DATE: 19 August 2010

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

FCC Radio Test Report

for

Mobile Access Networks

Equipment under test:

Mobile Access VE CELL-PCS System
Comprising:
1. VE Access Pod
2. VE Control Unit CELL-PCS

1. VAP-CELL-PCSE-EXTAN
2. VCU-CELL-PCS-12E

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 Access VE CELL-PCS System Comprising:

1. VE Access Pod

2. VE Control Unit CELL-PCS

FCC ID: OJFVECELLPCS12E

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-B: 2002

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
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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 Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Equipment Model No.:	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Equipment Serial No.:	1. 00094500A5 2. 00094500081
Date of Receipt of E.U.T:	06.12.09
Start of Test:	06.12.09
End of Test:	09.08.10*
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Parts 2, 22, 24

* Peak output power for PCS was tested on 09 August 2010. All other tests were performed between 06.12.09 – 10.12.09.

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.
7. Nemko (Norway), Authorization No. ELA 207.

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

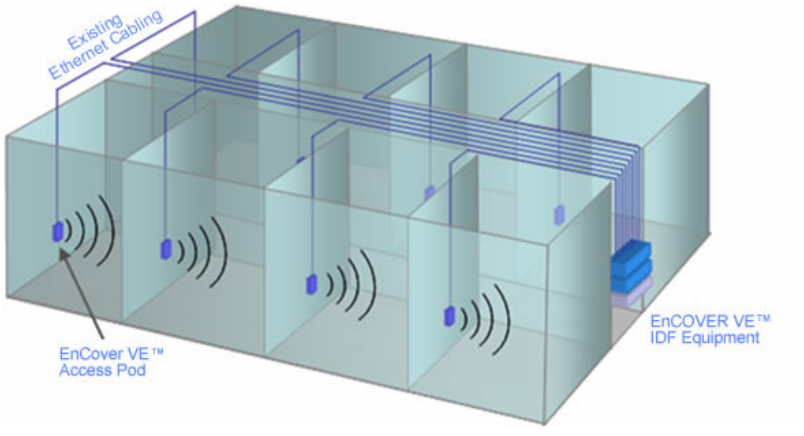
MobileAccess EnCOVER VE™ Dual-Band solution provides enhanced, cost effective in-building dual-band coverage for small to large-sized enterprises. This solution is quickly and simply deployed using the existing Ethernet cabling infrastructure to provide instant coverage without requiring the installation of new cables.

The EnCOVER VE™ solution distributes two types of services to EnCOVER VE™ Access Pods (VAPs) installed throughout the enterprise: wireless services from the service provider's equipment and Ethernet services from the corporate LAN. The Access Pods distribute the wireless services via integrated internal antennas, and provide Ethernet connectivity to the LAN terminals. (Optionally, external antennas can be connected to the Access Pods for additional coverage optimization).

The VAPs are distributed on each floor and plug into standard Ethernet jacks already installed at the enterprise site. They are powered via PoE technology and managed via an EnCOVER VE™ Control Unit (VCU) located in the floor's communication shaft. For site coverage that requires more than one VCU (each VCU supports up to 12 VAPs), several VCUs (up to 12) can be aggregated under a single VCU serving as Master. The Master VCU provides the interface to the capacity source, the service provider's equipment and for management of all units.

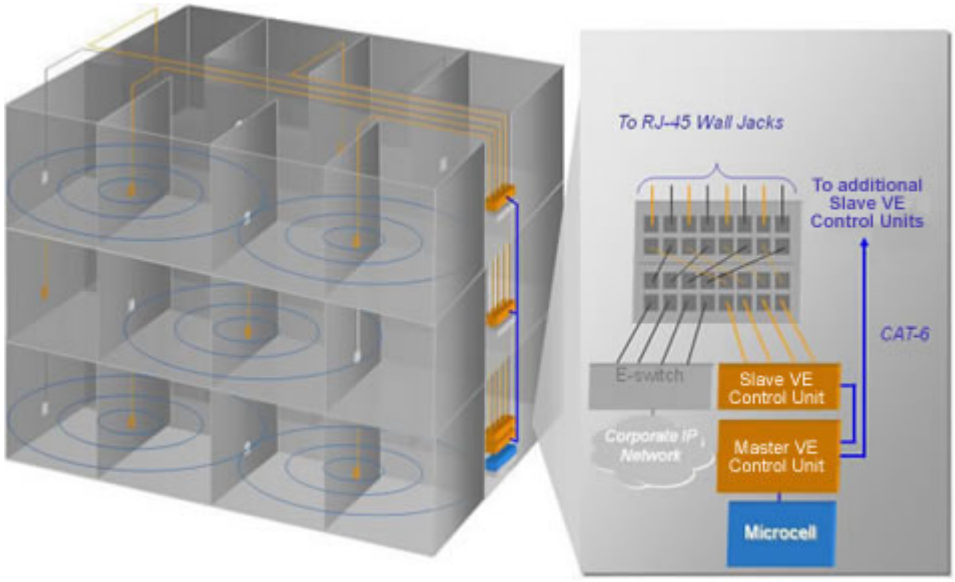
The following figures illustrate single-tier and multi-tier EnCOVER VE™ installations.

In a single-tier installation, the VCU is connected to the service provider's equipment and to the Ethernet switch and distributes Ethernet and mobile services to up to 12 VAPs distributed over one more adjacent floors.



Single Tier VE™ Installation

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



Multi Tier VE™ Installation

There are two versions of the EnCOVER VE Access Pod, one using extenal antennas and the possibility of using an internal antenna (M/N VAP-CELL-PCSE-EXTAN, antenna gain of up to 10 dBi) and the other using an internal antenna only (M/N VAP-CELLPCSE, antenna gain of 0 dBi). Model VAP-CELL-PCSE-EXTAN was tested.
See customer's declaration on following page.

mobileaccess

UnWiring the Workplace

2009–12–16

MobileAccess Networks Inc. hereby Declares that the only difference between the following VAP's:

P/N: VAP-CELL-PCSE

and

P/N: VAP-CELL-PCSE-EXTAN

is the option to use an external antenna connected to SMA connectors (available in *P/N VAP-CELL-PCSE-EXTAN)* instead of an internal antenna (available in both models).

Thank you,

Steven C Blum

Steve Blum
Product Manager
MobileAccess Networks Inc.
Office 541 758-2880
Mobile 541 990-3470

8391 Old Courthouse Road, Suite 300
Vienna, VA 22182

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

The uncertainty for this test is □2 dB.

Radiated Emission

The Open Site complies with the ±4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. System Test Configuration

2.1 Justification

The EUT consists of the VCU and VAP. The cellular signal is represented in the setup by the EGSM/UMTS portion of the setup.
An "Exercise" SW on the computer was used to enable/disable transmission of the VAP, while the EUT output was connected to the spectrum analyzer

System connected to 2 signal generators, one is feeding the VCU with Cell band at CDMA modulation (with 10dBm input power) and the other is feeding the VCU with PCS band at W-CDMA and GSM modulation (with 10dBm input power).

Both channels transmit while testing.

There are two versions of the EnCOVER VE Access Pod, one using external antennas and the possibility of using an internal antenna (M/N VAP-CELL-PCSE-EXTAN, antenna gain of up to 10 dBi) and the other using an internal antenna only (M/N VAP-CELLPCSE, antenna gain of 0 dBi). Model VAP-CELL-PCSE-EXTAN was tested.

2.2 EUT Exercise Software

The EnCOVER VE Control Unit and Access Pod units were delivered commands via Eng GUI Suite Ver. 0.3 B08.
These commands are used to enable/disable transmission of the VAP.
VCU Version 0.3 B11, VAP Version 0.3 B09.

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

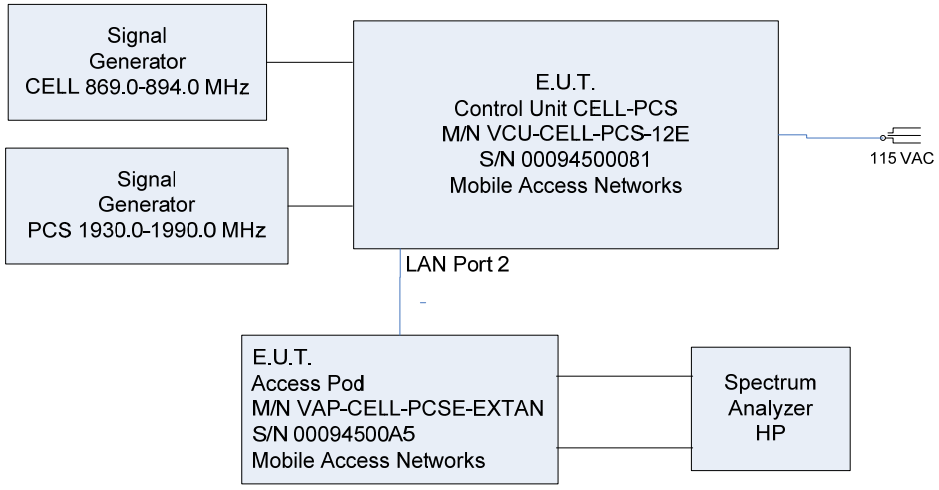


Figure 1. Tests Set-up

3. Conducted and Radiated Measurement Test Set-ups Photo

Figure 2. Conducted Emission From AC Mains Test

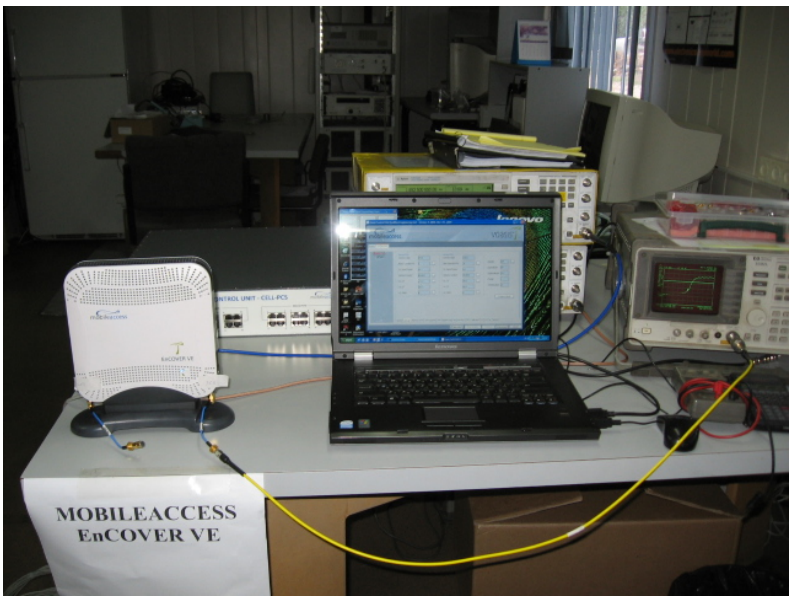


Figure 3. Conducted Emission From Antenna Ports Tests

Figure 4. Radiated Emission Test

4. Conducted Emission Data

4.1 Test Specification

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

4.2 Test Procedure

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

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

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

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

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

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

4.3 Measured Data

JUDGEMENT: Passed by 2.2 dB

The margin between the emission levels and the specification limit is, in the worst case, 7.8 dB for the phase line at 11.94 MHz and 2.2 dB at 11.94 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: 16.12.09

Typed/Printed Name: A. Sharabi

Conducted Emission

E.U.T Description	Mobile Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

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	0.194737	47.5	44.2	-19.7	34.5	-19.3	0.0
2	0.296119	23.1	19.7	-40.7	11.4	-39.0	0.0
3	0.822136	21.4	19.4	-36.6	14.1	-31.9	0.0
4	4.718041	38.6	33.6	-22.4	25.0	-21.0	0.0
5	11.935982	47.2	45.2	-14.8	42.2	-7.8	0.0
6	18.243717	33.8	32.5	-27.5	28.7	-21.3	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 Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

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

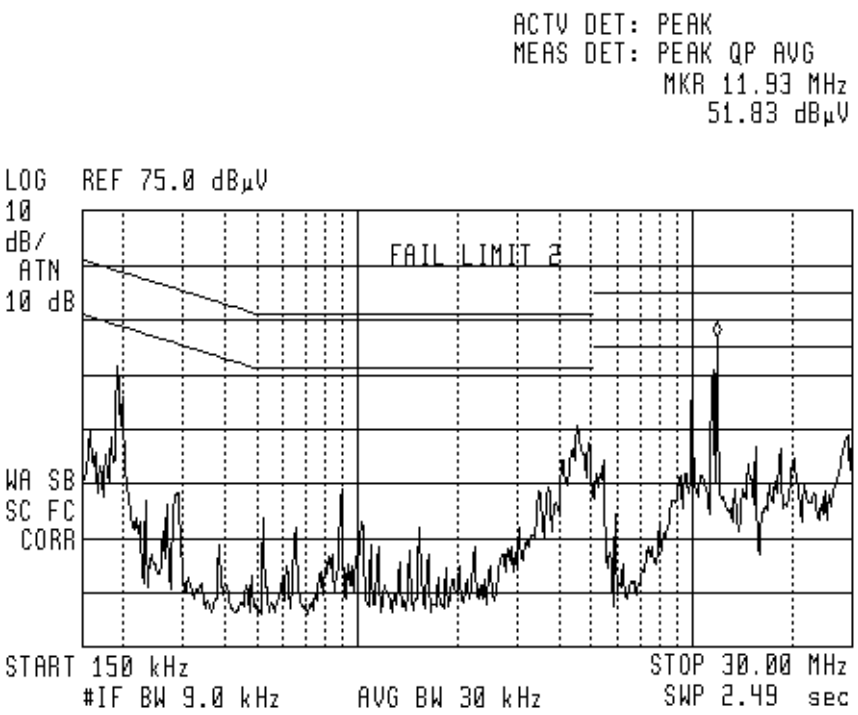


Figure 6. Detectors: Peak, Quasi-peak, Average

Note: Fail indication on the spectral plot results from peak detector level reading above the limit. This indication is for information only and it should not be interpreted as a test failure.

Conducted Emission

E.U.T Description	Mobile Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

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	0.194047	46.7	43.8	-20.1	34.2	-19.7	0.0
2	0.976083	21.6	18.0	-38.0	8.6	-37.4	0.0
3	4.538949	39.8	35.1	-20.9	24.5	-21.5	0.0
4	10.001115	44.8	43.8	-16.2	43.5	-6.4	0.0
5	11.937222	52.8	51.4	-8.6	47.8	-2.2	0.0
6	18.244272	33.3	31.9	-28.1	28.1	-21.9	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 Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

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

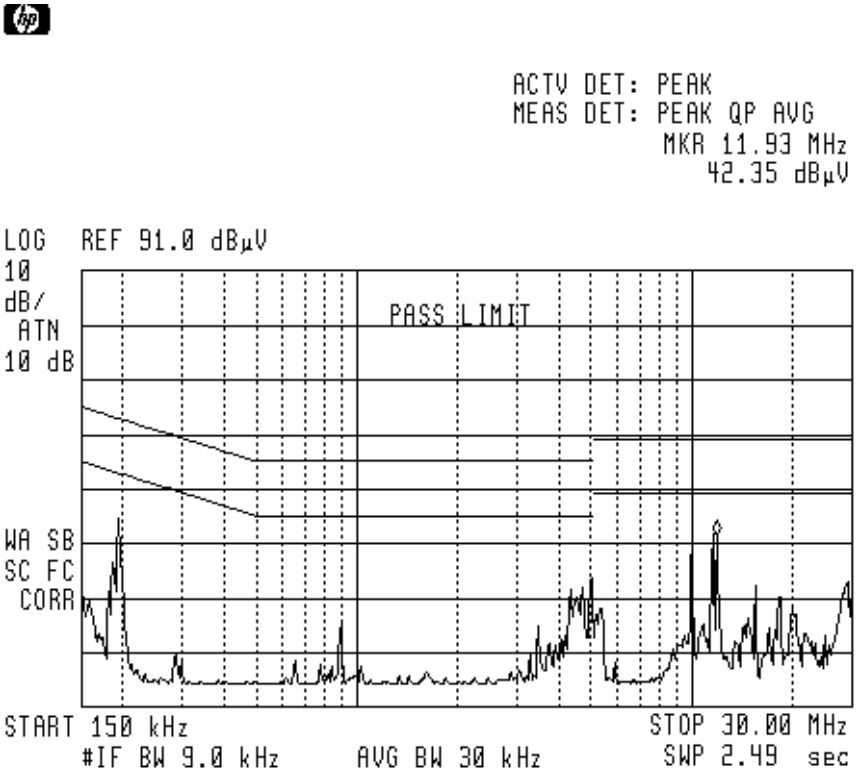


Figure 8 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

4.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 3, 2009	1 Year
LISN	Fischer	FCC-LISN-2A	128	March 3, 2009	1 Year
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1Year
RF Filter Section	HP	85420E	3705A00248	November 10, 2009	1Year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

5. Peak Output Power CDMA

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 (20 dB) and an appropriate coaxial cable (1dB). The E.U.T. RF output was CDMA 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, 881.5, and 892.80 MHz.

CDMA:

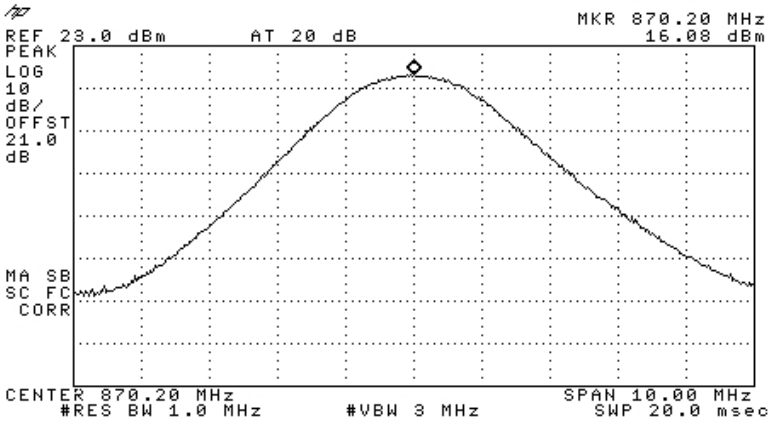


Figure 9.— 870.20 MHz

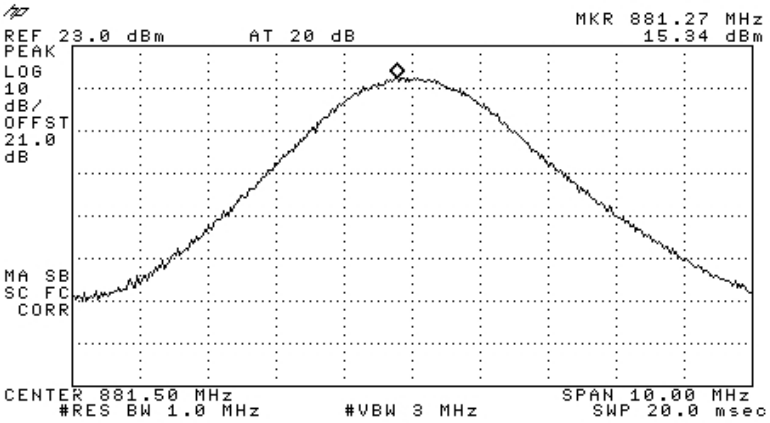


Figure 10.— 881.50 MHz

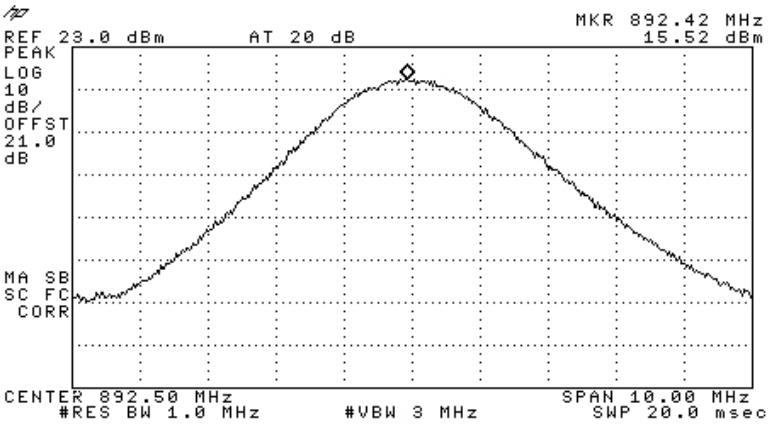


Figure 11.— 892.80 MHz

5.3 Results table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 22 Section 913, FCC Part 2, Section 1046

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	870.20	16.08	57.0	-40.92
	881.50	15.34	57.0	-41.66
	892.80	15.52	57.0	-41.48

Figure 12 Peak Output Power CDMA

JUDGEMENT: Passed by 40.92 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 16.12.09

Typed/Printed Name: A. Sharabi

5.4 Test Equipment Used.

Peak Output Power CDMA

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	GB450502	August 20, 2008	2 year
Signal Generator	HP	E4433B ESG-D	G40051392	August 6, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	October 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	October 19, 2009	1 year

Figure 13 Test Equipment Used

6. Occupied Bandwidth CDMA

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 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

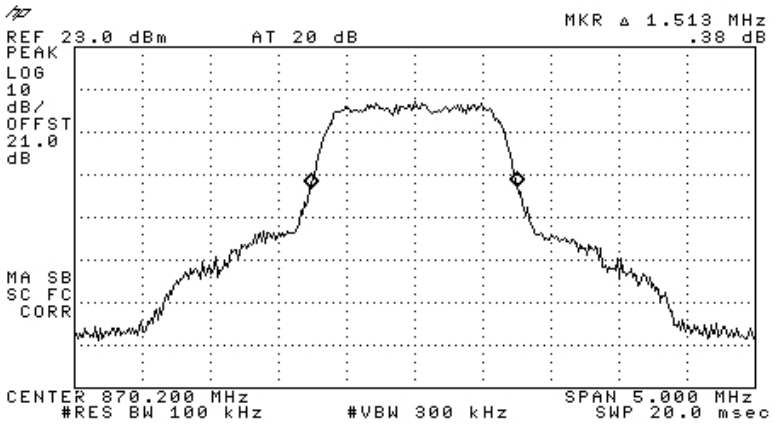


Figure 14.— Input 870.20

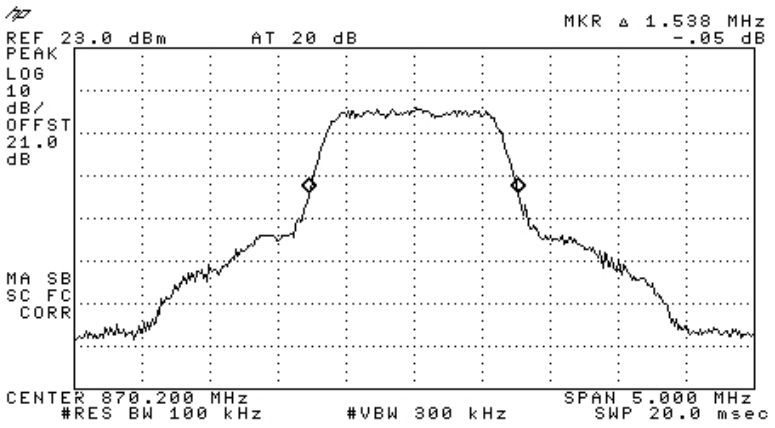


Figure 15.— Output 870.20

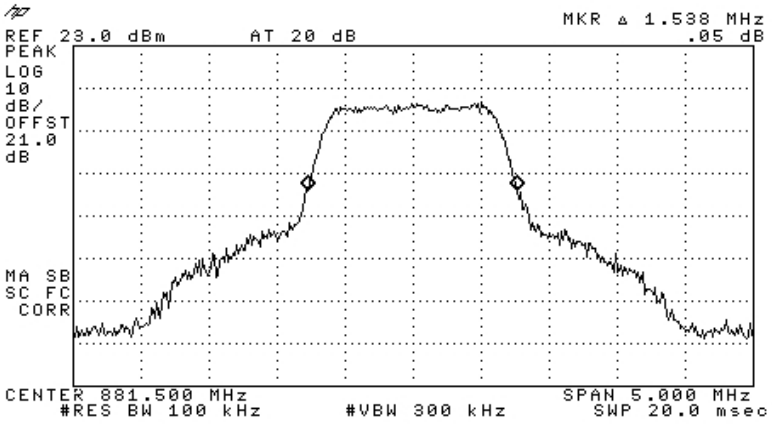


Figure 16.— Input 881.5 MHz.

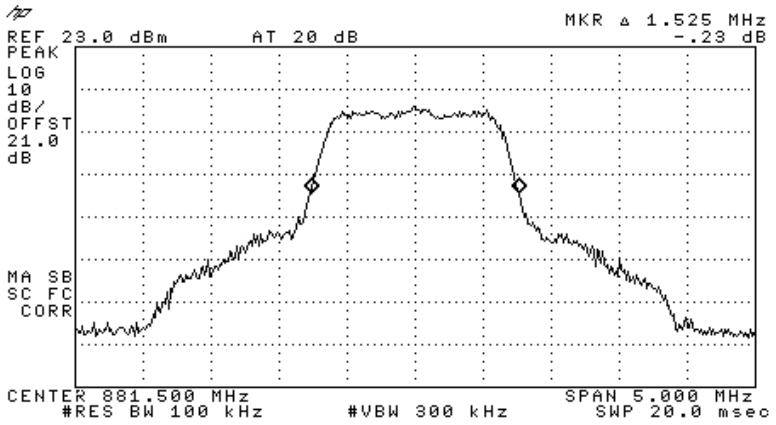


Figure 17.—Output 881.5Hz.

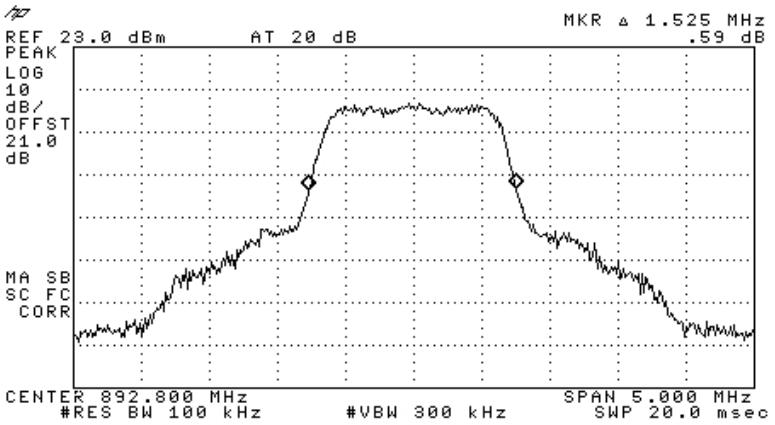


Figure 18.— Input 892.80 MHz.

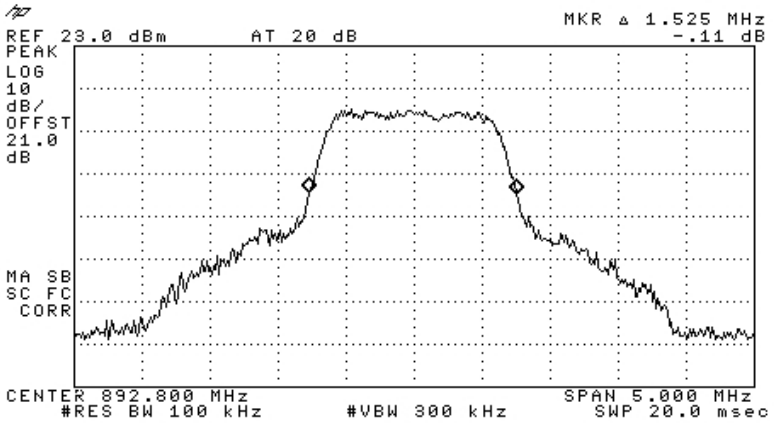


Figure 19.— Output 892.80 MHz.

6.3 Results Table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency	Reading (MHz)
CDMA	Input	870.20	1.513
CDMA	Output	870.20	1.538
CDMA	Input	881.50	1.538
CDMA	Output	881.50	1.525
CDMA	Input	892.80	1.525
CDMA	Output	892.80	1.525

Figure 20 Occupied Bandwidth CDMA

TEST PERSONNEL:

Tester Signature: _____ Date: 16.12.09

Typed/Printed Name: A. Sharabi

6.4 Test Equipment Used.

Occupied Bandwidth CDMA

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	GB40051392	August 6, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	October 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	October 19, 2009	1 year

Figure 21 Test Equipment Used

7. Out of Band Emissions at Antenna Terminals CDMA

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 (21 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

CDMA:

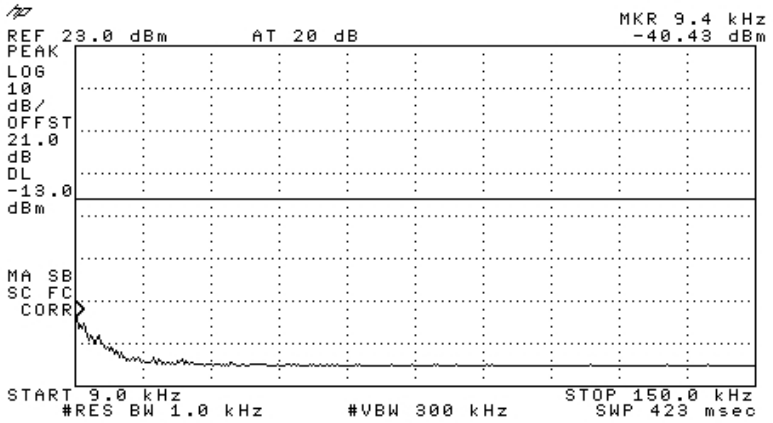


Figure 22.— 870.20 MHz

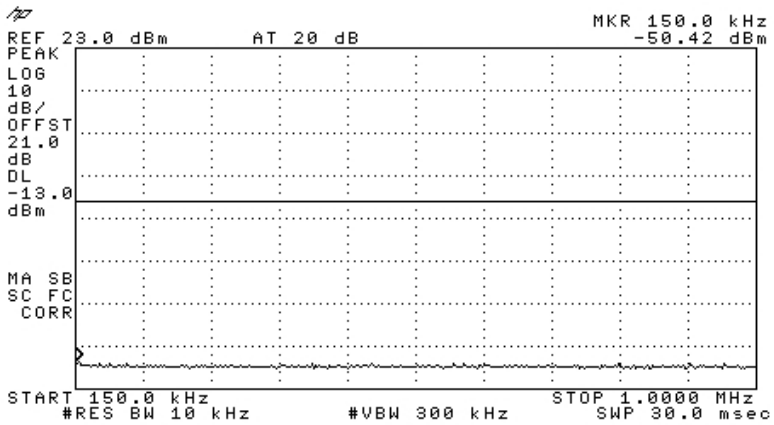


Figure 23.— 870.20 MHz

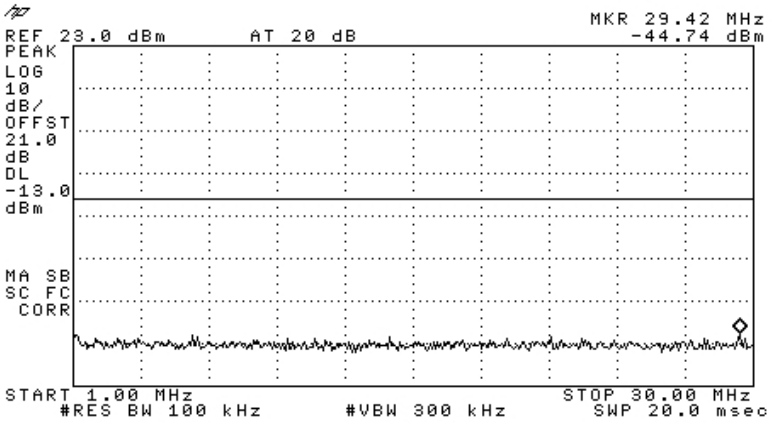


Figure 24.— 870.20 MHz

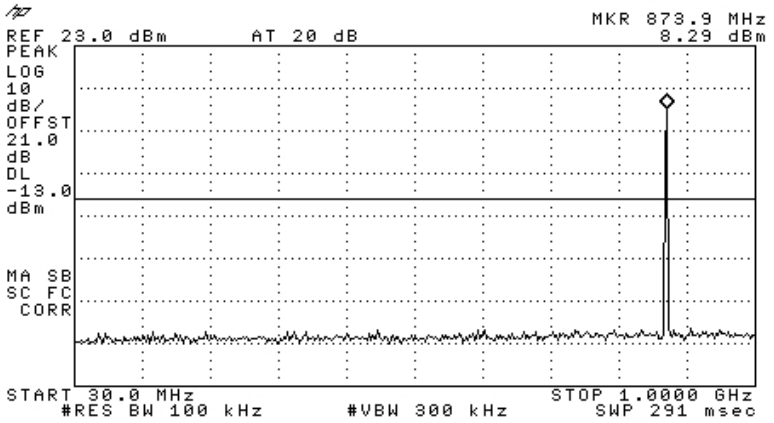


Figure 25.— 870.20 MHz

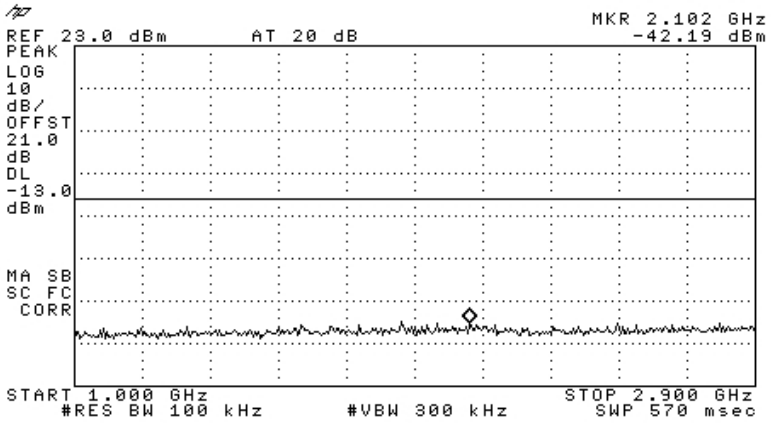


Figure 26.— 870.20 MHz

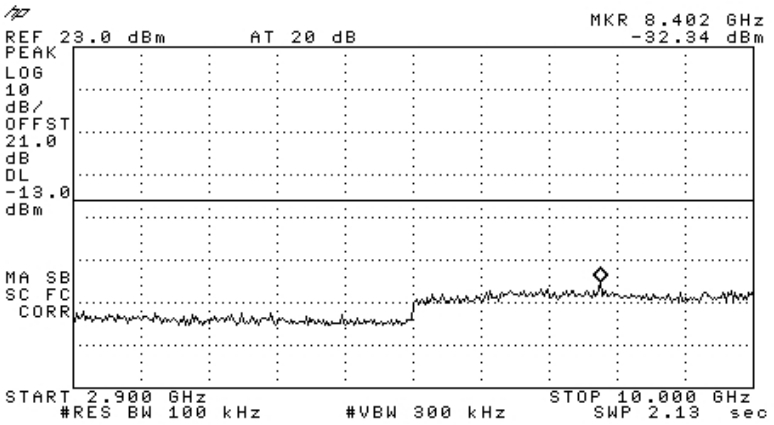


Figure 27.— 870.20 MHz

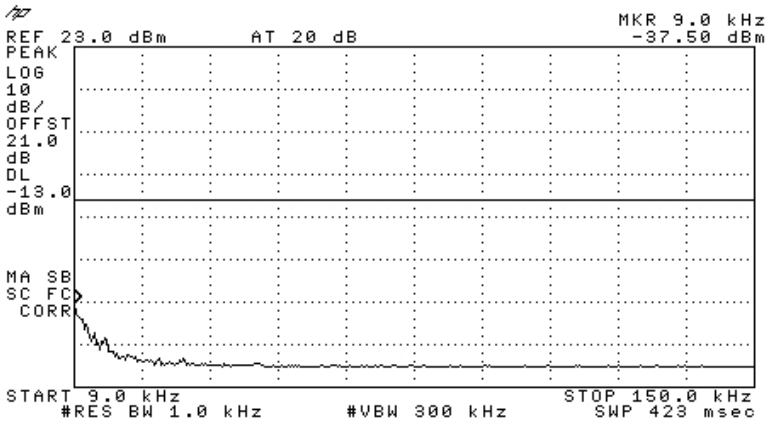


Figure 28.— 881.50 MHz

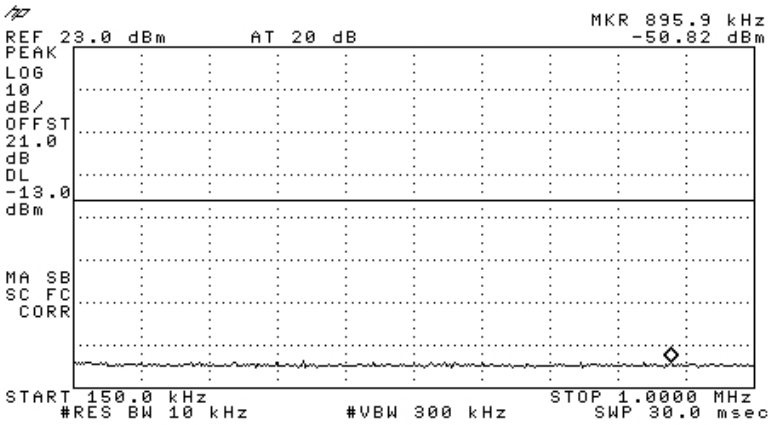


Figure 29.— 881.50 MHz

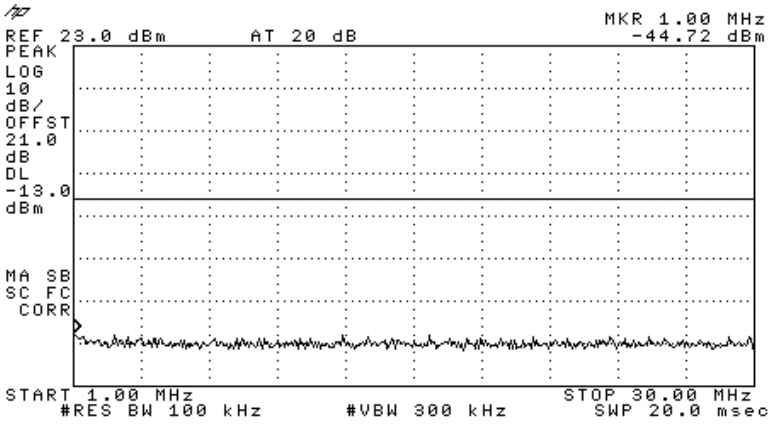


Figure 30.— 881.50 MHz

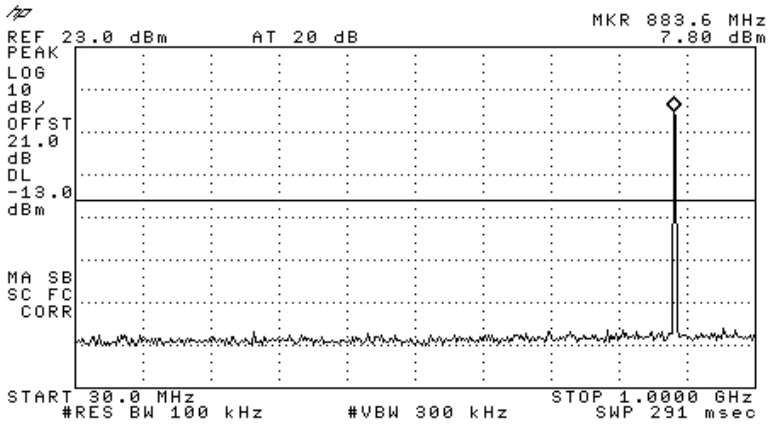


Figure 31.— 881.50 MHz

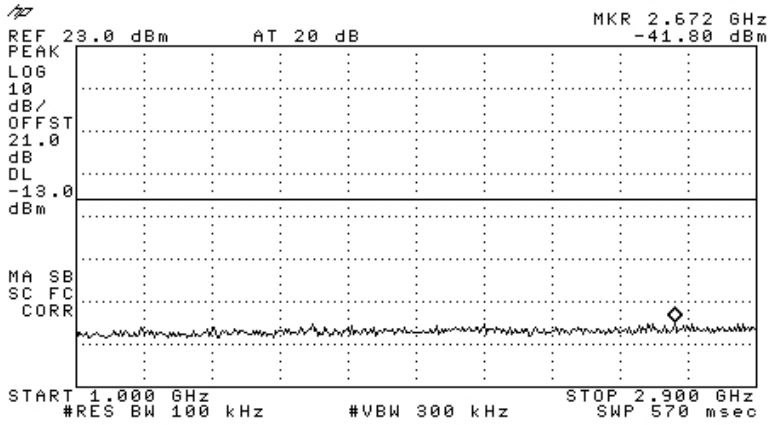


Figure 32.— 881.50 MHz

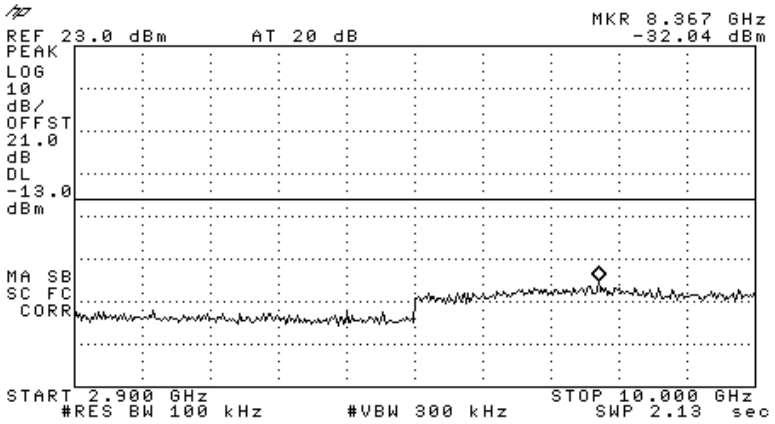


Figure 33.— 881.50 MHz

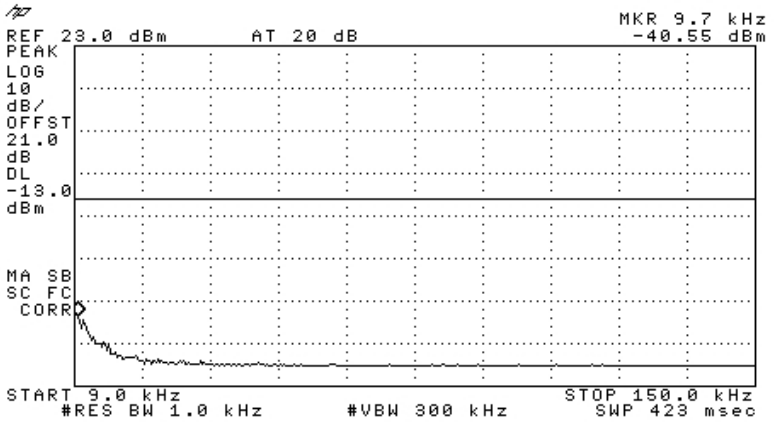


Figure 34.— 892.80 MHz

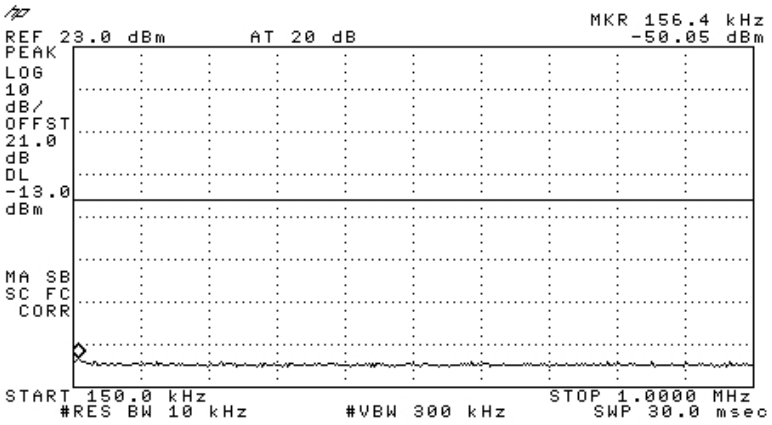


Figure 35.— 892.50 MHz

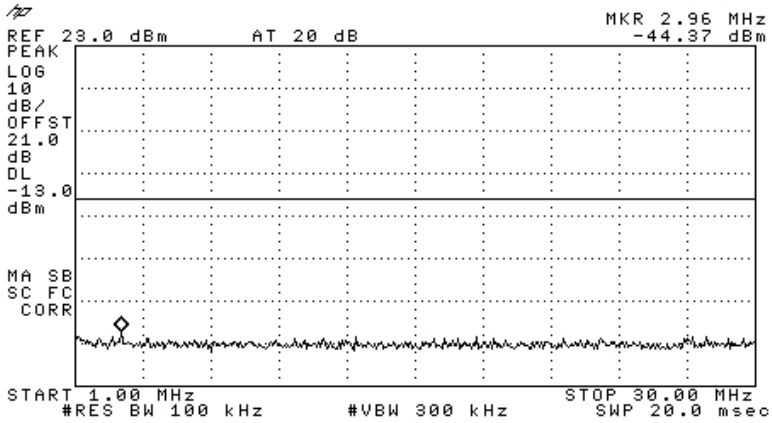


Figure 36.— 892.50 MHz

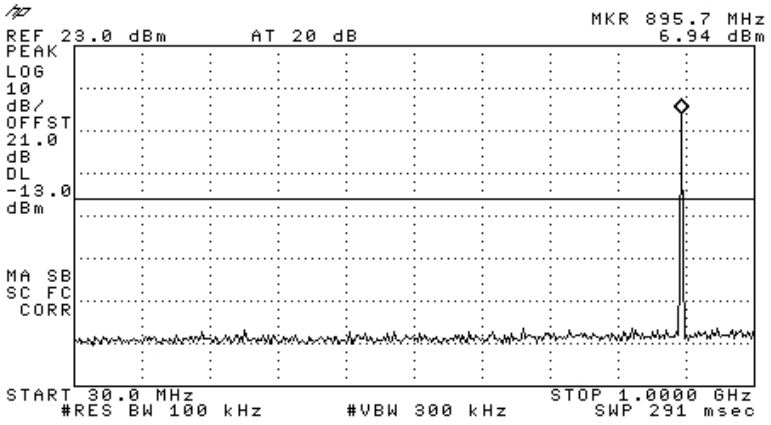


Figure 37.— 892.50 MHz

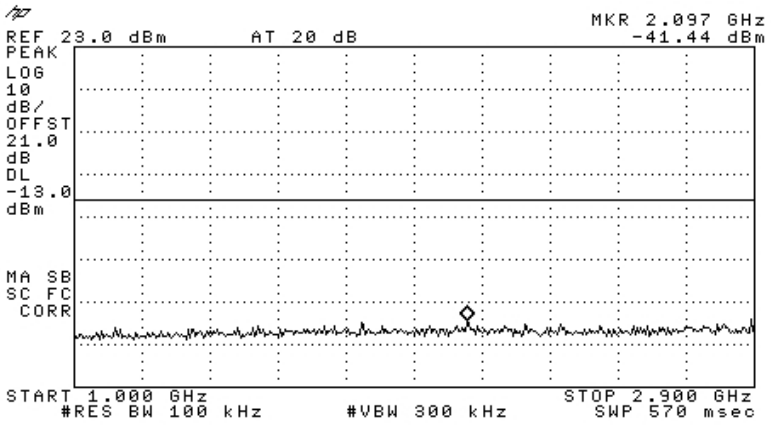


Figure 38.— 892.50 MHz

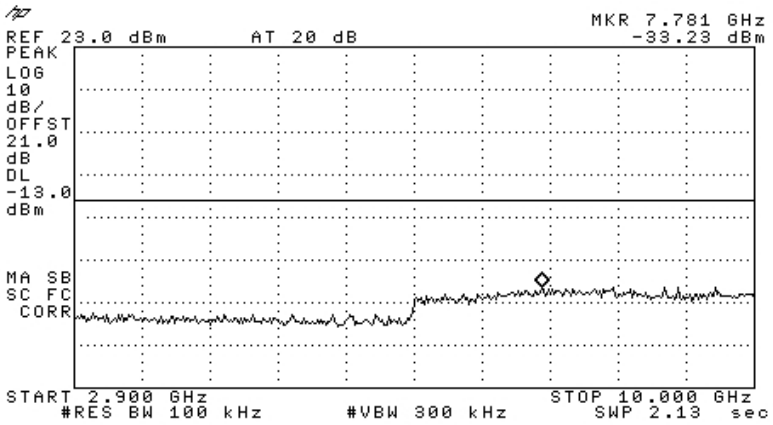


Figure 39.— 892.50 MHz

7.3 Results table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 24, Sub-part E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Frequency (GHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
CDMA	870.20	8.402	-32.34	-13.0	-19.34
	881.50	8.367	-32.04	-13.0	-19.04
	892.80	7.781	-33.23	-13.0	-20.23

Figure 40 Out of Band Emission Results CDMA

JUDGEMENT: Passed by 19.04 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 16.12.09
Typed/Printed Name: A. Sharabi

7.4 Test Equipment Used.

Out of Band Emission at Antenna Terminals CDMA

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	GB450502	August 20, 2008	2 year
Signal Generator	HP	E4433B ESG-D	GB40051392	August 6, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	October 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	October 19, 2009	1 year

Figure 41 Test Equipment Used

8. Band Edge Spectrum CDMA

8.1 Test Specification

FCC Part 22, FCC Part 2.1051

8.2 Test procedure

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.

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:

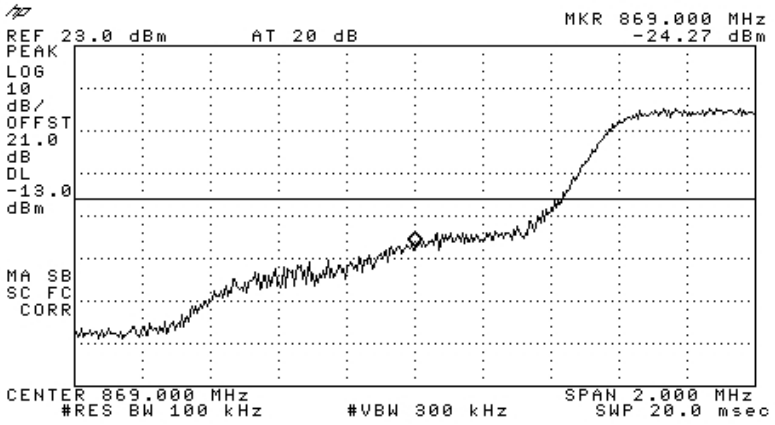


Figure 42.— 870.20 MHz

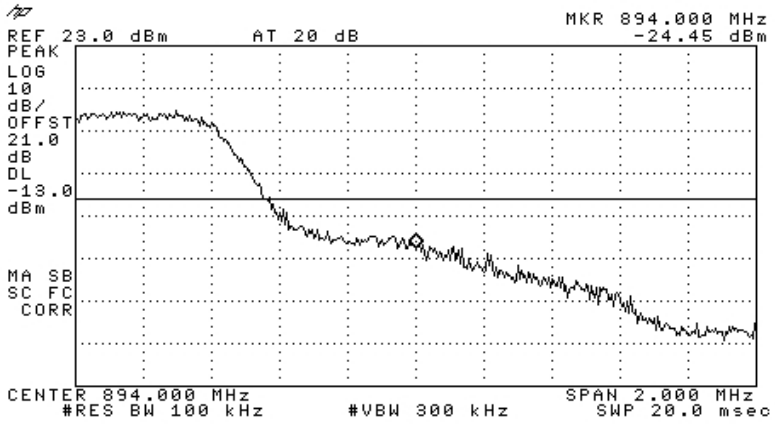


Figure 43.— 892.80 MHz

8.3 Results table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 24, Sub-part 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	-24.27	-13.0	-11.27
	892.80	894.00	-24.45	-13.0	-11.45

Figure 44 Band Edge Spectrum Results CDMA

JUDGEMENT: Passed by 11.27 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 16.12.09
Typed/Printed Name: A. Sharabi

8.4 Test Equipment Used.

Band Edge Spectrum CDMA

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	GB450502	August 20, 2008	2 year
Signal Generator	HP	E4433B ESG-D	GB40051392	August 6, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	October 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	October 19, 2009	1 year

Figure 45 Test Equipment Used

9. Out of Band Emissions (Radiated) CDMA

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-B: 2002, 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.

9.3 Test Data

CDMA:

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
870.20	1740.4	V	48.6	-50.4	4.9	7.0	-48.3	-13	-35.3
870.20	1740.4	H	48.8	-50.2	4.9	7.0	-48.1	-13	-35.1
881.50	1763.0	V	49.5	-49.6	4.9	7.0	-47.5	-13	-34.5
881.50	1763.0	H	48.4	-50.6	4.9	7.0	-48.5	-13	-35.5
892.80	1785.6	V	48.3	-50.7	4.9	7.0	-48.6	-13	-35.6
892.80	1785.6	H	59.6	-47.4	4.9	7.0	-47.3	-13	-34.3

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

TEST PERSONNEL:

Tester Signature: _____ Date: 16.12.09

Typed/Printed Name: A. Sharabi

9.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 17, 2008	1 year
RF Section	HP	85420E	3705A00248	November 16, 2008	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	August 3, 2009	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 24, 2010	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2009	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 29, 2009	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	January 7, 2009	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2009	1 Year
Signal Generator	HP	E4432B ESG-D	GB450502	August 8, 2008	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 16, 2008	2 year

10. Peak Output Power PCS

10.1 Test Specification

FCC Part 24, Sub-part 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 (20 dB) and an appropriate coaxial cable (1dB). The E.U.T. RF output was W-CDMA and GSM 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 1932.50, 1960.00, and 1987.5 MHz.

W-CDMA

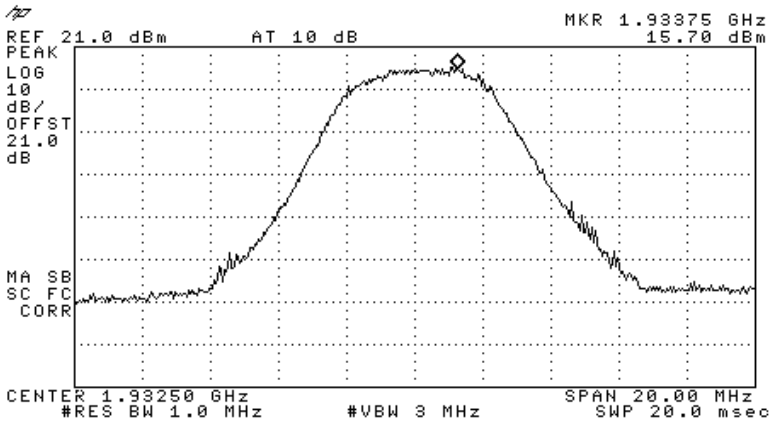


Figure 46.— 1932.50 MHz

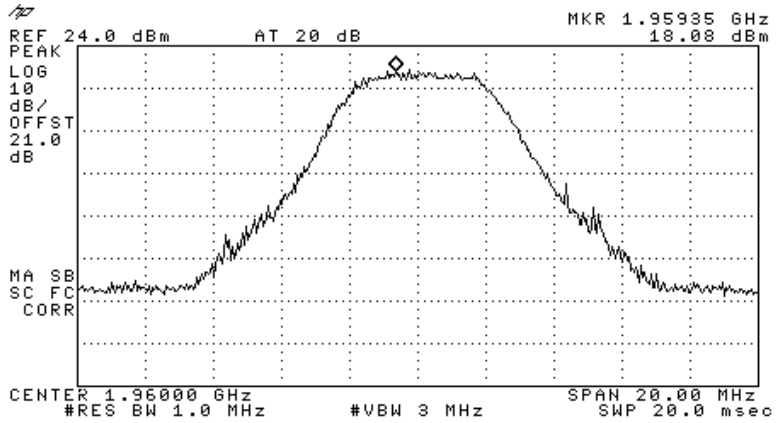


Figure 47.— 1960.00 MHz

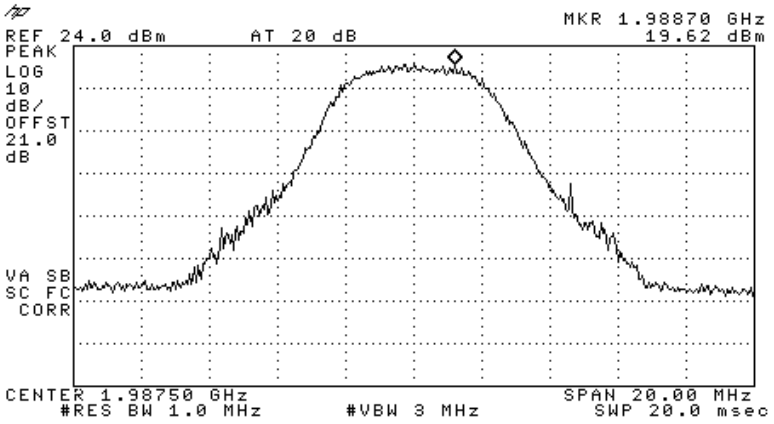


Figure 48.— 1987.50 MHz

GSM:

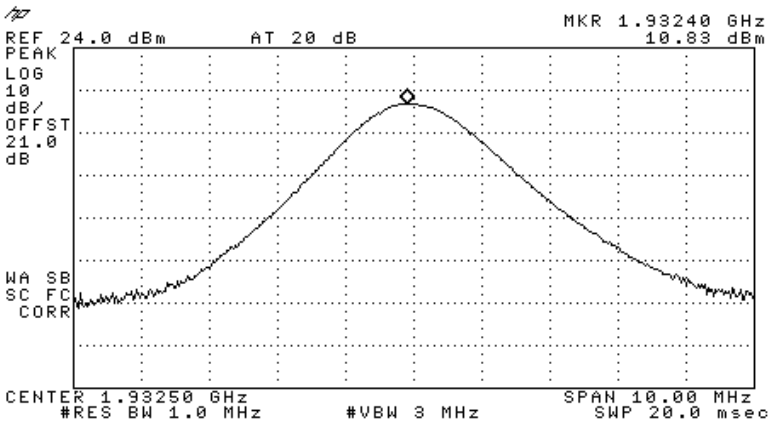


Figure 49.— 1932.50 MHz

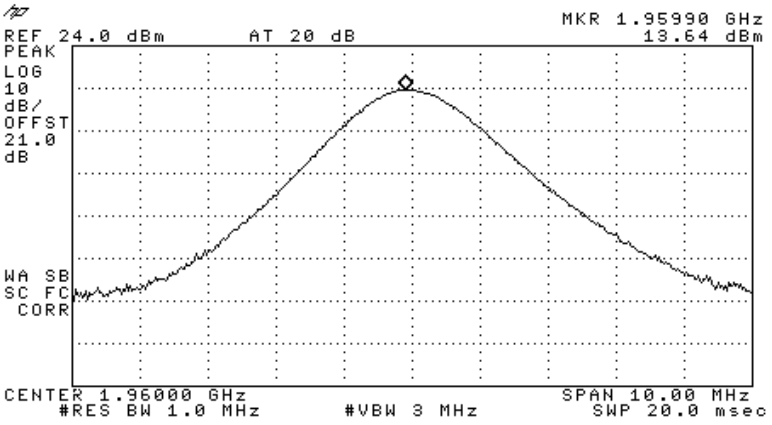


Figure 50.— 1960.00 MHz

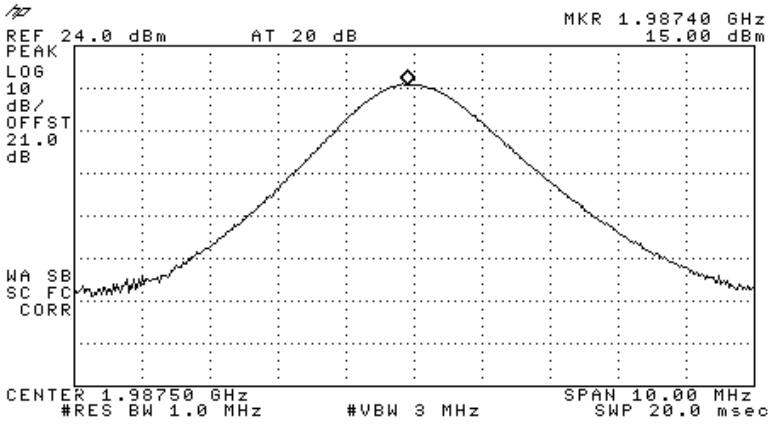


Figure 51.— 1987.50 MHz

10.3 Results table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 24, Subpart E, Section 232, FCC Part 2, Section 1046

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
W-CDMA	1932.50	15.70	50.0	-34.30
	1960.00	18.08	50.0	-31.92
	1987.50	19.62	50.0	-30.38
GSM	1932.50	10.83	50.0	-39.17
	1960.00	13.64	50.0	-36.36
	1987.50	15.00	50.0	-35.00

Figure 52 Peak Output Power PCS

JUDGEMENT: Passed by 30.4 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 26.08.10
Typed/Printed Name: A. Sharabi

10.4 Test Equipment Used.

Peak Output Power PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	GB40051392		1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	October 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	October 19, 2009	1 year

Figure 53 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 WCDMA, GSM 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.

W-CDMA

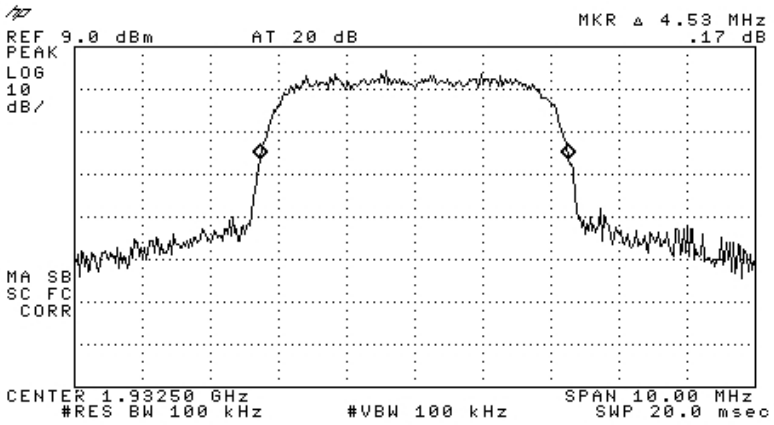


Figure 54.— Input 1932.50 MHz

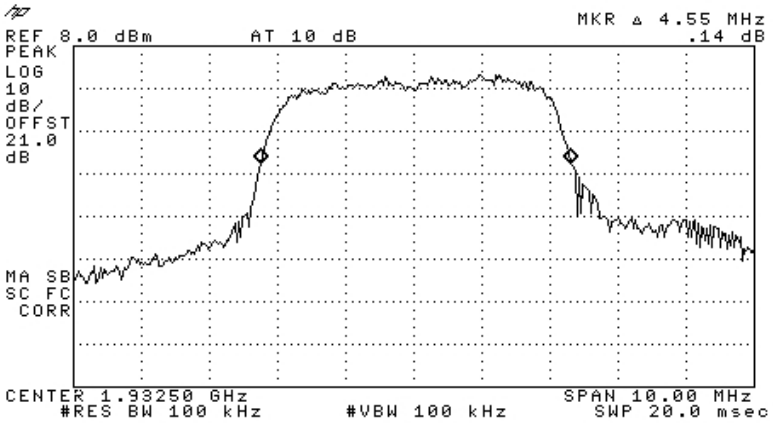


Figure 55.— Output 1932.50 MHz

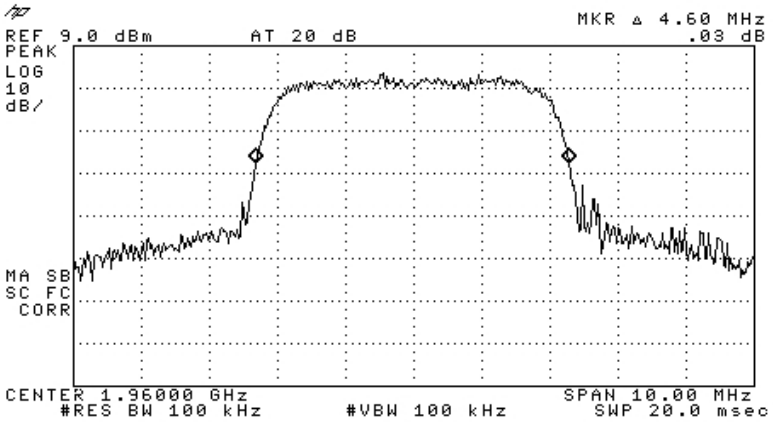


Figure 56.— Input 1960.00 MHz

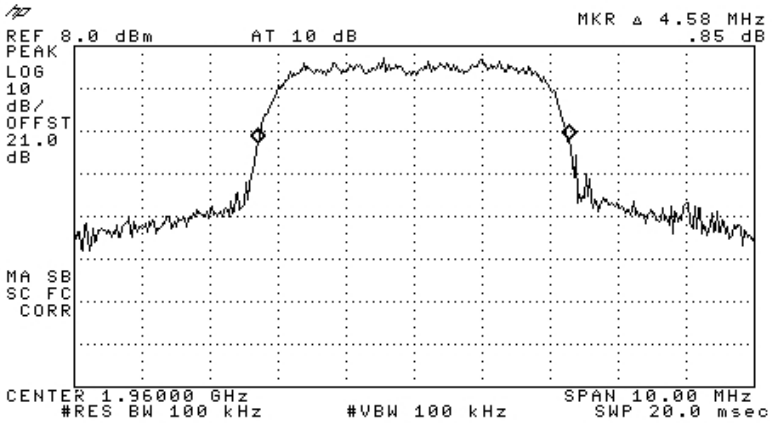


Figure 57.— Output 1960.00 MHz

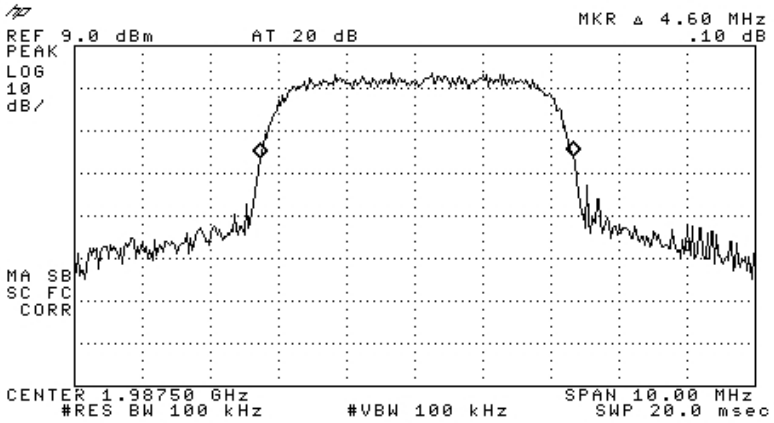


Figure 58.— Input 1987.50 MHz

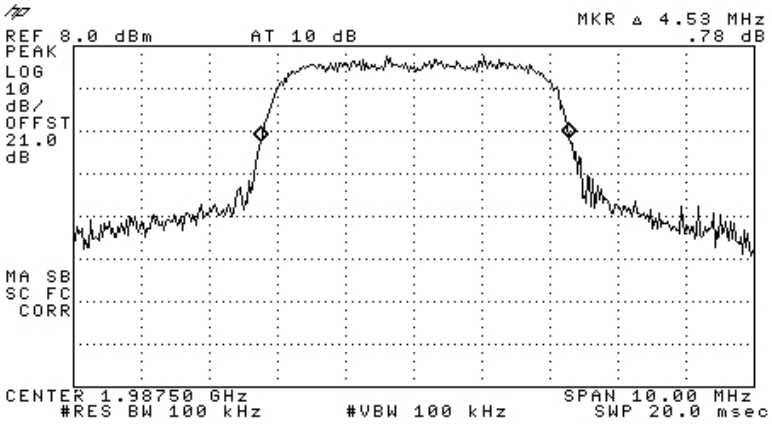


Figure 59.— Output 1987.50 MHz

GSM:

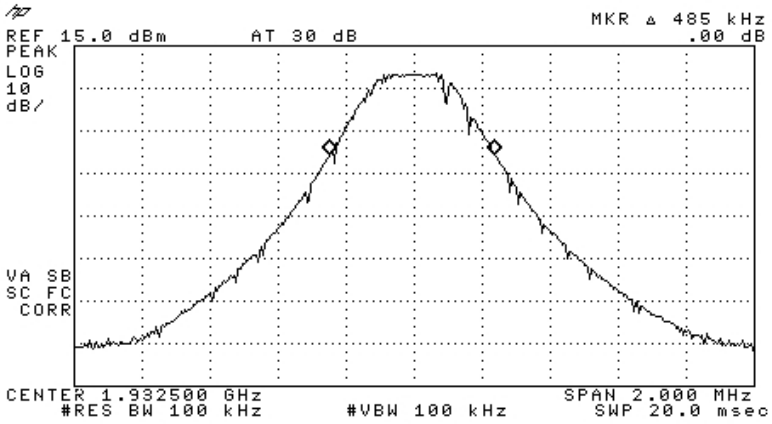


Figure 60.— Input 1932.50 MHz

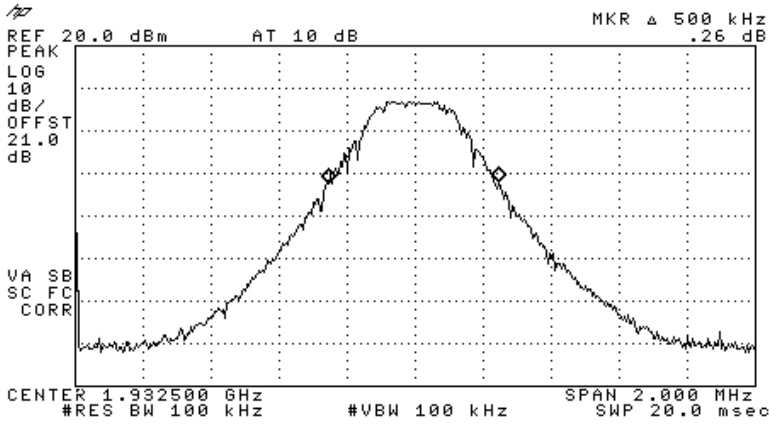


Figure 61.— Output 1932.50 MHz

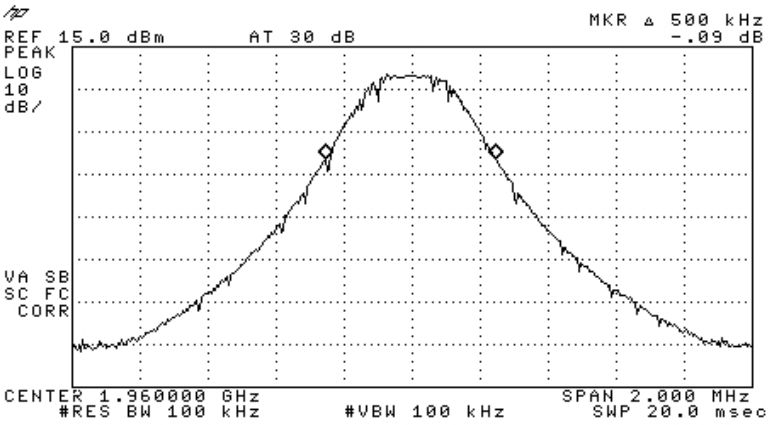


Figure 62.— Input 1960.00 MHz

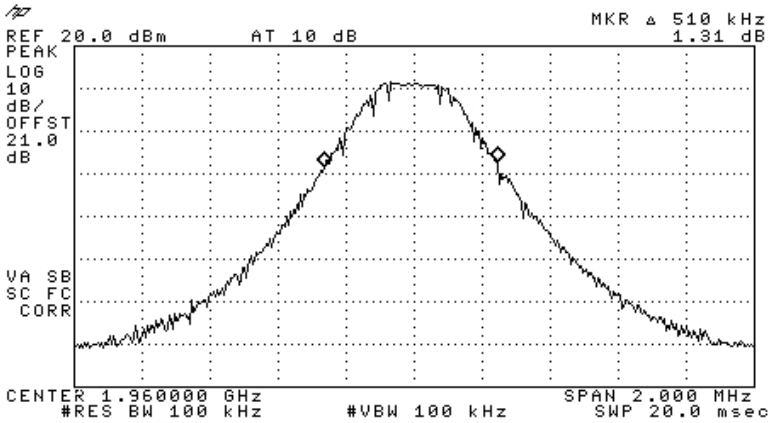


Figure 63.— Output 1960.00 MHz

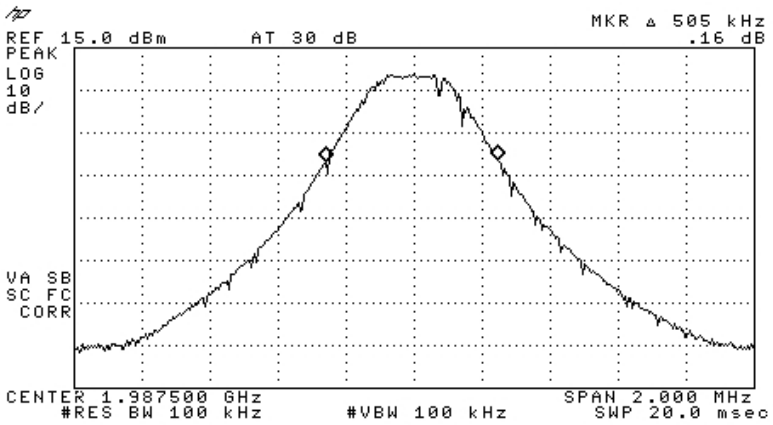


Figure 64.— Input 1987.50 MHz

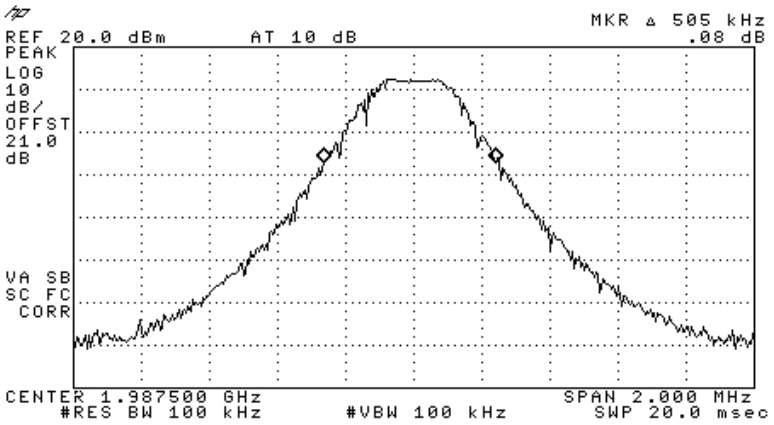


Figure 65.— Output 1987.50 MHz

11.3 Results Table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 2, Section 1049

Modulation		Operating Frequency	Reading (MHz)
W-CDMA	Input	1932.50	4.53
	Output	1932.50	4.55
	Input	1960.00	4.60
	Output	1960.00	4.58
	Input	1987.50	4.60
	Output	1987.50	4.53
GSM	Input	1932.50	0.485
	Output	1932.50	0.500
	Input	1960.00	0.500
	Output	1960.00	0.510
	Input	1987.50	0.505
	Output	1987.50	0.505

Figure 66 Occupied Bandwidth PCS

TEST PERSONNEL:

Tester Signature: _____ Date: 16.12.09

Typed/Printed Name: A. Sharabi

11.4 Test Equipment Used.

Occupied Bandwidth PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	3826A01204	March 17, 2009	1 year
Power Supply	Horizon Electronics	DHR 3653D-1.0	TE1232	N/A	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	April 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	April 19, 2009	1 year

Figure 67 Test Equipment Used

12. Out of Band Emissions at Antenna Terminals PCS

12.1 Test Specification

FCC Part 24, Sub-part 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 (21 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

W-CDMA:

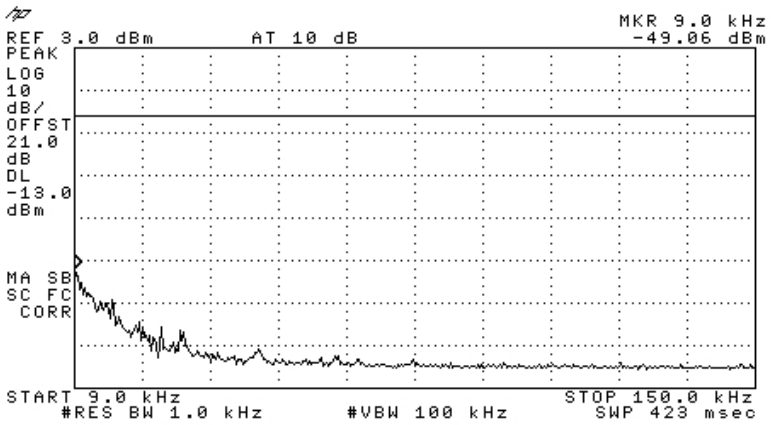


Figure 68.— 1932.50 MHz

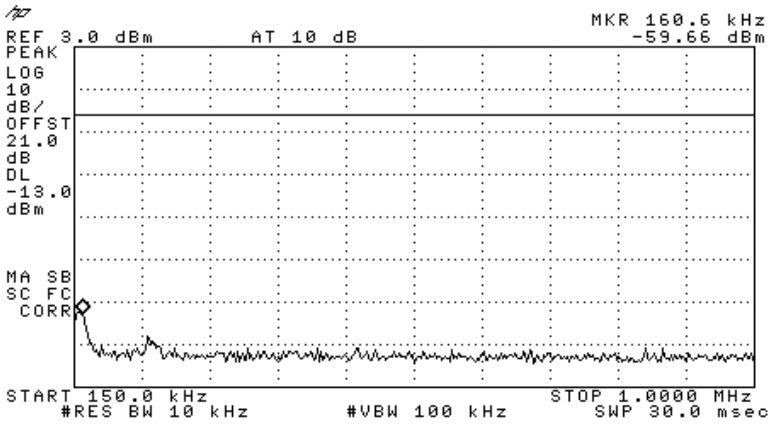


Figure 69.— 1932.50 MHz

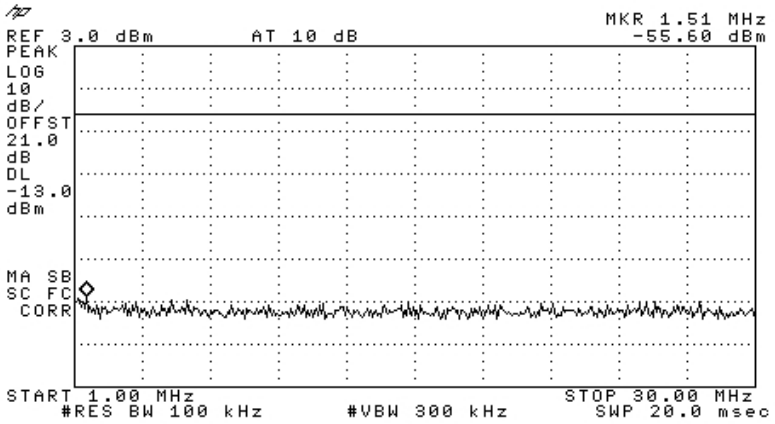


Figure 70.— 1932.50 MHz

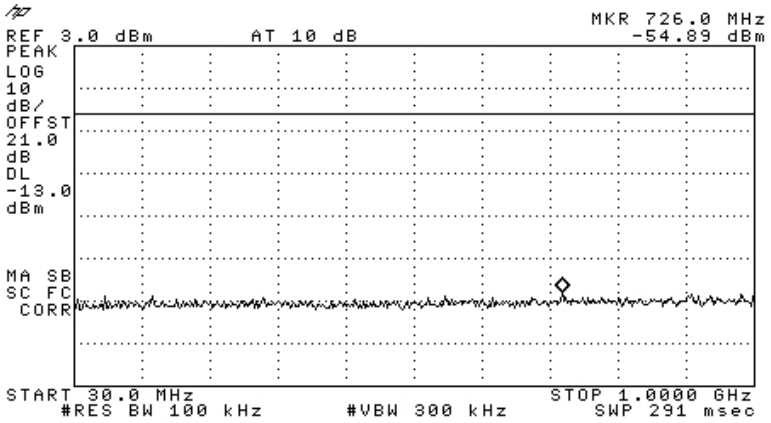


Figure 71.— 1932.50 MHz

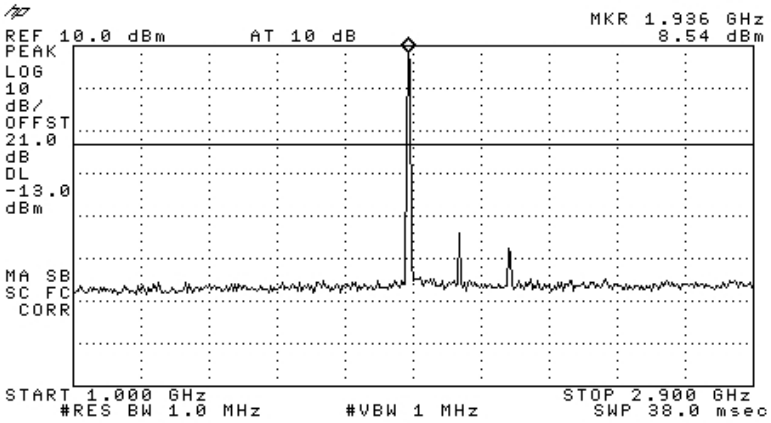


Figure 72.— 1932.50 MHz

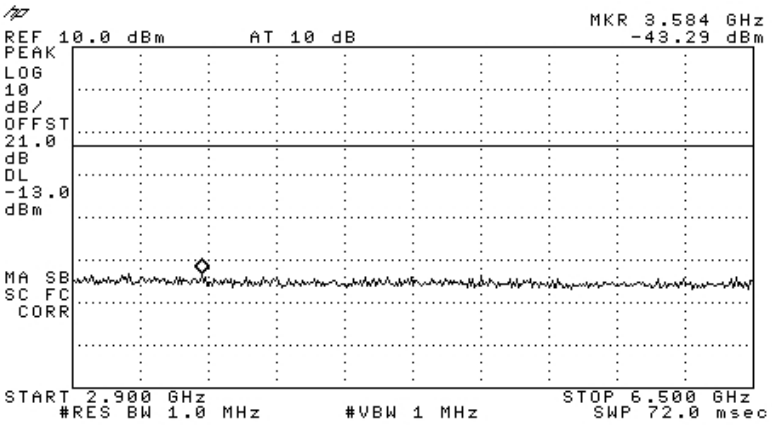


Figure 73.— 1932.50 MHz

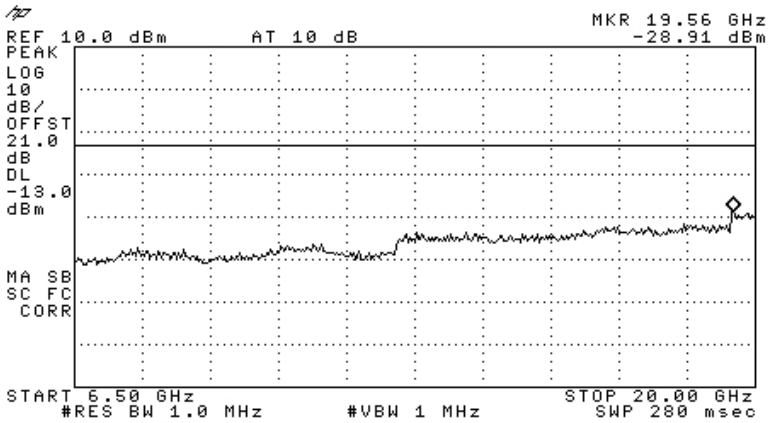


Figure 74.— 1932.50 MHz

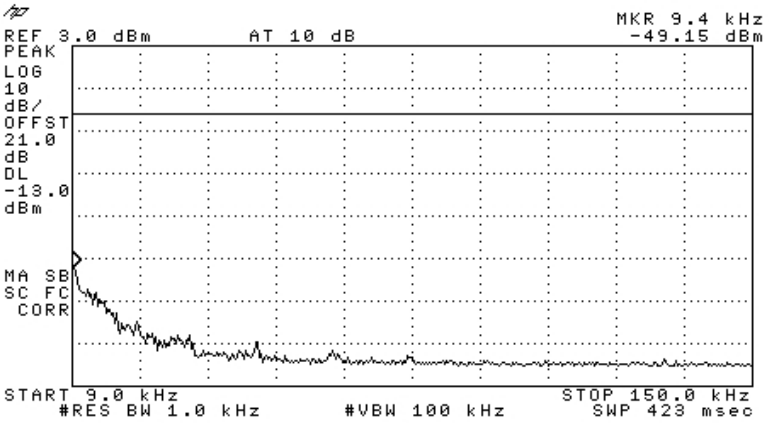


Figure 75.— 1960.00 MHz

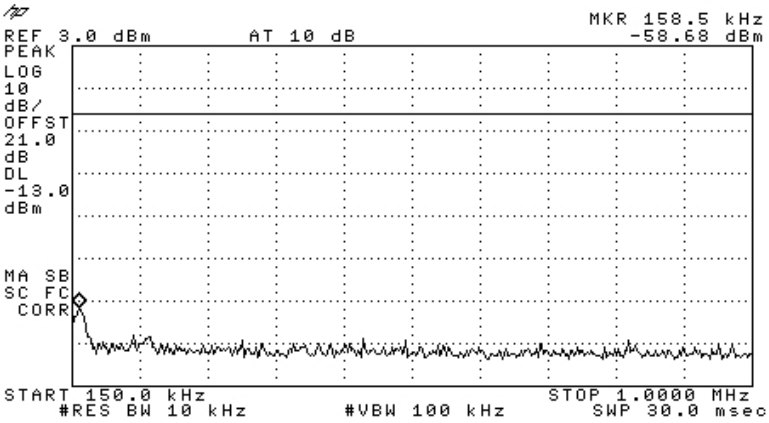


Figure 76.— 1960.00 MHz

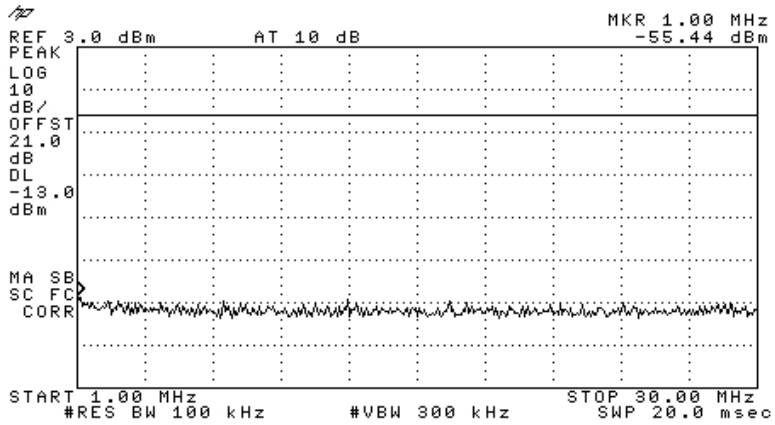


Figure 77.— 1960.00 MHz

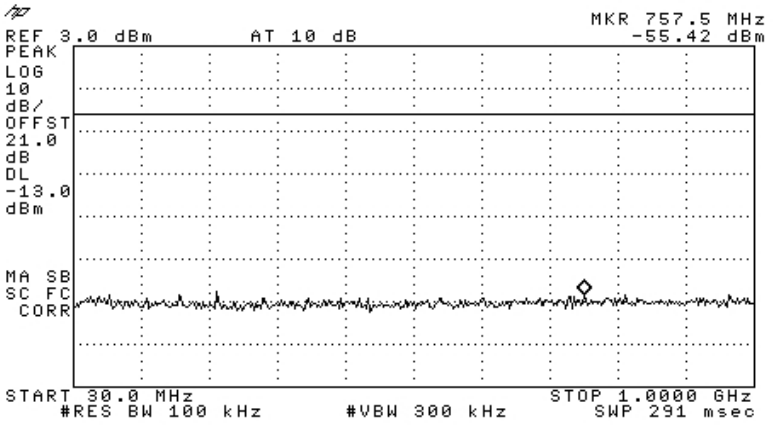


Figure 78.— 1960.00 MHz

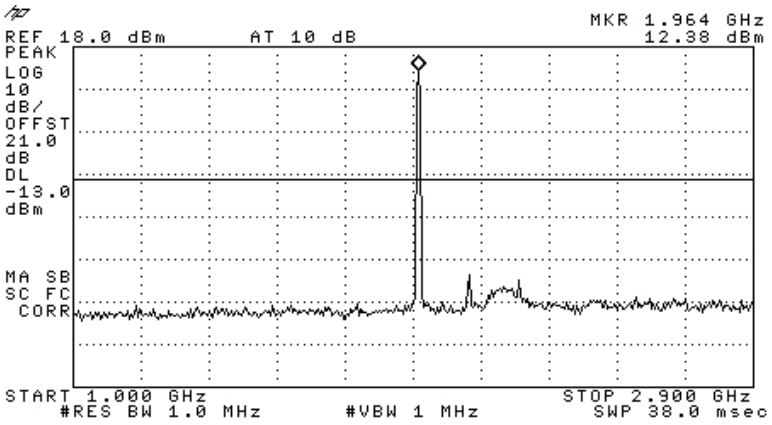


Figure 79.— 1960.00 MHz

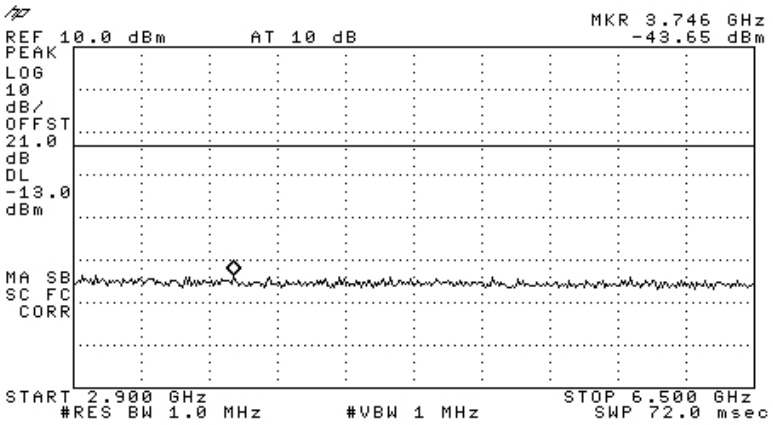


Figure 80.— 1960.00 MHz

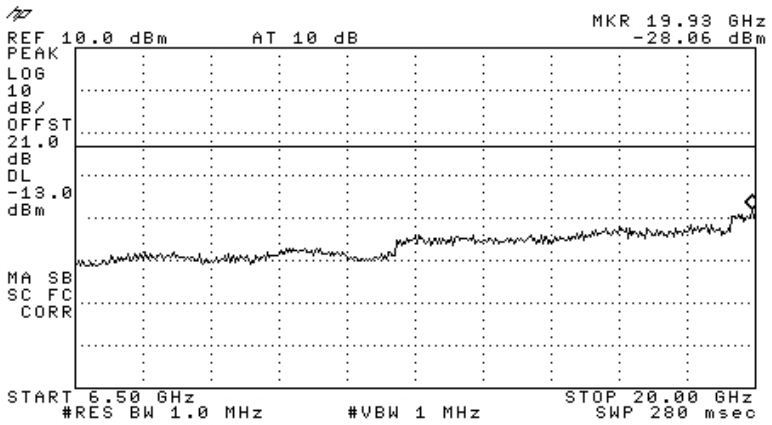


Figure 81.— 1960.00 MHz

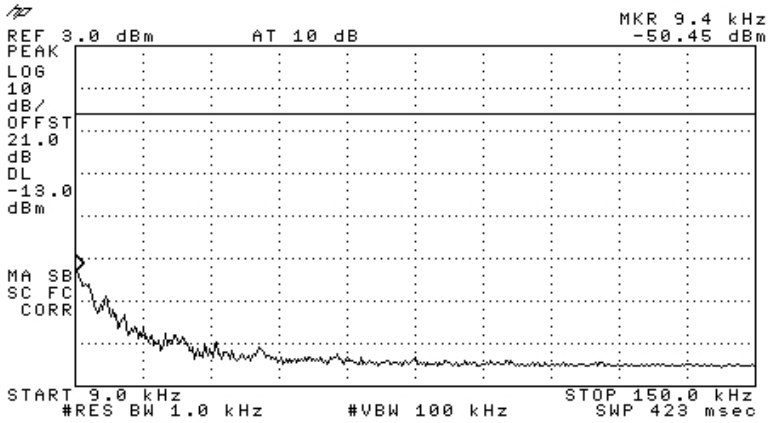


Figure 82.— 1987.50 MHz

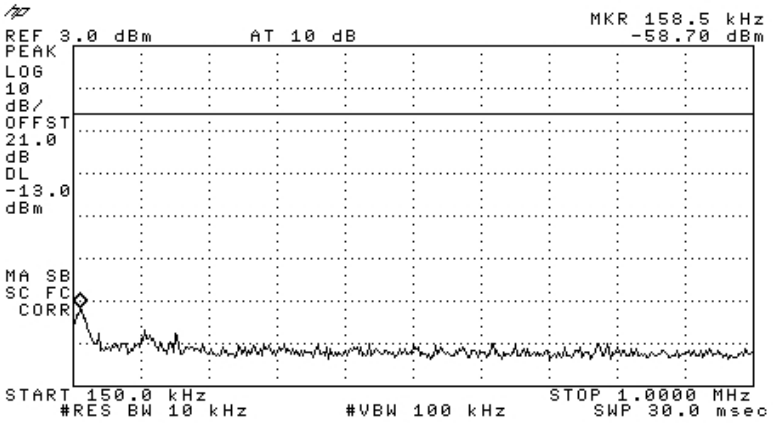


Figure 83.— 1987.50 MHz

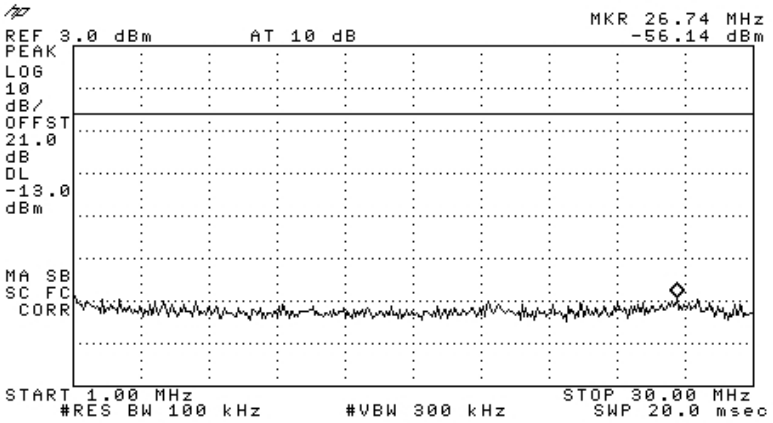


Figure 84.— 1987.50 MHz

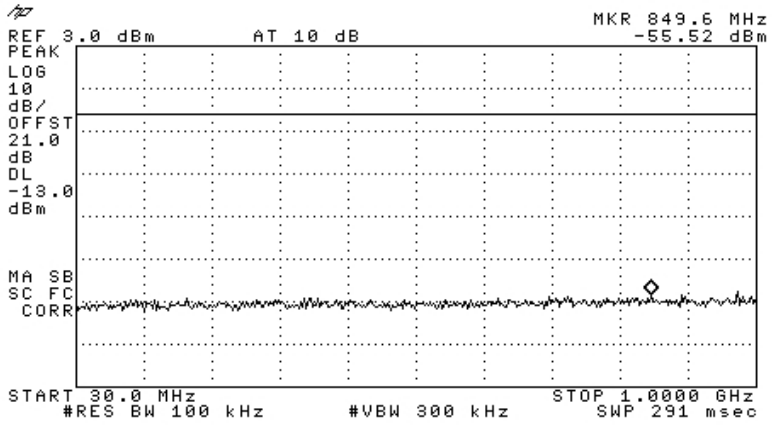


Figure 85.— 1987.50 MHz

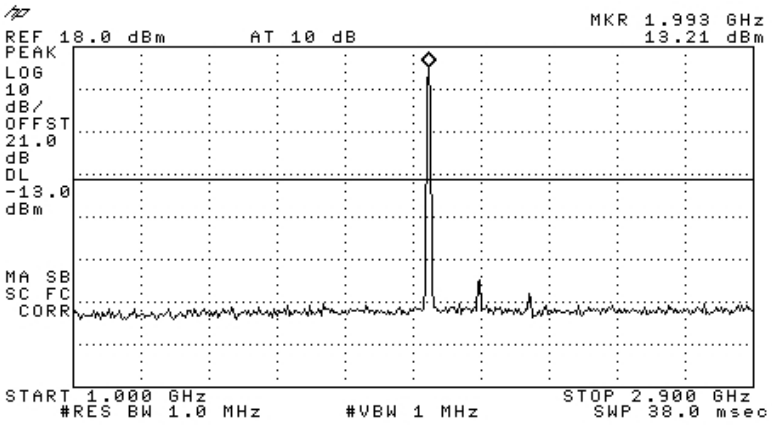


Figure 86.— 1987.50 MHz

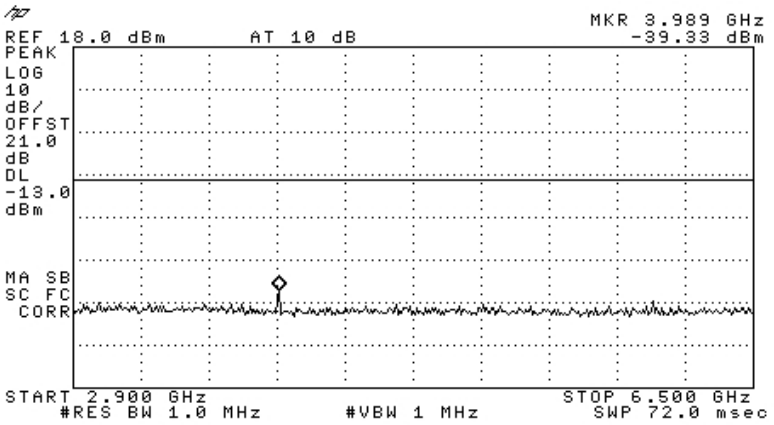


Figure 87.— 1987.50 MHz

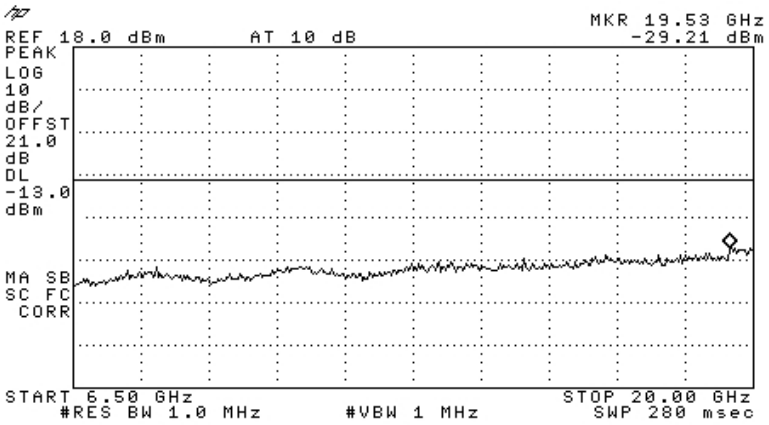


Figure 88.— 1987.50 MHz

GSM:

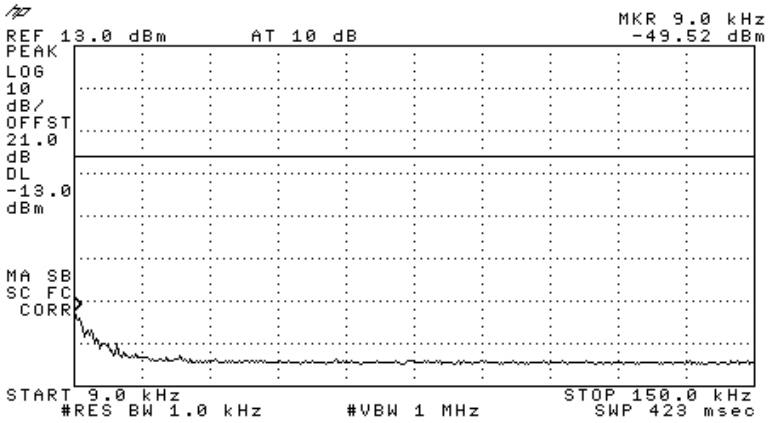


Figure 89.— 1932.50 MHz

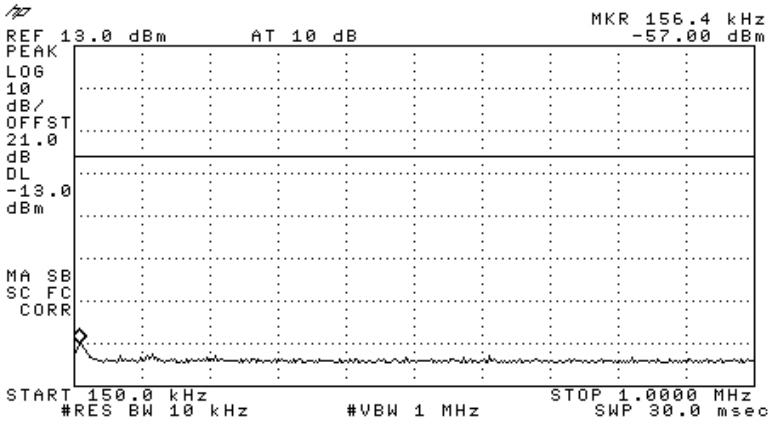


Figure 90.— 1932.50 MHz

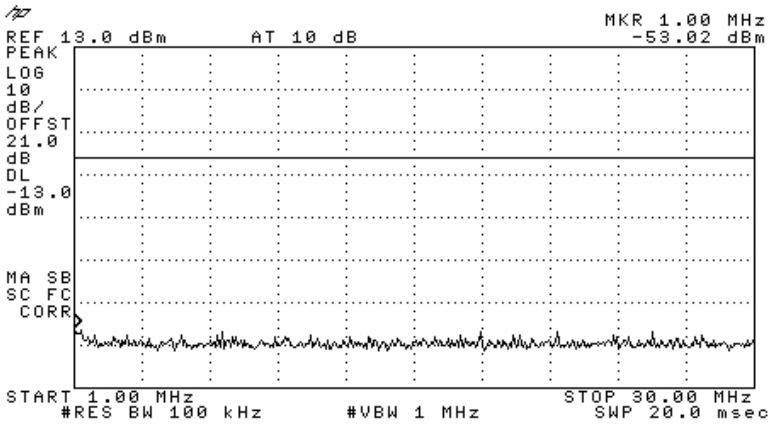


Figure 91.— 1932.50 MHz

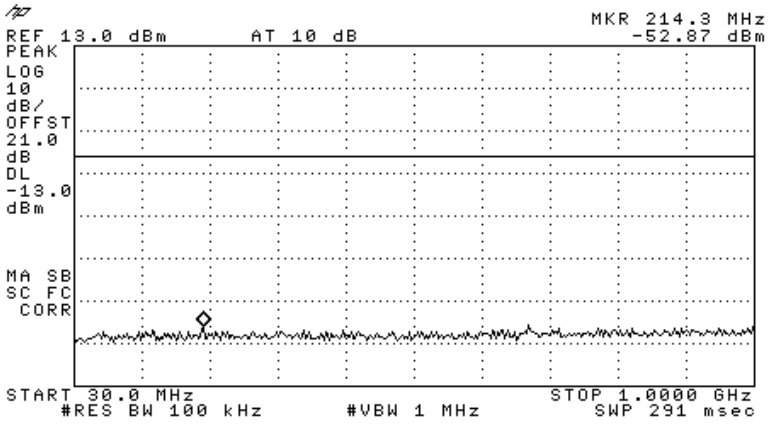


Figure 92.— 1932.50 MHz

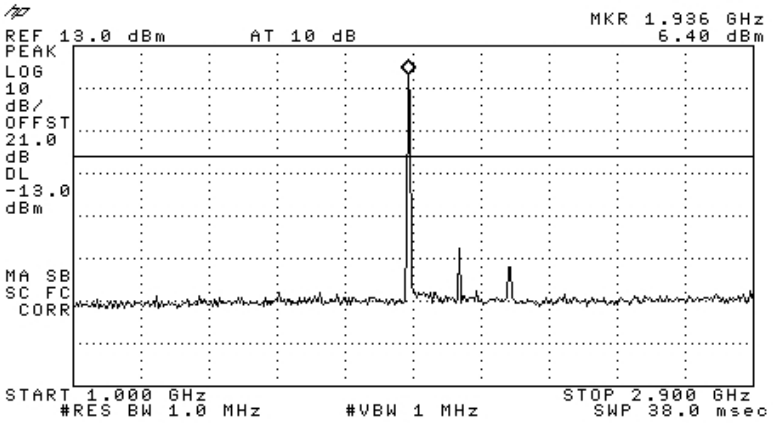


Figure 93.— 1932.50 MHz

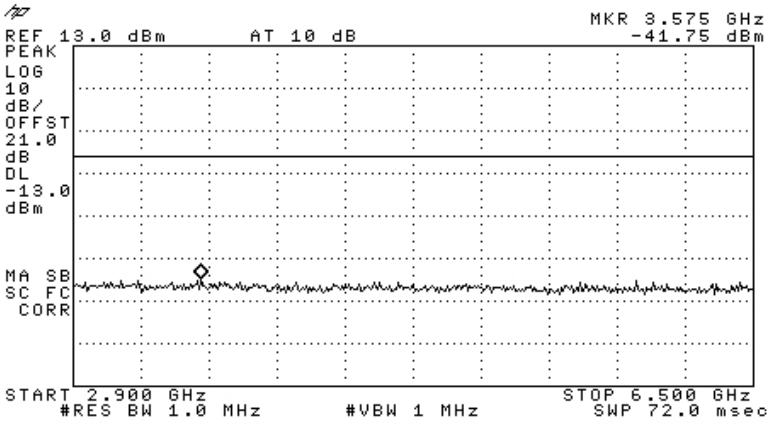


Figure 94.— 1932.50 MHz

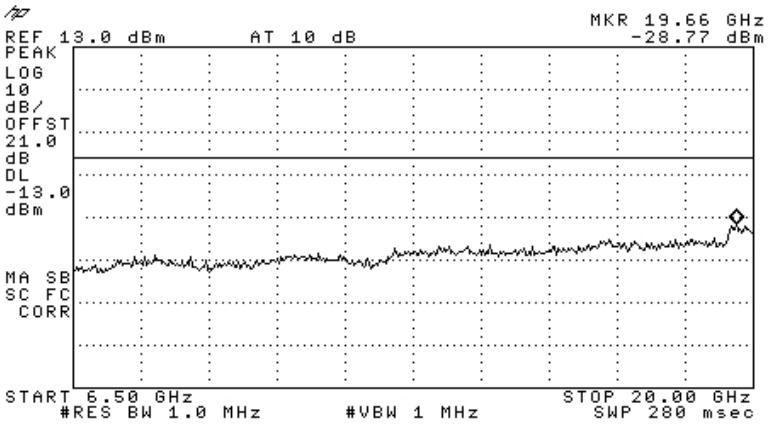


Figure 95.— 1932.50 MHz

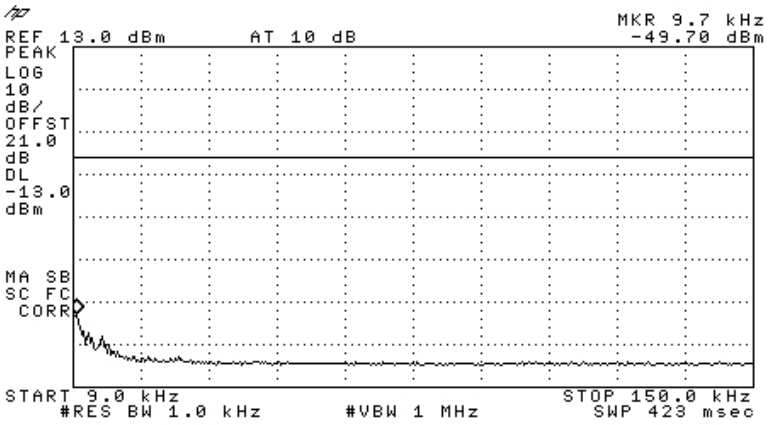


Figure 96.— 1960.00 MHz

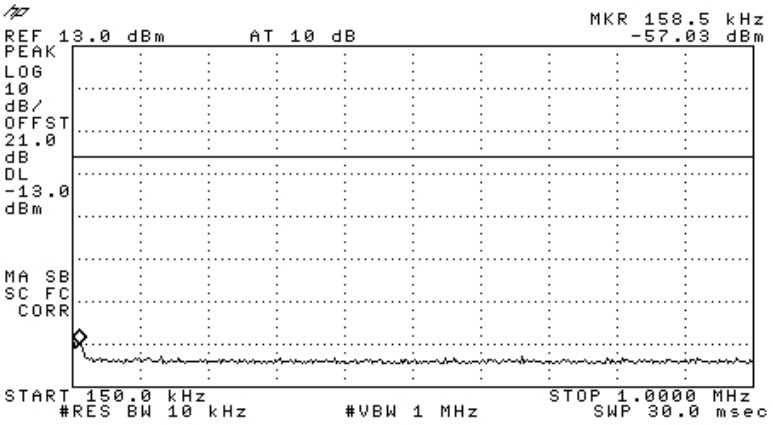


Figure 97.— 1960.00 MHz

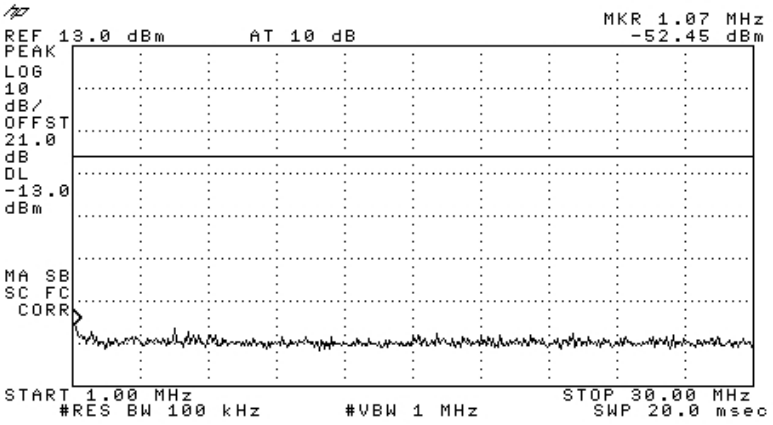


Figure 98.— 1960.00 MHz

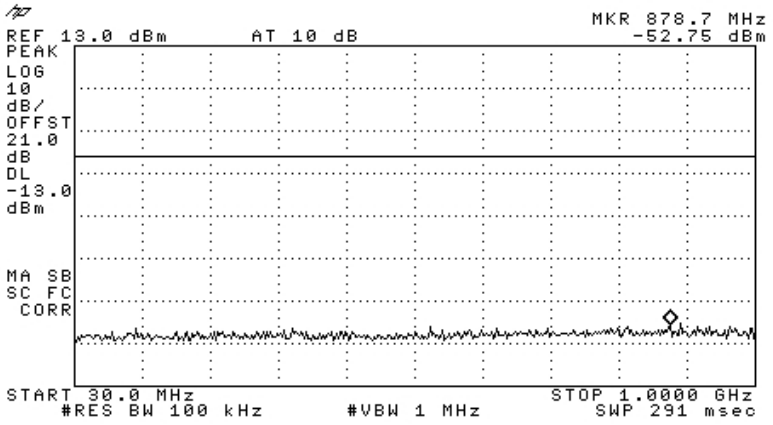


Figure 99.— 1960.00 MHz

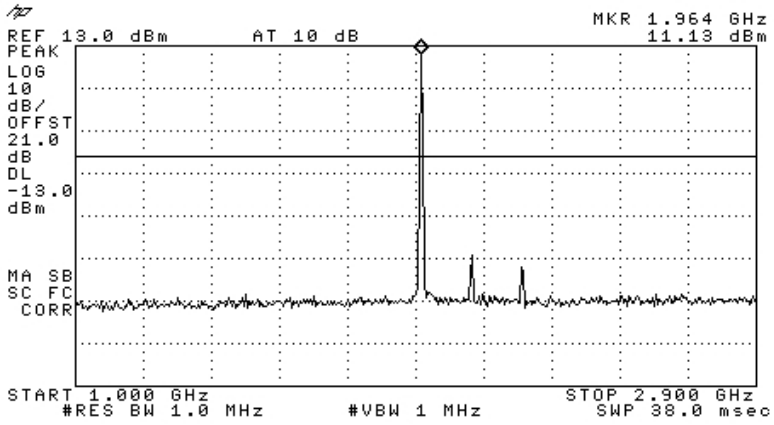


Figure 100.— 1960.00 MHz

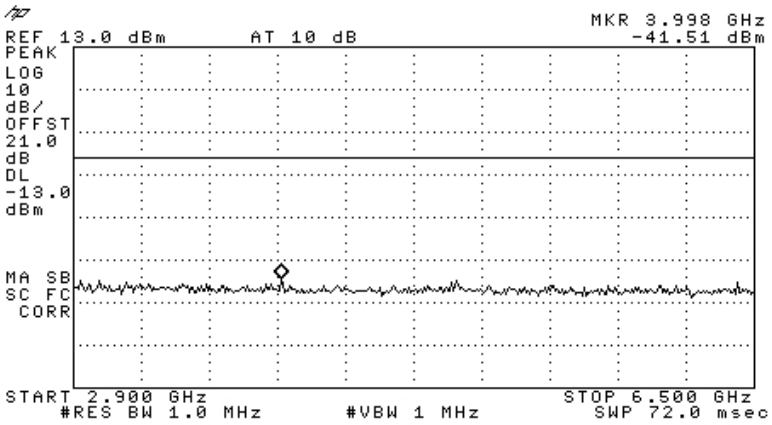


Figure 101.— 1960.00 MHz

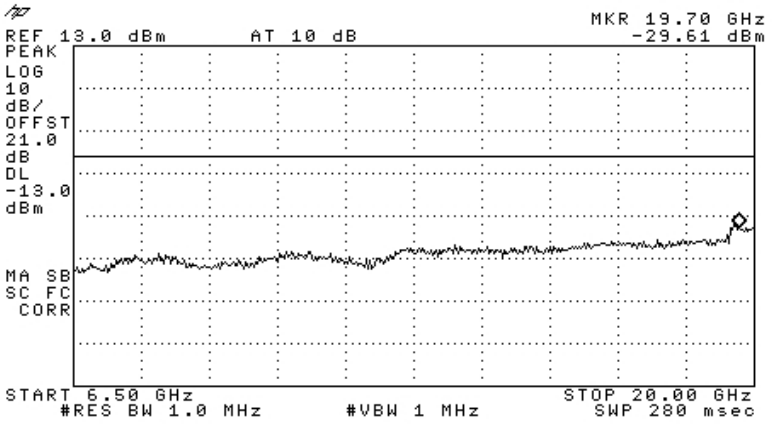


Figure 102.— 1960.00 MHz

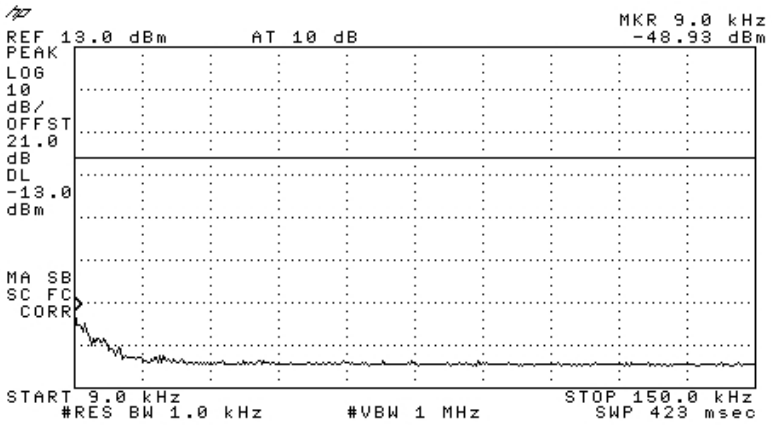


Figure 103.— 1987.50 MHz

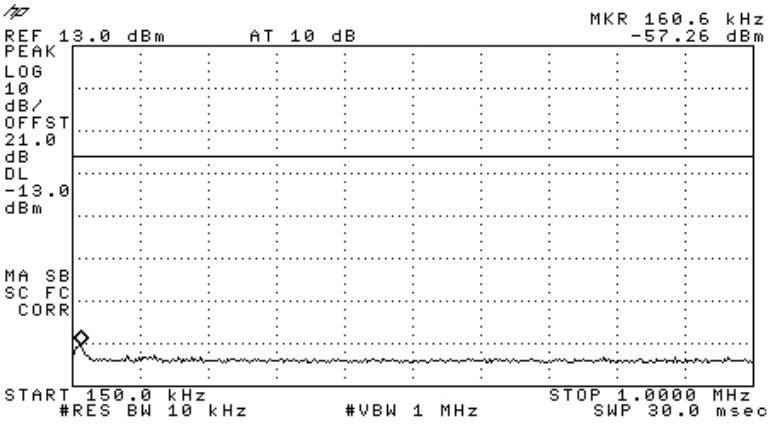


Figure 104.— 1987.50 MHz

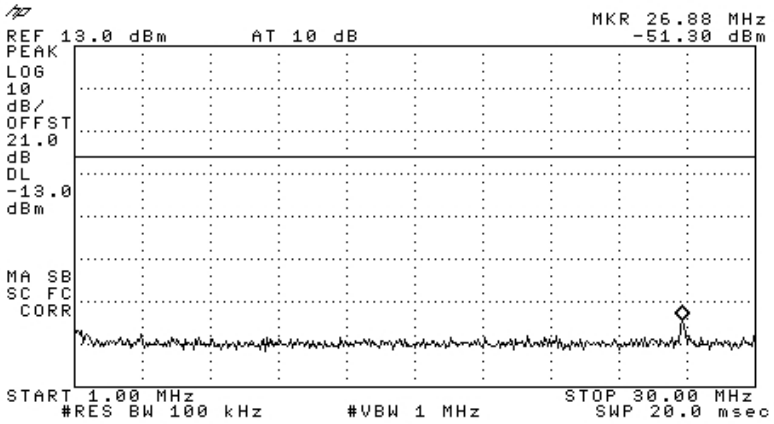


Figure 105.— 1987.50 MHz

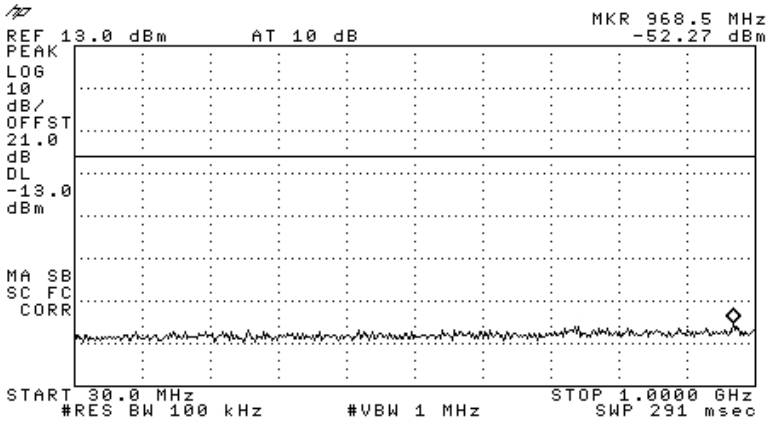


Figure 106.— 1987.50 MHz

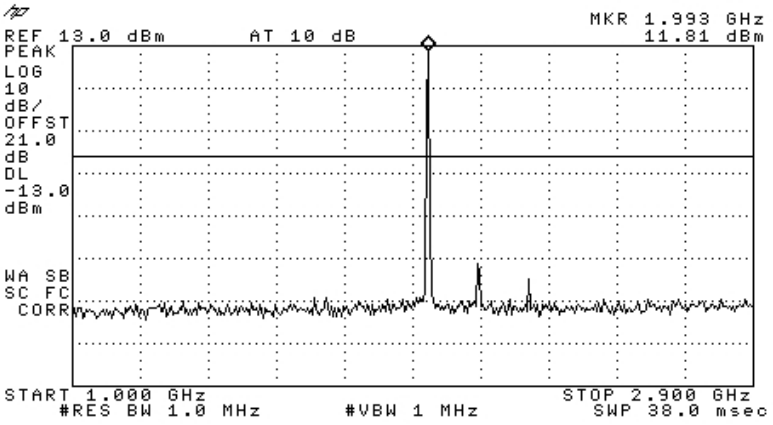


Figure 107.— 1987.50 MHz

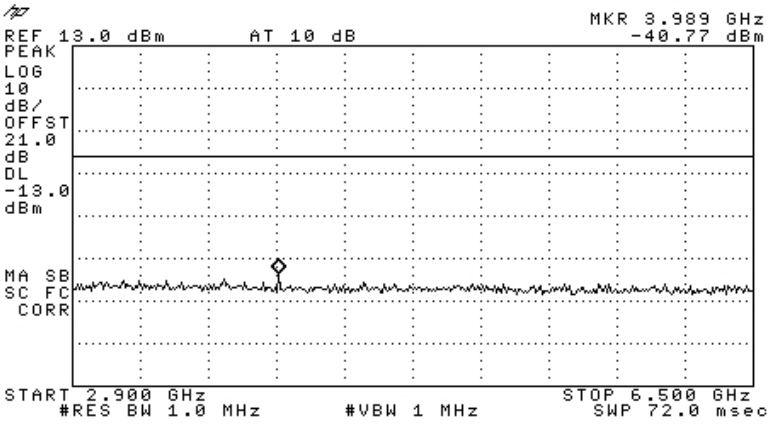


Figure 108.— 1987.50 MHz

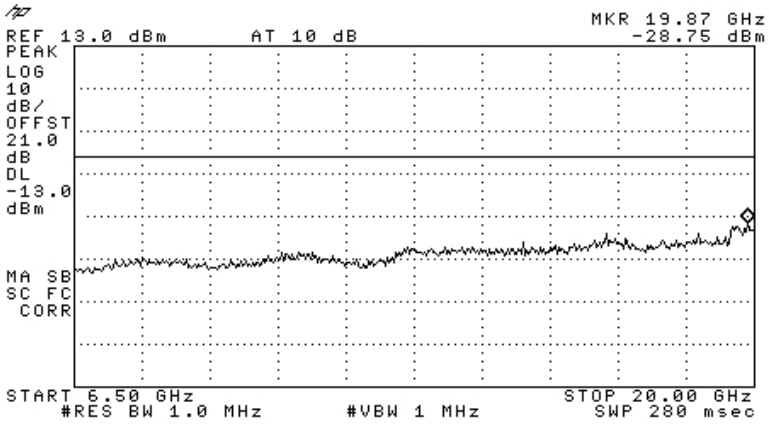


Figure 109.— 1987.50 MHz

12.3 Results table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 24, Sub-part E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
W-CDMA	1932.50	19.56	-28.91	-13.0	-15.91
	1960.00	19.93	-28.06	-13.0	-15.06
	1987.50	19.53	-29.21	-13.0	-16.21
GSM	1932.50	19.66	-28.77	-13.0	-15.77
	1960.00	19.70	-29.61	-13.0	-16.61
	1987.50	19.87	-28.75	-13.0	-15.75

Figure 110 Out of Band Emission Results PCS

JUDGEMENT: Passed by 15.06 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 16.12.09

Typed/Printed Name: A. Sharabi

12.4 Test Equipment Used.

Out of Band Emission at Antenna Terminals PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	GB450502	August 20, 2008	2 year
Signal Generator	HP	E4433B ESG-D	GB40051392	August 6, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	October 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	October 19, 2009	1 year

Figure 111 Test Equipment Used

13. Band Edge Spectrum

13.1 Test Specification

FCC Part 24, Sub-part E, Section 238; FCC Part 2.1051

13.2 Test procedure

Enclosed are spectrum analyzer plots for the lowest operation frequency (1932.5 MHz) and the highest operation frequency (1987.5 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.

W-CDMA:

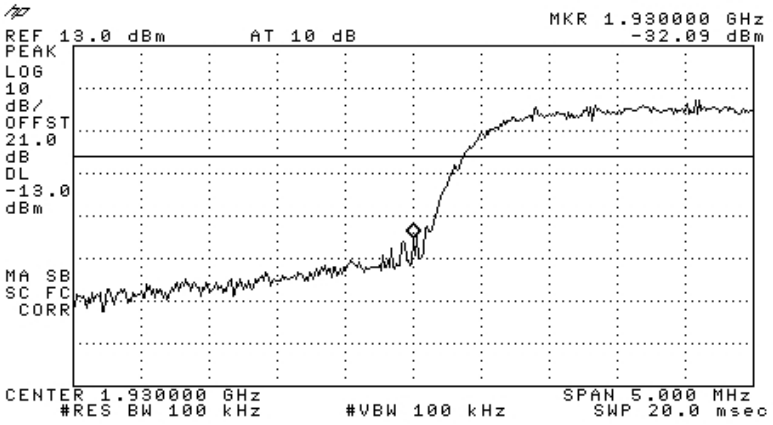


Figure 112.— 1932.50 MHz

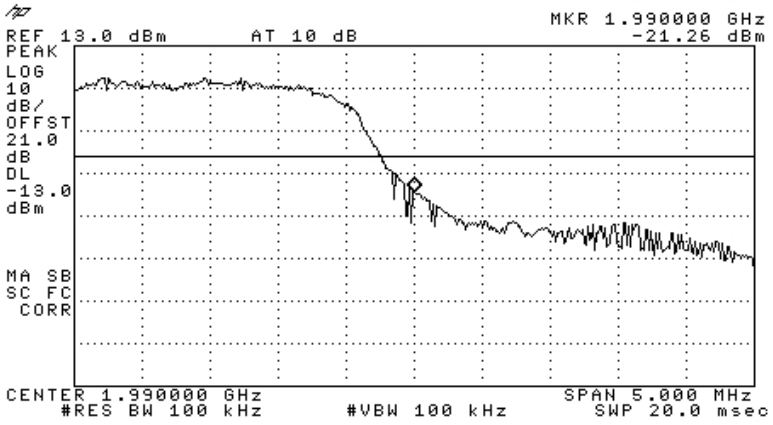


Figure 113.— 1987.50 MHz

GSM:

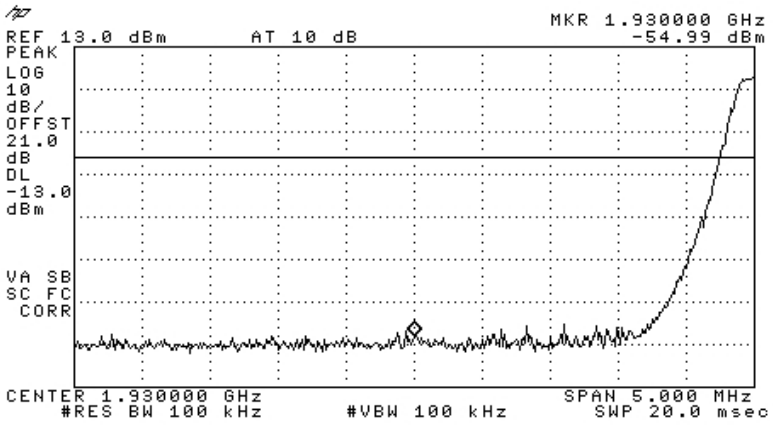


Figure 114.— 1932.50 MHz

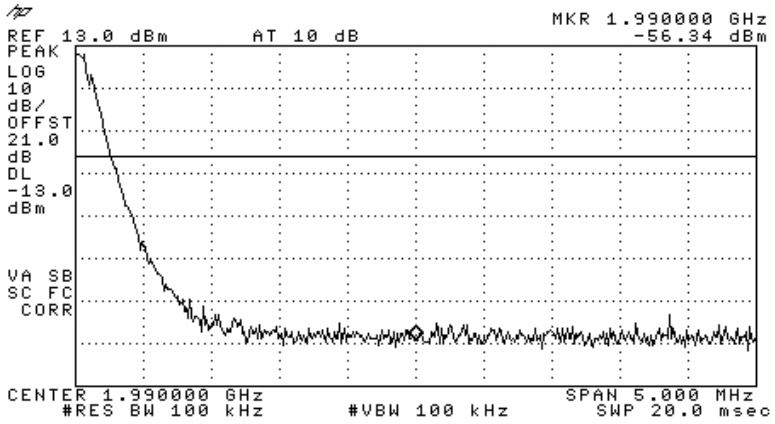


Figure 115.— 1987.50 MHz

13.3 Results table

E.U.T. Description: EnCOVER VE CELL-PCS System Comprising:
1. EnCOVER VE Access Pod
2. EnCOVER VE Control Unit CELL-PCS

Model No.: 1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number: 1. 00094500A5 2. 00094500081
Specification: FCC Part 24, Sub-part E, Section 238; Part 2 Section 1051

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
W-CDMA	1932.50	1930.00	-32.09	-13.0	-19.09
	1987.50	1990.00	-21.26	-13.0	-8.26
GSM	1932.50	1930.00	-54.99	-13.0	-41.99
	1987.50	1990.00	-56.34	-13.0	-43.34

Figure 116 Band Edge Spectrum Results PCS

JUDGEMENT: Passed by 8.26 dB

TEST PERSONNEL:
Tester Signature: _____ Date: 16.12.09
Typed/Printed Name: A. Sharabi

13.4 Test Equipment Used.

Band Edge Spectrum PCS

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Signal Generator	HP	E4433B ESG-D	3826A01204	March 17, 2009	1 year
Power Supply	Horizon Electronics	DHR 3653D-1.0	TE1232	N/A	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	April 19, 2009	1 year
Cable	Rhophase	KPS-5000-KPS	A1674	April 19, 2009	1 year

Figure 117 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-B: 2002, 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.

14.3 Test Data

W-CDMA:

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
1932.5	3865.0	V	47.7	-49.5	7.9	7.9	-49.5	-13	-36.5
1932.5	3865.0	H	46.7	-39.7	7.9	7.9	-39.7	-13	-26.7
1960.0	3920.0	V	47.8	-49.6	7.9	7.9	-49.6	-13	-36.6
1960.0	3920.0	H	47.5	-39.9	7.9	7.9	-39.9	-13	-26.9
1987.5	3975.0	V	46.4	-51.0	7.9	7.9	-51.0	-13	-38.0
1987.5	3975.0	H	47.5	-50.3	7.9	7.9	-50.3	-13	-37.3

GSM:

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)
1932.5	3865.0	V	48.7	-48.5	7.9	7.9	-48.5	-13	-35.5
1932.5	3865.0	H	47.7	-38.7	7.9	7.9	-38.7	-13	-25.7
1960.0	3920.0	V	48.8	-48.6	7.9	7.9	-48.6	-13	-35.6
1960.0	3920.0	H	46.5	-40.9	7.9	7.9	-40.9	-13	-27.9
1987.5	3975.0	V	48.4	-49.0	7.9	7.9	-49.0	-13	-36.0
1987.5	3975.0	H	48.5	-49.3	7.9	7.9	-49.3	-13	-36.3

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: 16.12.09

Typed/Printed Name: A. Sharabi

14.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 17, 2008	1 year
RF Section	HP	85420E	3705A00248	November 16, 2008	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	August 3, 2009	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 24, 2010	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2009	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 29, 2009	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	January 7, 2009	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2009	1 Year
Signal Generator	HP	E4432B ESG-D	GB450502	August 8, 2008	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 16, 2008	2 year

15. Frequency Stability

15.1 Test Specification

Part 24 Sub-part D Section 24.135

15.2 Test Procedure

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

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

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

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

The carrier frequency measurement was repeated for:

(a). +20°C and 97.5 VAC

(b). +20°C and 132.5 VAC

(c). -30°C and 115 VAC

(d). -30°C and 97.5 VAC

(e). -30°C and 132.5 VAC

(f). +50°C and 115 VAC

(g). +50°C and 97.5 VAC

(h). +50°C and 132.5 VAC

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

The E.U.T. was operated at 1932.50, 1960.00, and 1987.5 MHz.

and 870.2, 881.5, and 892.8 MHz

15.3 Test Results

The E.U.T met the requirements of Part 24 Sub-part D, Section 24.135 specification.

The details of the results are given in *Figure 119* to *Figure 118*.

For the operation frequency of 1932.50 MHz:

The frequency offset between the frequency measured under extreme conditions and the reference carrier frequency measured under normal test conditions, is in the worst case, 0.13 kHz at -30 °C.

For the operation frequency of 1960.00 MHz:

The frequency offset between the frequency measured under extreme conditions and the reference carrier frequency measured under normal test conditions, is in the worst case, 0.13 kHz at -30 °C.

For the operation frequency of 1987.50:

The frequency offset between the frequency measured under extreme conditions and the reference carrier frequency measured under normal test conditions, is in the worst case, 0.13 kHz at -30 °C.

For the operation frequency of 870.20 MHz:

The frequency offset between the frequency measured under extreme conditions and the reference carrier frequency measured under normal test conditions, is in the worst case, 0.07 kHz at +50 °C at 97.5 and 115 VAC.

For the operation frequency of 881.50 MHz:

The frequency offset between the frequency measured under extreme conditions and the reference carrier frequency measured under normal test conditions, is in the worst case, 0.12 kHz at +50 °C.

For the operation frequency of 892.80:

The frequency offset between the frequency measured under extreme conditions and the reference carrier frequency measured under normal test conditions, is in the worst case, 0.12 kHz at -30 °C.

JUDGEMENT: Passed by 0.13 kHz

TEST PERSONNEL:

Tester Signature: _____ Date: 29.12.09

Typed/Printed Name: A. Sharabi

Frequency Stability

E.U.T Description	Mobile Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

Specification: FCC Part 24 Sub-part D Section 24.135

Operation Frequency (MHz)	Frequency Readings (MHz)			Δ f(max) (kHz)	Spec. (kHz)
	97.5 (VAC)	115 (VAC)	132.5 (VAC)		
1932.50	1932.49975	1932.49975	1932.49975	-	± 1.9
1960.00	1959.99975	1959.99975	1959.99975	-	± 1.9
1987.50	1987.49975	1987.49975	1987.49975	-	± 1.9

Figure 118. Frequency Stability 20°C

Operation Frequency (MHz)	Frequency Readings (MHz)			Δ f(max) (kHz)	Spec. (kHz)
	97.5 (VAC)	115 (VAC)	132.5 (VAC)		
1932.50	1932.49988	1932.49988	1932.49988	+0.13	± 1.9
1960.00	1959.99988	1959.99988	1959.99988	+0.13	± 1.9
1987.50	1987.49988	1987.49988	1987.49988	+0.13	± 1.9

Figure 119. Frequency Stability -30°C

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm = ± 1.9 kHz

Frequency Stability

E.U.T Description	Mobile Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

Specification: FCC Part 24 Sub-part D Section 24.135

Operation Frequency (MHz)	Frequency Readings (MHz)			Δ f(max) (kHz)	Spec. (kHz)
	97.5 (VAC)	115 (VAC)	132.5 (VAC)		
1932.50	1932.49975	1932.49975	1932.49975	0.00	± 1.9
1960.00	1959.99975	1959.99975	1959.99975	0.00	± 1.9
1987.50	1987.49975	1987.49975	1987.49975	0.00	± 1.9

Figure 120. Frequency Stability +50°C

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm = ± 1.9 kHz

Frequency Stability

E.U.T Description	Mobile Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

Specification: FCC Part 24 Sub-part D Section 24.135

Operation Frequency (MHz)	Frequency Readings (MHz)			Δ f(max) (kHz)	Spec. (kHz)
	97.5 (VAC)	115 (VAC)	132.5 (VAC)		
870.2	870.20032	870.20032	870.20032	-	± 0.87
881.5	881.50037	881.50037	881.50037	-	± 0.88
892.8	892.80025	892.80025	892.80025	-	± 0.89

Figure 121. Frequency Stability 20°C

Operation Frequency (MHz)	Frequency Readings (MHz)			Δ f(max) (kHz)	Spec. (kHz)
	97.5 (VAC)	115 (VAC)	132.5 (VAC)		
870.2	870.20037	870.20037	870.20037	+0.05	± 0.87
881.5	881.50037	881.50037	881.50037	0.00	± 0.88
892.8	892.80037	892.80037	892.80037	+0.12	± 0.89

Figure 122. Frequency Stability -30°C

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm = ± 1.9 kHz

Frequency Stability

E.U.T Description	Mobile Access VE CELL-PCS System Comprising: 1. VE Access Pod 2. VE Control Unit CELL-PCS
Type	1. VAP-CELL-PCSE-EXTAN 2. VCU-CELL-PCS-12E
Serial Number:	1. 00094500A5 2. 00094500081

Specification: FCC Part 24 Sub-part D Section 24.135

Operation Frequency (MHz)	Frequency Readings (MHz)			Δ f(max) (kHz)	Spec. (kHz)
	97.5 (VAC)	115 (VAC)	132.5 (VAC)		
870.2	870.20025	870.20025	870.20037	-0.07*	± 0.87
881.5	881.50025	881.50025	881.50025	-0.12	± 0.88
892.8	892.80025	892.80025	892.80025	0.00	± 0.89

Figure 123. Frequency Stability +50°C

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm = ± 1.9 kHz

* Worst case result.

15.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Environmental Chamber	THERMOTRON CORP	SM 32C Mini Max	25-1030	March 04, 2009	1 Year
Digital Voltage Meter	Escort	EDM1111A	10313121	November 3, 2008	2 Years
Variable Voltage Transformer	Variac Voltage Co.	-	-	N/A	N/A
Spectrum Analyzer	HP	8594E	3809U03785	February 26, 2009	1 Year
Signal Generator	HP	83731B	US37100653	December 12, 2009	2 Years
Signal Generator	HP	86478	3625U00686	December 12, 2009	2 Years

16. APPENDIX A - CORRECTION FACTORS

16.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

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

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

NOTES:

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

16.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

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

NOTES:

1. The cable type is RG-8.

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

16.3 Correction factors for CABLE

from spectrum analyzer to test antenna above 2.9 GHz

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

NOTES:

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

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

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

16.4 Correction factors for LOG PERIODIC ANTENNA

Type 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".*

16.5 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".*

16.6 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".

16.7 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			

16.8 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (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