Engineering and Testing for EMC and Safety Compliance

CLASS II PERMISSIVE CHANGE TEST REPORT

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MODEL: OpenSky Cell Site Base Station 854-869 MHz

FCC ID: BV8MCS800A025

May 23, 2006

Standards Referenced for this Report	
Part 2: 2003	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2003	§15.109: Radiated Emissions Limits
Part 90: 2003	Private Land Mobile Radio Services
ANSI C63.4-2003	Standard Format Measurement/Technical Report Personal Computer and Peripherals
ANSI/TIA/EIA 603- 2002	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI/TIA/EIA –102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods
RSS-119; Issue 7; 2006	Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Frequency Range (MHz)	Maximum Measured Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
854-869	16.2	0.1	13K1F9W

REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS

Document Number: 2006050/QRTL06-221A

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1 General Information

The following Class II Permissive Change Report is prepared on behalf of **M/A-COM, Inc**. in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **Model MCS-0001, OpenSky Cell Site Base Station; FCC ID: BV8MCS800A025**, **IC: 3670195674A**. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2003. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.2 Related Submittal(s)/Grant(s)

This is a Class II permissive change report for FCC ID: BV8MCS800A025, originally certified by the FCC on April 28, 2000, and by Industry Canada on May 23, 2000.

1.3 Description of Change in Device

A new emissions designator is being added to this radio product to support a new modulation format. Changes were made to the base-band DSP filtering to alter the bandwidth of the pulse shaping filter and a change was made to the value of FM deviation. These changes altered the overall modulation bandwidth of the transmitted signal and thus a new FCC emissions designator is warranted. No changes were made to any portion of the hardware with the inclusion of this new designator. The radio product is intended support existing legacy systems already deployed in the market place and as such must continue to maintain the former emissions designators in the FCC grant.

1.4 Product Description

The EUT is a cell site station radio that operates in the 854-869 MHz band. Output power is continuously variable from 5W to 16W. The EUT is digitally modulated using a 4-level Gaussian Minimum Shift Keying (GMSK) with a symbol rate of 9600 Hz (19.2 kbps).

2 Conformance Statement

Standards Referenced for this Report	
Part 2: 2003	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2003	§15.109: Radiated Emissions Limits
Part 90: 2003	Private Land Mobile Radio Services
ANSI C63.4-2003	Standard Format Measurement/Technical Report Personal Computer and Peripherals
ANSI/TIA/EIA603 - 2002	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI/TIA/EIA – 102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods
RSS-119; Issue 7; 2006	Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Frequency Range	Maximum Measured Output Power (W) Conducted	Measured Frequency Tolerance (ppm)	Emission Designator
854-869	16.2	0.1	13K1F9W

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the above standards for Certification methodology.

Signature: _____ Date: May 23, 2006

Typed/Printed Name: Desmond A. Fraser Position: President

Signature: _____ Date: May 23, 2006

Typed/Printed Name: Daniel W. Biggs Position: Test Engineer

3 Tested System Details

The test sample was received 4/17/2006. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

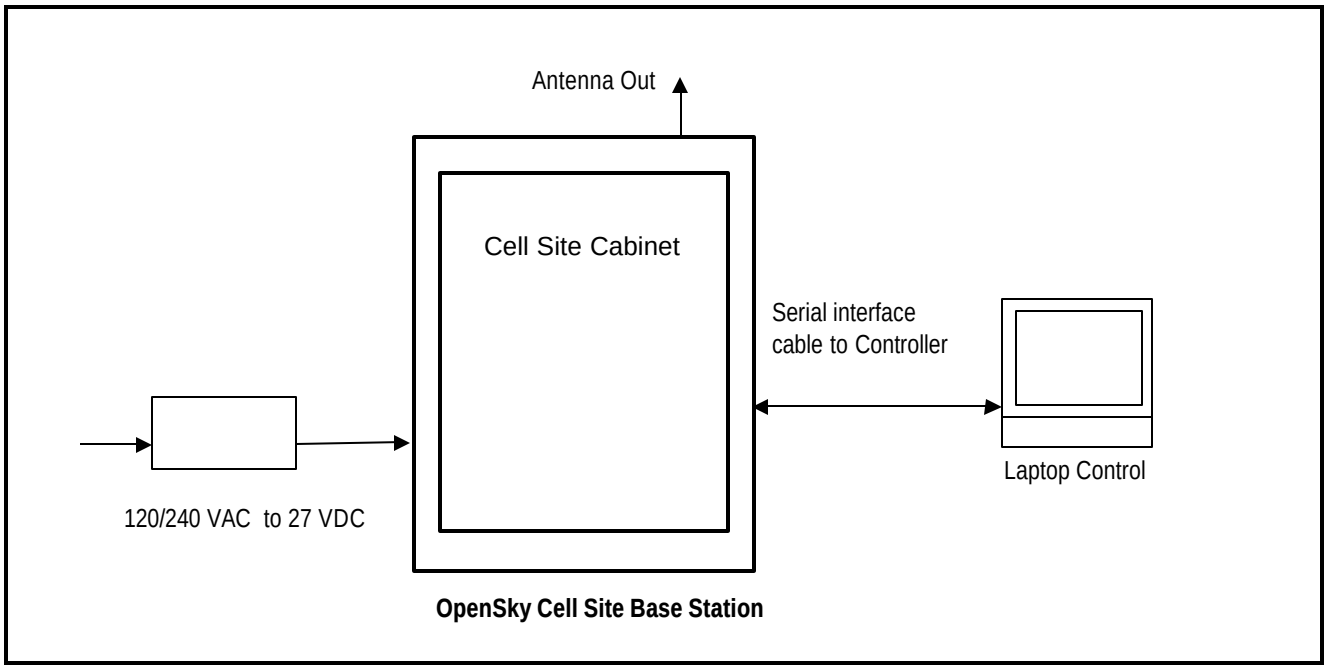
Table 3-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
OpenSky Cell Site Base Station	M/A-Com, Inc.	MCS-0001	1000019821-0001	BV8MCS800A025	17210
Power Supply	MW	SE-600-27	N/A	N/A	N/A

Table 3-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Notebook computer	Compaq	Armada	N/A	N/A	17212
Serial interface cable	N/A	DB-9	N/A	N/A	N/A

Figure 3-1: Configuration of Tested System



4 FCC Rules and Regulations Part 2 §2.1033(C)(8) Voltages and Currents Through the Final Amplifying Stage

Nominal DC Voltage: 27.0 VDC
Current: 4.0 AMPS

5 FCC Rules and Regulations Part 2 §2.1046 (a): RF Power Output: Conducted; RSS-119 Section §5.4: Transmitter Output Power

5.1 Test Procedure

ANSI/TIA/EIA-603-2002, Section 2.2.1.

The EUT was connected to a coaxial attenuator having a 50Ω load impedance.

5.2 Test Data

The following channels (in MHz) were tested: 851.0125, 854.0125, 861.5000, and 868.9875.

Table 5-1: RF Power Output (High Power): Carrier Output Power (Unmodulated)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
1	851.0125	16.2
2	854.0125	16.2
3	861.5000	16.2
4	868.9875	16.2

* Measurement accuracy: +/- .02 dB (logarithmic mode)

Table 5-2: RF Power Output (Rated Power)

Rated Power (W)
16

Table 5-3: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184/901186	Agilent	E4416A/E9323A	Power Meter/ Sensor	GB41050573/US420.52510380	09/21/06

TEST PERSONNEL:

Daniel Biggs		May 5, 2006
Test Technician/Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals; RSS-119 §5.8: Transmitter Unwanted Emissions

6.1 Test Procedure

ANSI/TIA/EIA-603-2002, Section 2.2.13.

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

6.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc.

Limits: Mask D (dBm): P(dBm) – (43+10xLOG P(W))

The following channels (in MHz) were investigated: 851.0125, 854.0125, 861.5000 and 868.9875. The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Table 6-1: Conducted Spurious Emissions – 851.0125 MHz – High Power

25 kHz channel spacing; Conducted power = 16.2 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1702.025	99.40	55.10	-44.30
2553.038	94.40	55.10	-39.30
3404.05	101.20	55.10	-46.10
4255.063	98.50	55.10	-43.40
5106.075	102.00	55.10	-46.90
5957.088	101.30	55.10	-46.20
6808.1	87.40	55.10	-32.30
7659.113	97.00	55.10	-41.90
8510.125	94.20	55.10	-39.10

Table 6-2: Conducted Spurious Emissions – 854.0125 MHZ – High Power

25 kHz channel spacing; Conducted power = 16.2 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1708.025	79.47	55.10	-24.37
2562.038	73.80	55.10	-18.70
3416.05	108.30	55.10	-53.20
4270.063	93.10	55.10	-38.00
5124.075	109.90	55.10	-54.80
5978.088	103.60	55.10	-48.50
6832.1	100.00	55.10	-44.90
7686.113	105.20	55.10	-50.10
8540.125	101.90	55.10	-46.80

Table 6-3: Conducted Spurious Emissions – 861.5000 MHz – High Power

25 kHz channel spacing; Conducted power = 16.2 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1723	77.80	55.10	-22.70
2584.5	75.50	55.10	-20.40
3446	109.30	55.10	-54.20
4307.5	91.20	55.10	-36.10
5169	108.90	55.10	-53.80
6030.5	105.30	55.10	-50.20
6892	101.90	55.10	-46.80
7753.5	107.50	55.10	-52.40
8615	101.70	55.10	-46.60

Table 6-4: Conducted Spurious Emissions – 868.9875 MHz – High Power

25 kHz channel spacing; Conducted power = 16.2 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1737.975	79.50	55.10	-24.40
2606.963	81.30	55.10	-26.20
3475.95	109.10	55.10	-54.00
4344.938	95.50	55.10	-40.40
5213.925	108.80	55.10	-53.70
6082.913	104.20	55.10	-49.10
6951.9	104.50	55.10	-49.40
7820.888	108.90	55.10	-53.80
8689.875	94.80	55.10	-39.70

Table 6-5: Test Equipment Used For Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz-12.8 GHz)	3826A00144	09/21/06
901132	Par Electronics	UHF	UHF Notch Filter	N/A	02/1/09

TEST PERSONNEL:

Daniel Biggs		May 4, 2006
Test Technician/Engineer	Signature	Date Of Test

7 FCC Rules and Regulations Part 2 §2.1049(c)(1): Occupied Bandwidth; RSS-119 §5.8: Transmitter Unwanted Emissions

Occupied Bandwidth - provided that the ACCP requirements are met, the applicants may request any authorized bandwidth that does not exceed the channel size.

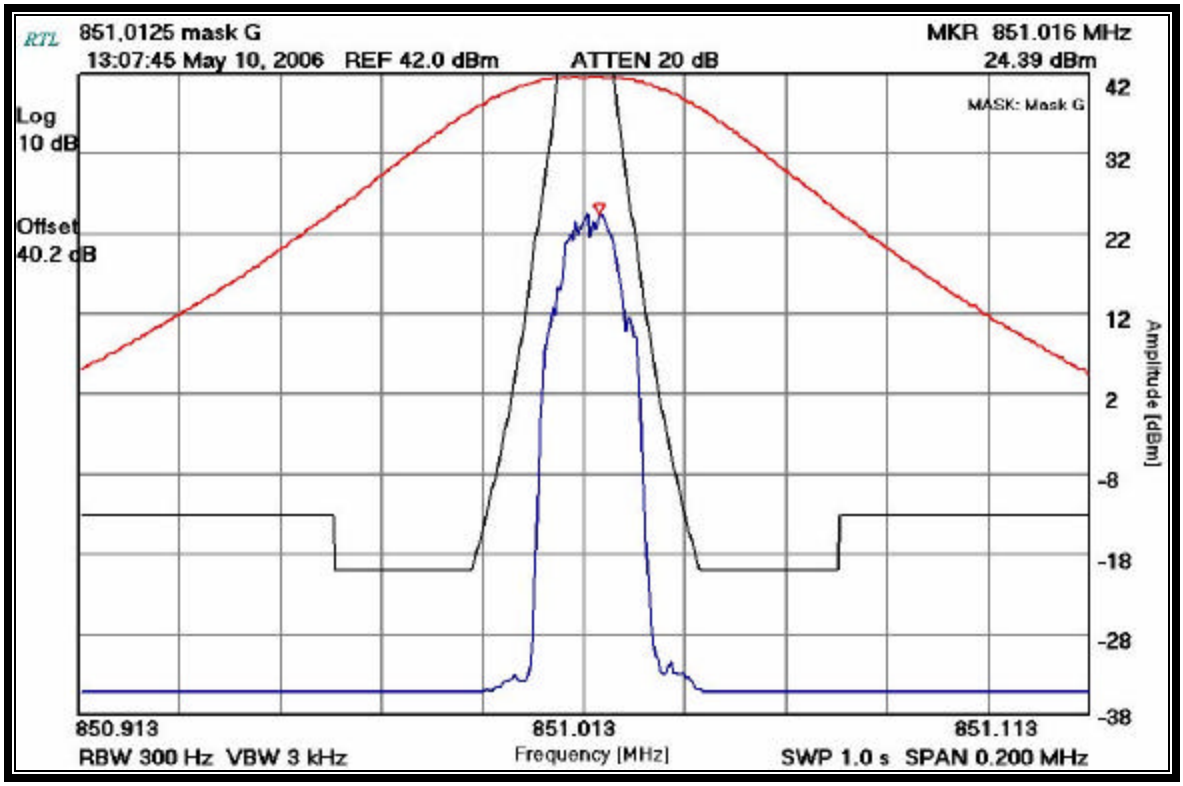
7.1 Test Procedure

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

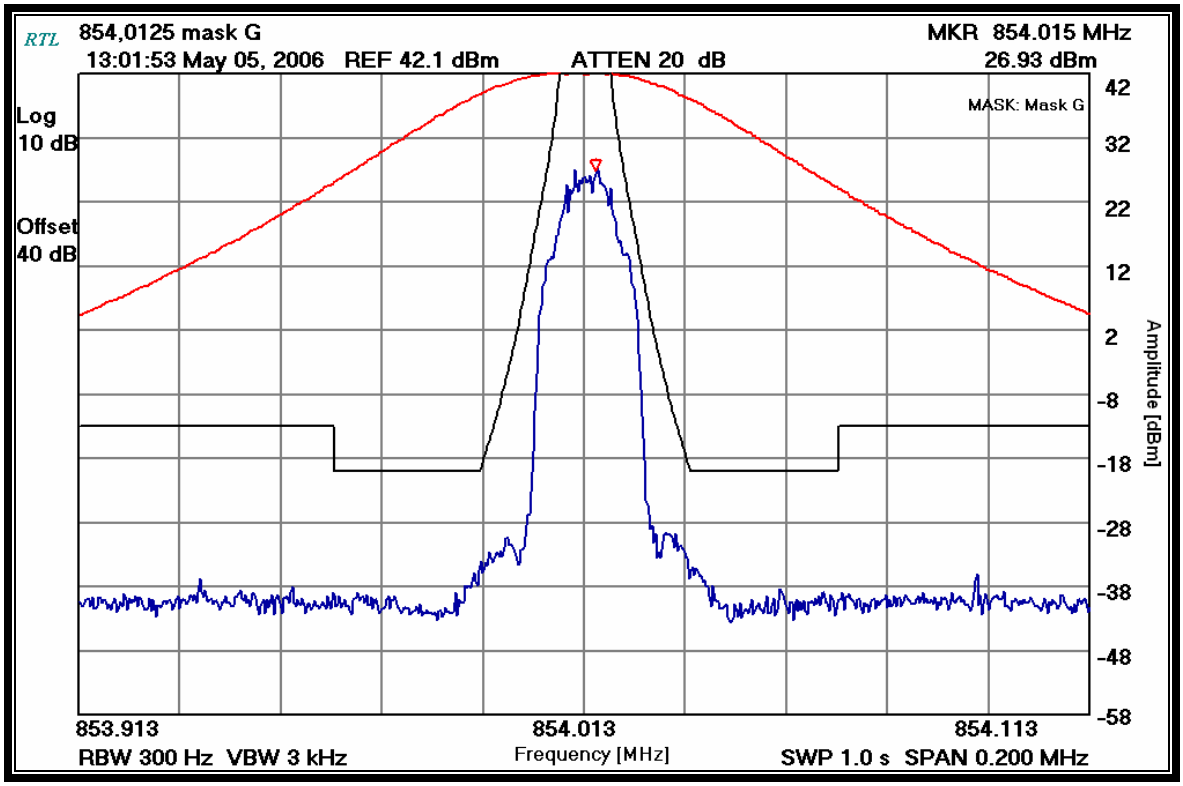
ANSI/TIA/EIA-603-2002, Section 2.2.11.

7.2 Test Data

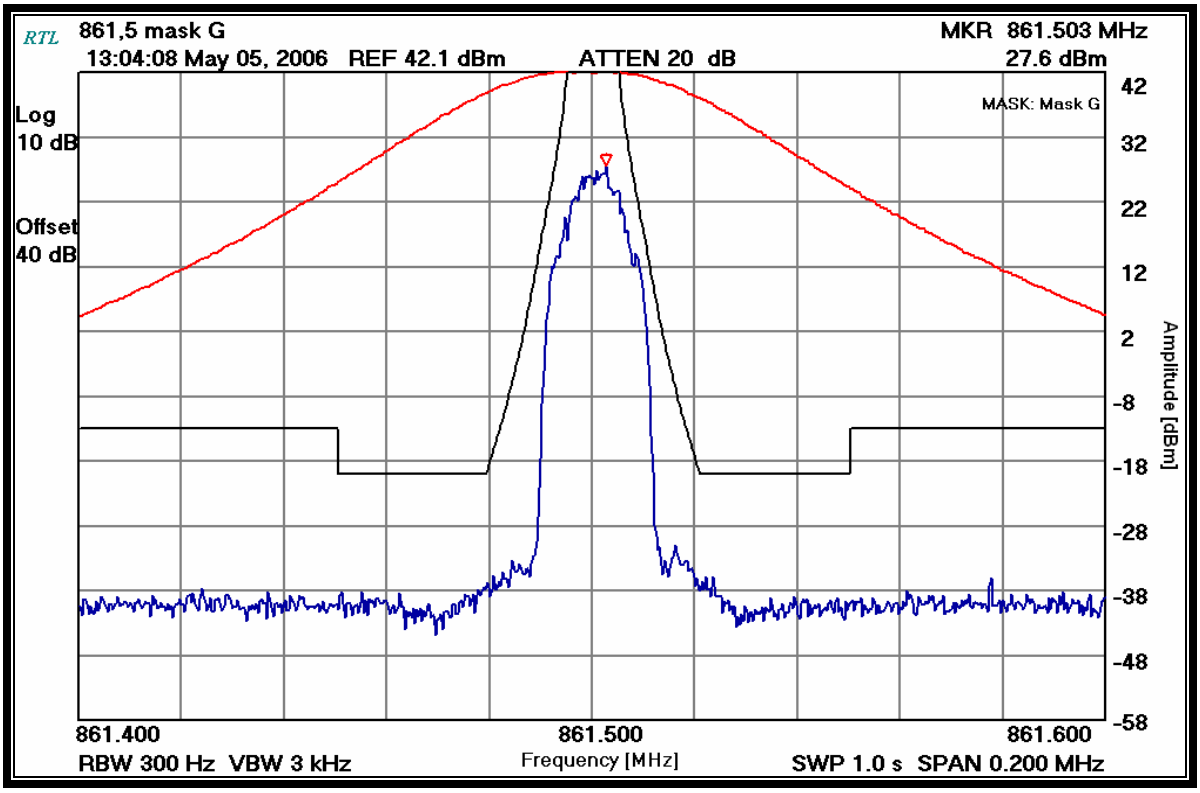
Plot 7-1: Occupied Bandwidth; Wide band; 851.0125 MHz



Plot 7-2: Occupied Bandwidth; Wide band; 854.0125 MHz



Plot 7-3: Occupied Bandwidth; Wide band; 861.5000 MHz



Plot 7-4: Occupied Bandwidth; Wide band; 868.9875 MHz

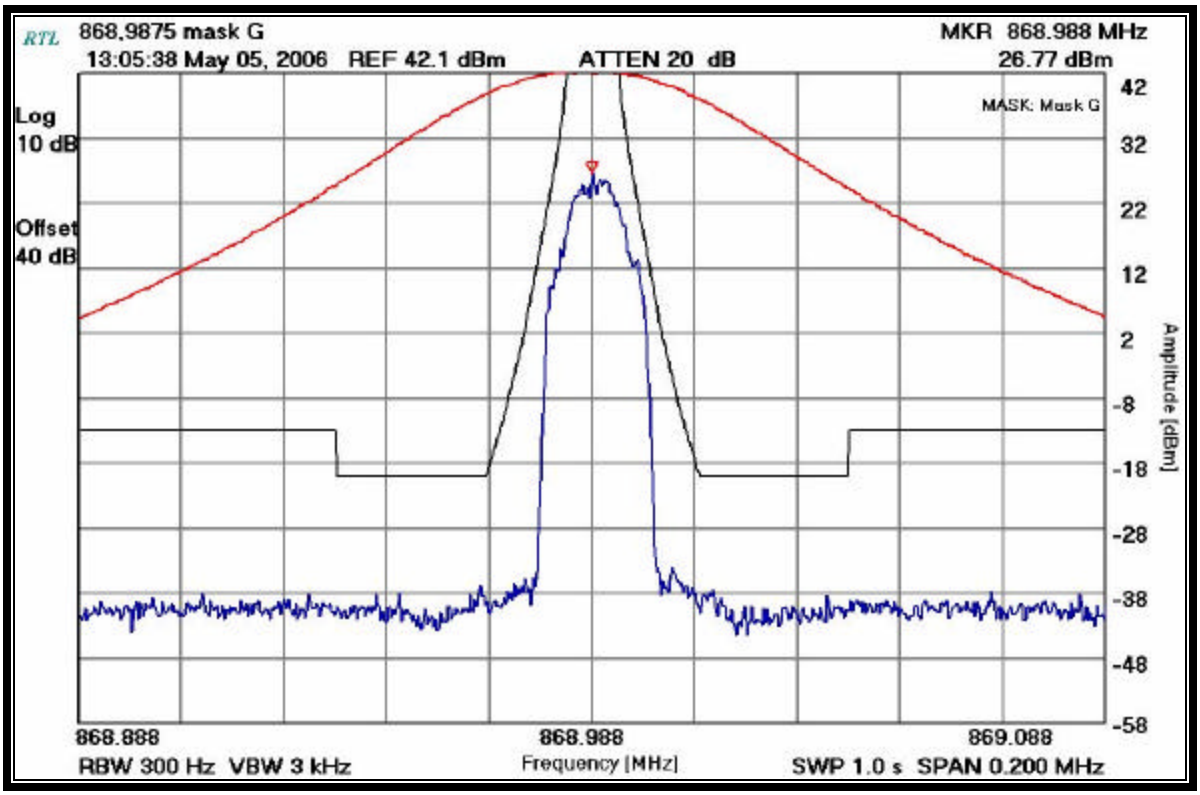


Table 7-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	9/14/06

Test Personnel:

Daniel Biggs	Daniel Biggs	May 5 & 10, 2006
Test Technician/Engineer	Signature	Dates Of Test

8 FCC Rules and Regulations Part 2 §2.202: Necessary Bandwidth and Emission Bandwidth

Type of Emission: F9W

FCC Mask 90.210(g):
Type of Emission: F9W
Digital Voice and Data: 19,200 BPS

Calculation:

B(n) = (R/Log{2}S + 2KD), where Log{2} is Log base 2

where
R = 19.2 kilobits per second [raw data rate]
S = 4 [4-level FSK]
D = 4.2 KHz [FM Deviation]
K = 0.415, [K is best quadratic fit to occupied BW measurements; K = (-0.256*d*d + 1.066*d - 0.576), where d = normalized deviation factor of 1.4

B(n) = 13,100 or 13K1
FCC Emission Designator: 13K1F9W

9 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc**. Model **MCS-0001, OpenSky Cell Site Base Station; FCC ID: BV8MCS800A025, IC: 3670195674A,** complies with applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119.