



Engineering and Testing for EMC and Safety Compliance

CLASS II PERMISSIVE CHANGE TEST REPORT

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**MODEL: OpenSky Cell Site Base Station
851-869 MHz**

**FCC ID: BV8MCS800A025
IC: 3670195674A**

July 14, 2006

Standards Referenced for this Report	
Part 2: 2005	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2005	§15.109: Radiated Emissions Limits
Part 90: 2005	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	Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41-960 MHz

Frequency Range (MHz)	Maximum Measured Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
851-854	25.2	0.1	12K1F9W
854-869	24.9	0.1	12K1F9W

REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS

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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 application for FCC ID: BV8MCS800A025, originally certified by the FCC on April 28, 2000, and by Industry Canada on May 23, 2000, with a Class II permissive change request granted on May 26, 2006.

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 to include the new designator. The radio product is intended to support existing legacy systems already deployed in the marketplace, and as such must continue to maintain the emissions designators as listed on the previously issued FCC grants.

1.4 Product Description

The EUT is a cell site station radio that operates in the 851-869 MHz band. Output power is continuously variable from 5 W to 25 W. 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 Tested System Details

The test sample was received on July 5, 2006. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

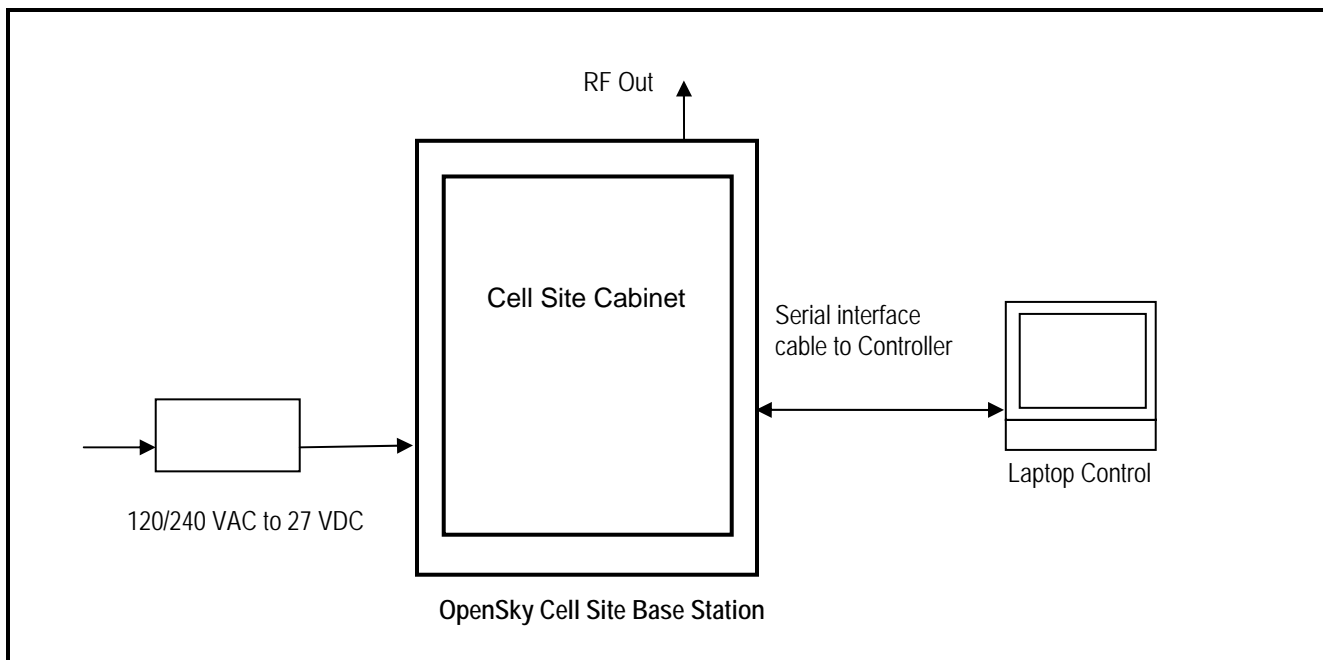
Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
OpenSky Cell Site Base Station	M/A-Com, Inc.	MCS-0001	1000019821-0001	BV8MCS800A025	17361
Power Supply	MW	SE-600-27	N/A	N/A	N/A

Table 2-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Notebook Computer	Compaq	Armada	N/A	N/A	17362
Serial Interface Cable		DB-9	N/A	N/A	N/A

Figure 2-1: Configuration of Tested System



3 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

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

4.1 Test Procedure

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

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

4.2 Test Data

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

Table 4-1: RF Power Output (High Power): Carrier Output Power (Unmodulated)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
1	851.0125	25.18
2	854.0125	24.95
3	861.5000	25.06
4	868.9875	24.32

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

Table 4-2: RF Power Output (Rated Power)

Rated Power (W)
25

Table 4-3: 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		July 10, 2006
Test Technician/Engineer	Signature	Date Of Test

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

5.1 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.

5.2 Test Data

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

Limits: 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 5-1: Conducted Spurious Emissions – 851.0125 MHz – High Power

12.5 kHz channel spacing; Conducted power = 25.2 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1702.025	98.51	57.01	-41.50
2553.038	89.61	57.01	-32.60
3404.05	110.91	57.01	-53.90
4255.063	105.81	57.01	-48.80
5106.075	112.01	57.01	-55.00
5957.088	108.21	57.01	-51.20
6808.1	98.41	57.01	-41.40
7659.113	107.91	57.01	-50.90
8510.125	104.81	57.01	-47.80

Table 5-2: Conducted Spurious Emissions – 854.0125 MHz – High Power

25 kHz channel spacing; Conducted power = 24.95 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1708.025	97.84	56.96	-40.88
2562.038	88.87	56.96	-31.91
3416.05	110.57	56.96	-53.61
4270.063	107.87	56.96	-50.91
5124.075	109.97	56.96	-53.01
5978.088	108.77	56.96	-51.81
6832.1	102.97	56.96	-46.01
7686.113	107.57	56.96	-50.61
8540.125	105.67	56.96	-48.71

Table 5-3: Conducted Spurious Emissions – 861.5000 MHz – High Power

25 kHz channel spacing; Conducted power = 25.1 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1723	99.99	57.00	-42.99
2584.5	94.09	57.00	-37.09
3446	110.49	57.00	-53.49
4307.5	108.49	57.00	-51.49
5169	111.49	57.00	-54.49
6030.5	107.99	57.00	-50.99
6892	105.09	57.00	-48.09
7753.5	109.59	57.00	-52.59
8615	102.99	57.00	-45.99

Table 5-4: Conducted Spurious Emissions – 868.9875 MHz – High Power

25 kHz channel spacing; Conducted power = 24.3 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1737.975	99.56	56.86	-42.70
2606.963	101.86	56.86	-45.00
3475.95	111.26	56.86	-54.40
4344.938	110.56	56.86	-53.70
5213.925	111.66	56.86	-54.80
6082.913	108.56	56.86	-51.70
6951.9	106.96	56.86	-50.10
7820.888	108.16	56.86	-51.30
8689.875	99.16	56.86	-42.30

Table 5-5: 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	SN (806-902)	UHF Notch Filter	N/A	02/1/09

TEST PERSONNEL:

Daniel Biggs		July 10, 2006
Test Technician/Engineer	Signature	Date Of Test

6 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.

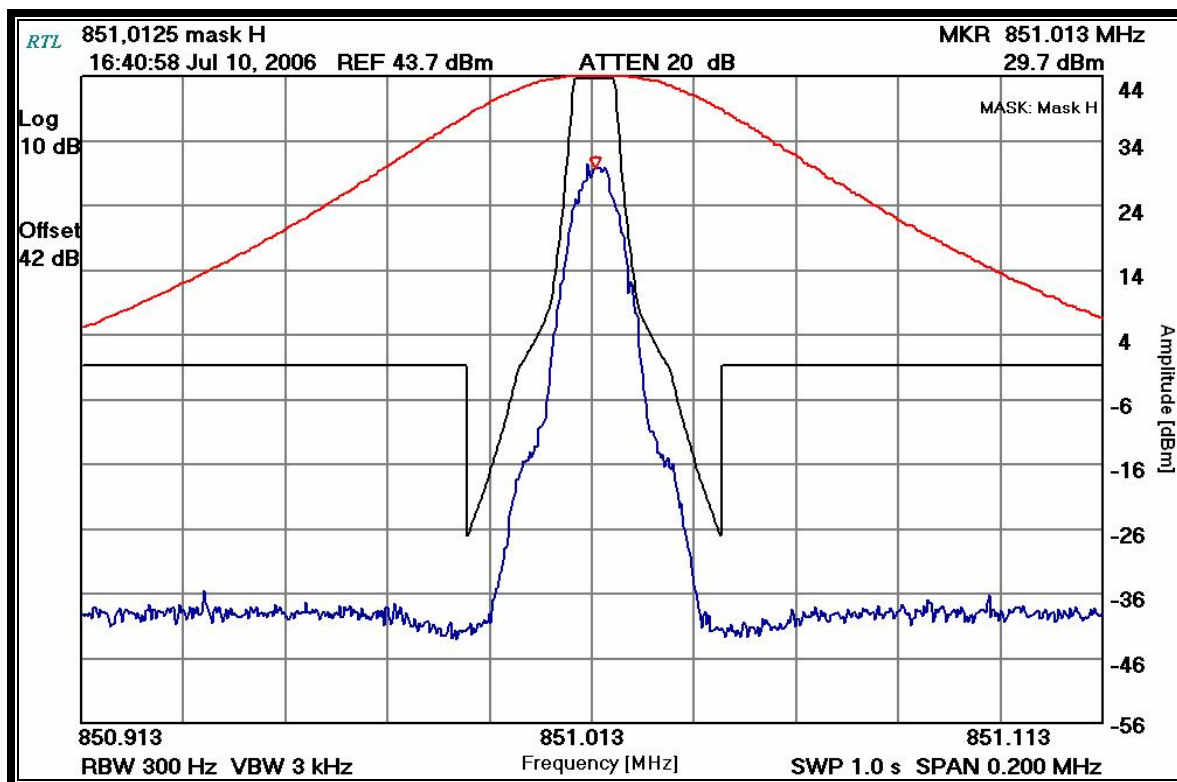
6.1 Test Procedure

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

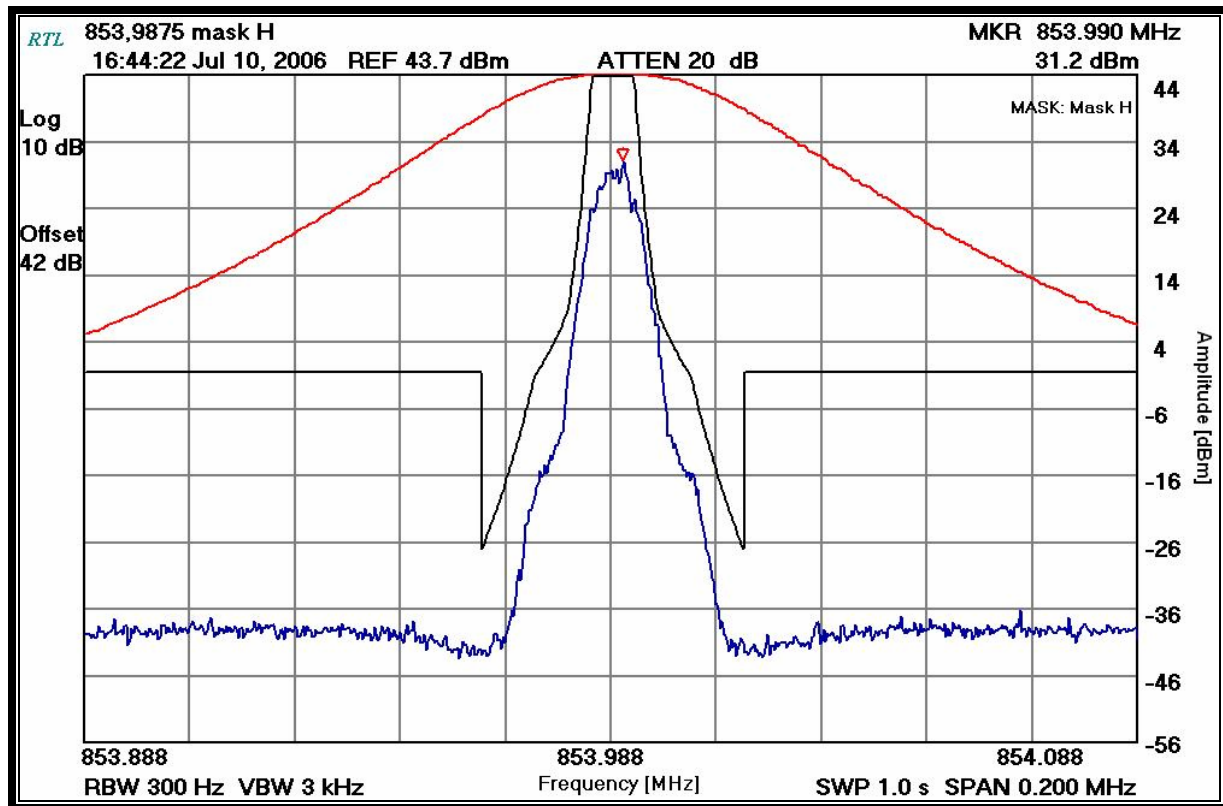
ANSI/TIA/EIA-603-2002, Section 2.2.11.

6.2 Test Data

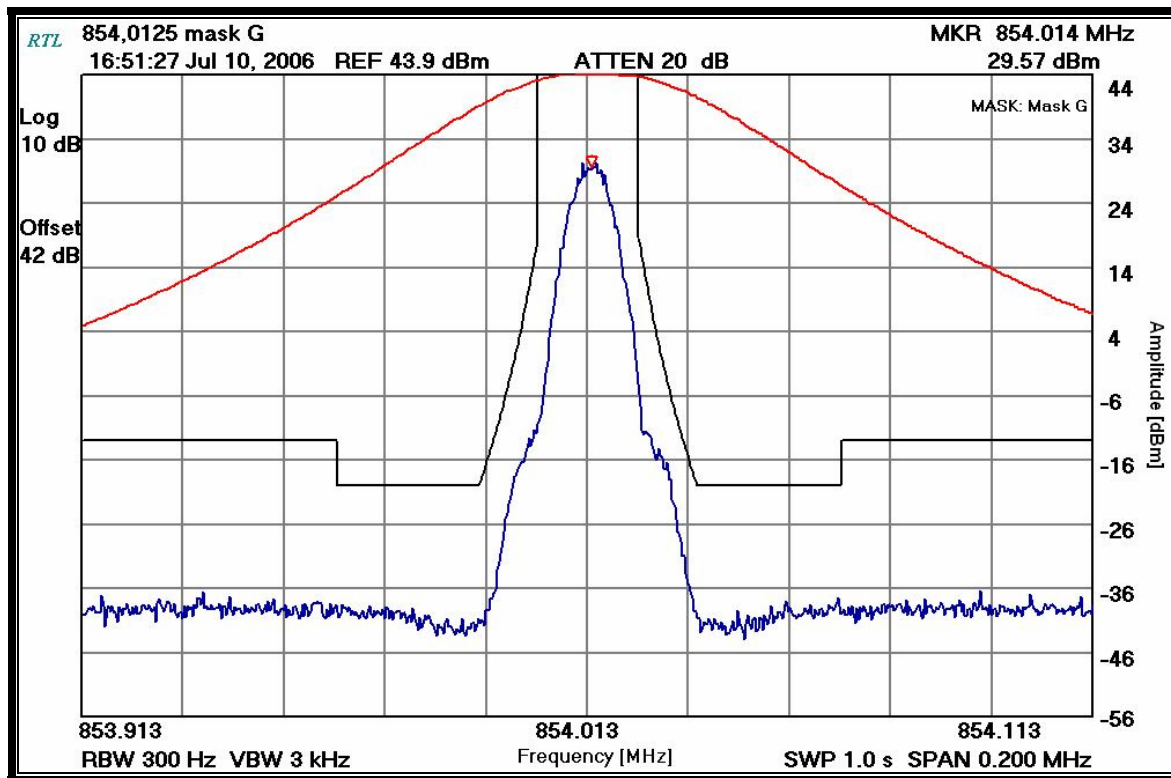
Plot 6-1: Occupied Bandwidth; 851.0125 MHz; Mask H



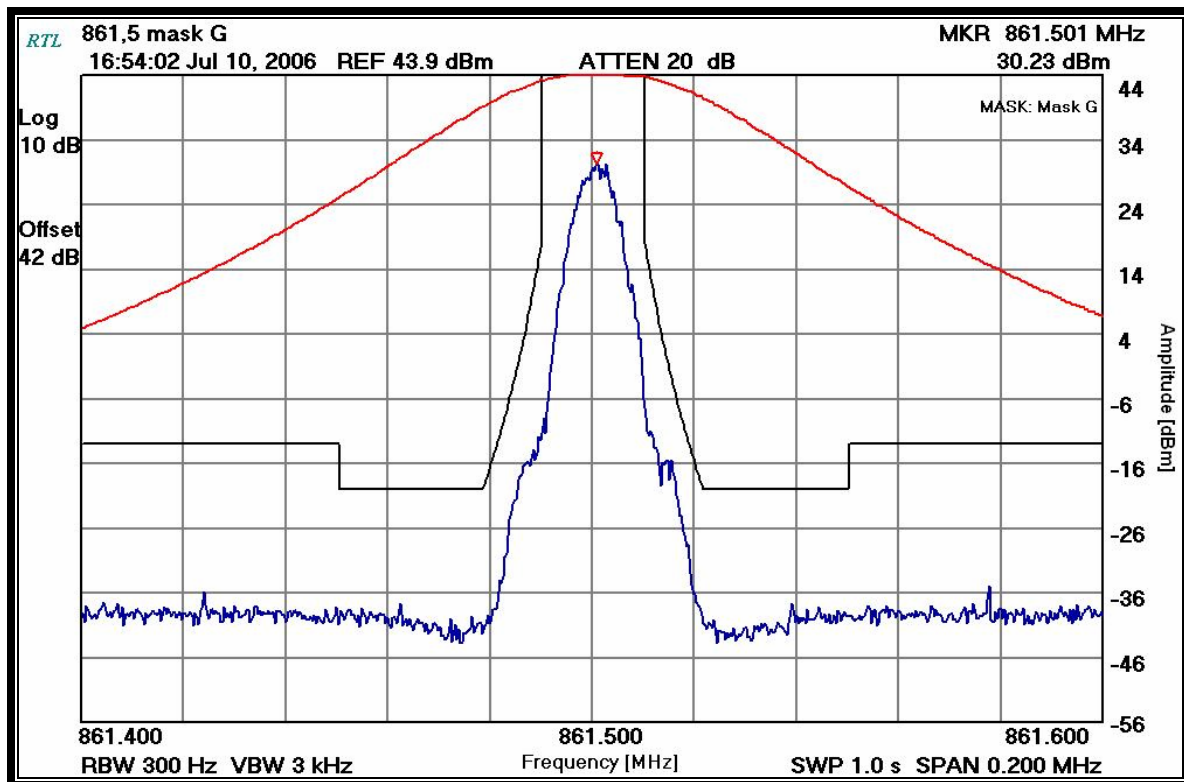
Plot 6-2: Occupied Bandwidth; 853.9875 MHz; Mask H



Plot 6-3: Occupied Bandwidth; 854.0125 MHz; Mask G



Plot 6-4: Occupied Bandwidth; 861.5000 MHz; Mask G



Plot 6-5: Occupied Bandwidth; 868.9875 MHz; Mask G

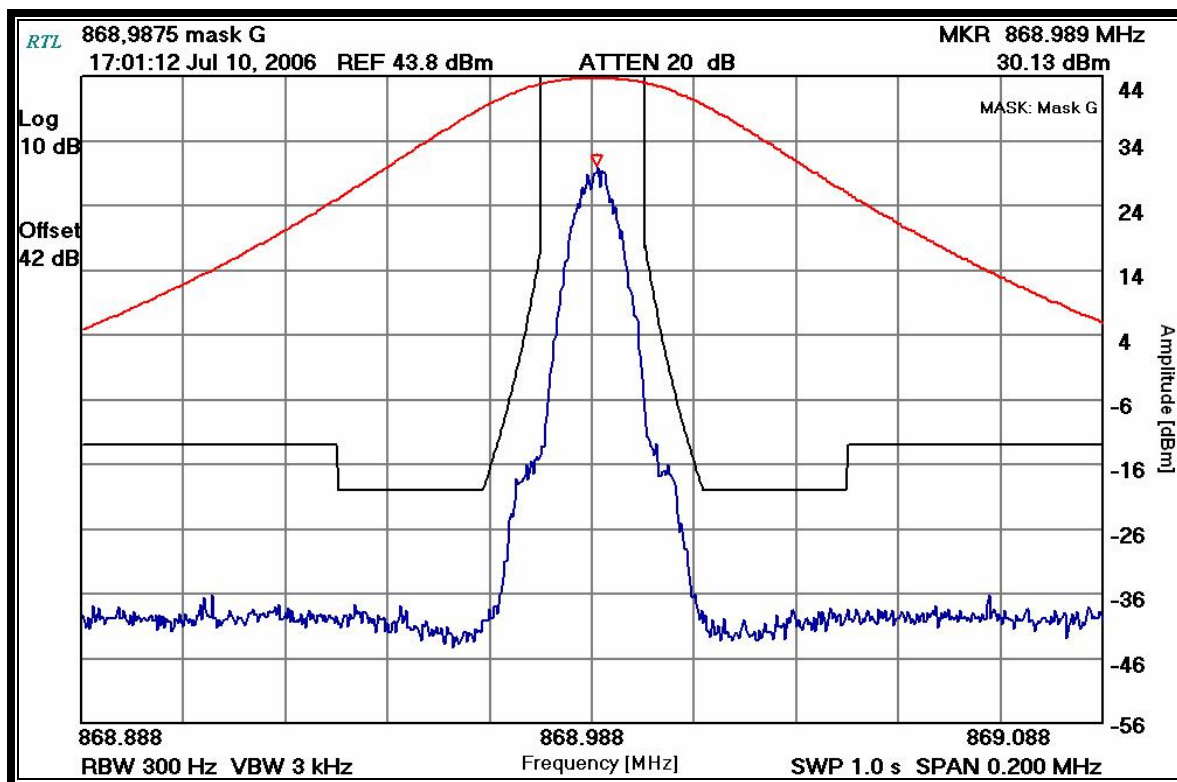


Table 6-1: Test Equipment Used For Testing Occupied Bandwidth

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		July 10, 2006
Test Technician/Engineer	Signature	Dates Of Test

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

Type of Emission: F9W

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

Calculation:

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

where

$R = 19.2$ kilobits per second [raw data rate]

$S = 4$ [4-level FSK]

$D = 3.75$ kHz [FM Deviation]

$K = 0.335$, [K is best quadratic fit to occupied BW measurements; $K = (-0.0256*d*d + 1.066*d - 0.576)$, where d = normalized deviation factor of 1.2]

$B(n) = 12,100$ or 12K1

FCC Emission Designator: 12K1F9W

8 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 the applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119.