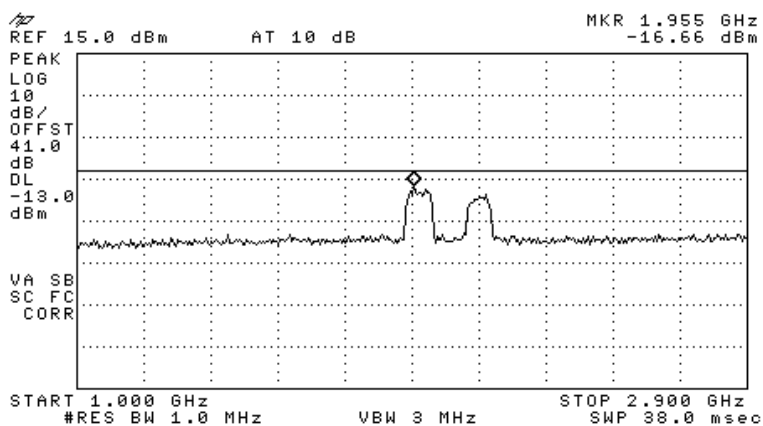


Figure 92.— 891.50 MHz

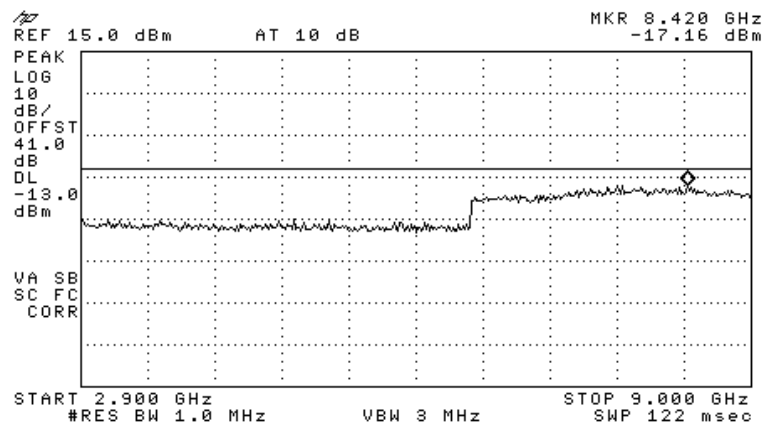


Figure 93.— 891.50 MHz

7.3 Results Table

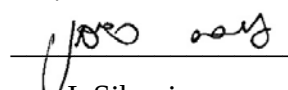
E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
FCC Part 22, Section 917; FCC Part 2.1051

Modulation	Operation Frequency (MHz)	Frequency (GHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	870.20	1.960	-17.05	-13.0	-4.05
	881.00	1.950	-16.50	-13.0	-3.50
	892.80	7.704	-16.17	-13.0	-3.17
GSM	870.20	1.960	-16.73	-13.0	-3.73
	881.00	7.795	-17.20	-13.0	-4.20
	892.80	1.950	-15.33	-13.0	-2.33
W-CDMA	871.50	7.643	-16.26	-13.0	-3.26
	881.00	1.950	-17.02	-13.0	-4.02
	895.50	1.955	-16.66	-13.0	-3.66

Figure 94 Out of Band Emission Results CELL

JUDGEMENT: Passed by 2.33 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni



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

Figure 95 Test Equipment Used

8. Band Edge Spectrum CELL

8.1 Test Specification

FCC Part 22, FCC Part 2.1051

8.2 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:

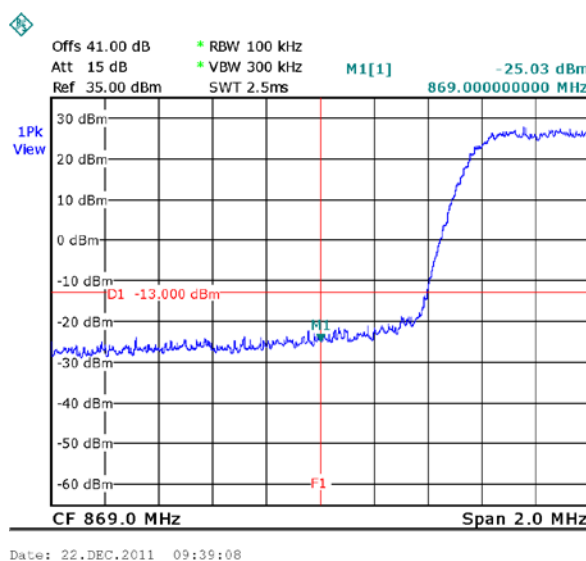


Figure 96.— 870.20 MHz

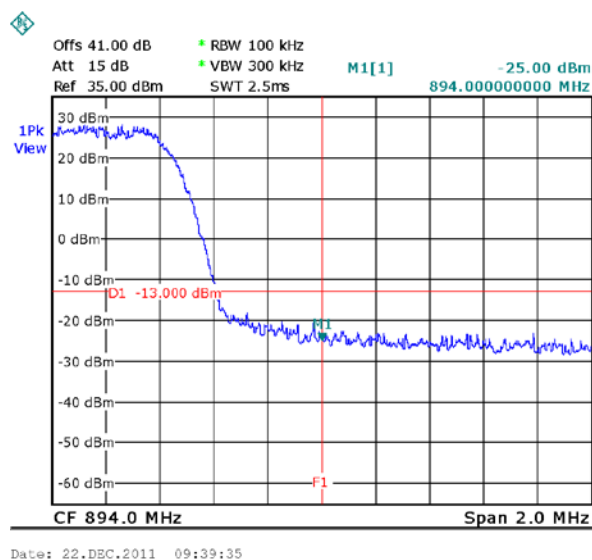


Figure 97.— 892.80 MHz

GSM:

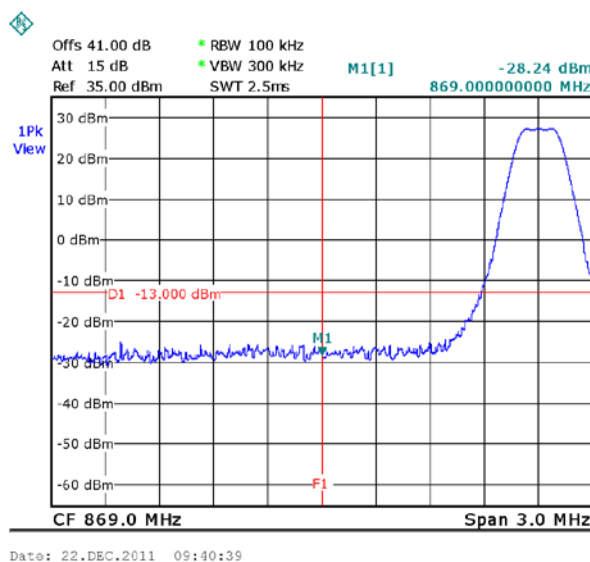


Figure 98.— 870.20 MHz

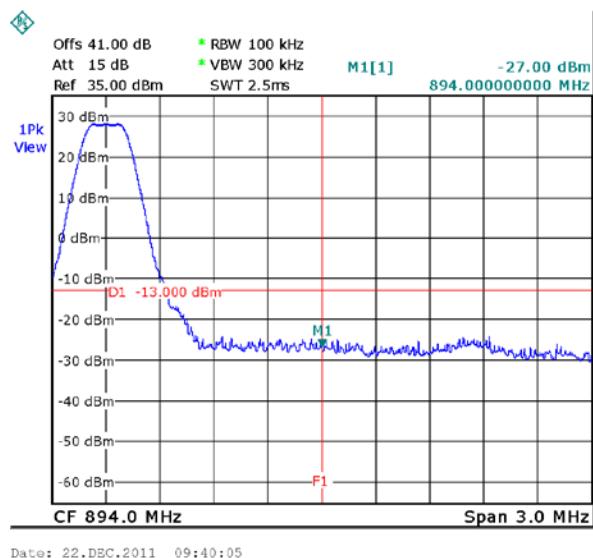


Figure 99.— 892.80 MHz

W-CDMA:

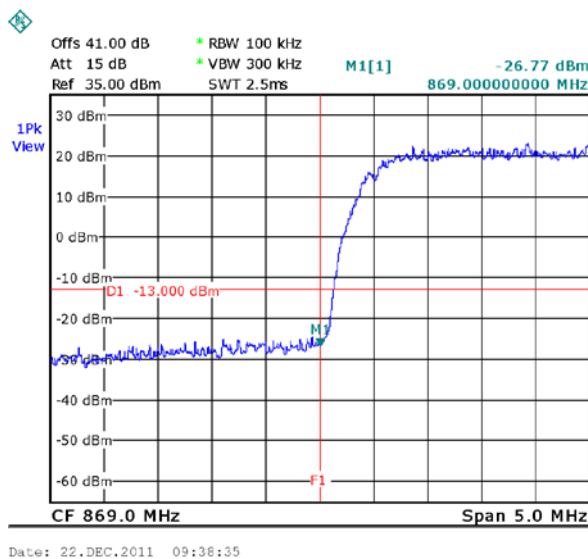


Figure 100.— 871.50 MHz

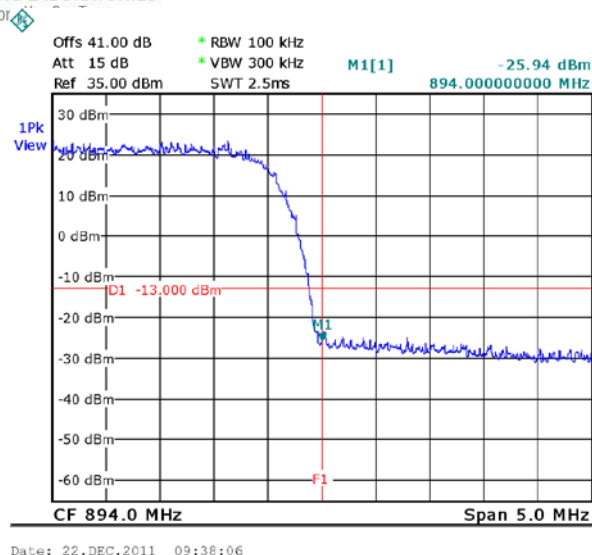


Figure 101.— 891.50 MHz

8.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO

Model No.: HX-C85P19L70MA17M-AC-A

Serial Number: 0B422A0

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	870.2	869.0	-25.03	-13.0	-12.03
	892.8	894.0	-25.00	-13.0	-12.00
GSM	870.2	869.0	-28.24	-13.0	-15.24
	892.8	894.0	-27.00	-13.0	-14.00
W-CDMA	871.5	869.0	-26.77	-13.0	-13.77
	891.5	894.0	-25.94	-13.0	-12.94

Figure 102 Band Edge Spectrum Results CELL

JUDGEMENT: Passed by 12.00 dB

TEST PERSONNEL:

Tester Signature:

Date: 13.02.12

Typed/Printed Name: V. Siboni

8.4 Test Equipment Used.

Band Edge Spectrum CELL

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	R&S	FSL6	10-300191865	30.10.2011	1 year
Signal Generator	HP	E4438C ESG-	MY45091956	May 4, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	May 4, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 103 Test Equipment Used

9. Out of Band Emissions (Radiated) CELL

9.1 Test Specification

FCC Part 22, Section 917; FCC Part 2.1053

9.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12

Unwanted Emissions: Radiated Spurious.

The power of any emission outside of the authorized operating frequency ranges (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:

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dB)}$$

P_d = Dipole equivalent power (result).

P_g = Signal generator output level.



9.3 Results Table

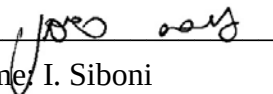
Carrier Channel	Freq.	Antenna Pol.	Maximum Peak Level	Signal Generator RF Output	Cable Loss	Antenna Gain	Effective Radiated Power Level	Spec.	Margin
(MHz)	(MHz)		(dBμV/m)	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
870.20	1740.4	V	47.1	-53.71	5.45	7.64	-51.52	-13.0	-38.52
870.20	1740.4	H	46.4	-54.24	5.45	7.64	-52.05	-13.0	-39.05
881.00	1762	V	48.0	-51.79	5.6	7.66	-49.73	-13.0	-36.73
881.00	1762	H	47.5	-52.55	5.6	7.66	-50.49	-13.0	-37.49
892.80	1785.6	V	47.8	-51.99	5.6	7.66	-49.93	-13.0	-36.93
892.80	1785.6	H	45.4	-54.65	5.6	7.66	-52.59	-13.0	-39.59

Figure 104 Out of Band (Radiated) CELL

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

Judgment: Passed by 36.73 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni



9.4 Test Instrumentation Used, Radiated Measurements CELL

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

10. Peak Output Power PCS

10.1 Test Specification

FCC Part 24, Subpart E

10.2 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

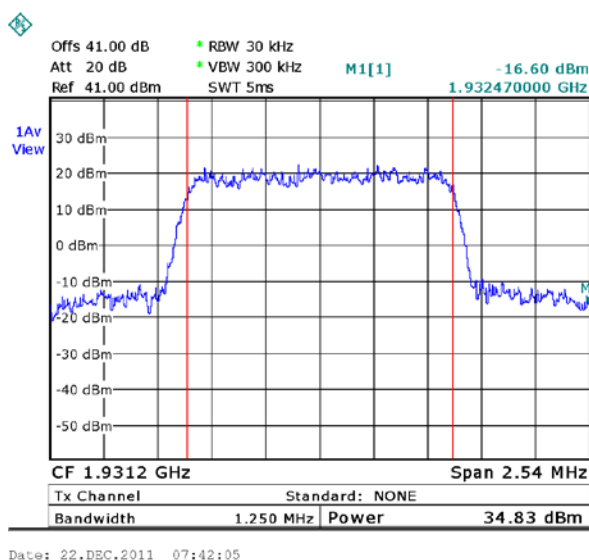


Figure 105.— 1931.20 MHz

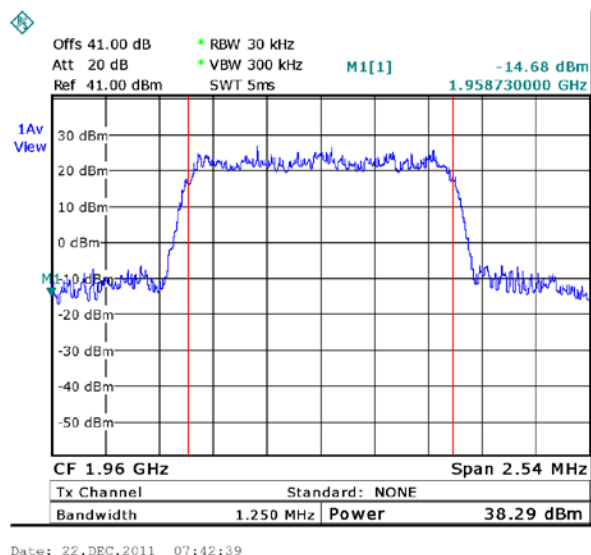


Figure 106.— 1960.00 MHz

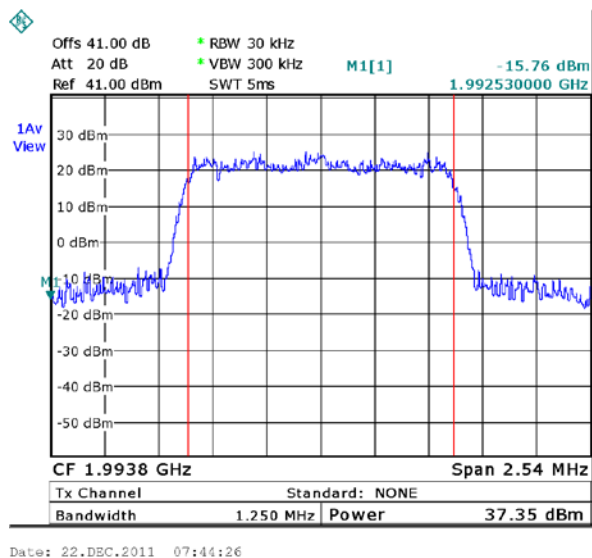


Figure 107.— 1993.80 MHz

GSM:

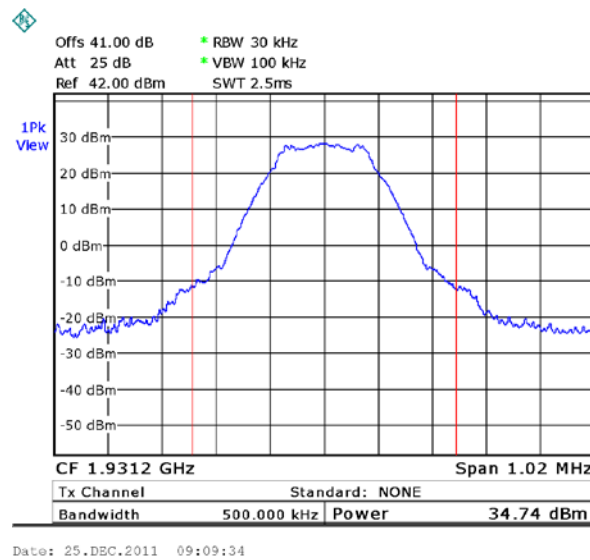


Figure 108.— 1931.20 MHz

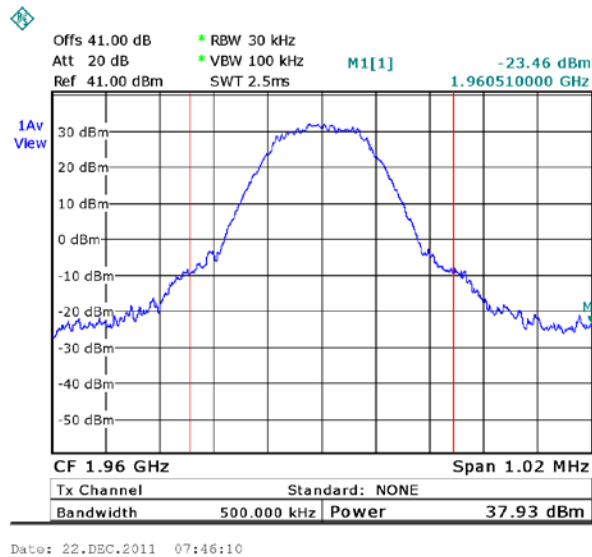


Figure 109.— 1960.00 MHz

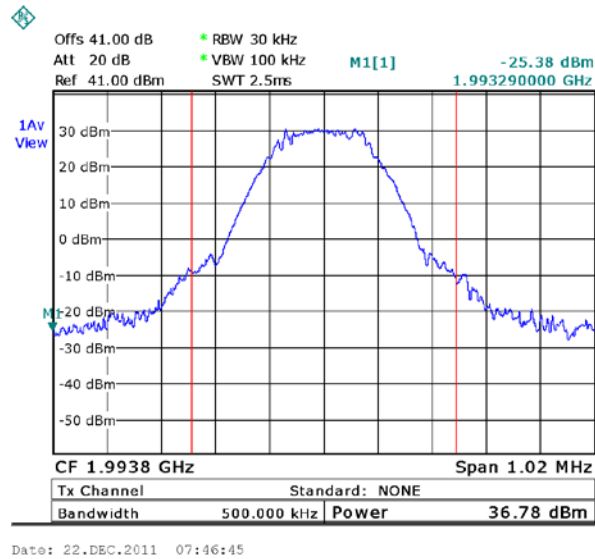


Figure 110.— 1993.80 MHz

W-CDMA:

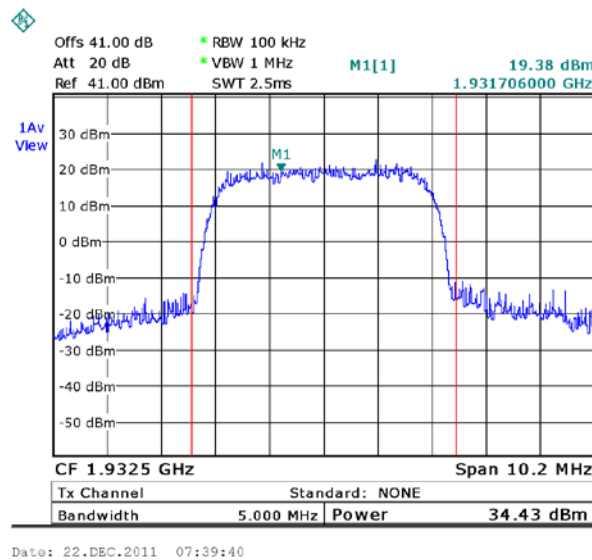


Figure 111.— 1932.50 MHz

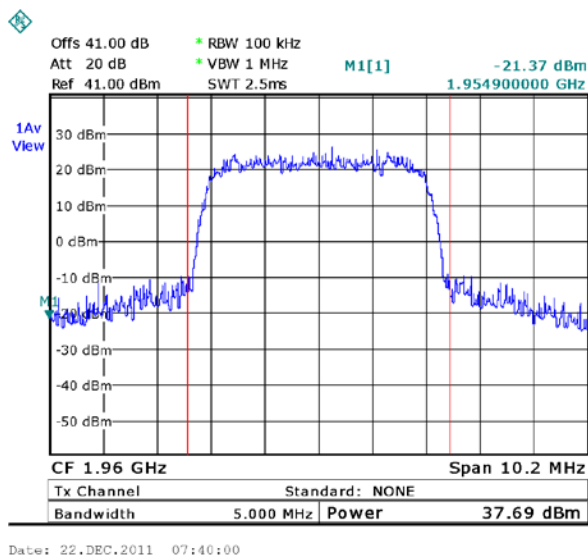


Figure 112.— 1960.00 MHz

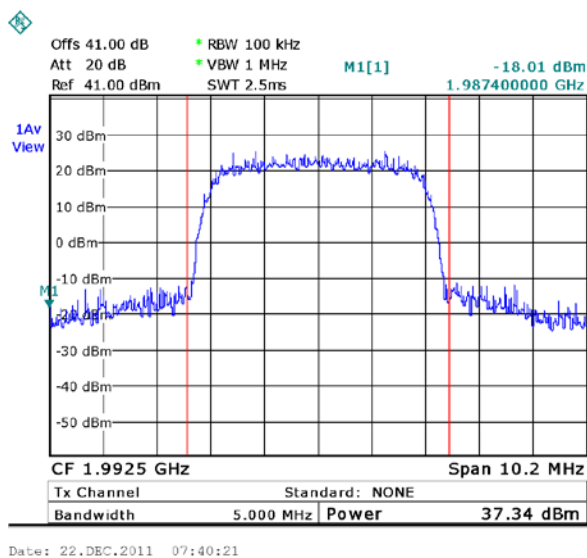


Figure 113.— 1992.50 MHz

10.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO

Model No.: HX-C85P19L70MA17M-AC-A

Serial Number: 0B422A0

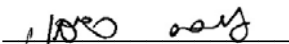
Specification: FCC Part 24, Subpart E, Section 232, FCC Part 2, Section 1046

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	1931.2	34.83	50.0	-15.17
	1960.0	38.29	50.0	-11.71
	1993.8	37.35	50.0	-12.65
GSM	1931.2	34.74	50.0	-15.26
	1960.0	37.93	50.0	-12.07
	1993.8	36.78	50.0	-13.22
W-CDMA	1932.5	34.43	50.0	-15.57
	1960.0	37.69	50.0	-12.31
	1992.5	37.34	50.0	-12.66

Figure 114 Peak Output Power PCS

JUDGEMENT: Passed by 11.71 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni

10.4 Test Equipment Used.

Peak Output Power PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	R&S	FSL6	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4438C ESG-	MY45091956	December 12, 2011	1 year
Signal Generator	HP	E4433B ESG-D	GB40050702	December 12, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 115 Test Equipment Used

11. Occupied Bandwidth PCS

11.1 Test Specification

FCC Part 2, Section 1049

11.2 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

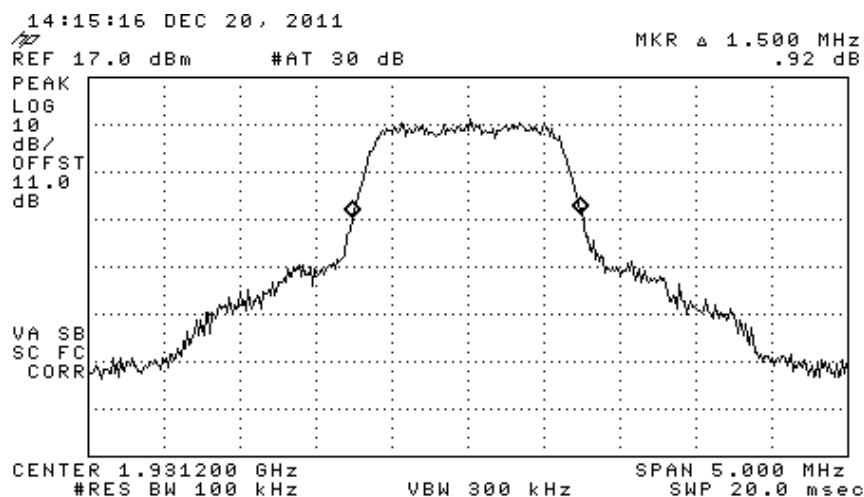


Figure 116.— Input 1931.20 MHz

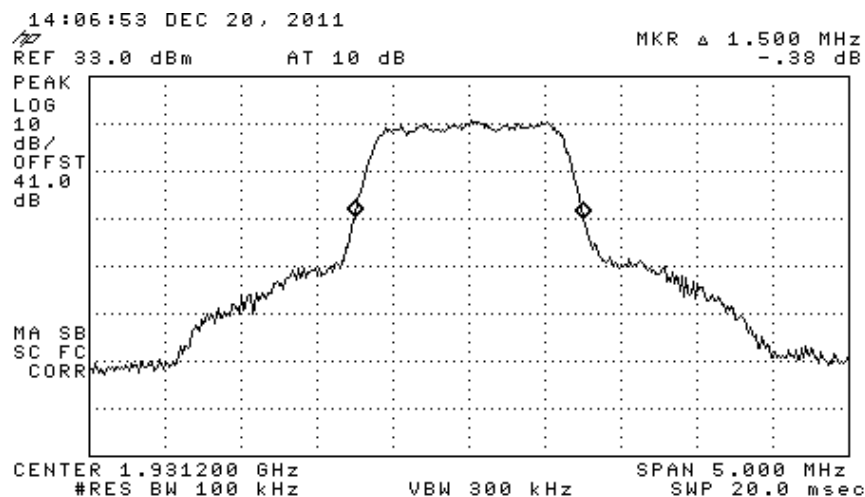


Figure 117.— Output 1931.20 MHz

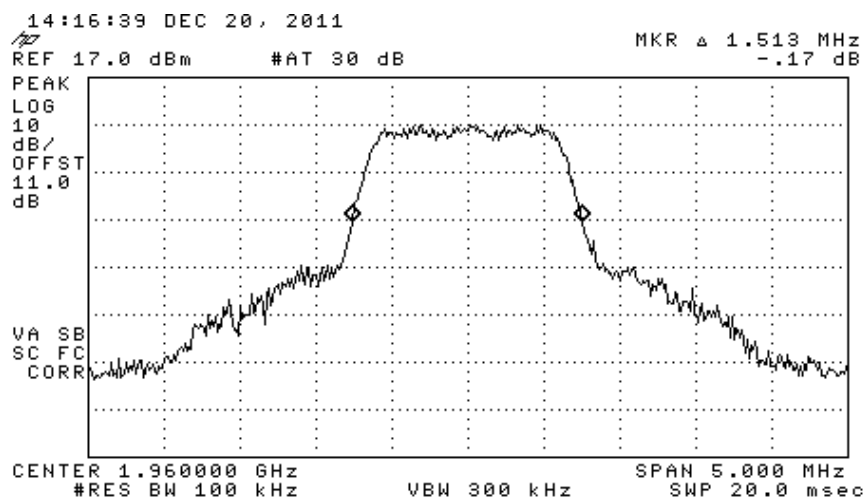


Figure 118.— Input 1960.00 MHz

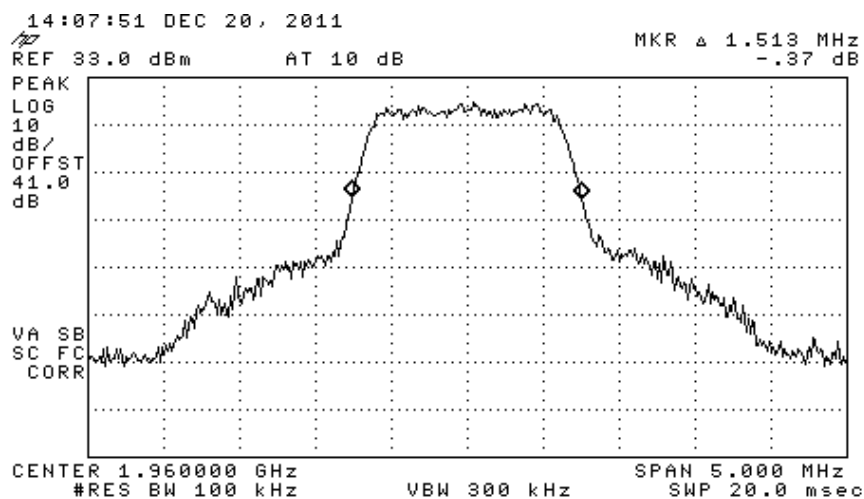


Figure 119.— Output 1960.00 MHz

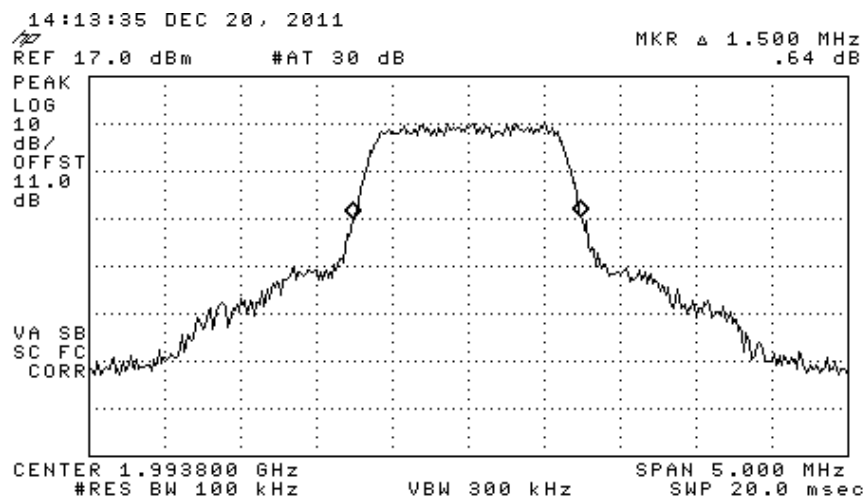


Figure 120.— Input 1993.80 MHz

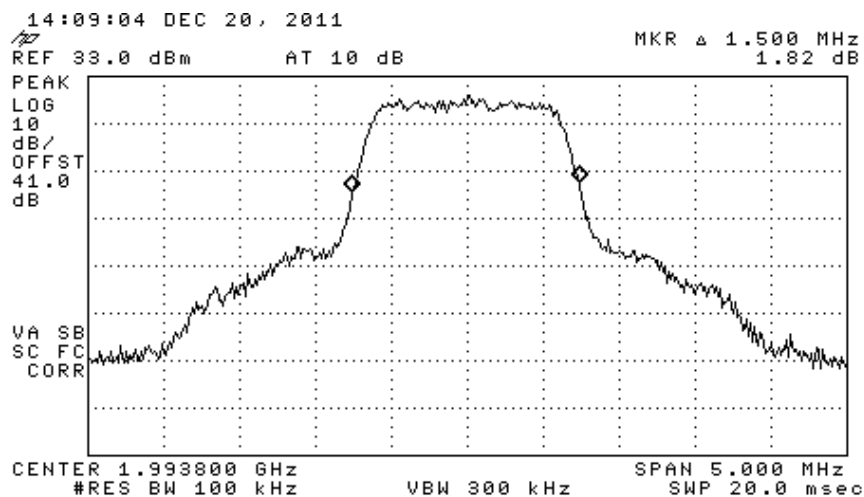


Figure 121.— Output 1993.80 MHz

GSM:

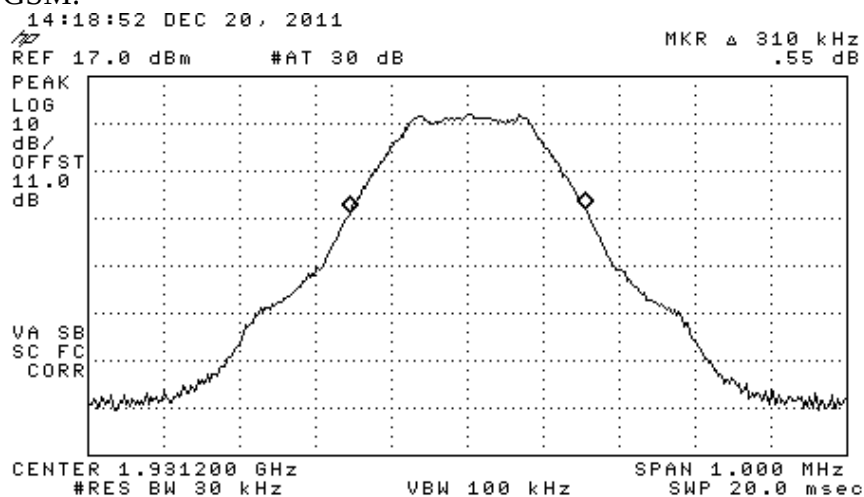


Figure 122.— Input 1931.20 MHz

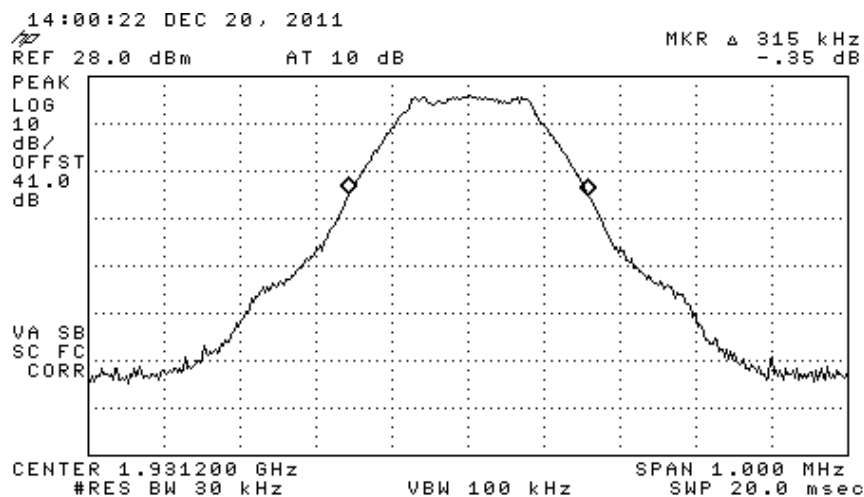


Figure 123.— Output 1931.20 MHz

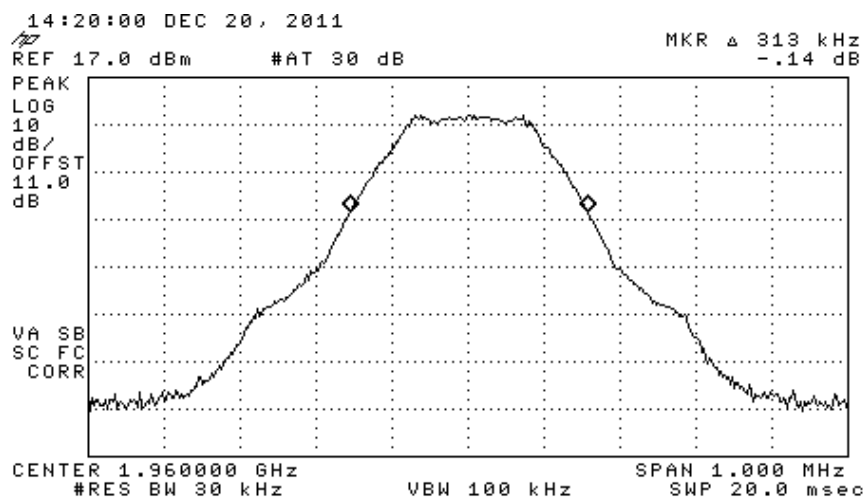


Figure 124.— Input 1960.00 MHz

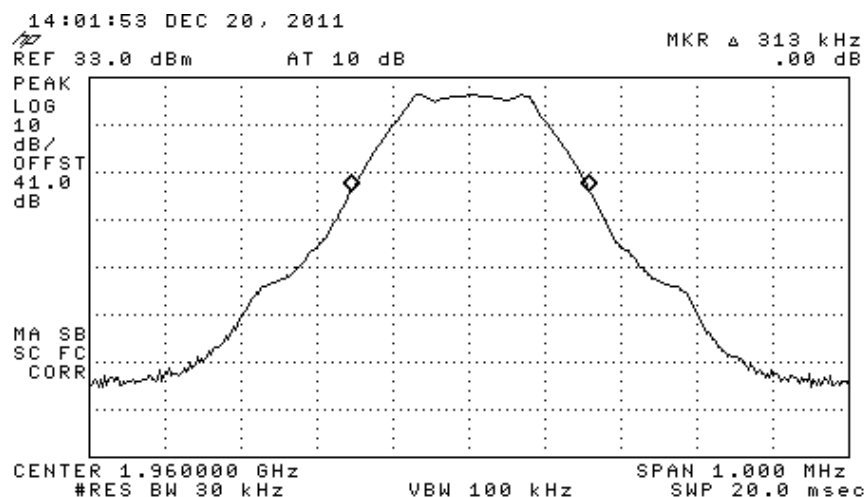


Figure 125.— Output 1960.00 MHz

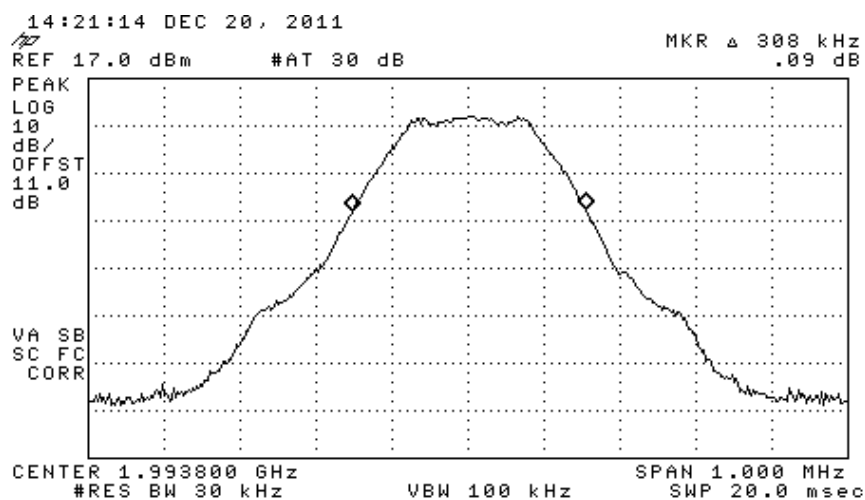


Figure 126.— Input 1993.80 MHz

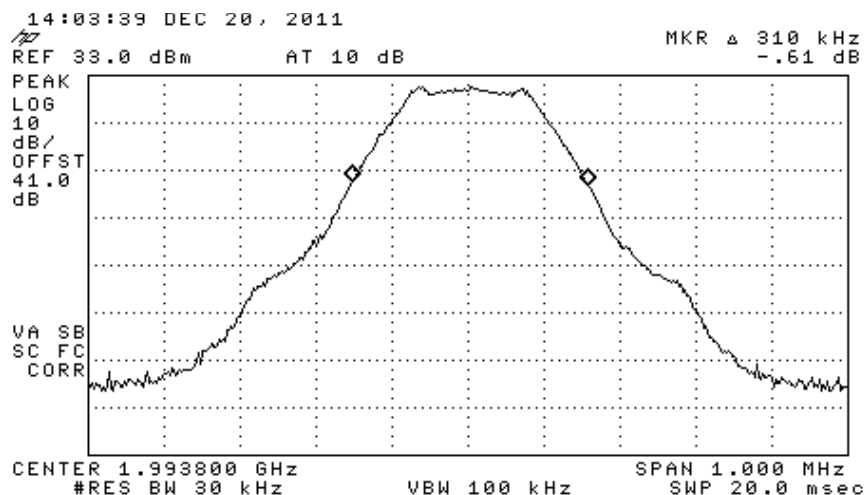


Figure 127.— Output 1993.80 MHz

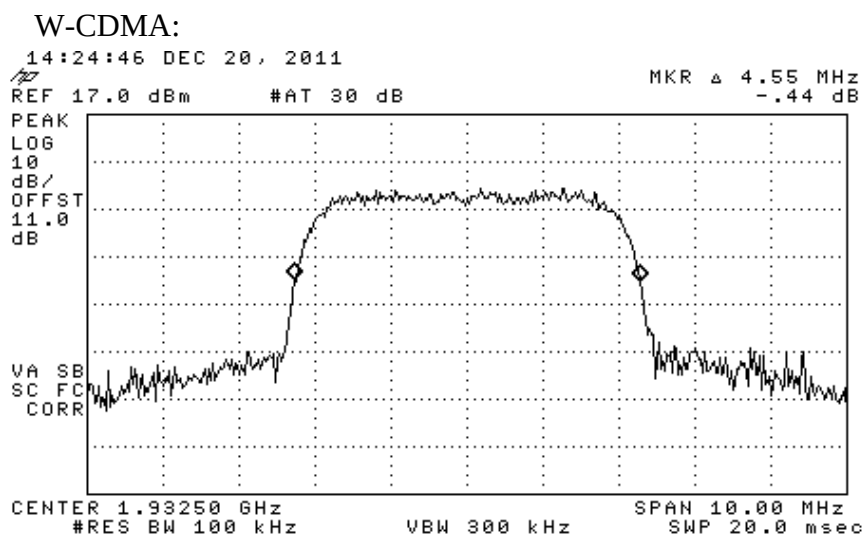


Figure 128.— Input 1932.50 MHz

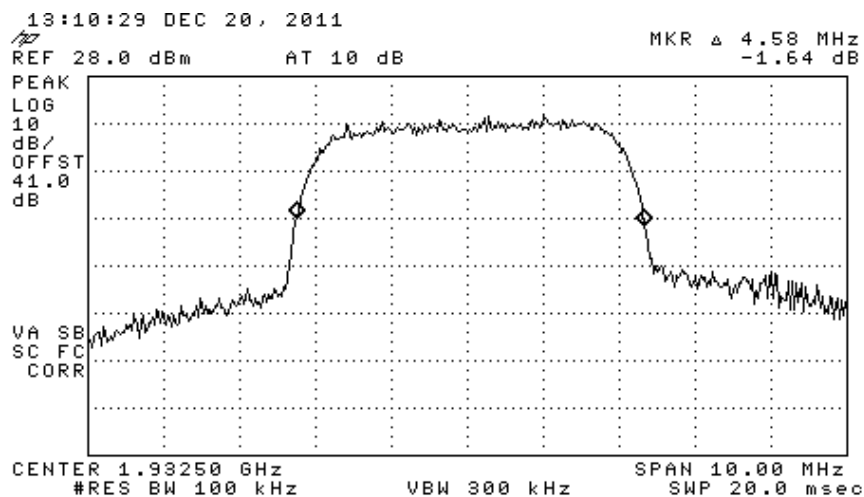


Figure 129.— Output 1932.50 MHz

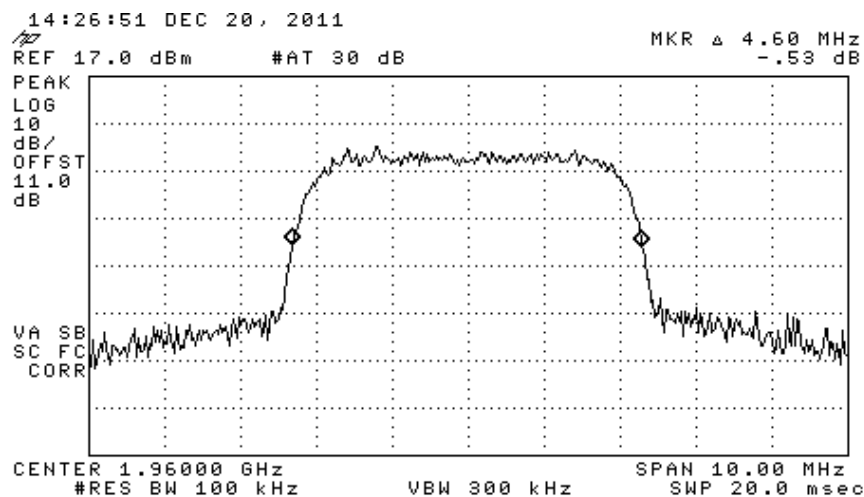


Figure 130.— Input 1960.00 MHz

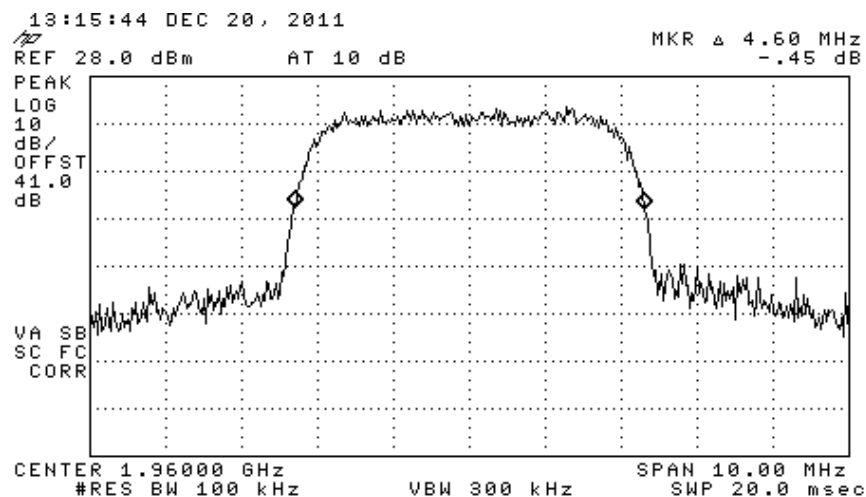


Figure 131.— Output 1960.00 MHz

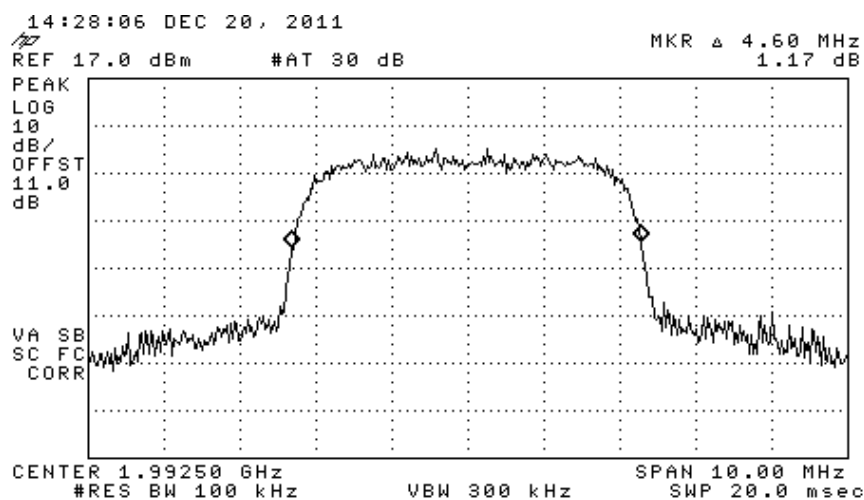


Figure 132.— Input 1992.50 MHz

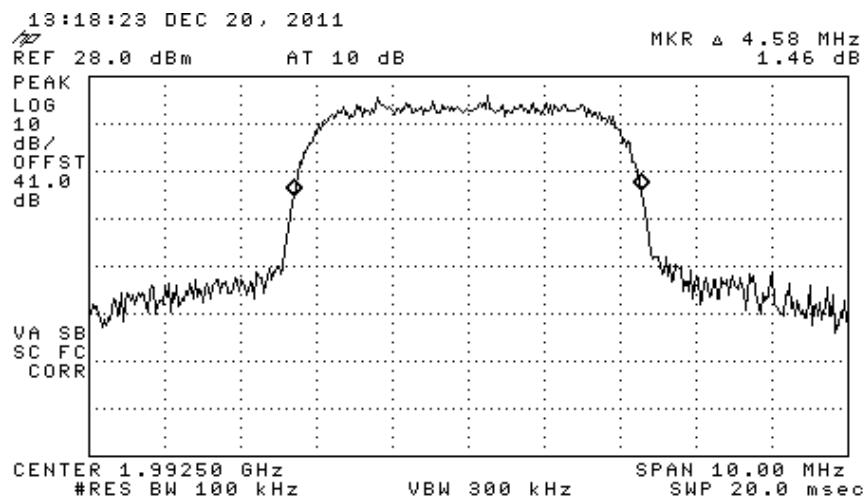


Figure 133.— Output 1992.50 MHz

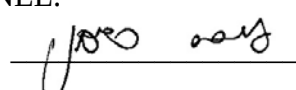
11.3 Results Table

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

Modulation		Operating Frequency (MHz)	Reading (MHz)
CDMA	Input	1931.20	1.500
	Output	1931.20	1.500
	Input	1960.00	1.513
	Output	1960.00	1.513
	Input	1993.80	1.500
	Output	1993.80	1.500
GSM	Input	1931.20	0.310
	Output	1931.20	0.315
	Input	1960.00	0.313
	Output	1960.00	0.313
	Input	1993.80	0.308
	Output	1993.80	0.310
W-CDMA	Input	1932.50	4.550
	Output	1932.50	4.580
	Input	1960.00	4.600
	Output	1960.00	4.600
	Input	1992.50	4.600
	Output	1992.50	4.5800

Figure 134 Occupied Bandwidth PCS

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni

11.4 Test Equipment Used.

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

Figure 135 Test Equipment Used

12. Out of Band Emissions at Antenna Terminals PCS

12.1 Test Specification

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

12.2 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 100 kHz R.B.W.

Signal power was +10 dBm to EUT.

CDMA:

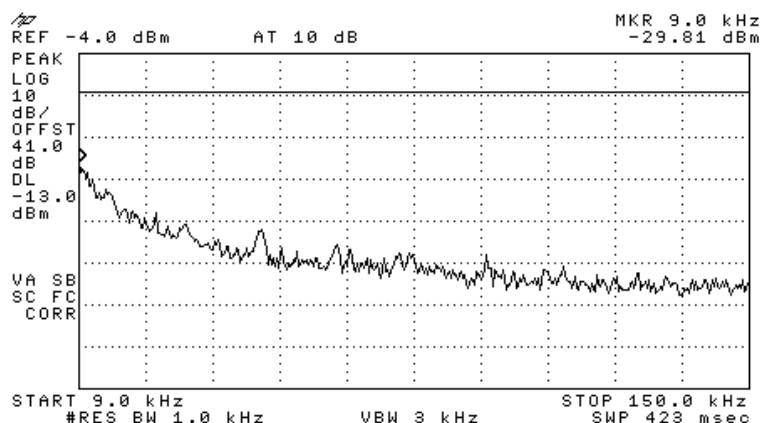


Figure 136.— 1931.20 MHz

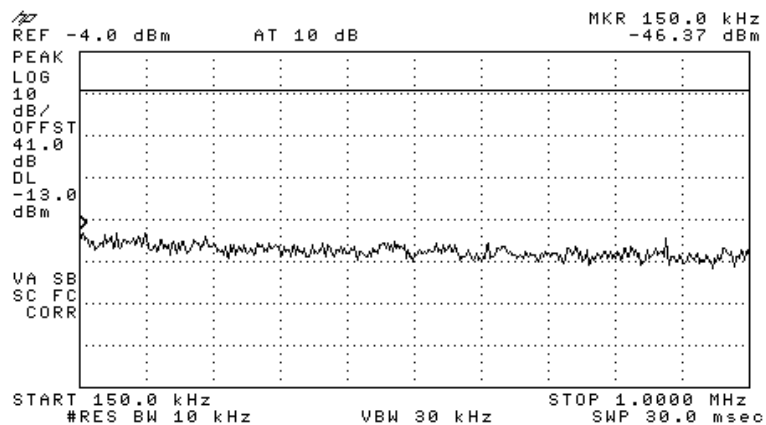


Figure 137.— 1931.20 MHz

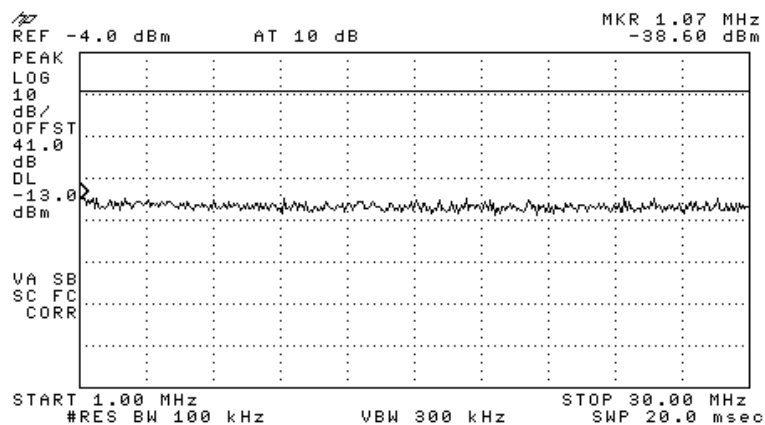


Figure 138.— 1931.20 MHz

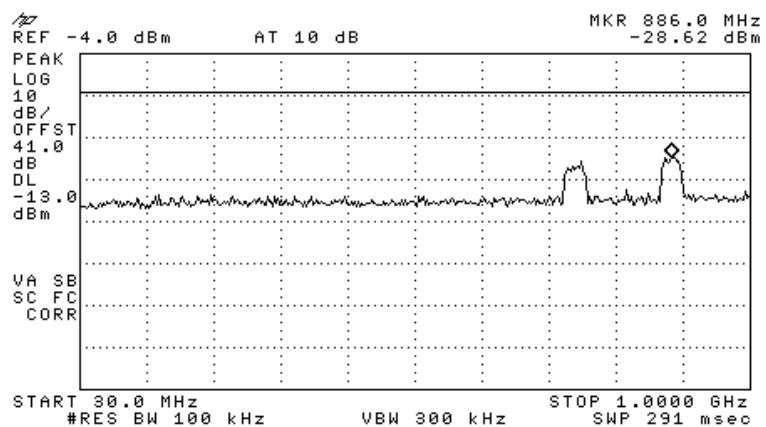


Figure 139.— 1931.20 MHz

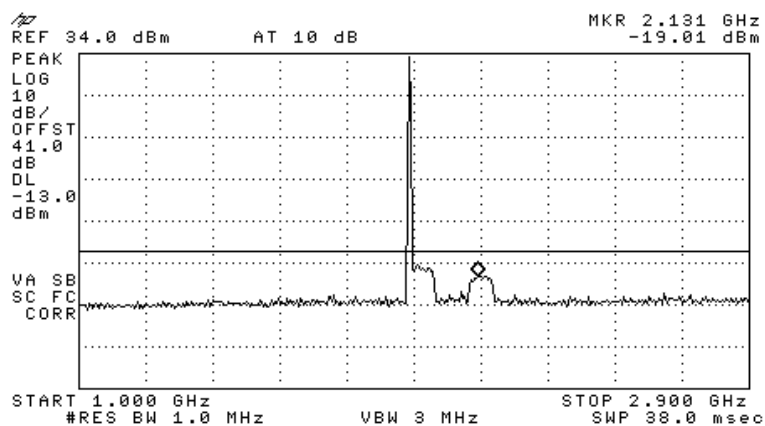


Figure 140.— 1931.20 MHz

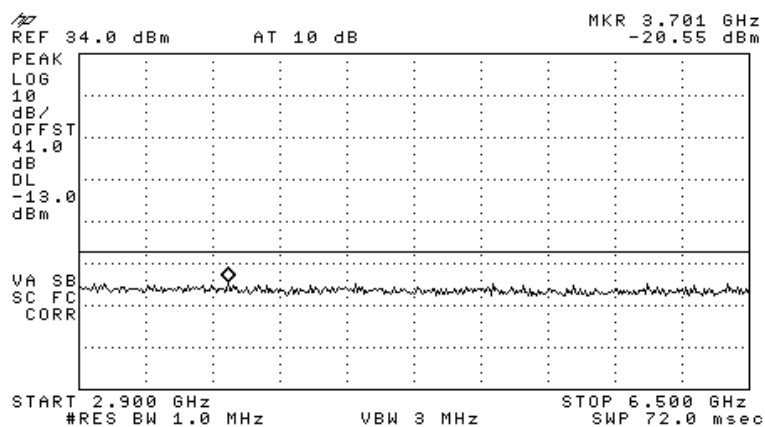


Figure 141.— 1931.20 MHz

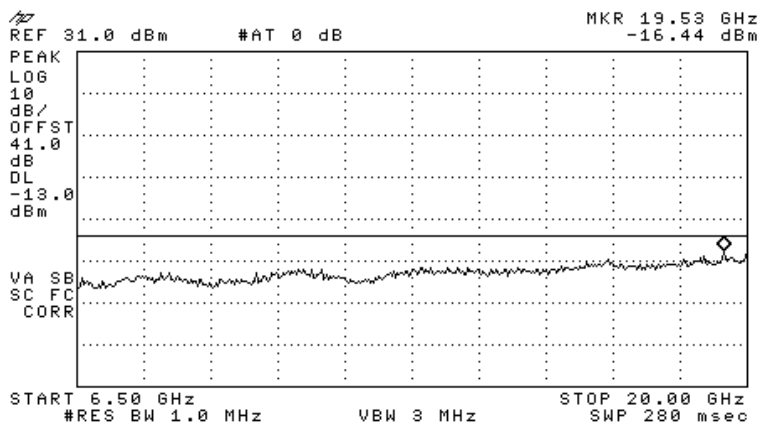


Figure 142.— 1931.20 MHz

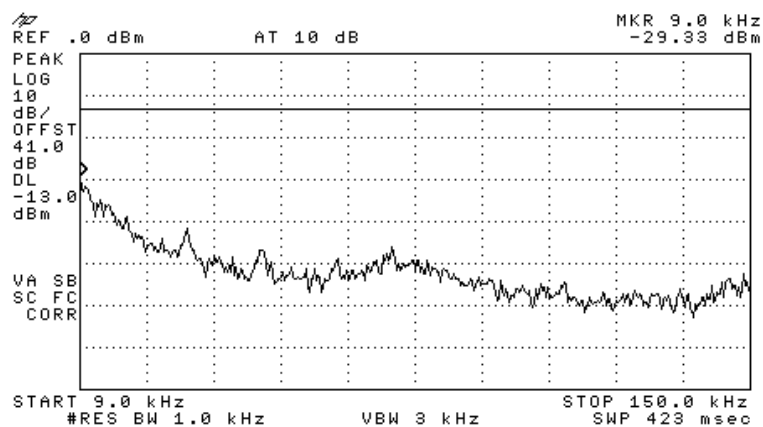


Figure 143.— 1960.00 MHz

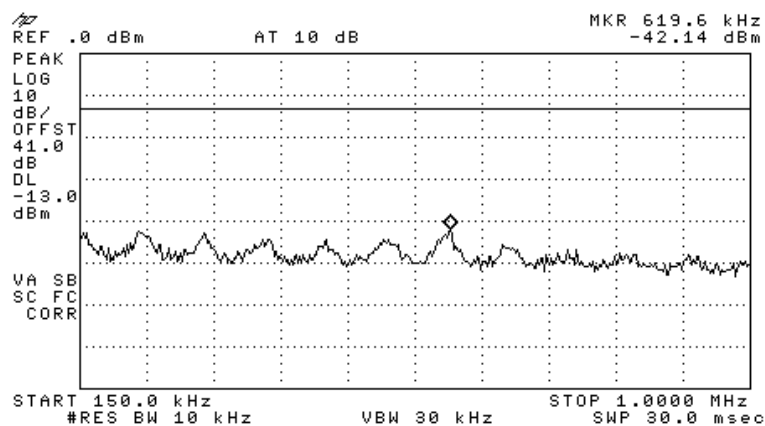


Figure 144.— 1960.00 MHz

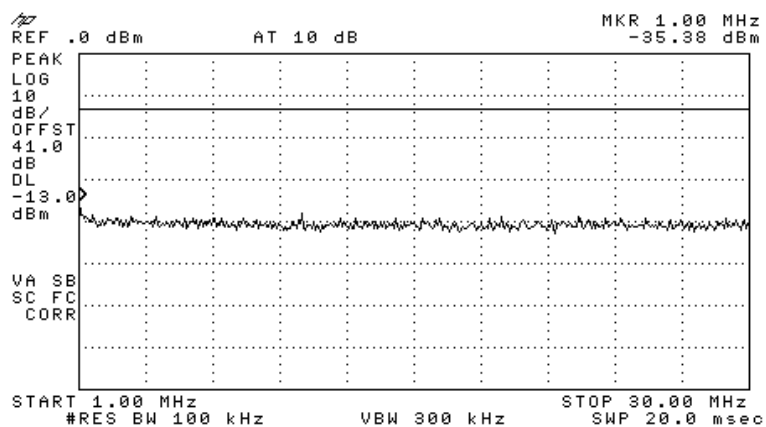


Figure 145.— 1960.00 MHz

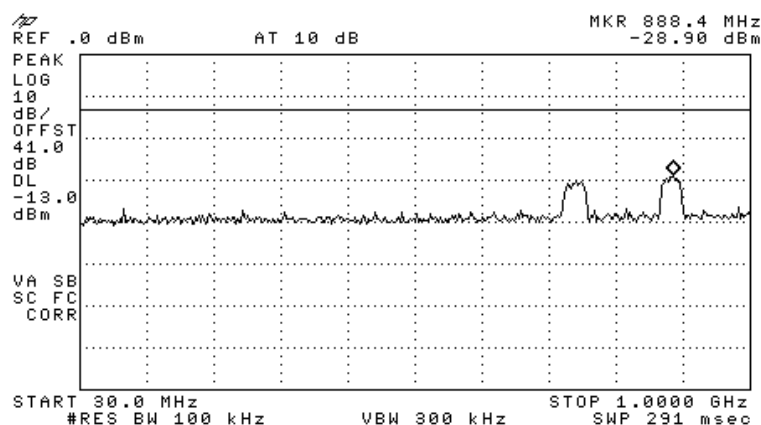


Figure 146.— 1960.00 MHz

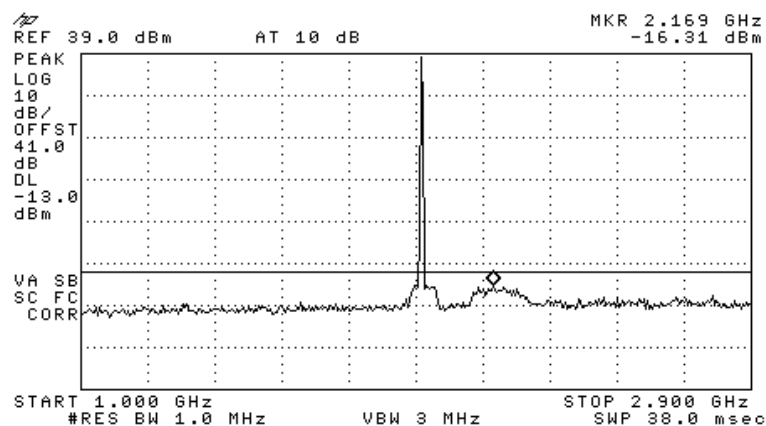


Figure 147.— 1960.00 MHz

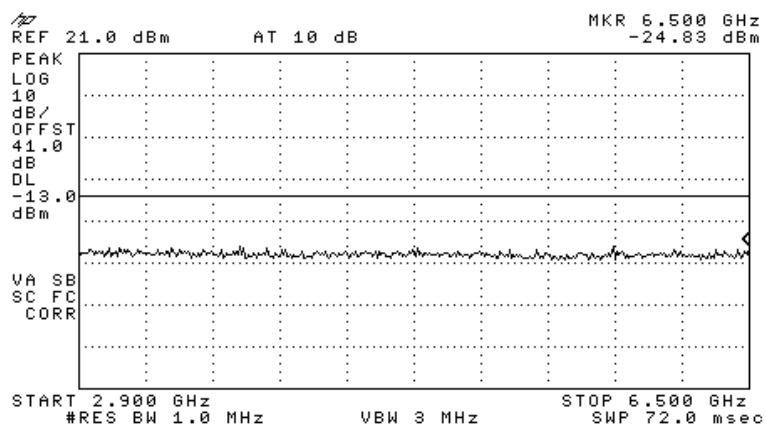


Figure 148.— 1960.00 MHz

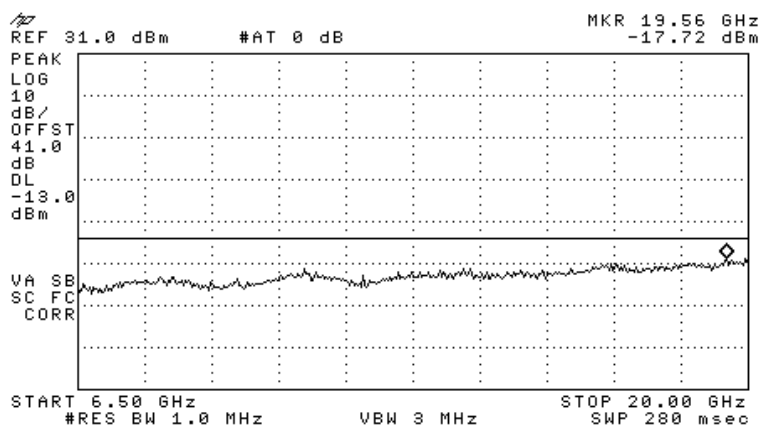


Figure 149.— 1960.00 MHz

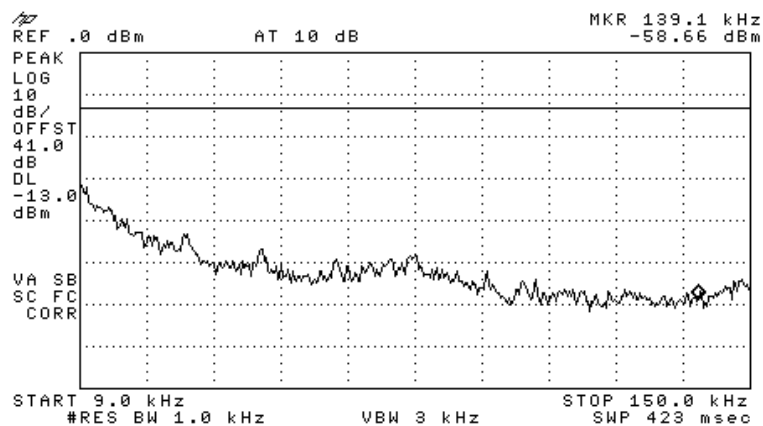


Figure 150.— 1993.80 MHz

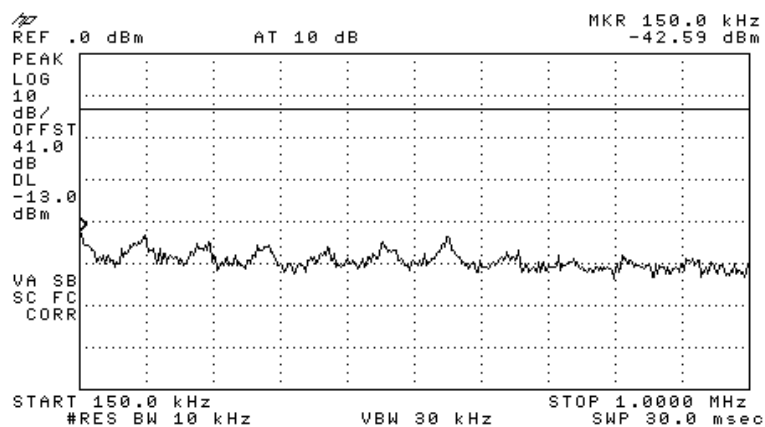


Figure 151.— 1993.80 MHz

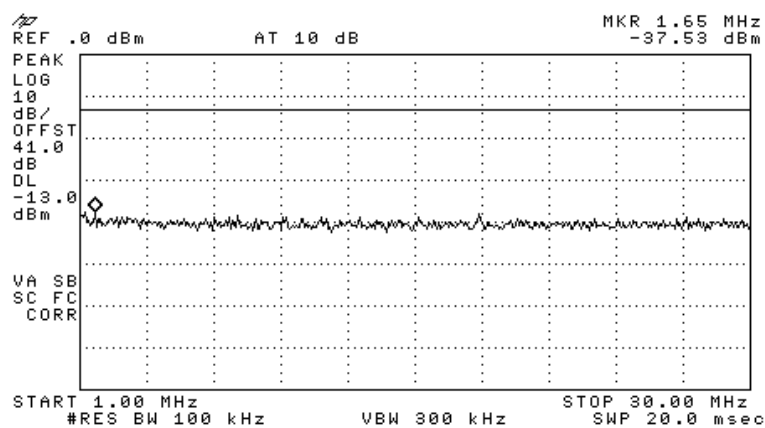


Figure 152.— 1993.80 MHz

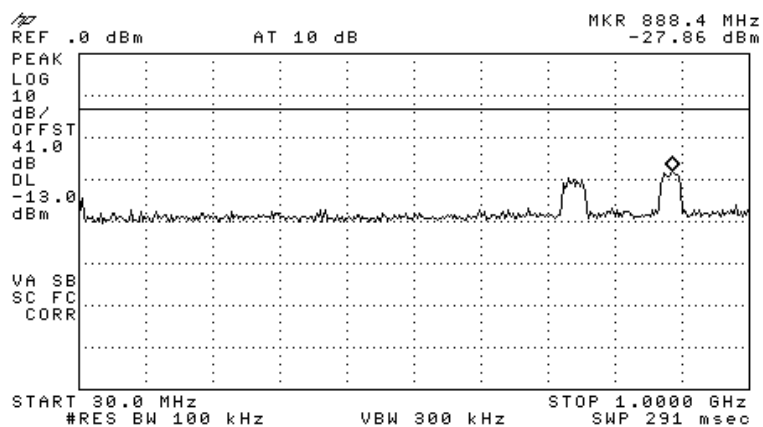


Figure 153.— 1993.80 MHz

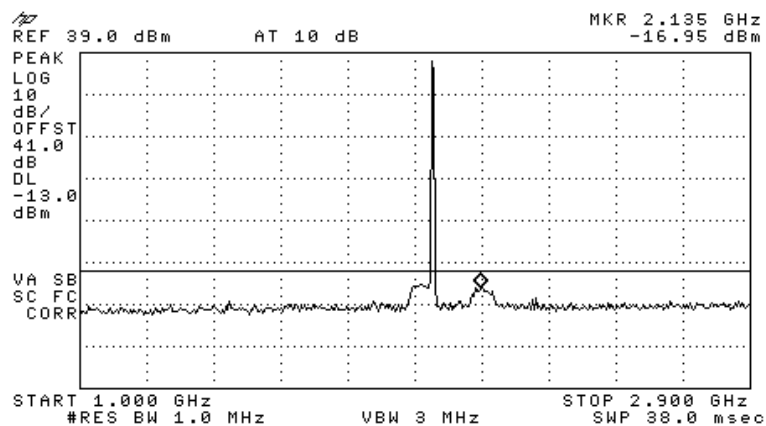


Figure 154.— 1993.80 MHz

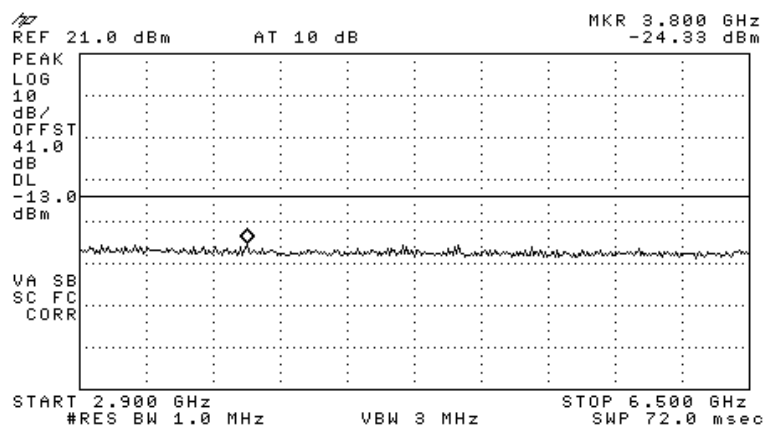


Figure 155.— 1993.80 MHz

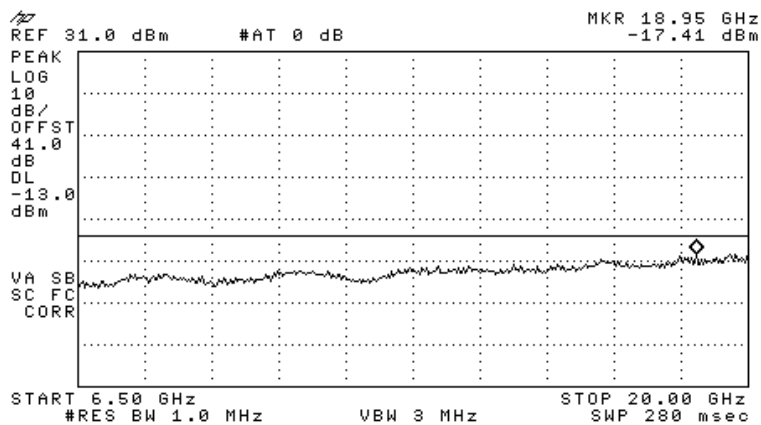


Figure 156.— 1993.80 MHz

GSM:

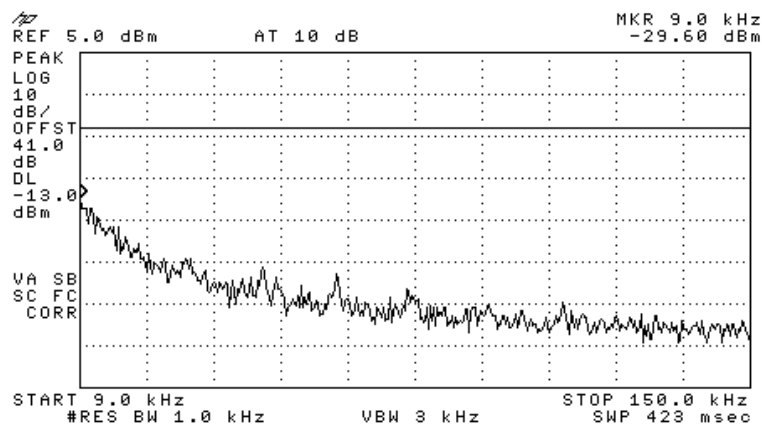


Figure 157.— 1931.20 MHz

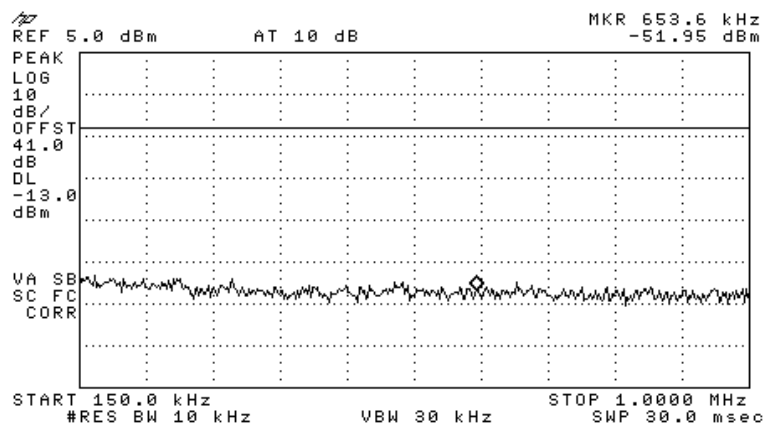


Figure 158.— 1931.20 MHz

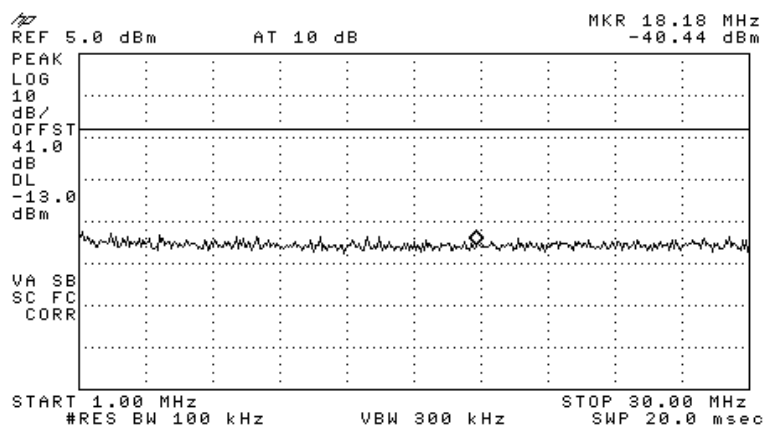


Figure 159.— 1931.20 MHz

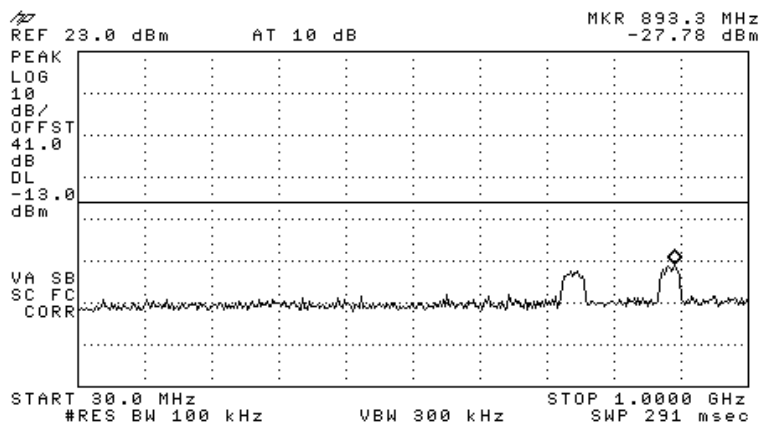


Figure 160.— 1931.20 MHz

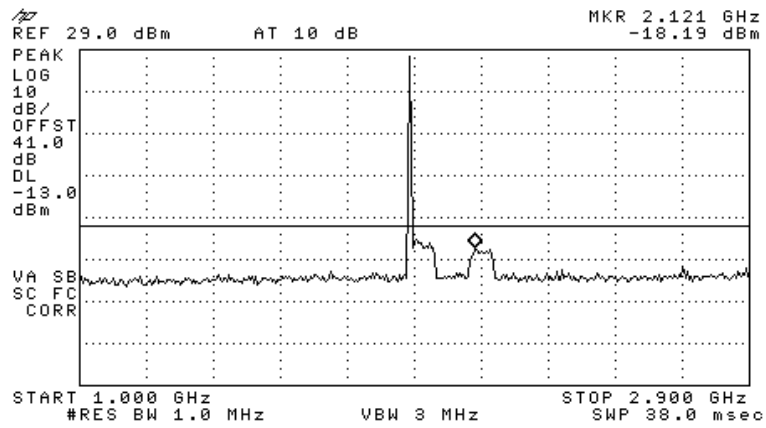


Figure 161.— 1931.20 MHz

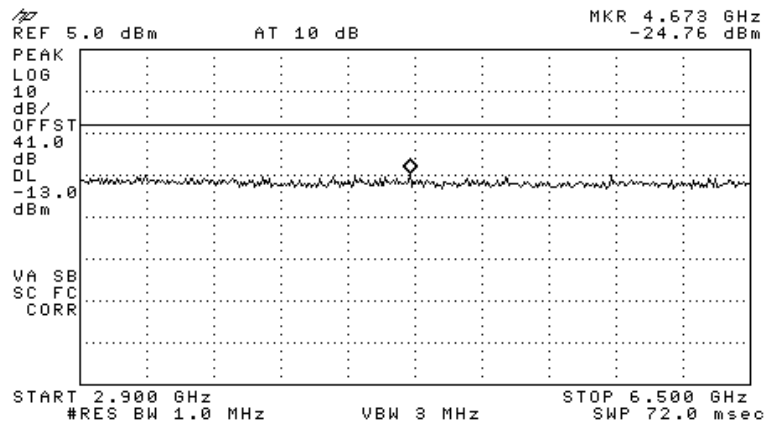


Figure 162.— 1931.20 MHz

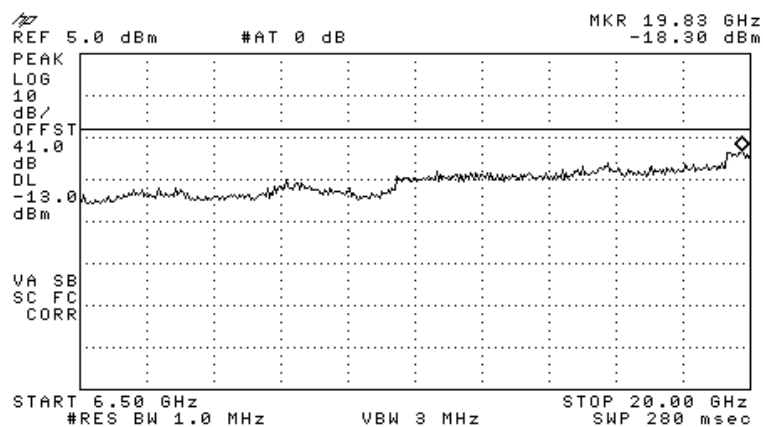


Figure 163.— 1931.20 MHz

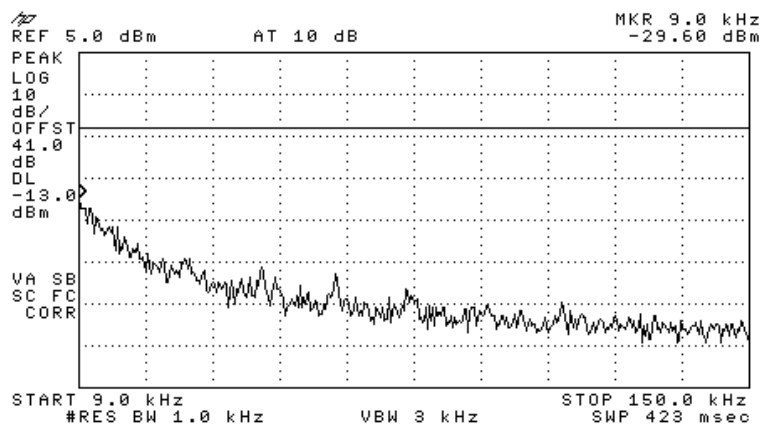


Figure 164.— 1960.00 MHz

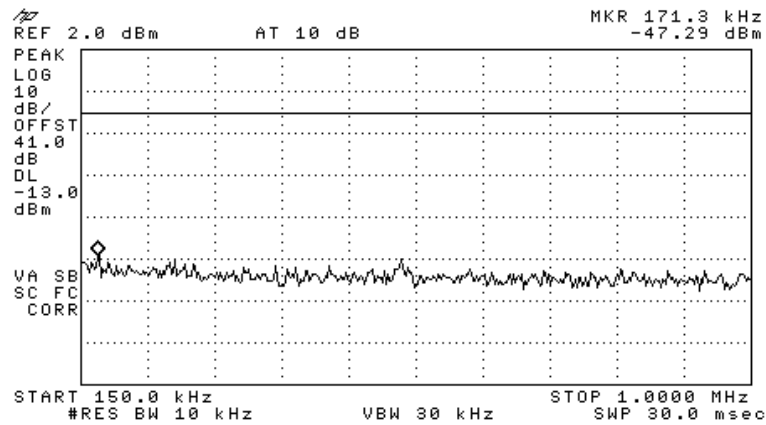


Figure 165.— 1960.00 MHz

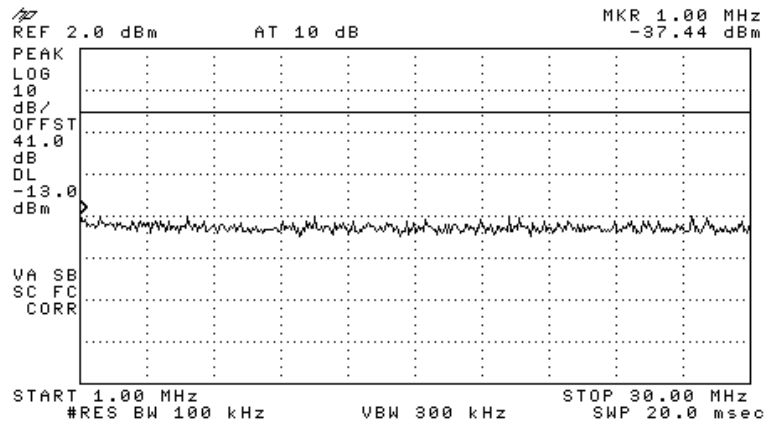


Figure 166.— 1960.00 MHz

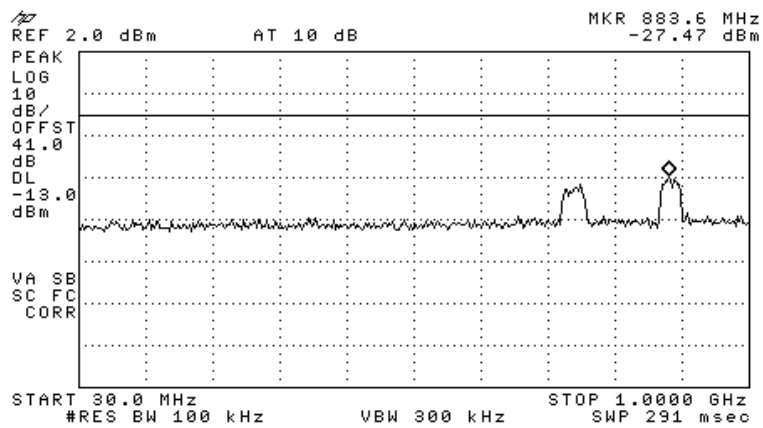


Figure 167.— 1960.00 MHz

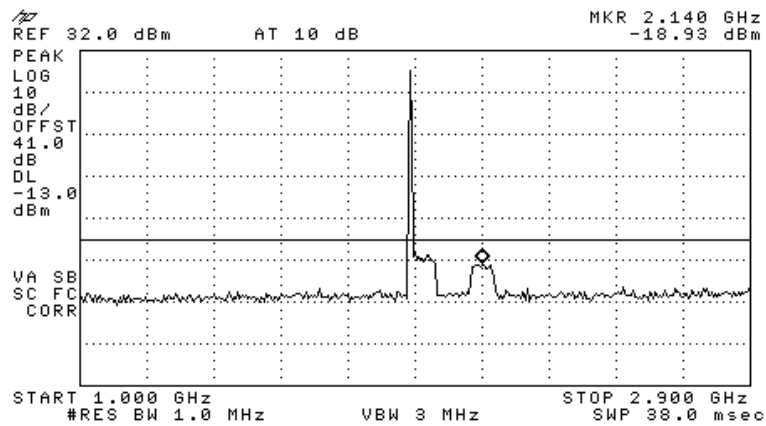


Figure 168.— 1960.00 MHz

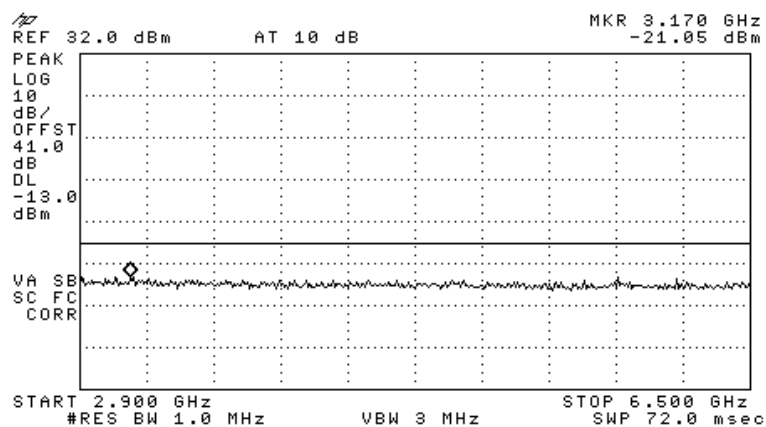


Figure 169.— 1960.00 MHz

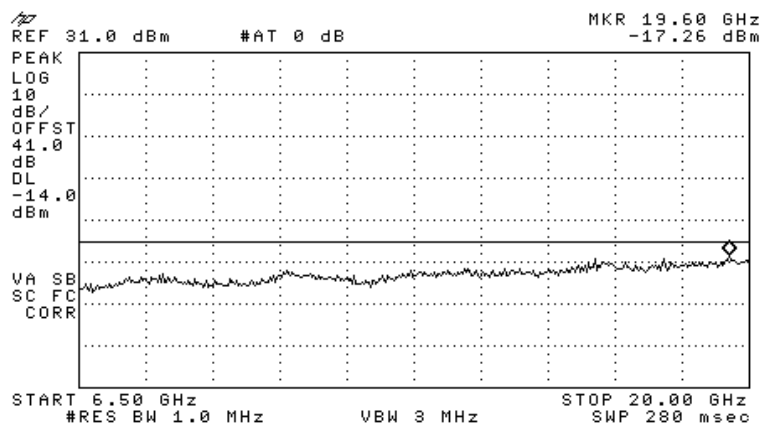


Figure 170.— 1960.00 MHz

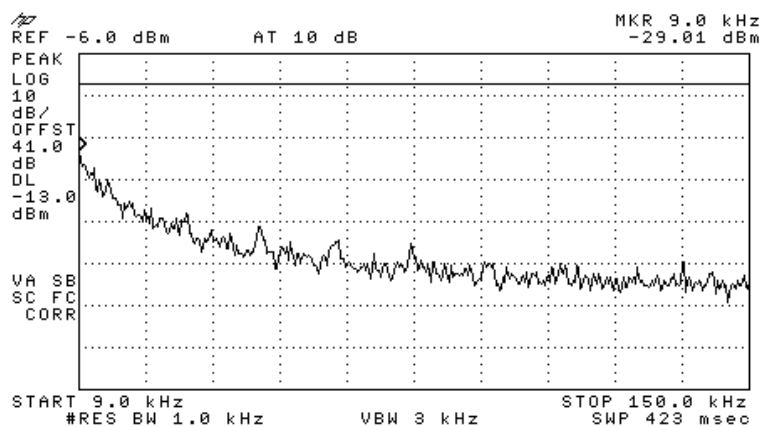


Figure 171.— 1993.80 MHz

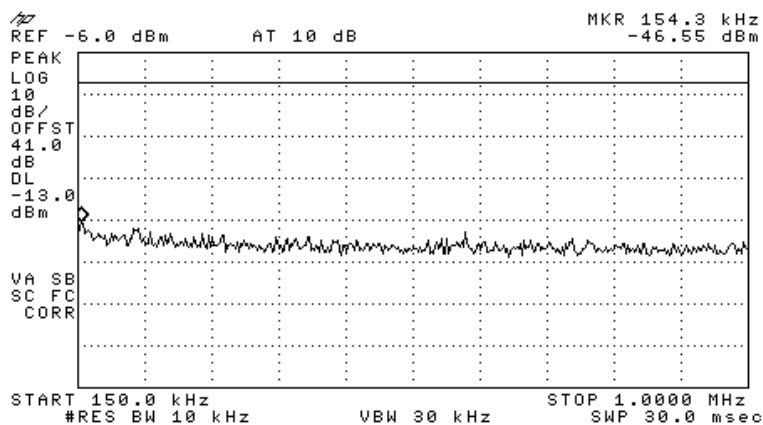


Figure 172.— 1993.80 MHz

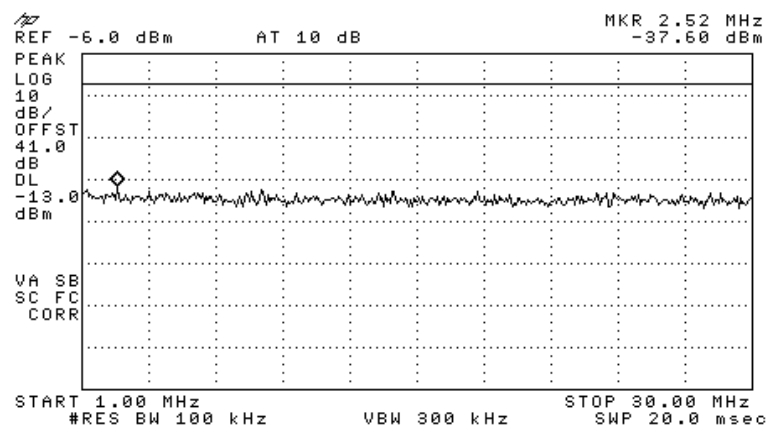


Figure 173.— 1993.80 MHz

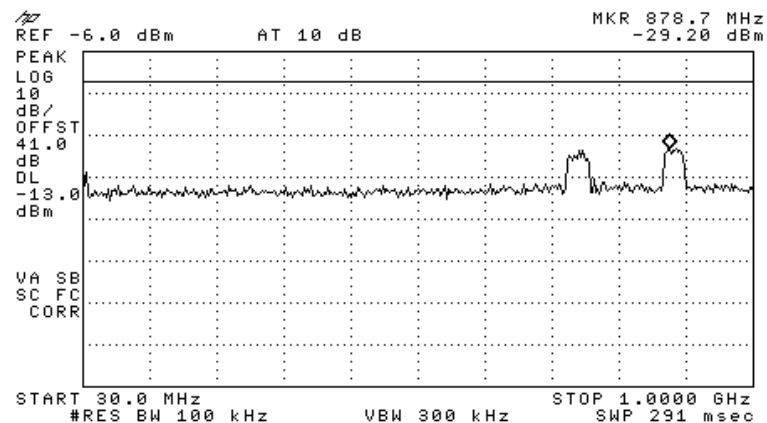


Figure 174.— 1993.80 MHz

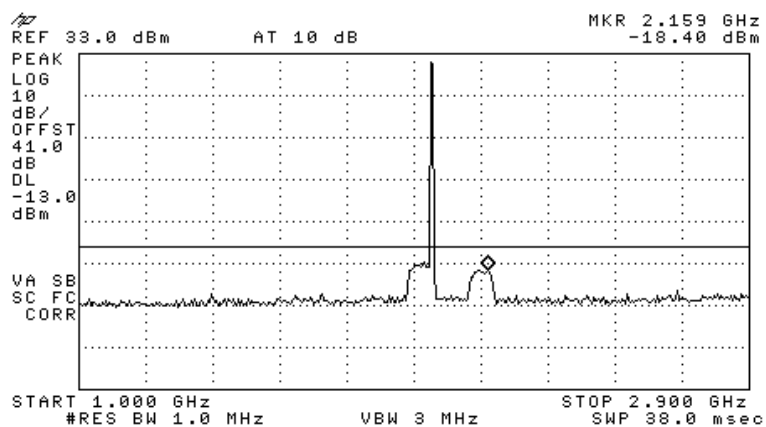


Figure 175.— 1993.80 MHz

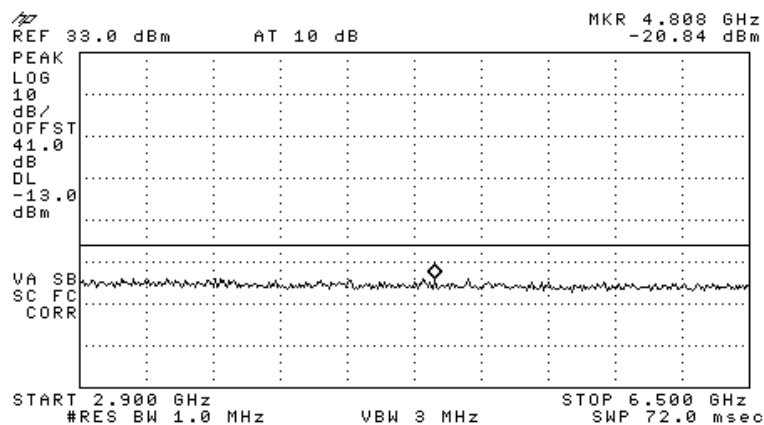


Figure 176.— 1993.80 MHz

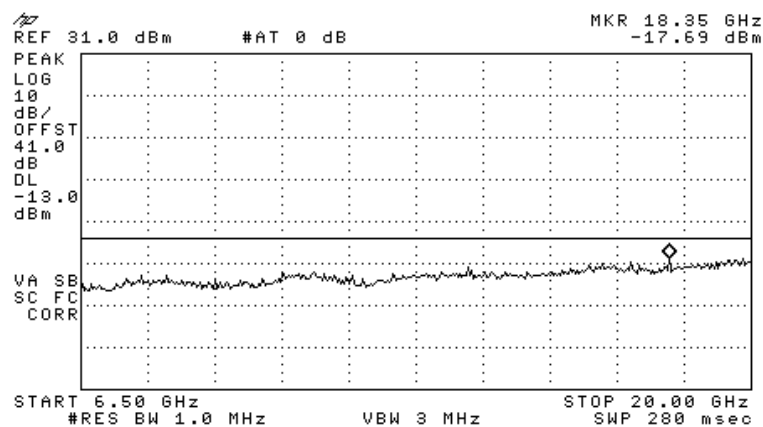


Figure 177.— 1993.80 MHz

W-CDMA:

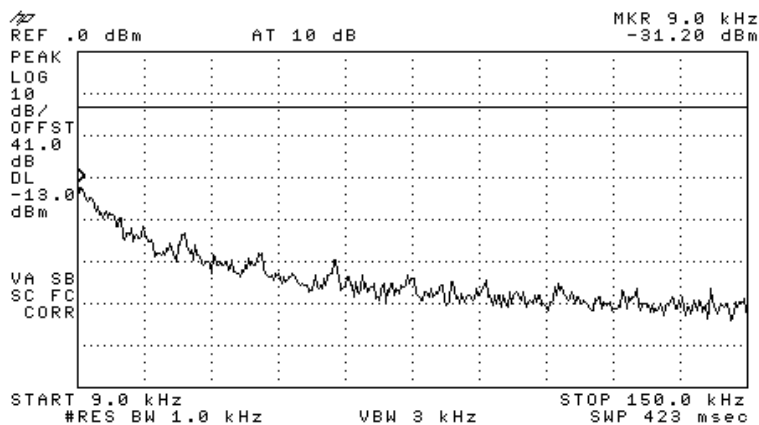


Figure 178.— 1932.50 MHz

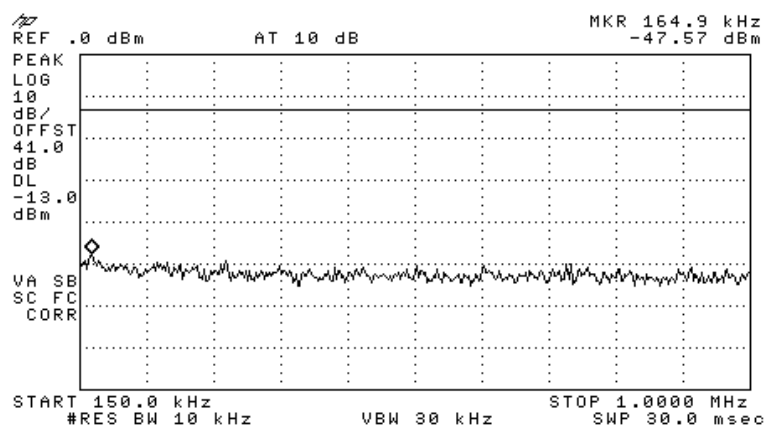


Figure 179.— 1932.50 MHz

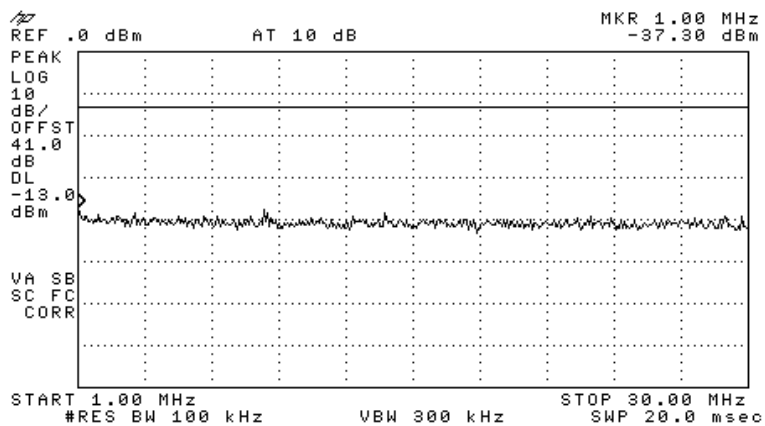


Figure 180.— 1932.50 MHz

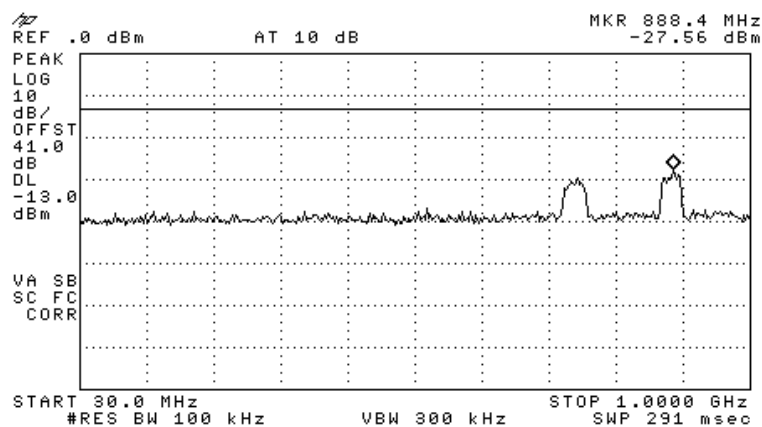


Figure 181.— 1932.50 MHz

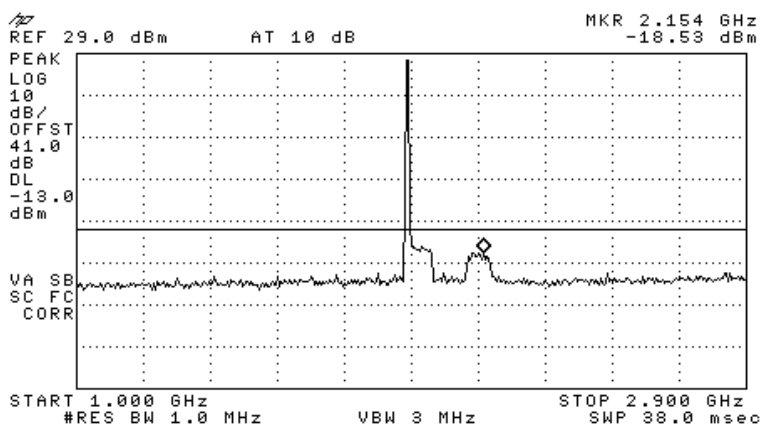


Figure 182.— 1932.50 MHz

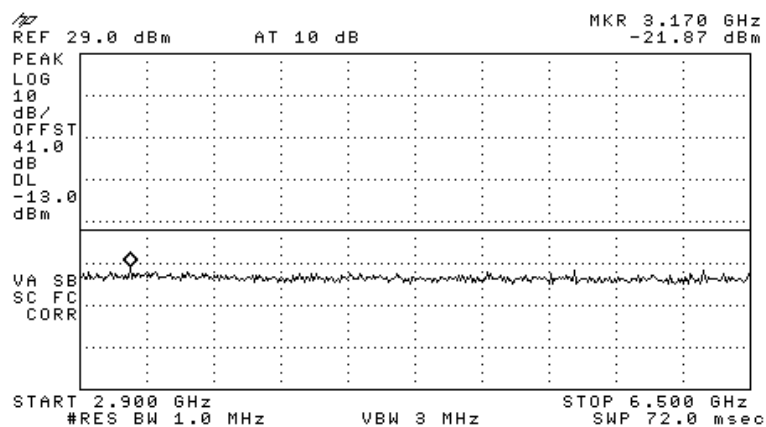


Figure 183.— 1932.50 MHz

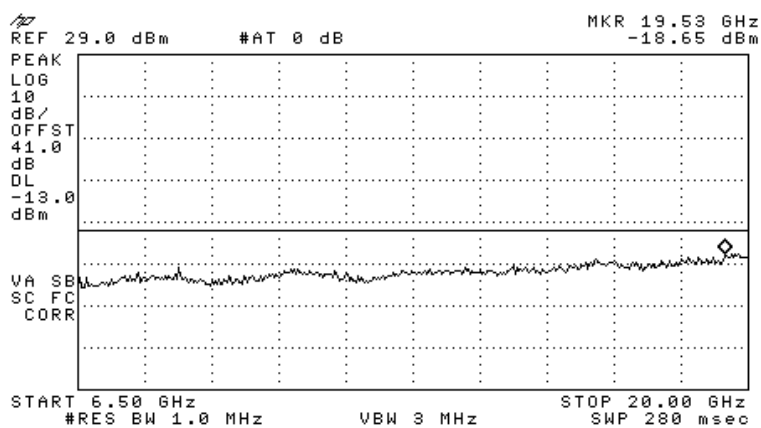


Figure 184.— 1932.50 MHz

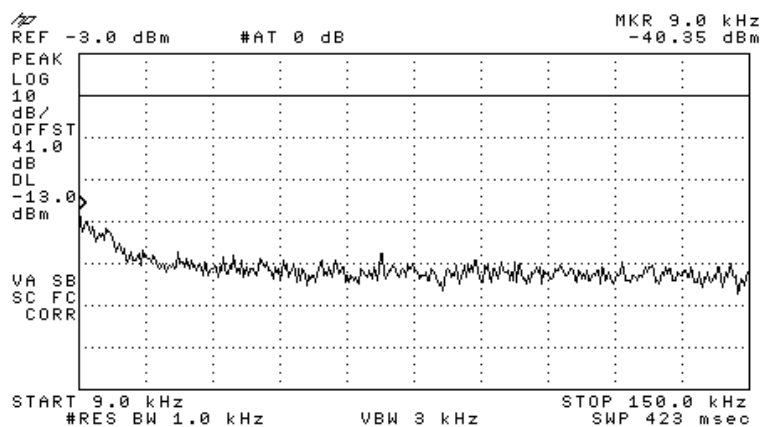


Figure 185.— 1960.00 MHz

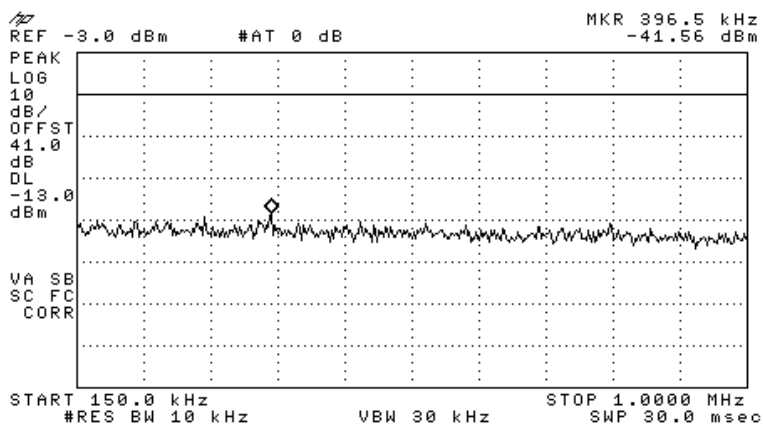


Figure 186.— 1960.00 MHz

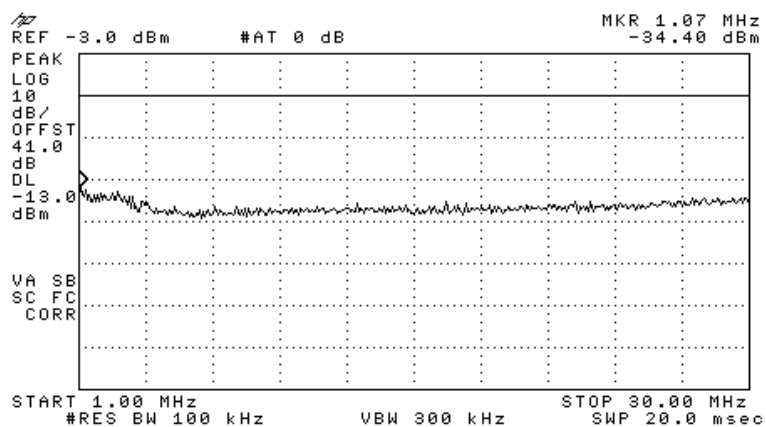


Figure 187.— 1960.00 MHz

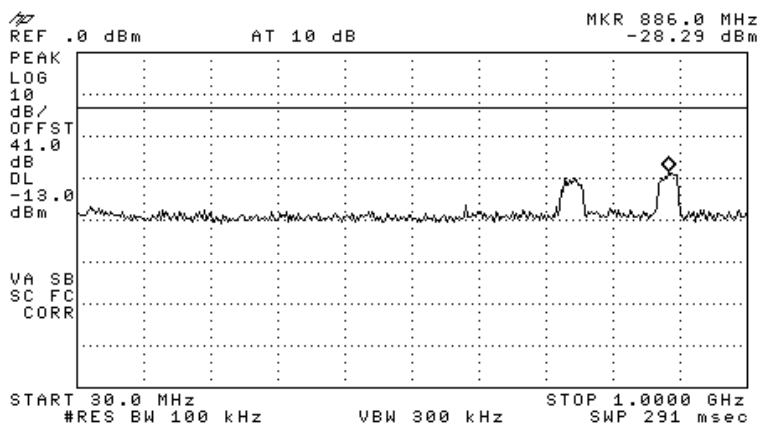


Figure 188.— 1960.00 MHz

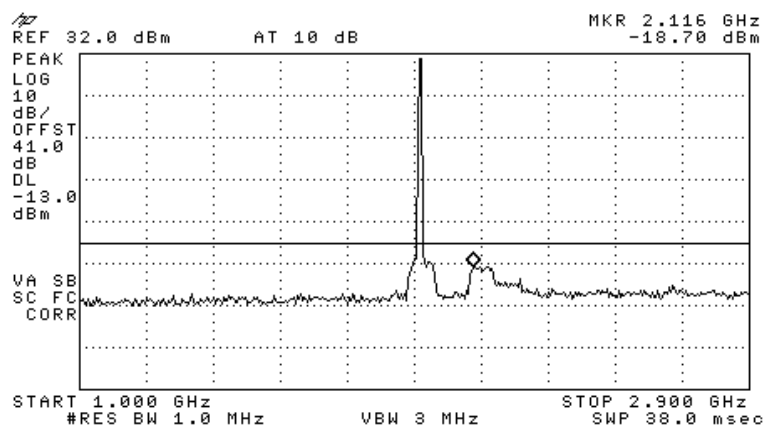


Figure 189.— 1960.00 MHz

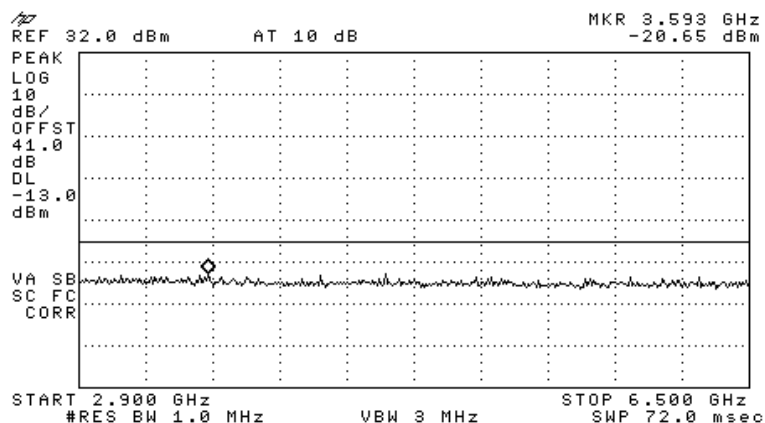


Figure 190.— 1960.00 MHz

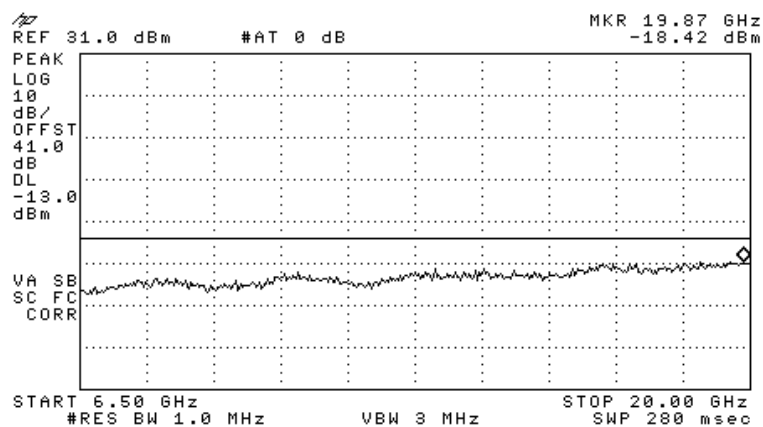


Figure 191.— 1960.00 MHz

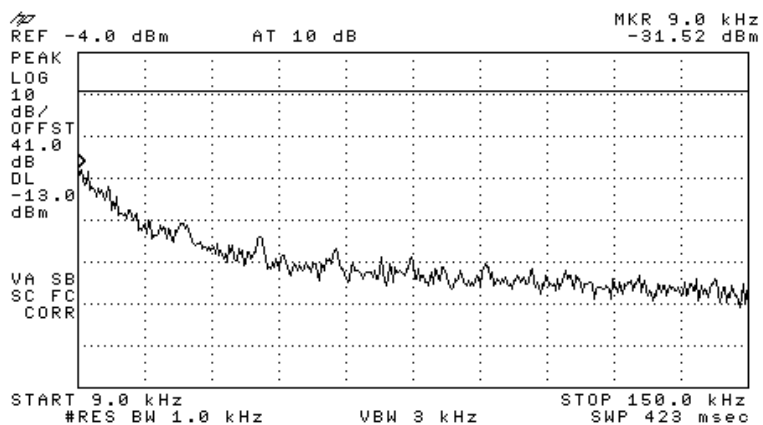


Figure 192.— 1992.50 MHz

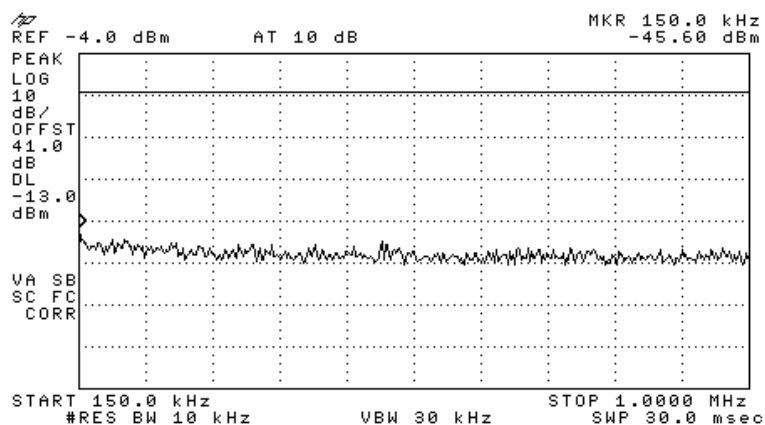


Figure 193.— 1992.50 MHz

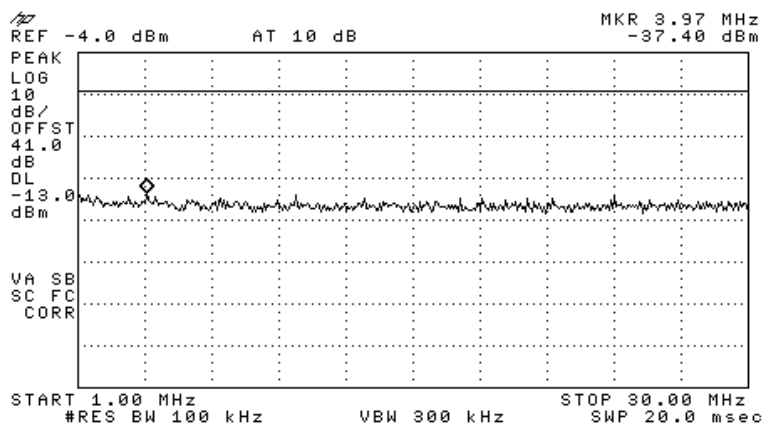


Figure 194.— 1992.50 MHz

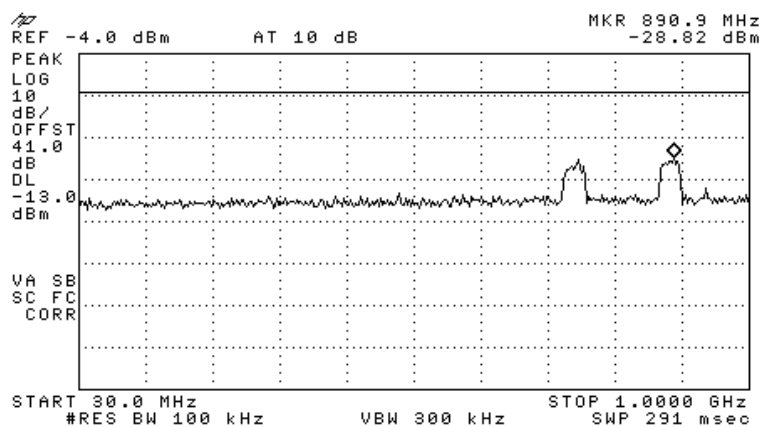


Figure 195.— 1992.50 MHz

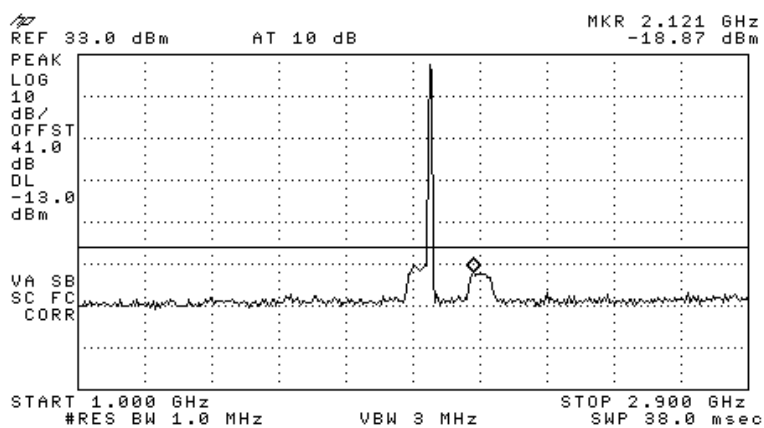


Figure 196.— 1992.50 MHz

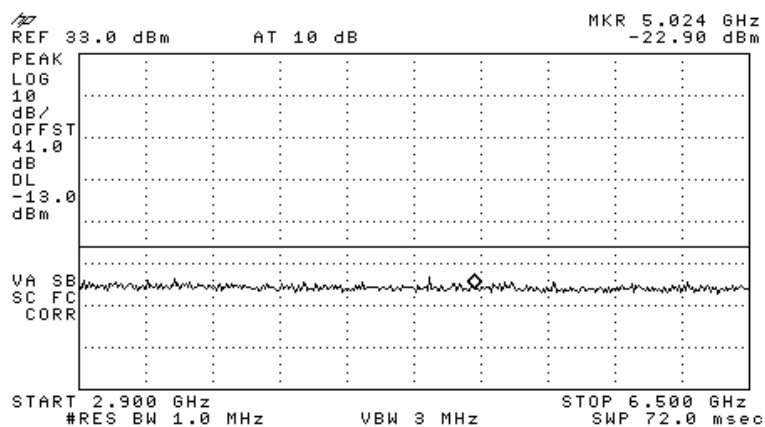


Figure 197.— 1992.50 MHz

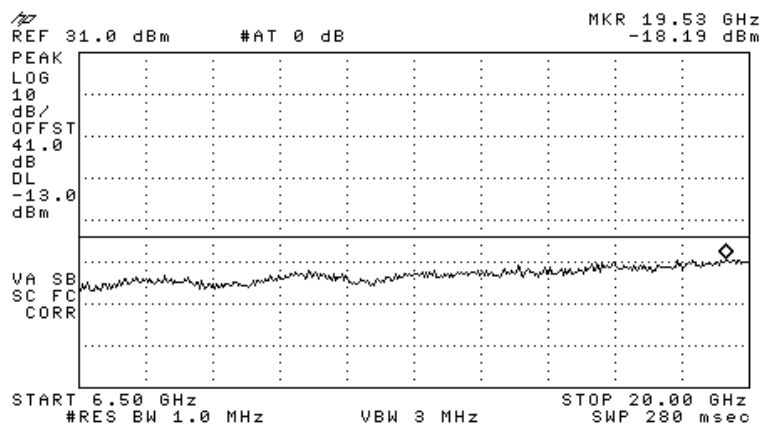


Figure 198.— 1992.50 MHz

12.3 Results Table

E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO

Model No.: HX-C85P19L70MA17M-AC-A

Serial Number: 0B422A0

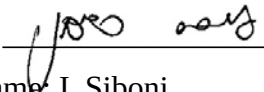
Specification: FCC Part 24, Subpart E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Frequency (GHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	1931.20	19.53	-16.44	-13.0	-3.44
	1960.00	2.169	-16.31	-13.0	-3.31
	1993.80	2.135	-16.95	-13.0	-3.95
GSM	1931.20	19.83	-18.30	-13.0	-5.30
	1960.00	19.60	-17.26	-13.0	-4.26
	1993.80	18.35	-17.69	-13.0	-4.69
W-CDMA	1932.50	2.154	-18.53	-13.0	-5.53
	1960.00	19.87	-18.42	-13.0	-5.42
	1992.50	19.53	-18.19	-13.0	-5.19

Figure 199 Out of Band Emission Results PCS

JUDGEMENT: Passed by 3.31 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni

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

Figure 200 Test Equipment Used

13. Band Edge Spectrum PCS

13.1 Test Specification

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

13.2 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:

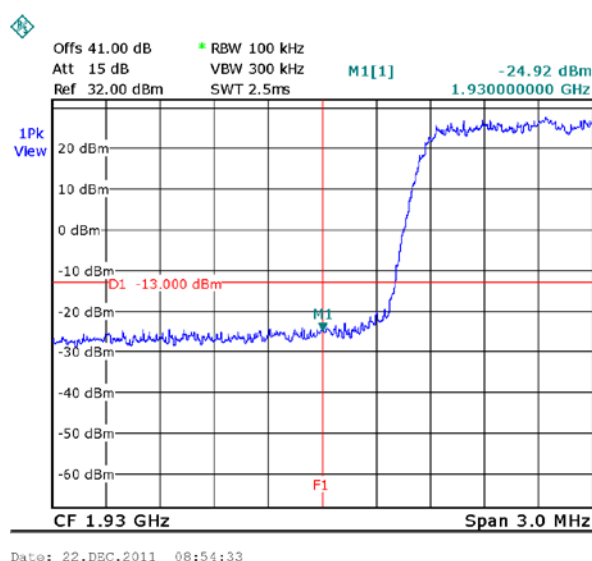


Figure 201.— 1931.20 MHz

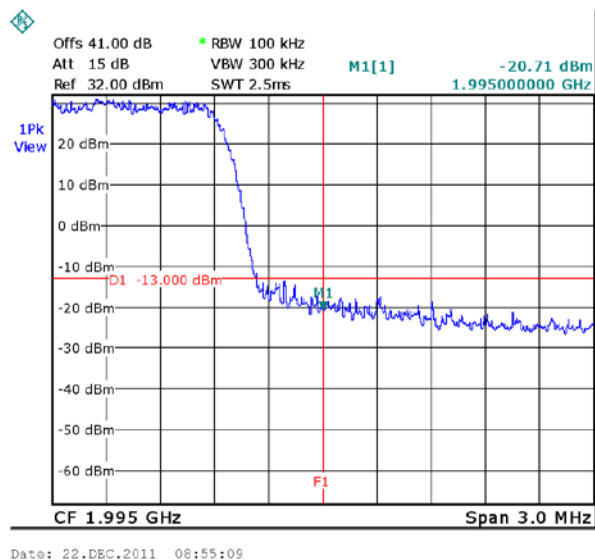


Figure 202.— 1993.80 MHz

GSM:

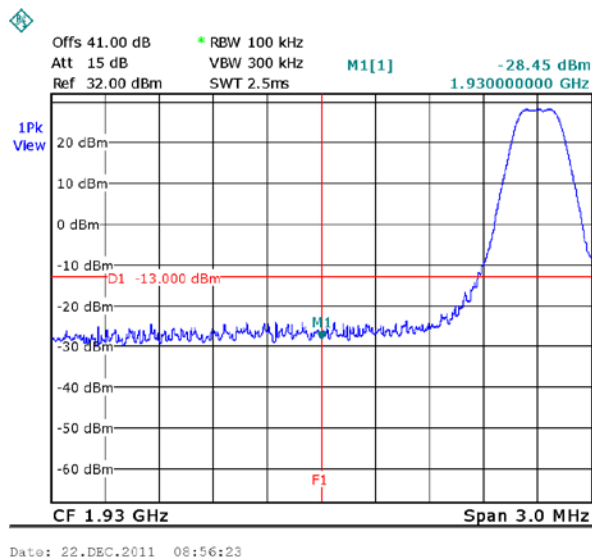


Figure 203.— 1931.20 MHz

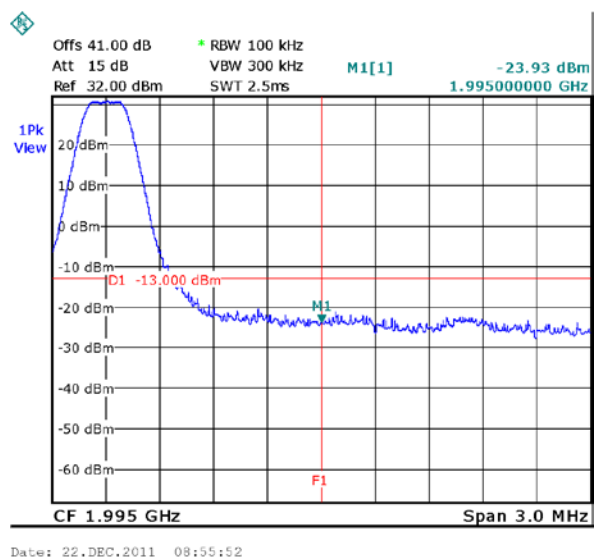


Figure 204.— 1993.80 MHz

W-CDMA:

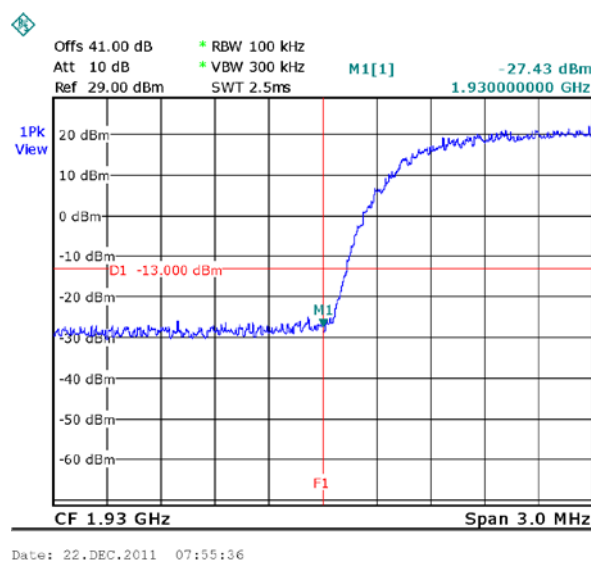


Figure 205.— 1932.50 MHz

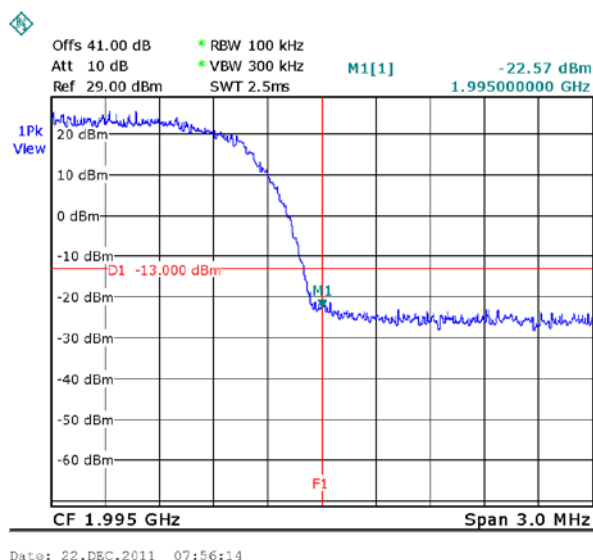


Figure 206.— 1992.50 MHz

13.3 Results Table

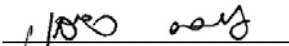
E.U.T. Description: Mobile AccessHX High-Power DAS Remote Unit MIMO
Model No.: HX-C85P19L70MA17M-AC-A
Serial Number: 0B422A0
Specification: FCC Part 24, Subpart E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	1931.2	1930.0	-24.92	-13.0	-11.92
	1993.8	1995.0	-20.71	-13.0	-7.71
GSM	1931.2	1930.0	-28.45	-13.0	-15.45
	1993.8	1995.0	-23.93	-13.0	-10.93
W-CDMA	1932.5	1930.0	-27.43	-13.0	-14.43
	1992.5	1995.0	-22.57	-13.0	-9.57

Figure 207 Band Edge Spectrum Results PCS

JUDGEMENT: Passed by 7.71 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni



13.4 Test Equipment Used.

Band Edge Spectrum PCS

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

Figure 208 Test Equipment Used

14. Out of Band Emissions (Radiated) PCS

14.1 Test Specification

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

14.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12

Unwanted Emissions: Radiated Spurious.

The power of any emission outside of the authorized operating frequency ranges (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:

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dB)}$$

P_d = Dipole equivalent power (result).

P_g = Signal generator output level.



14.3 Results Table

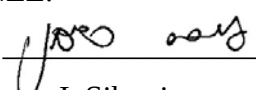
Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBμV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
1931.20	3862.4	V	45.8	-56.02	4.3	8.62	-51.7	-13.0	-38.70
1931.20	3862.4	H	45.4	-55.56	4.3	8.62	-51.24	-13.0	-38.24
1960.00	3920	V	44.2	-57.62	4.3	8.62	-53.3	-13.0	-40.30
1960.00	3920	H	46.4	-54.56	4.3	8.62	-50.24	-13.0	-37.24
1993.80	3987.6	V	45.3	-57	4.3	8.6	-52.7	-13.0	-39.70
1993.80	3987.6	H	44.9	-56.45	4.3	8.6	-52.15	-13.0	-39.15

Figure 209 Out of Band (Radiated) PCS

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

JUDGEMENT: Passed by 37.24 dB

TEST PERSONNEL:

Tester Signature: 

Date: 13.02.12

Typed/Printed Name: I. Siboni



14.4 Test Instrumentation Used, Radiated Measurements

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

15. APPENDIX A - CORRECTION FACTORS

15.1 Correction factors for

CABLE

from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
90.0	1.6		
100.0	1.7		
150.0	2.0		
200.0	2.3		
250.0	2.7		
300.0	3.1		
350.0	3.4		
400.0	3.7		
450.0	4.0		
500.0	4.3		
600.0	4.7		
700.0	5.3		
800.0	5.9		
900.0	6.3		
1000.0	6.7		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

15.2 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.

15.3 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.

15.4 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 38M30.ANT for a 3 meter range,
and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission
Test EMI Receiver".

15.5 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".

**15.6 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".

15.7 Correction factors for Double-Ridged Waveguide Horn

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

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

15.8 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