Engineering and Testing for EMC and Safety Compliance

CLASS II PERMISSIVE CHANGE TEST REPORT

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MODEL: OpenSky M-803 V-TAC (Vehicular Tactical Network) 800 MHz Mobile Radio

FCC ID: BV8VTAC800

October 14, 2005

Standards Referenced for This Report	
FCC Part 2: 2004	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
FCC Part 15: 2004	§15.109: Radiated Emissions Limits
FCC Part 90: 2004	Private Land Mobile Radio Services
Industry Canada RSS-119	Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
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

Frequency Range (MHz)	Maximum Conducted Power Output (W)	Frequency Tolerance Limit (ppm)	Emission Designator
806-824	24.55	1.5	17K6F7D (OTP)
851-869	24.55	1.5	17K6F7D (OTP/ORP)
806-824	24.55	1.5	17K6F7E (OTP)
851-869	24.55	1.5	17K6F7E (OTP/ORP)
806-821/851-866	24.55	1.5	16K0F3E (OCF SMR)
821-824/866-869	24.55	1.5	14K0F3E (OCF NPS)
806-824/851-869	24.55	1.5	8K4F1D/F1E (P25)

REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS

Document Number: 2005110/QRTL05-187

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1 General Information

The following certification report is prepared on behalf of **M/A-COM, Inc**. in accordance with the Federal Communications Commission Rules and Regulations. The Equipment Under Test (EUT) was the **OpenSky M-803 V-TAC (Vehicular Tactical Network) 800 MHz Mobile Radio; FCC ID: BV8VTAC800**. 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, Part 90, and ANSI/TIA/EIA 603-2002, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

Please note that portions of the EUT are subject to Part 15 DoC testing. A DoC report is on file for this product.

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.

1.2 Related Submittal(s)/Grant(s)

This is a Class II permissive change report for FCC ID: BV8VTAC800, originally certified May 26, 2005.

1.3 Description of Change in Device

An HPA change was made to the last stage of RF amplification of the M803 VRM transceiver section of the VTAC configuration. The original power amplifier became obsolete and was changed to a newer version of the same amplifier. The part is from the same manufacturer, and has the same specs as the original. The only difference between the old and the new power amplifier is that the bias voltage changed, which required changing three additional components which affect the bias voltage. This change is critical to all transmit parameters on the radio, e.g. RF power, current, spectral purity, etc.

Due to the fact that this amplifier needs to be biased differently, the following components were also changed:

- R127 from 2.43kΩ to 619Ω
- R124 from 1kΩ to 71.5Ω
- C89 from 100pF to 1.5pF

1.4 Product Description

The M-803 Vehicular Tactical (V-TAC) unit is a voice and data radio designed for a mobile environment. It operates in the 800 MHz SMR and NPSPAC frequency bands. The rated RF output power is continuously variable between 0.25 – 24 W. The MAMROS0016 configuration, consisting of a trunk mount transceiver (VRM), vehicular repeater base (VRB), RF combiner, control head, and 10 db power attenuator, was tested. OpenSky digital and conventional modulation software was provided for testing.

Table 1-1: Product Description

Trade Name	OpenSky V-TAC (Vehicular Tactical Network) 800 MHz Mobile Radio
Use of Product	Voice and data communications
FCC Identifier	BV8VTAC800
Type Modulation	GFSK, FM
Bit Rate	9600, 19200 bps
Baud Rate	9600
RF Output	Continuously variable between 0.25 - 24W
Frequency Range	806-824 MHz and 851-869 MHz
Max. Number of Channels	830 normal, 830 talkaround
Antenna Gain	3 dBd
External Input	Audio and digital

The M-803 Vehicular Tactical Unit (V-TAC) consists of a Full Duplex Trunk Mount M-803 Mobile Radio Unit (MRU) with GPS, an M-803 Vehicular Repeater Base Unit (VRB), and an 800 MHz RF Combiner, see Figure 1-1.

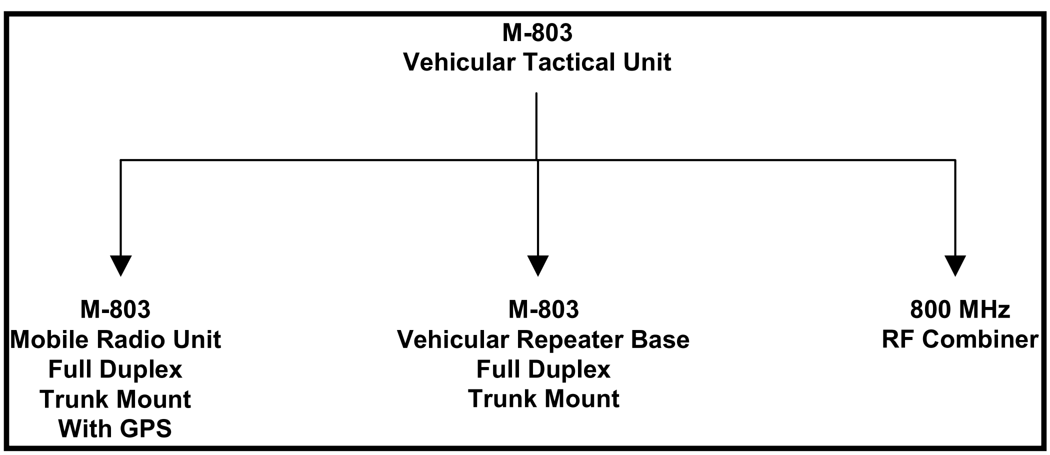


Figure 1-1: M-803 Vehicular Tactical Unit (VTAC) Major Components

2 Conformance Statement

Standards Referenced for This Report	
FCC Part 2: 2004	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
FCC Part 15: 2004	§15.109: Radiated Emissions Limits
FCC Part 90: 2004	Private Land Mobile Radio Services
Industry Canada RSS-119	Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
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

Frequency Range (MHz)	Maximum Conducted Power Output (W)	Frequency Tolerance Limit (ppm)	Emission Designator
806-824	24.55	1.5	17K6F7D (OTP)
851-869	24.55	1.5	17K6F7D (OTP/ORP)
806-824	24.55	1.5	17K6F7E (OTP)
851-869	24.55	1.5	17K6F7E (OTP/ORP)
806-821/851-866	24.55	1.5	16K0F3E (OCF SMR)
821-824/866-869	24.55	1.5	14K0F3E (OCF NPS)
806-824/851-869	24.55	1.5	8K4F1D/F1E (P25)

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: October 14, 2005

Typed/Printed Name: Desmond Fraser Position: President

Signature: _________________ Date: October 14, 2005

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

3 Tested System Details

The EUT test sample was received on July 11, 2005. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

The system consists of an 800 MHz transceiver (VRM), a repeater (VRB), and an RF combiner, and is controlled by a control head/microphone. The system was tested in a duplex operating mode.

The EUT consists of two transceivers that can transmit simultaneously, which connect to a single antenna through a combiner. Since both transceivers can transmit simultaneously, simultaneous transmission was determined to be the worst case mode of operation for power measurements and spurious measurements. During these tests, the power from one of the transceivers was investigated with the other transceiver set to the channel which generated the highest power.

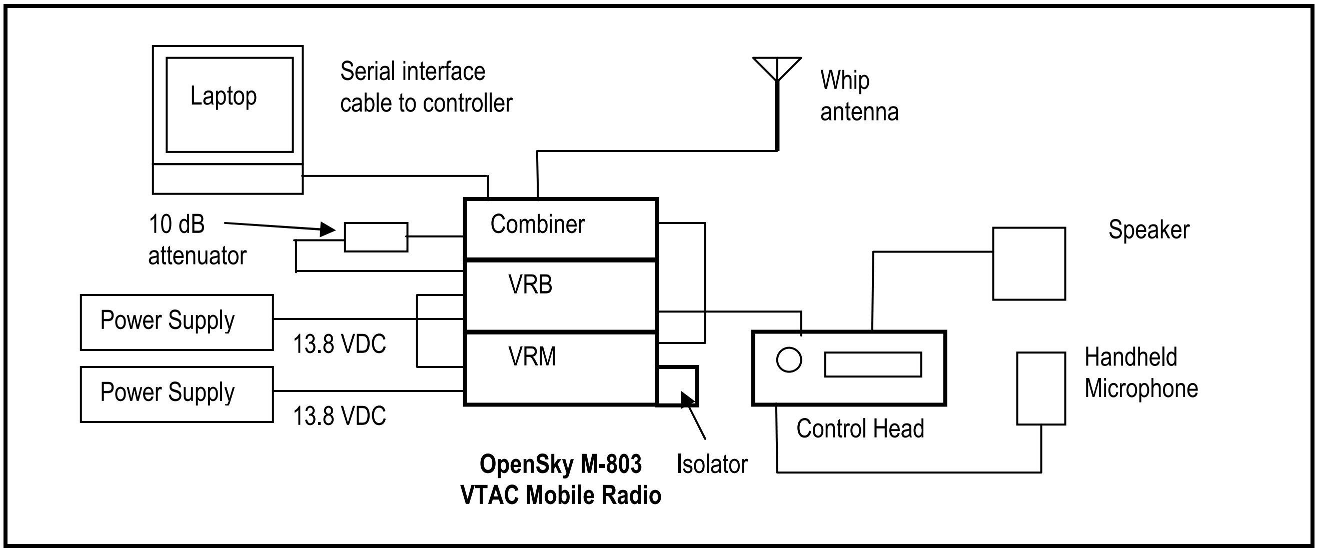
Table 3-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
800 MHz Transceiver	M/A-Com, Inc.	M-803 MAMROS0006	A4007116843F	BV8VTAC800	16916
Vehicular Repeater Base	M/A-Com, Inc.	M-803 MAMROS0007	A4008019A37B	BV8VTAC800	16916
Combiner	M/A-Com, Inc.	MAMROS0016	A400901918A0	N/A	16916
Isolator	M/A-Com, Inc.	MAMROS0106	N/A	N/A	16916
Control Head	M/A-Com, Inc.	MACDOS0003	A4000A16F69B	N/A	16809
Speaker	M/A-Com, Inc.	N/A	LS102824V10R1A	N/A	16811
Microphone	OTTO	N/A	LS102824V10	N/A	16810
Antenna	M/A-Com, Inc.	ASP-1860	N/A	N/A	N/A

Table 3-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Notebook Computer	N/A	N/A	N/A	N/A	N/A
RS-232 Interface Cable	N/A	DB-9	N/A	N/A	16500
Power Supply	M/A-Com, Inc.	N/A	N/A	N/A	16804
Power Supply	M/A-Com, Inc.	N/A	N/A	N/A	16805

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: 13.8 VDC
Current: 4 Amps RX Mode; 12 Amps TX Mode

5 FCC Rules and Regulations Part 2 §2.1046(a): RF Power Output: Conducted; RSS-119 §6.2: Output Power Test

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. The EUT was tested with both the VRM and VRB units transmitting simultaneously on separate frequencies. The power measurements reported in Tables 5-1 and 5-2 are a combined power reading from the antenna RF port of the combiner. The VRM was set to a power of 41 dBm (high power) and the VRB was set to a power of 39 dBm (high power).

5.2 Test Data

Table 5-1: RF Power Output (VRM/VRB Combined – VRB High Power): Carrier Output Power (Unmodulated)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
001/001	806.0125/851.0125	24.0
001/830	806.0125/868.9875	23.0
830/001	823.9875/851.0125	23.0

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

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

Rated Power (W)
24

Table 5-3: Test Equipment 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	Daniel Biggs	Sept. 29, 2005
Test Technician/Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals; RSS-119 §6.3: Unwanted Emissions

6.1 Test Procedure

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

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

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600 bps.

The system was tested with both the VRM and VRB transmitting on separate frequencies. The VRM was set to a power of 41 dBm (high power) and the VRB set to a power of 39 dBm (high power) for all tests.

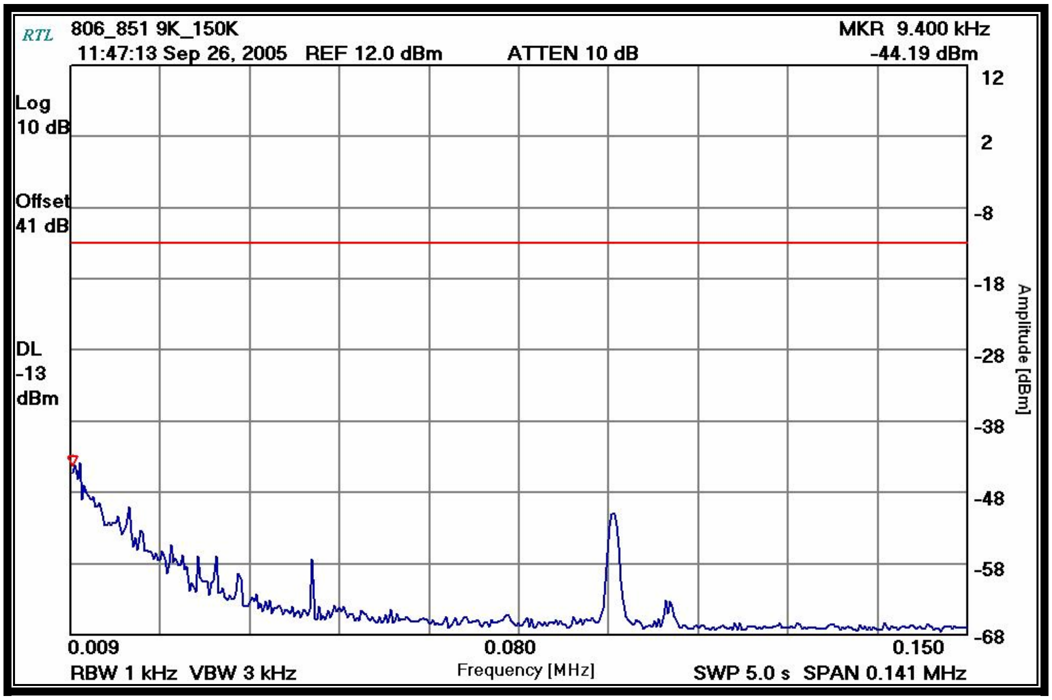
6.2 Test Data

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

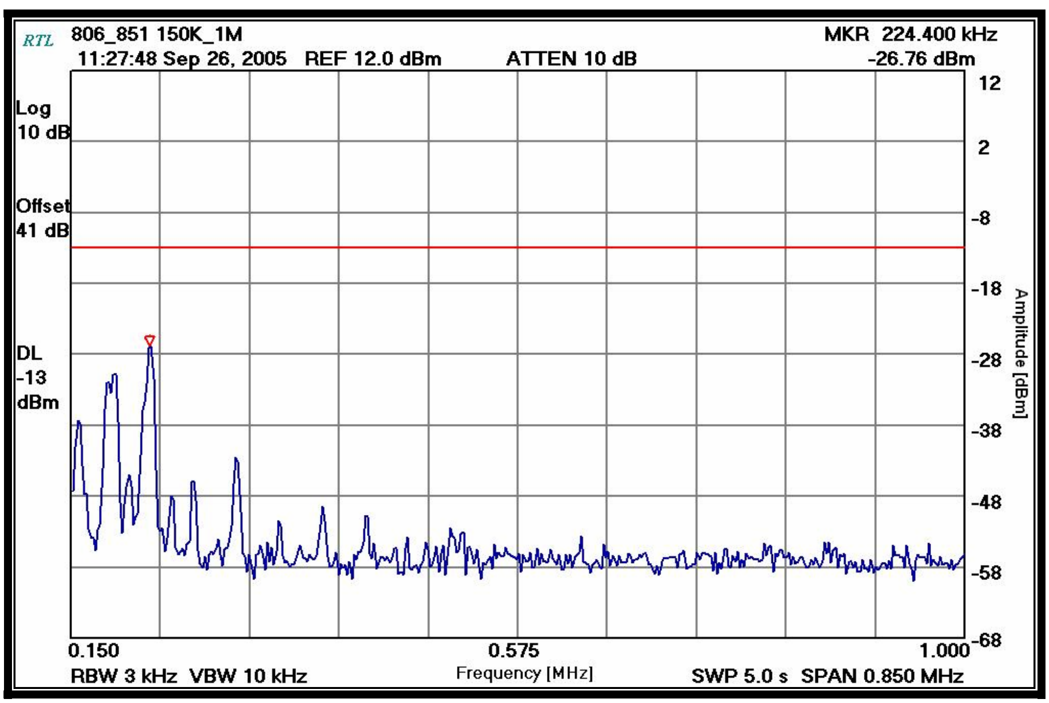
Limits: P(dBm) – (43 + 10xLOG P(W))

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.

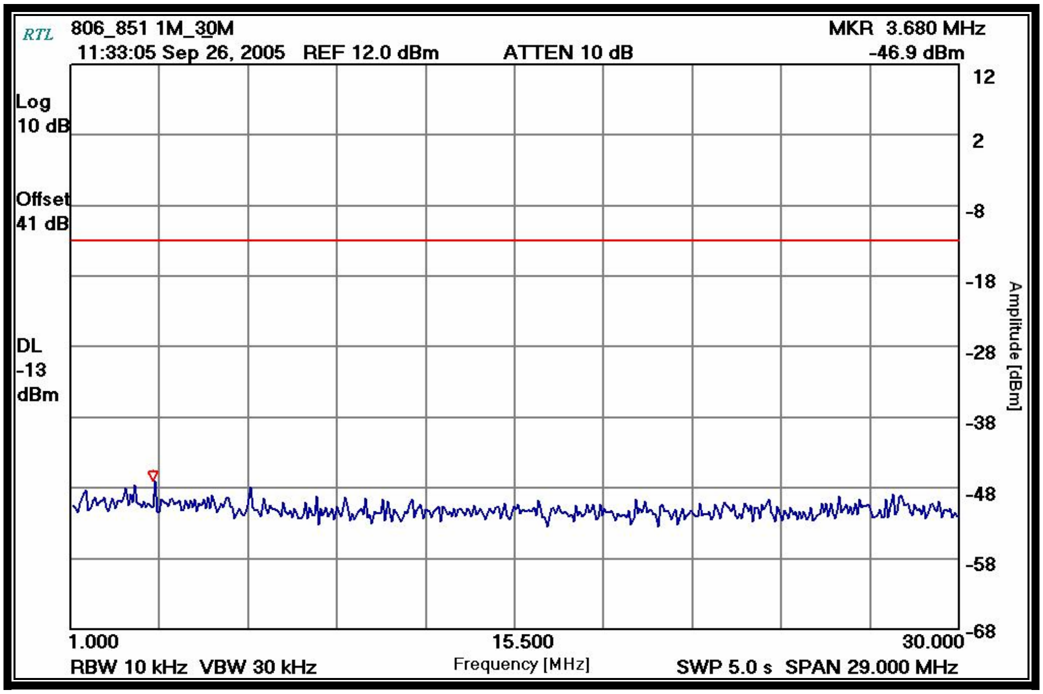
Plot 6-1: Conducted Spurious Emissions Channel 001/001 – VRM-806.0125/VRB-851.0125 MHz (9 kHz – 150 kHz) – VRB High Power



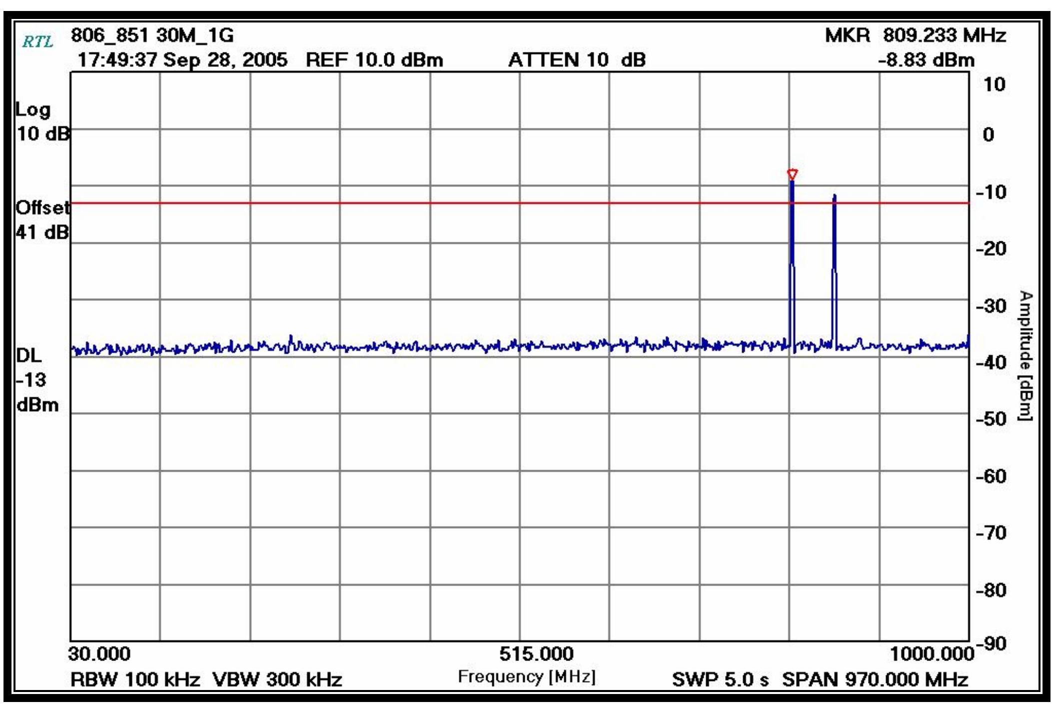
Plot 6-2: Conducted Spurious Emissions Channel 001/001 – VRM-806.0125/VRB-851.0125 MHz (150 kHz – 1 MHz) – VRB High Power



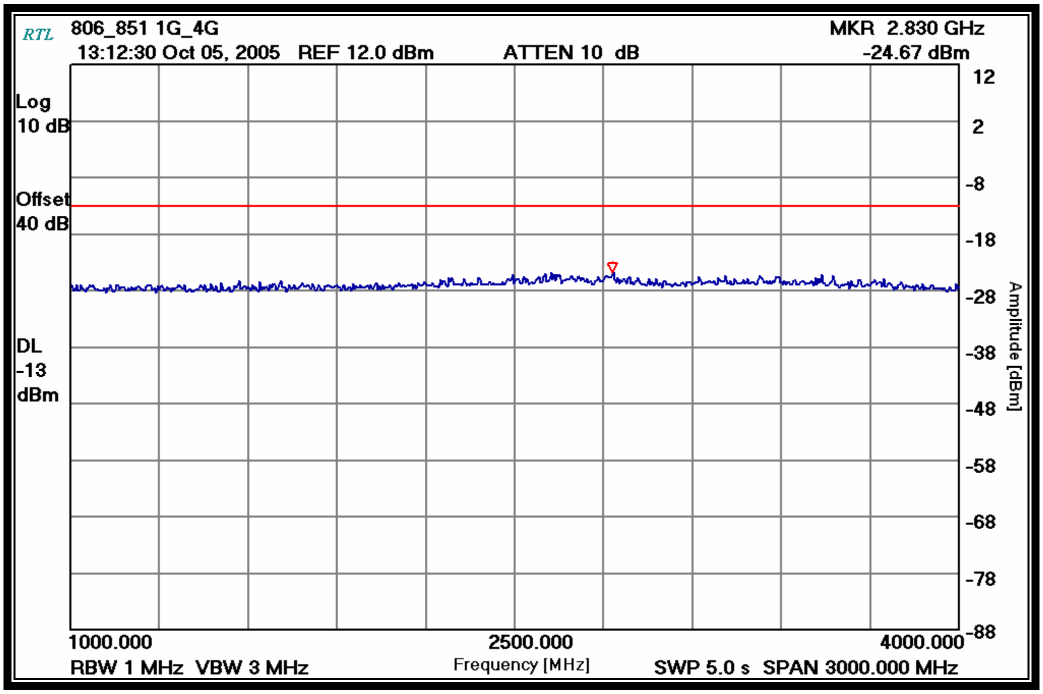
Plot 6-3: Conducted Spurious Emissions Channel 001/001 – VRM-806.0125/VRB-851.0125 MHz (1 MHz – 30 MHz) – VRB High Power



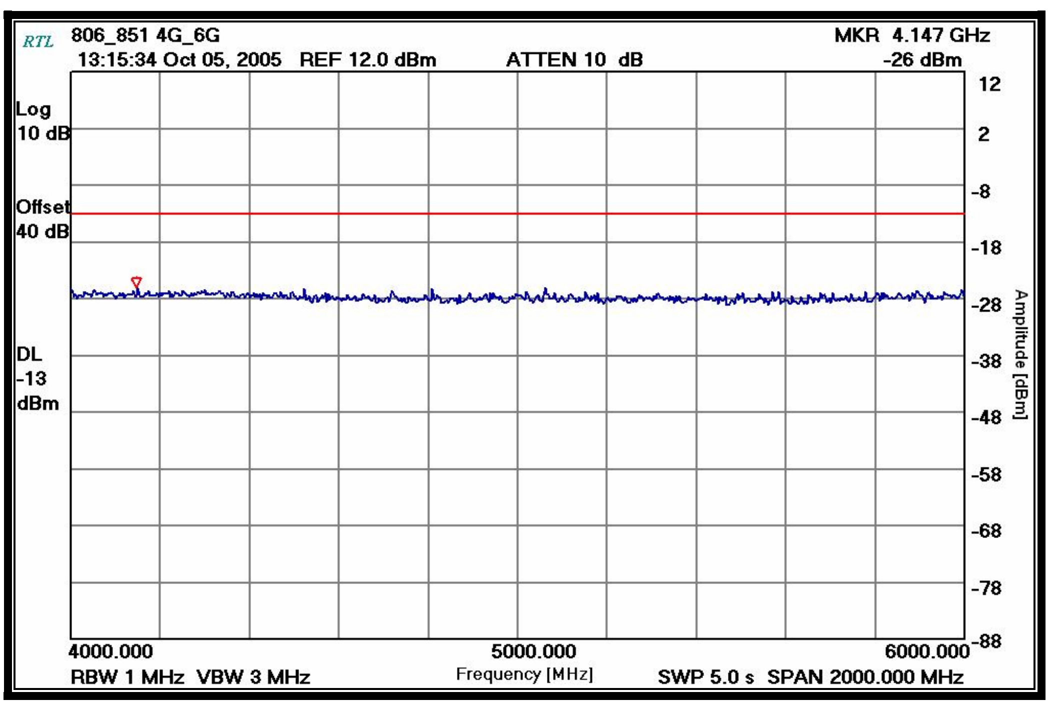
Plot 6-4: Conducted Spurious Emissions Channel 001/001 – VRM-806.0125/VRB-851.0125 MHz (30 MHz – 1 GHz) – VRB High Power



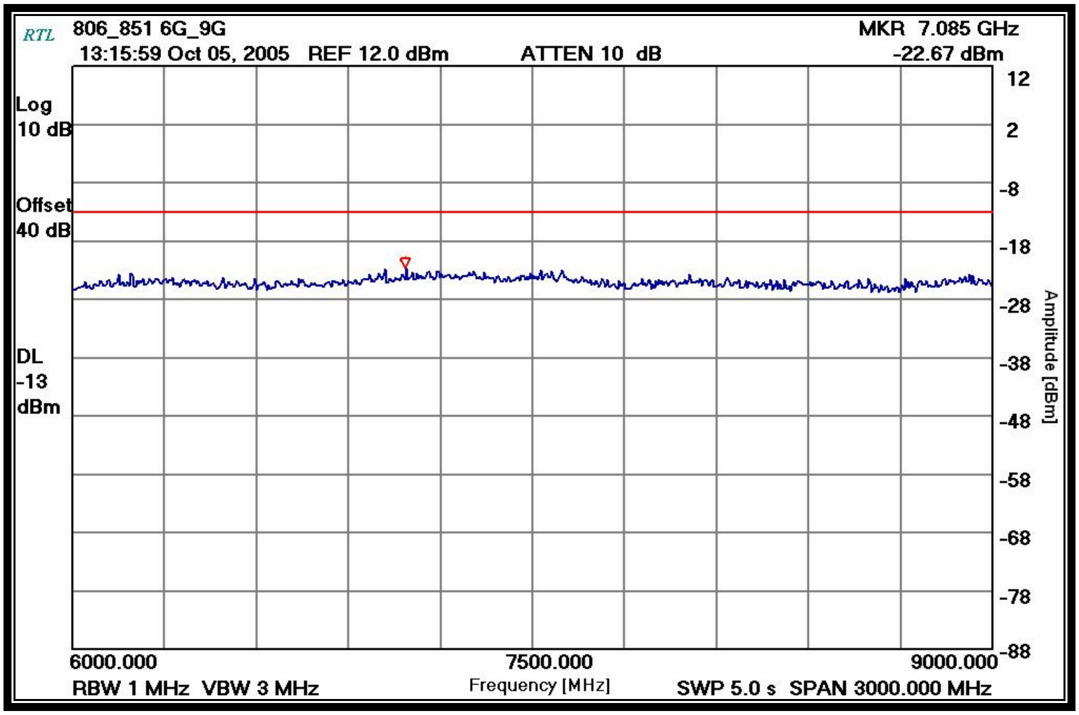
Plot 6-5: Conducted Spurious Emissions Channel 001/001 – VRM-806.0125/VRB-851.0125 MHz (1 GHz – 4 GHz) – VRB High Power



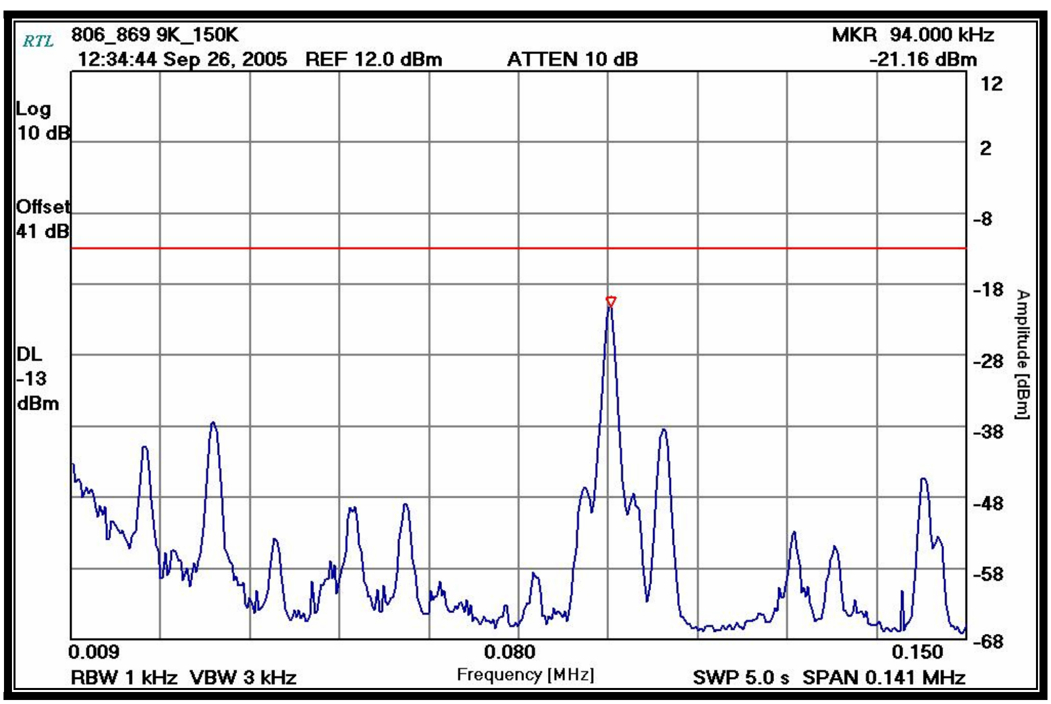
Plot 6-6: Conducted Spurious Emissions Channel 001/001 – VRM-806.0125/VRB-851.0125 MHz (4 GHz – 6 GHz) – VRB High Power



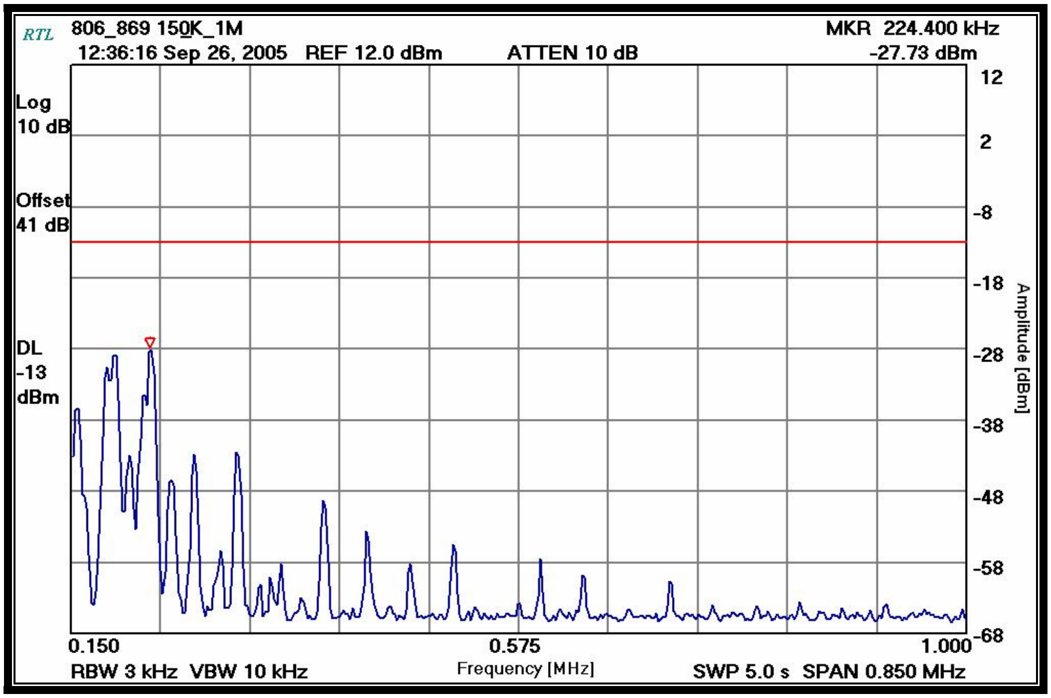
Plot 6-7: Conducted Spurious Emissions Channel 001/001 – VRM-806.0125/VRB-851.0125 MHz (6 GHz – 9 GHz) – VRB High Power



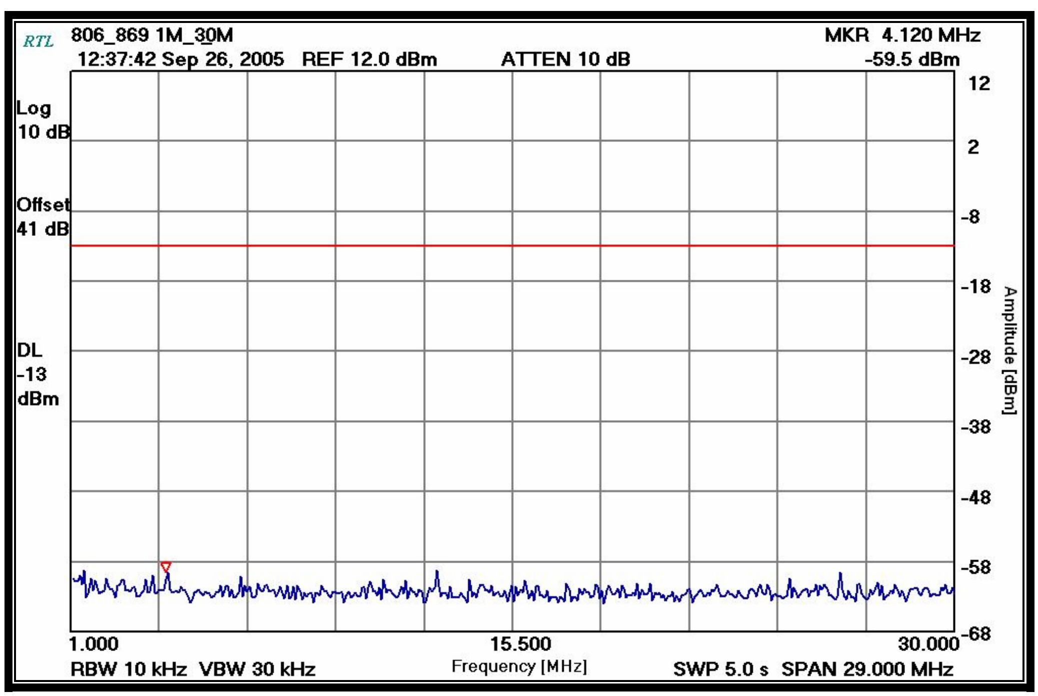
Plot 6-8: Conducted Spurious Emissions Channel 001/830 – VRM-806.0125/VRB-868.9875 MHz (9 kHz – 150 kHz) – VRB High Power



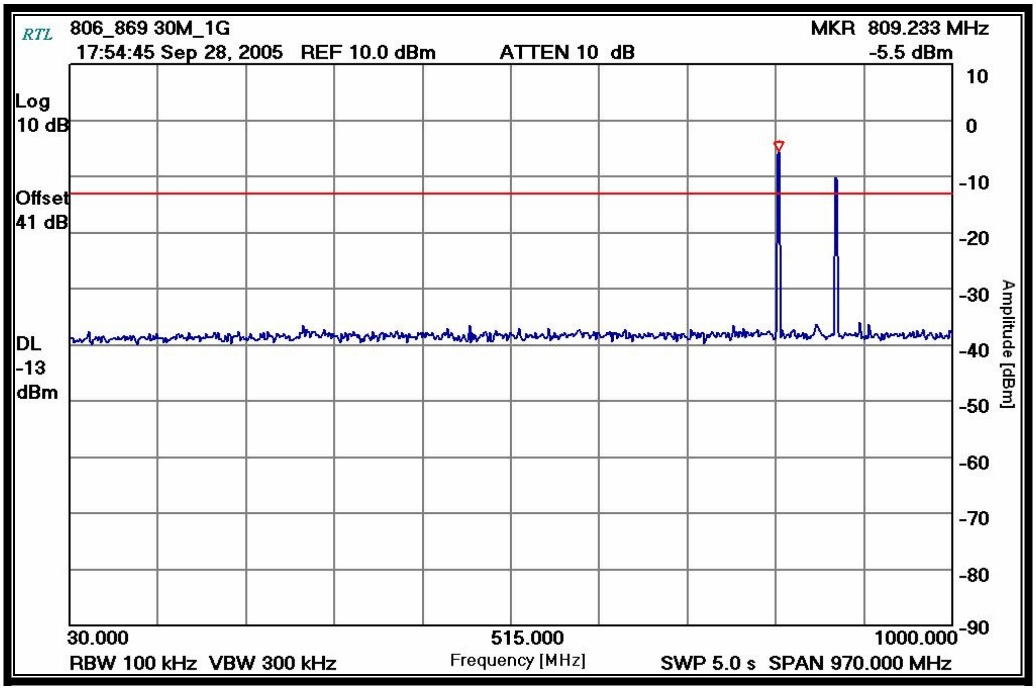
Plot 6-9: Conducted Spurious Emissions Channel 001/830 – VRM-806.0125/VRB-868.9875 MHz (150 kHz – 1 MHz) – VRB High Power



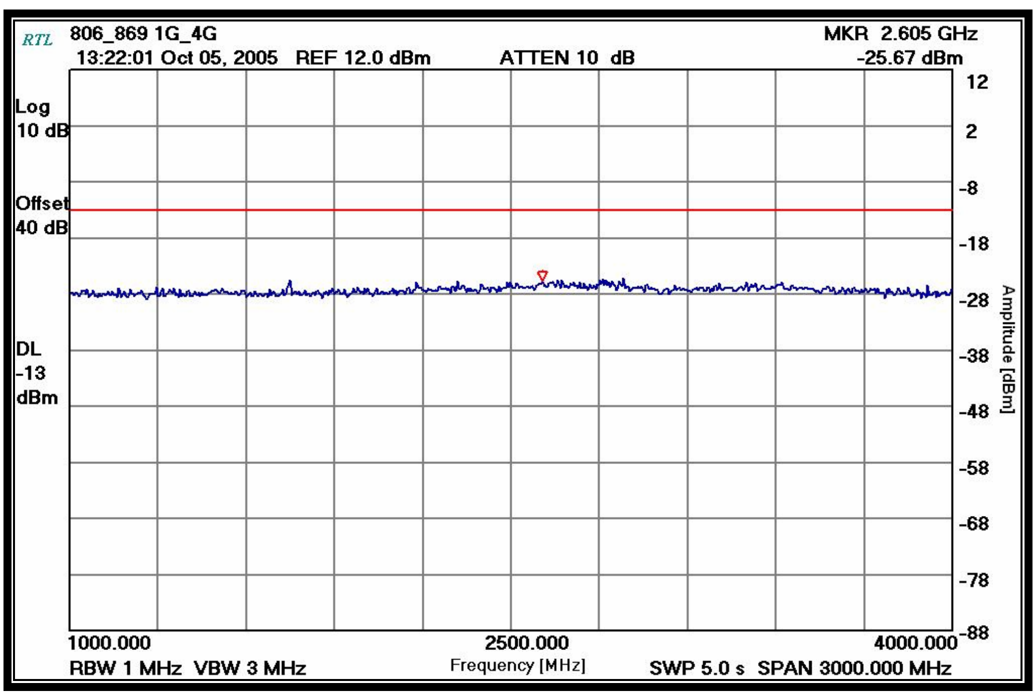
Plot 6-10: Conducted Spurious Emissions Channel 001/830 – VRM-806.0125/VRB-868.9875 MHz (1 MHZ – 30 MHz) – VRB High Power



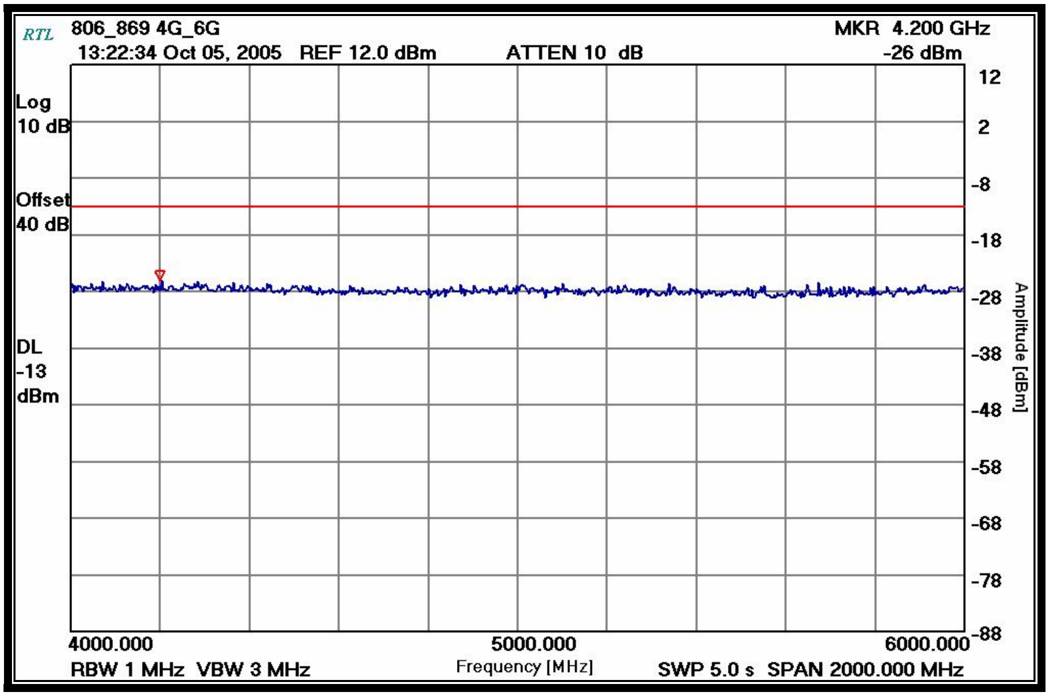
Plot 6-11: Conducted Spurious Emissions Channel 001/830 – VRM-806.0125/VRB-868.9875 MHz (30 MHz – 1 GHz) – VRB High Power



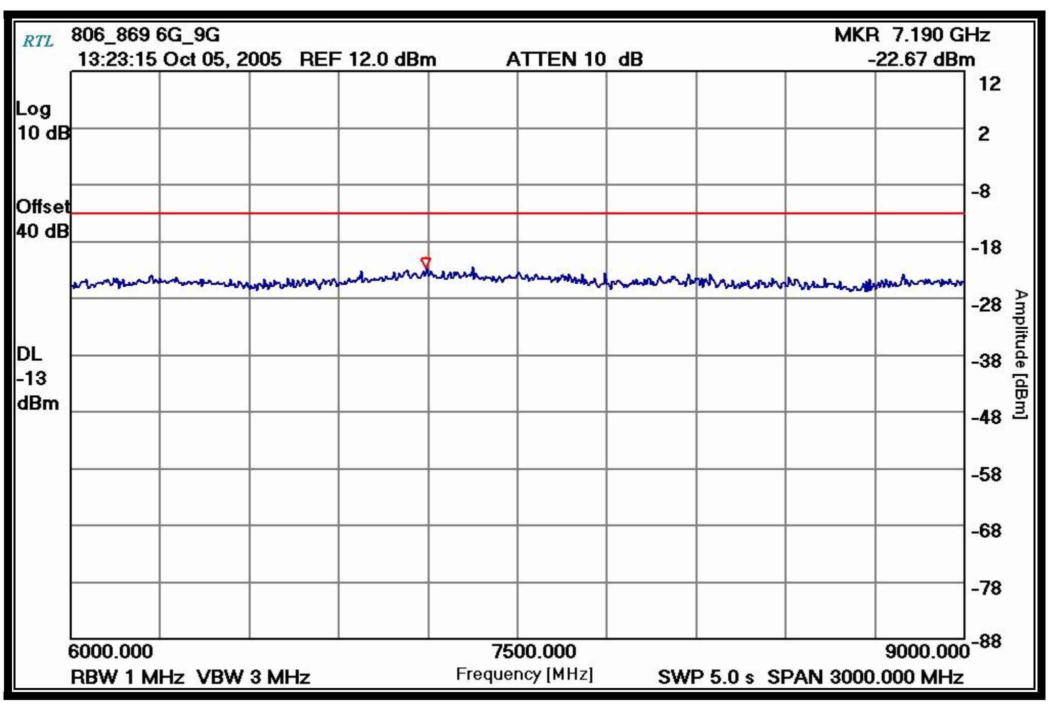
Plot 6-12: Conducted Spurious Emissions Channel 001/830 – VRM-806.0125/VRB-868.9875 MHz (1 GHz – 4 GHz) – VRB High Power



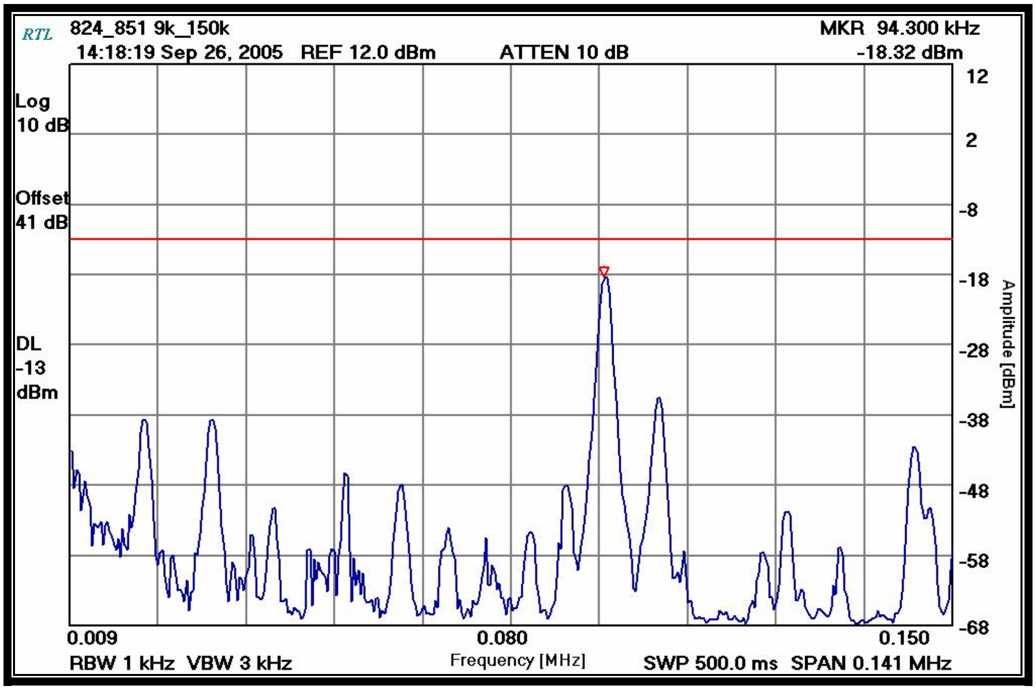
Plot 6-13: Conducted Spurious Emissions Channel 001/830 – VRM-806.0125/VRB-868.9875 MHz (4 GHz – 6 GHz) - VRB High Power



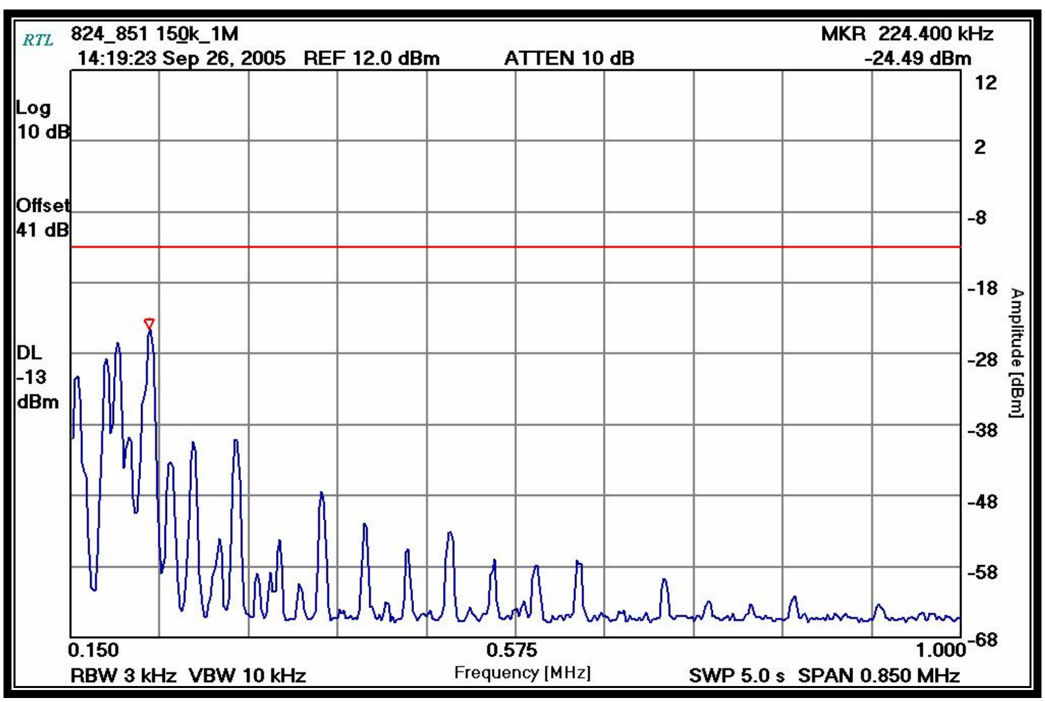
Plot 6-14: Conducted Spurious Emissions Channel 001/830 – VRM-806.0125/VRB-868.9875 MHz (6 GHz – 9 GHz) – VRB High Power



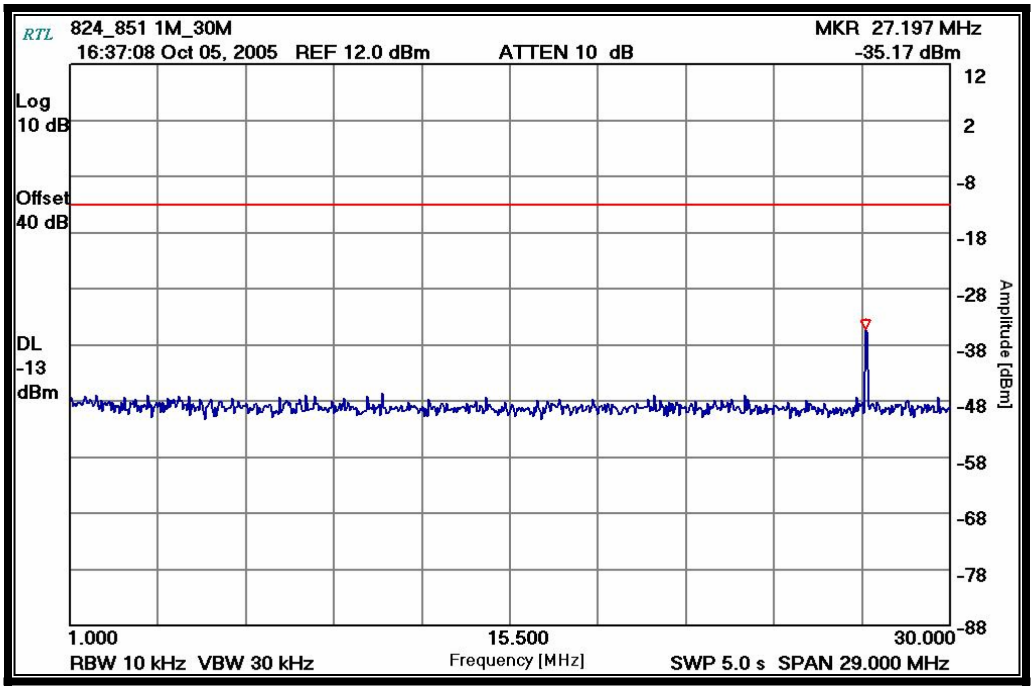
Plot 6-15: Conducted Spurious Emissions Channel 830/001 – VRM-823.9875/VRB-851.0125 MHz (9 kHz – 150 kHz) – VRB High Power



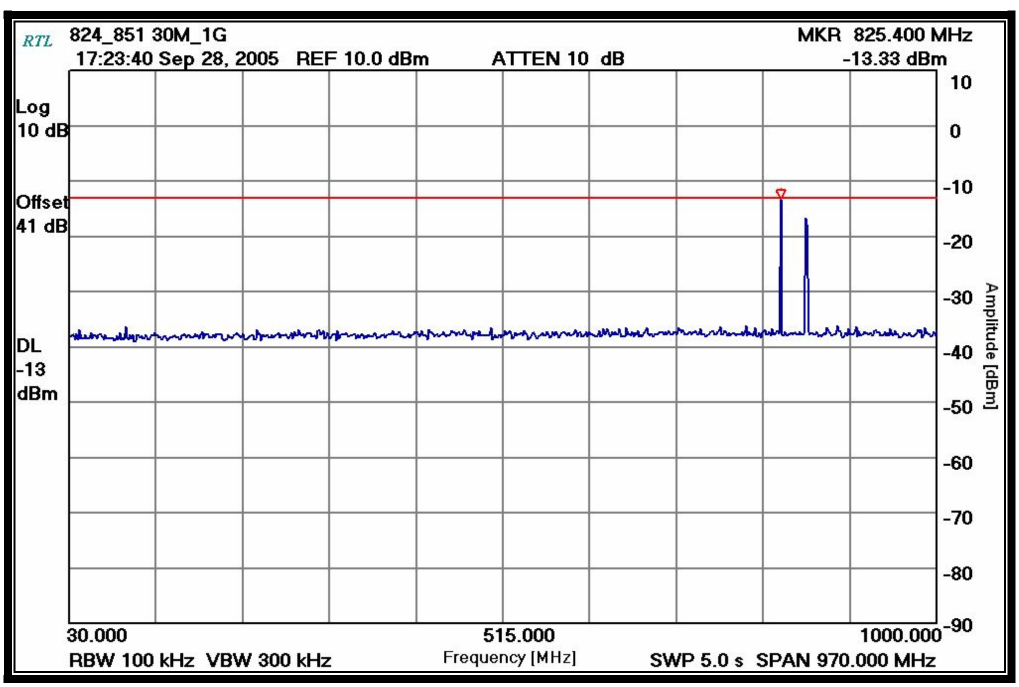
Plot 6-16: Conducted Spurious Emissions Channel 830/001 – VRM-823.9875/VRB-851.0125 MHz (150 kHz – 1 MHz) – VRB High Power



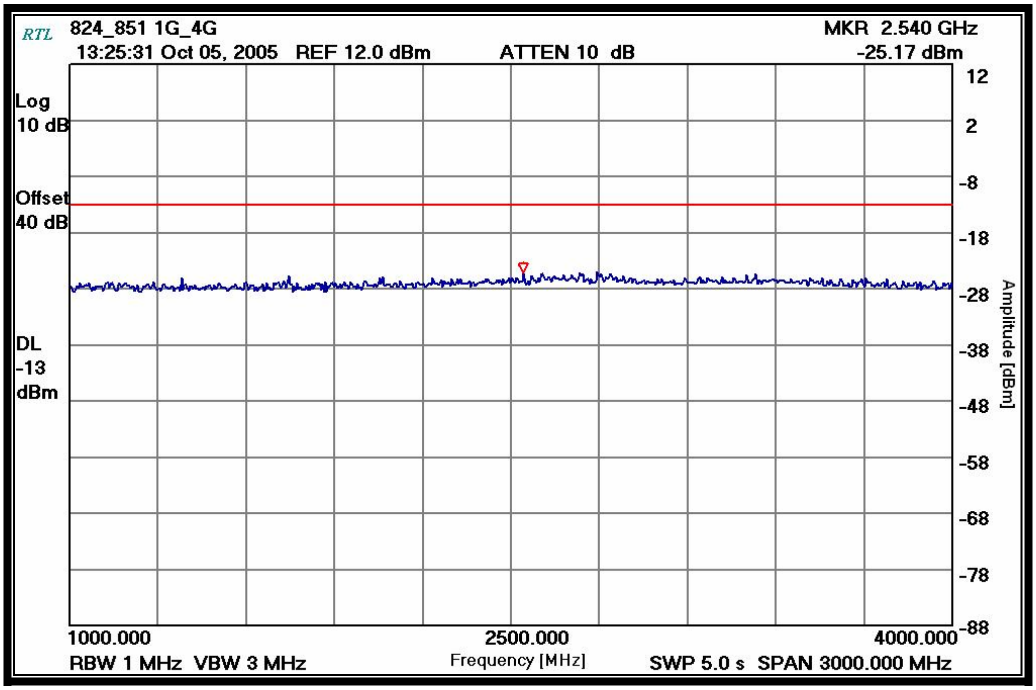
Plot 6-17: Conducted Spurious Emissions Channel 830/001 – VRM-823.9875/VRB-851.0125 MHz (1 MHz – 30 MHz) – VRB High Power



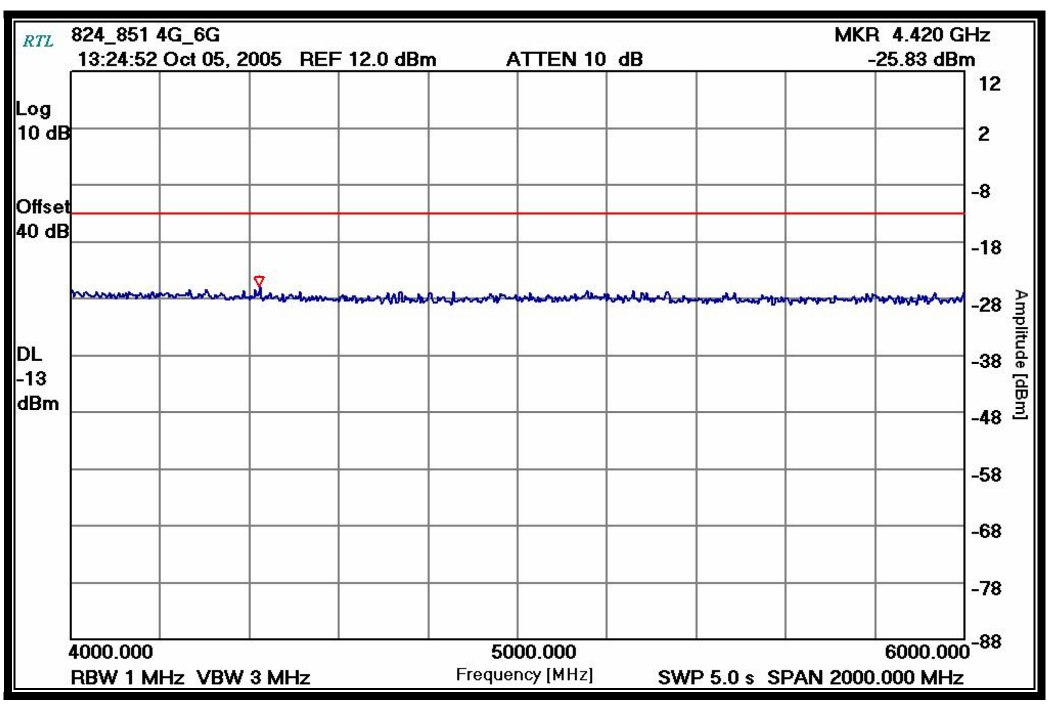
Plot 6-18: Conducted Spurious Emissions Channel 830/001 – VRM-823.9875/VRB-851.0125 MHz (30 MHz – 1 GHz) – VRB High Power



Plot 6-19: Conducted Spurious Emissions Channel 830/001 – VRM-823.9875/VRB-851.0125 MHz (1 GHz – 4 GHz) – VRB High Power



Plot 6-20: Conducted Spurious Emissions Channel 830/001 – VRM-823.9875/VRB-851.0125 MHz (4 GHz – 6 GHz) – VRB High Power



Plot 6-21: Conducted Spurious Emissions Channel 830/001 – VRM-823.9875/VRB-851.0125 MHz (6 GHz – 9 GHz) – VRB High Power

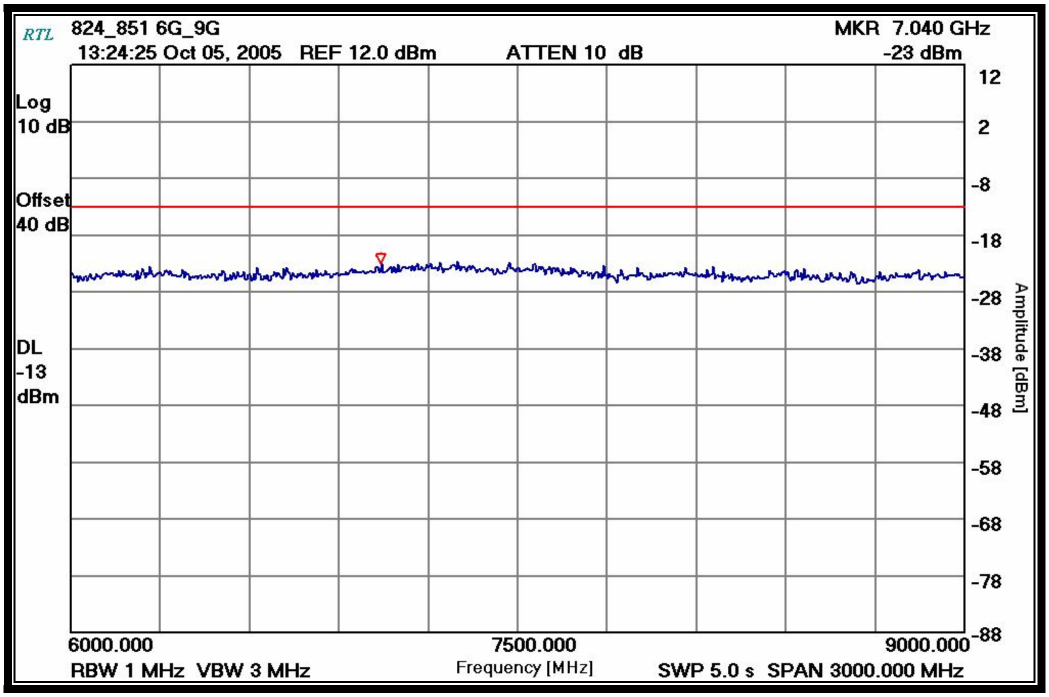
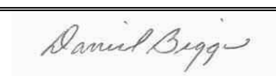


Table 6-1: Test Equipment for Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	09/22/06

TEST PERSONNEL:

Daniel Biggs		Sept. 26 & 28 & Oct. 5, 2005
Test Technician/Engineer	Signature	Dates Of Test

7 FCC Rules and Regulations Part 2 §2.1053(a): Field Strength of Spurious Radiation; RSS-119 §6.3: Unwanted Emissions

7.1 Test Procedure

ANSI/TIA/EIA-603-2002, Section 2.2.12.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19200 bps.

The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half-wave dipole.

7.2 Test Data

7.2.1 CFR 47 Part 90.210 Requirements

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

The VRM power was set to 41 dBm and the VRB was set to 39 dBm. Both transmitters were transmitting simultaneously.

Table 7-1: Field Strength of Spurious Radiation Channel 001/830 – 806.0125/868.9875 MHz; High Power

Freq = 806.0125 MHz   Limit = 43 + 10 Log P = 54.7 dBc   Conducted Power = 41.7 dBm = 14.8 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1612.025	40.8	-44.3	1.3	4.9	82.3	-27.6
2418.038	54.8	-36.9	1.5	6.8	73.2	-18.5
3224.05	50.8	-41.9	1.7	7.4	77.8	-23.1
4030.063	49.3	-37.0	1.7	7.0	73.4	-18.7
4836.075	52.2	-35.7	2.0	7.2	72.2	-17.5
5642.088	46.2	-41.2	2.0	8.3	76.6	-21.9
6448.1	42.8	-45.7	2.2	8.8	80.8	-26.1
7254.113	51.7	-36.3	2.7	8.3	72.4	-17.7
8060.125	38.2	-48.6	2.3	7.3	85.3	-30.6

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

Freq = 868.9875 MHz   Limit = 43 + 10 Log P = 52.2 dBc   Conducted Power = 39.2 dBm = 8.3 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1737.975	32.7	-52.60	1.2	5.0	88.0	-35.8
2606.963	59.7	-30.90	1.7	7.0	64.8	-12.6
3475.95	53.2	-39.30	1.8	7.5	72.8	-20.6
4344.938	42.7	-45.40	1.5	7.6	78.5	-26.3
5213.925	62.5	-24.00	1.8	7.8	57.2	-5.0
6082.913	62.3	-24.60	2.2	8.6	57.4	-5.2
6951.9	52.5	-35.00	2.4	8.1	68.5	-16.3
7820.888	49.3	-37.70	2.3	7.8	71.4	-19.2
8689.875	38.6	-44.10	2.2	8.5	77.0	-24.8

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

Table 7-2: Field Strength of Spurious Radiation Channel 830/001 – 823.9875/851.0125 MHz; High Power

Freq = 823.9875 MHz Limit = 43 + 10 Log P = 54.6 dBc Conducted Power = 41.6 dBm = 14.5 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1647.975	49.8	-36.3	1.0	4.9	73.9	-19.3
2471.963	51.7	-39.5	1.3	6.8	75.6	-20.9
3295.95	46.0	-46.8	1.5	7.3	82.6	-27.9
4119.938	45.0	-42.4	1.5	7.1	78.4	-23.7
4943.925	51.3	-36.1	1.5	7.3	71.9	-17.2
5767.913	46.2	-41.4	2.0	8.4	76.6	-22.0
6591.9	40.3	-47.1	2.2	8.7	82.2	-27.5
7415.888	49.5	-38.2	2.3	8.5	73.6	-18.9
8239.875	38.8	-44.5	2.8	7.6	81.3	-26.6

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

Freq = 851.0125 MHz Limit = 43 + 10 Log P = 52.4 dBc Conducted Power = 39.4 dBm = 8.7 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1702.025	39.20	-47.1	1.2	4.9	82.8	-30.4
2553.038	62.80	-27.7	1.3	6.8	61.6	-9.2
3404.05	55.20	-37.3	1.5	7.5	70.7	-18.3
4255.063	40.00	-48.4	1.8	7.8	81.8	-29.4
5106.075	51.00	-35.7	1.8	7.7	69.2	-16.8
5957.088	48.80	-38.0	2.4	8.6	71.2	-18.8
6808.1	50.20	-37.4	2.3	8.2	70.9	-18.5
7659.113	44.30	-43.4	2.5	8.7	76.6	-24.2
8510.125	39.00	-43.0	2.8	8.4	76.8	-24.4

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

Table 7-3: Test Equipment for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	09/20/05
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridge Guide Antenna (1 - 18 GHz)	2310	2/17/06
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	N/A
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	09/14/06

TEST PERSONNEL:

Daniel Biggs		Sept. 30, 2005
Test Technician/Engineer	Signature	Date Of Test

8 FCC Rules and Regulations Part 2 §2.1049(c)(1): Occupied Bandwidth; RSS-119 §6.4: Emissions Masks

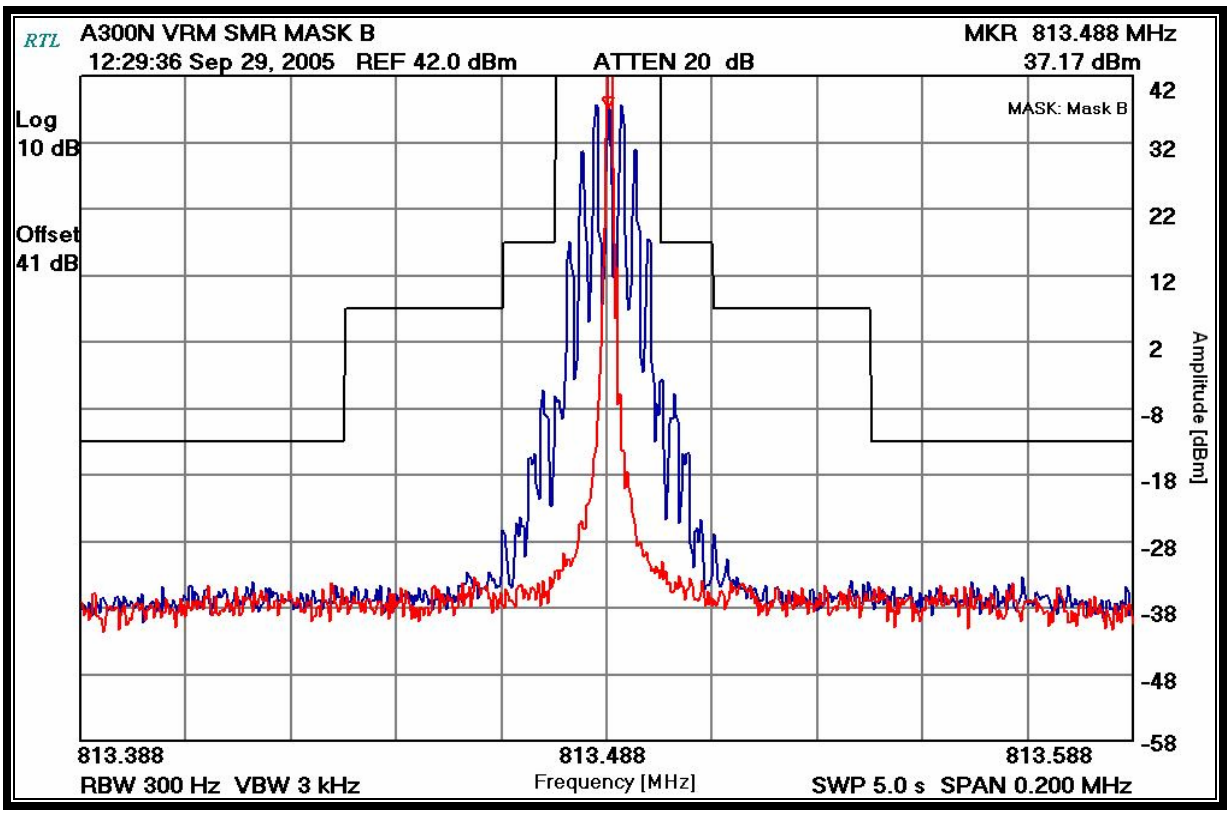
8.1 Test Procedure

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19200 bps.

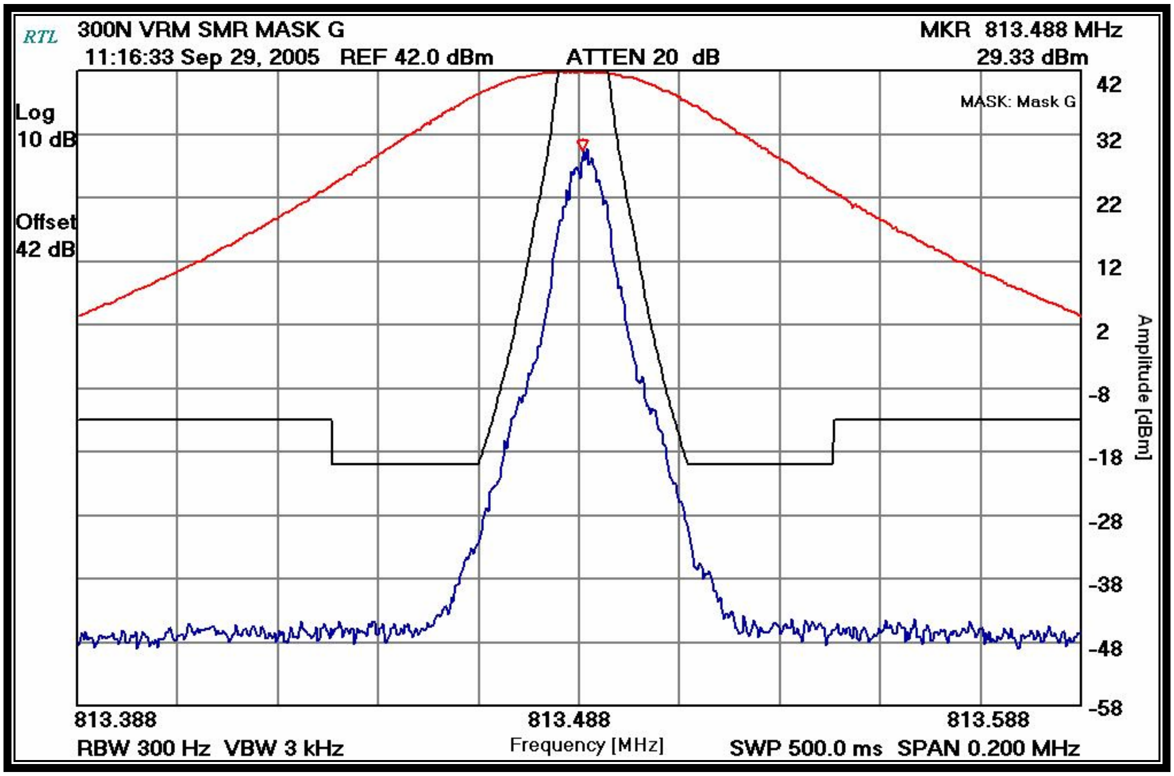
ANSI/TIA/EIA-603-2002, Section 2.2.11.

8.2 Test Data

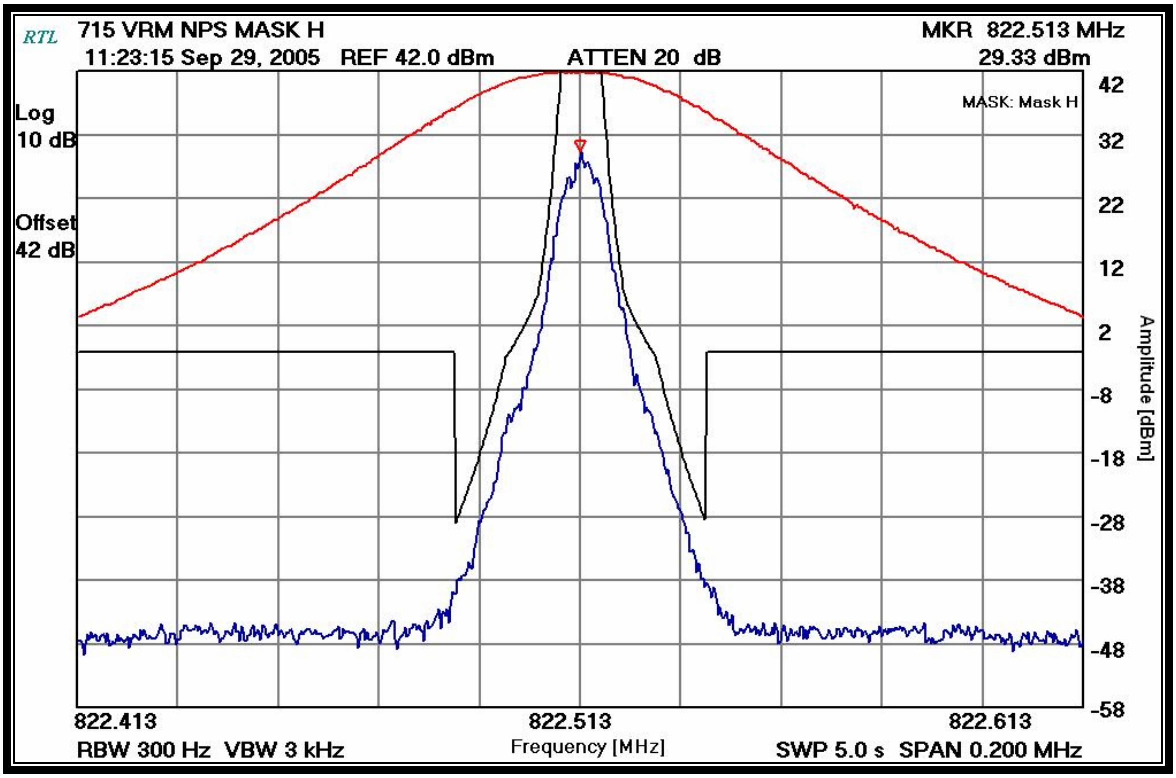
Plot 8-1: Emissions Masks; VRM; SMR; OCF; Channel 300N



Plot 8-2: Emissions Masks; VRM; SMR; OTP; Channel 300N



Plot 8-3: Emissions Masks; VRM NPS; OTP; Channel 715N



Plot 8-4: Emissions Masks; VRM NPS; P25; Channel 715T

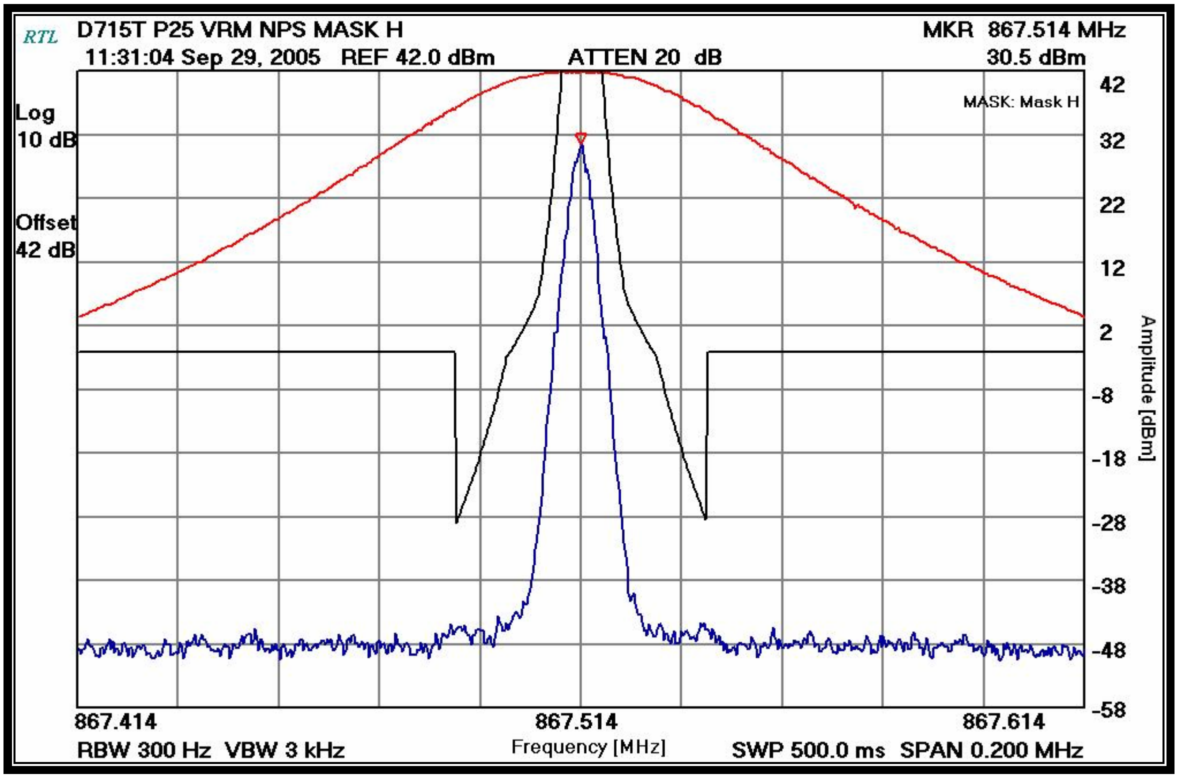


Table 8-1: Test Equipment For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	09/22/06

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	Sept. 29, 2005
Test Technician/Engineer	Signature	Date Of Test

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

Type of Emission: F3E, F7D, F7E

Voice – SMR - 25 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5.0
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

Voice – NPSPAC - 25 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 14K0F3E

OTP/ORP – SMR - 19200 bps
Calculation:
Data rate in bps (R) = 19200
Peak deviation of carrier (D) = 4000 Hz
Bn = $[R/\log_2(4) + 2 (D) (1)]$ = 17.6 kHz
Emission designator: 17K6F7D, 17K6F7E

OTP/ORP – NPSPAC - 19200 bps
Calculation:
Data rate in bps (R) = 19200
Peak deviation of carrier (D) = 4000 Hz
Bn = $[R/\log_2(4) + 2 (D) (1)]$ = 17.6 kHz
Emission designator: 17K6F7D, 17K6F7E

P25 – SMR - 9600 bps
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800 Hz
Bn = $[R/\log_2(4) + 2 (D) (1)]$ = 8.4 kHz
Emission designator: 8K4F1D, 8K4F1E

P25 – NPSPAC - 9600 bps
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800 Hz
Bn = $[R/\log_2(4) + 2 (D) (1)]$ = 8.4 kHz
Emission designator: 8K4F1D, 8K4F1E

10 FCC Rules and Regulations Part 15 §15.109: Radiated Emissions Limits

10.1 Amendments to Emissions Test Methodology

10.1.1 Deviations from Test Methodology

There was no deviation from, additions to, or exclusions from, ANSI C63.4: 2003.

10.2 Radiated Emissions Measurements

10.2.1 Site and Test Description

Before final radiated emissions measurements were made on the OATS, the EUT was scanned indoors at both one and three meter distances. This was done in order to determine its emission spectrum signal. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS, at each frequency, in order to ensure that maximum emission amplitudes were measured.

Final radiated emissions measurements were made on the OATS at a distance of 3 meters. The EUT was placed on a nonconductive turntable at a height of 1 meter.

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emissions maximum levels. Measurements were taken using both horizontal and vertical antenna polarization. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

10.2.2 Field Strength Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(dB\mu V/m) = SAR(dB\mu V) + SCF(dB/m)$$

FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(dB/m) = -PG(dB) + AF(dB/m) + CL(dB)$$

SCF = Site Correction Factor
PG = Pre-Amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\mu V/m) = 10^{FI(dB\mu V/m)/20}$$

For example, assume a signal frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is –11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3dB\mu V - 11.5dB/m = 37.8dB\mu V/m$$
$$10^{37.8/20} = 10^{1.89} = 77.6\mu V/m$$

10.2.3 Measurement Uncertainty

Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech Quality Manual, Section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

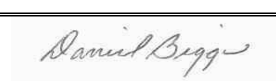
10.2.4 Test Limits

FCC Class B Radiated Emissions	
Frequency (MHz)	**At 3m (dBμV/m)**
30-88	40.0
88-216	43.5
216-960	46.0
> 1000	54

10.2.5 Radiated Emissions Data – Mode: RX/Standby, Limit/Distance FCC B/3M

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
57.600	Qp	V	270	1.0	54.4	-25.8	28.6	40.0	-11.4
60.014	Qp	V	45	1.0	55.6	-25.3	30.3	40.0	-9.7
80.011	Qp	H	270	2.0	58.9	-24.3	34.6	40.0	-5.4
80.011	Qp	V	160	1.0	60.1	-24.8	35.3	40.0	-4.7
164.316	Qp	H	270	2.0	50.5	-20.3	30.2	43.5	-13.3
164.316	Qp	V	180	1.0	49.1	-20.0	29.1	43.5	-14.4
166.674	Qp	H	180	2.0	48.4	-20.4	28.0	43.5	-15.5
166.681	Qp	V	300	1.0	49.9	-20.1	29.8	43.5	-13.7
171.455	Qp	H	270	1.5	50.4	-20.5	29.9	43.5	-13.6
240.049	Qp	V	180	1.0	50.4	-17.7	32.7	46.0	-13.3
300.043	Qp	V	350	1.0	47.0	-16.2	30.8	46.0	-15.2
300.049	Qp	H	180	1.0	51.3	-15.8	35.5	46.0	-10.5
400.063	Qp	H	230	1.0	53.0	-12.2	40.8	46.0	-5.2
400.063	Qp	V	180	1.0	46.0	-12.4	33.6	46.0	-12.4
500.072	Qp	V	300	1.0	51.5	-9.8	41.7	46.0	-4.3
500.075	Qp	H	180	1.0	49.4	-9.5	39.9	46.0	-6.1
550.072	Qp	V	300	1.0	47.0	-8.2	38.8	46.0	-7.2
550.081	Qp	H	200	1.0	47.1	-8.5	38.6	46.0	-7.4
650.104	Qp	V	300	1.0	43.5	-7.0	36.5	46.0	-9.5
700.104	Qp	V	300	1.0	48.1	-7.2	40.9	46.0	-5.1
921.012	Qp	V	45	1.0	37.7	-3.8	33.9	46.0	-12.1
935.988	Qp	V	0	1.0	37.0	-3.8	33.2	46.0	-12.8
938.995	Qp	V	0	1.0	37.1	-3.7	33.4	46.0	-12.6

TEST PERSONNEL:

Daniel Biggs		Sept. 30, 2005
Test Technician/Engineer	Signature	Date Of Test

11 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc**. Model **OpenSky M-803 V-TAC Mobile Radio; FCC ID: BV8VTAC800,** complies with the applicable requirements of Parts 90 and 2 of the FCC Rules.