



Engineering and Testing for EMC and Safety Compliance

Class II Permissive Change Test Report

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Model: P7200 700/800 MHz Portable Radio

FCC ID: BV8P7200
IC: 3670A-P7200

August 25, 2006

Standards Referenced for This Report	
Part 2: 2005	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2005	Radio Frequency Devices - §15.109: Radiated Emissions Limits
Part 90: 2005	Private Land Portable Radio Services
ANSI/TIA-603-C-2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI/TIA/EIA – 102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods
ANSI/TIA/EIA – 102.CAAA; 2004	Digital C4FM/CQPSK Transceiver Measurement Methods
RSS-119; Issue 7; 2006	Land Portable and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Frequency Range (MHz)	Maximum Conducted Power Output (W)	Emission Designator
809-824	3.0	16K3F9W

REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS

Document Number: 2006120/QRTL06-314

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Test results relate only to the item tested.*

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Original Grant Specifications

Frequency Range (MHz)	Measured Output Power (W) Conducted	Frequency Tolerance (ppm)	Modulation	Mode	Emission Designator
806-824	3.24	1.5	Analog FM (SMR)	OCF Trunked/Conventional	16K0F3E
806-824	3.24	1.5	Analog FM (NPSPAC)	OCF Trunked/Conventional	14K0F3E
851-869	3.16	1.5	Analog FM (SMR)	OCF Talkaround	16K0F3E
851-869	3.16	1.5	Analog FM (NPSPAC)	OCF Talkaround on NPSPAC channels	14K0F3E
806-809, 821-824	3.20	1.5	2-level (digitized data/voice)	NPSPAC Trunked/Conventional	11K9F1D/E
806-824	3.20	1.5	2-level (digitized data/voice)	SMR Trunked/Conventional	14K2F1D/E
851-854, 866-869	3.24	1.5	2-level (digitized data/voice)	NPSPAC T/A	11K9F1D/E
851-869	3.20	1.5	2-level (digitized data/voice)	SMR T/A	14K2F1D/E
806-824	3.31	1.5	P25 (digitized data/voice)	Trunked or Conventional	8K4F1D/E
851-869	3.24	1.5	P25 (digitized data/voice)	Talkaround	8K4F1D/E
806-809, 821-824	3.24	1.5	OTP	NPSPAC Trunked	13K2F9W
806-824	3.20	1.5	OTP	SMR Trunked	13K2F9W
764-767, 773-776	2.82	0.4	P25 (digitized data/voice)	Talkaround	8K4F1D/E
794-797, 803-806	2.82	0.4	P25 (digitized data/voice)	Trunked or Conventional	8K4F1D/E
794-797, 803-806	2.88	0.4	OTP	Trunked	13K2F9W
764-767, 773-776	1.86	0.4	Analog FM (12.5 kHz channel spacing)	Talkaround	11K0F3E
794-797, 803-806	1.91	0.4	Analog FM (12.5 kHz channel spacing)	Trunked or Conventional	11K0F3E

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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 **P7200 700/800 MHz Portable Radio; FCC ID: BV8P7200, IC: 3670A-P7200**. 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, Industry Canada RSS-119, and ANSI/TIA-603-C-2004, 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.

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 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: **BV8P7200**, originally certified September 20, 2005.

1.3 Description of Change in Device

See Appendix A for a description of the change(s).

2 Tested System Details

The test sample was received on August 10, 2006. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable. The device was programmed for multiple modes of operation and modulation types.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Radio	M/A Com, Inc,	P7200 700/800 MHz Portable Radio	MAHROS0050/A40041001BE9	BV8P7200	017420
Radio	M/A Com, Inc,	P7200 700/800 MHz Portable Radio	MAHROS0050/A40041001D08	BV8P7200	017421
Battery	M/A Com, Inc,	7.5V NMH	BKB191210/36 R1A	N/A	016855
Antenna	M/A-Com, Inc.	Whip	KRE1011506/1	N/A	016852
Antenna	M/A-Com, Inc.	Whip	KRE1011506/2	N/A	016853

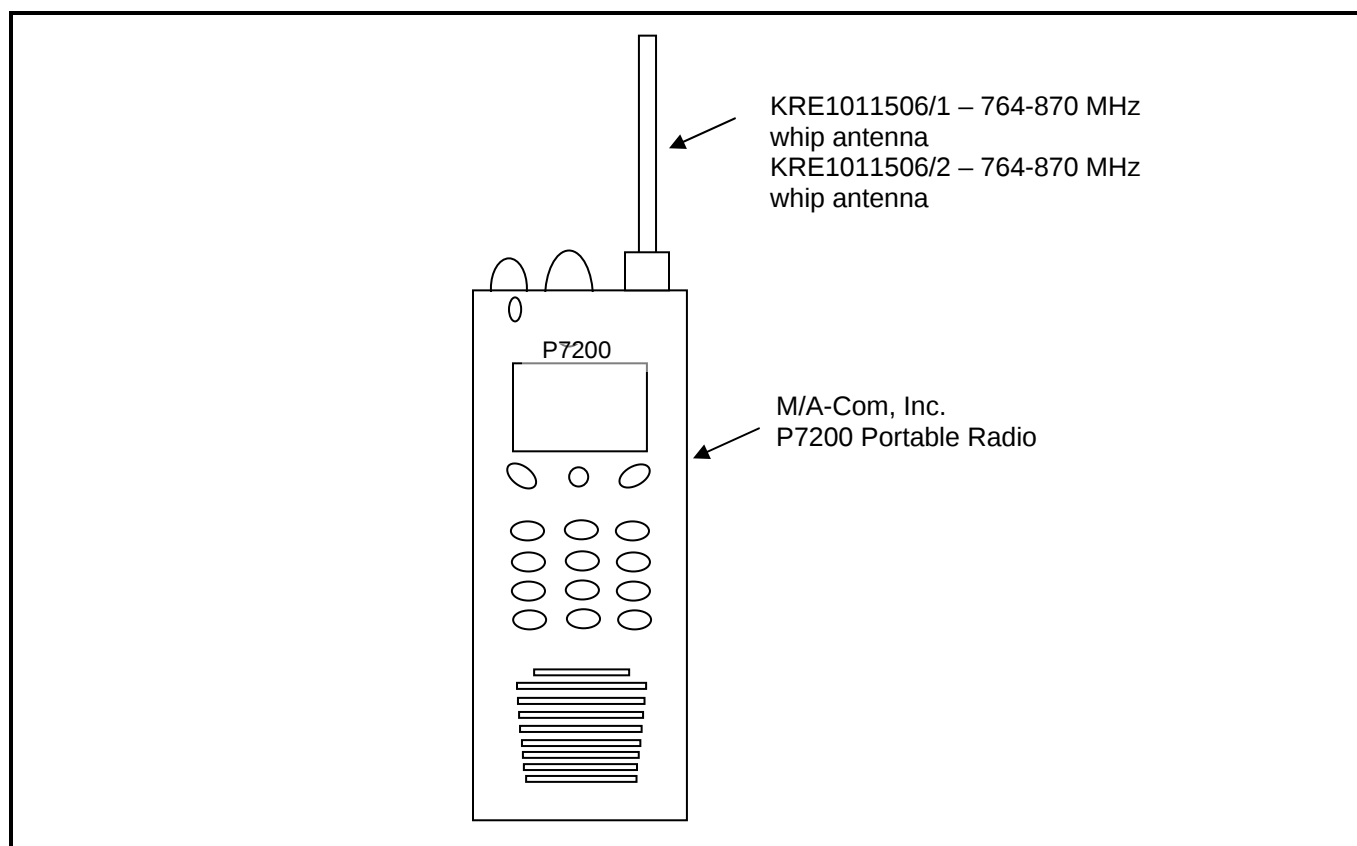


Figure 2-1: Configuration of Tested System

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

Nominal DC Voltage: 7.5 VDC

Current: 0.9 AMPS

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

4.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.1

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

4.2 Test Data

Table 4-1: RF Power Output: Carrier Output Power

Frequency (MHz)	Mode	High Power RF Power Measured (Watt)*
806.0125	OTP	3.01
807.5125	OTP	2.99
810.7375	OTP	2.95
810.7625	OTP	2.95
813.4875	OTP	2.92
816.9875	OTP	2.95
821.0375	OTP	2.98
821.0500	OTP	2.92
822.5375	OTP	2.95
823.9875	OTP	2.97

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

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

Rated Power High Power (W)
3.0 (800 Band)

Table 4-3: Test Equipment For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901184/901186	Agilent	E4416A/E9323A	Power Meter / Sensor	GB41050573/US420.52510380	09/02/06

TEST PERSONNEL:

Daniel Biggs		August 25, 2006
Test Technician/Engineer	Signature	Date Of Test

5 FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals; Part 90 §90.210: Emissions Masks; RSS-119 §5.8: Unwanted Emissions

5.1 Test Procedure

ANSI TIA-603-C-2004, 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 –19200 bps for OTP mode.

5.2 Test Data

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

Limit: $P(\text{dBm}) - (43 + 10 \times \text{LOG } P(\text{W}))$

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.

Table 5-1: Conducted Spurious Emissions – 806.0125 MHz; Wide Band; OTP

Conducted power = 34.78 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1612.025	97.53	47.79	-49.74
2418.038	97.00	47.79	-49.21
3224.050	102.73	47.79	-54.94
4030.063	101.53	47.79	-53.74
4836.075	102.83	47.79	-55.04
5642.088	94.93	47.79	-47.14
6448.100	102.23	47.79	-54.44
7254.113	96.23	47.79	-48.44
8060.125	98.43	47.79	-50.64

Table 5-2: Conducted Spurious Emissions – 821.0375 MHz; Wide Band; OTP

Conducted power = 34.74 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1643.025	98.23	47.74	-50.49
2465.013	97.53	47.74	-49.79
3287.000	100.33	47.74	-52.59
4108.988	98.63	47.74	-50.89
4930.975	101.63	47.74	-53.89
5752.963	96.63	47.74	-48.89
6574.950	98.03	47.74	-50.29
7396.938	94.83	47.74	-47.09
8218.925	100.83	47.74	-53.09

Table 5-3: Conducted Spurious Emissions – 823.9875 MHz; Wide Band; OTP

Conducted power = 34.73 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1647.975	99.73	47.73	-52.00
2471.963	98.93	47.73	-51.20
3295.950	100.53	47.73	-52.80
4119.938	98.53	47.73	-50.80
4943.925	104.43	47.73	-56.70
5767.913	96.03	47.73	-48.30
6591.900	96.23	47.73	-48.50
7415.888	100.23	47.73	-52.50
8239.875	99.93	47.73	-52.20

Table 5-4: Conducted Spurious Emissions – 807.5125 MHz; Wide Band; OTP

Conducted power = 34.75 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1615.025	97.13	47.77	-49.36
2422.538	96.53	47.77	-48.76
3230.050	101.10	47.77	-53.33
4037.563	99.43	47.77	-51.66
4845.075	100.63	47.77	-52.86
5652.588	94.43	47.77	-46.66
6460.100	99.23	47.77	-51.46
7267.613	97.13	47.77	-49.36
8075.125	96.73	47.77	-48.96

Table 5-5: Conducted Spurious Emissions – 810.7375 MHz; Wide Band; OTP

Conducted power = 34.70 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1621.475	96.26	47.77	-48.49
2432.213	97.43	47.77	-49.66
3242.950	99.83	47.77	-52.06
4053.688	99.23	47.77	-51.46
4864.425	100.73	47.77	-52.96
5675.163	92.83	47.77	-45.06
6485.900	99.13	47.77	-51.36
7296.638	97.33	47.77	-49.56
8107.375	98.16	47.77	-50.39

Table 5-6: Conducted Spurious Emissions – 810.7625 MHz; Wide Band; OTP

Conducted power = 34.7 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1621.525	97.23	47.77	-49.46
2432.288	97.43	47.77	-49.66
3243.050	99.33	47.77	-51.56
4053.813	100.23	47.77	-52.46
4864.575	101.23	47.77	-53.46
5675.338	94.03	47.77	-46.26
6486.100	98.83	47.77	-51.06
7296.863	97.03	47.77	-49.26
8107.625	97.86	47.77	-50.09

Table 5-7: Conducted Spurious Emissions – 816.9875 MHz; Wide Band; OTP

Conducted power = 34.70 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1633.975	97.93	47.77	-50.16
2450.963	96.90	47.77	-49.13
3267.950	101.83	47.77	-54.06
4084.938	100.43	47.77	-52.66
4901.925	98.93	47.77	-51.16
5718.913	94.53	47.77	-46.76
6535.900	100.53	47.77	-52.76
7352.888	100.06	47.77	-52.29
8169.875	98.93	47.77	-51.16

Table 5-8: Test Equipment for Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	09/14/06
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/02/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/12/06

Test Personnel:

Daniel Biggs		August 25, 2006
Test Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1049: Occupied Bandwidth; Part 90 §90.210: Emissions Masks; RSS-119 §5.8: Unwanted Emissions

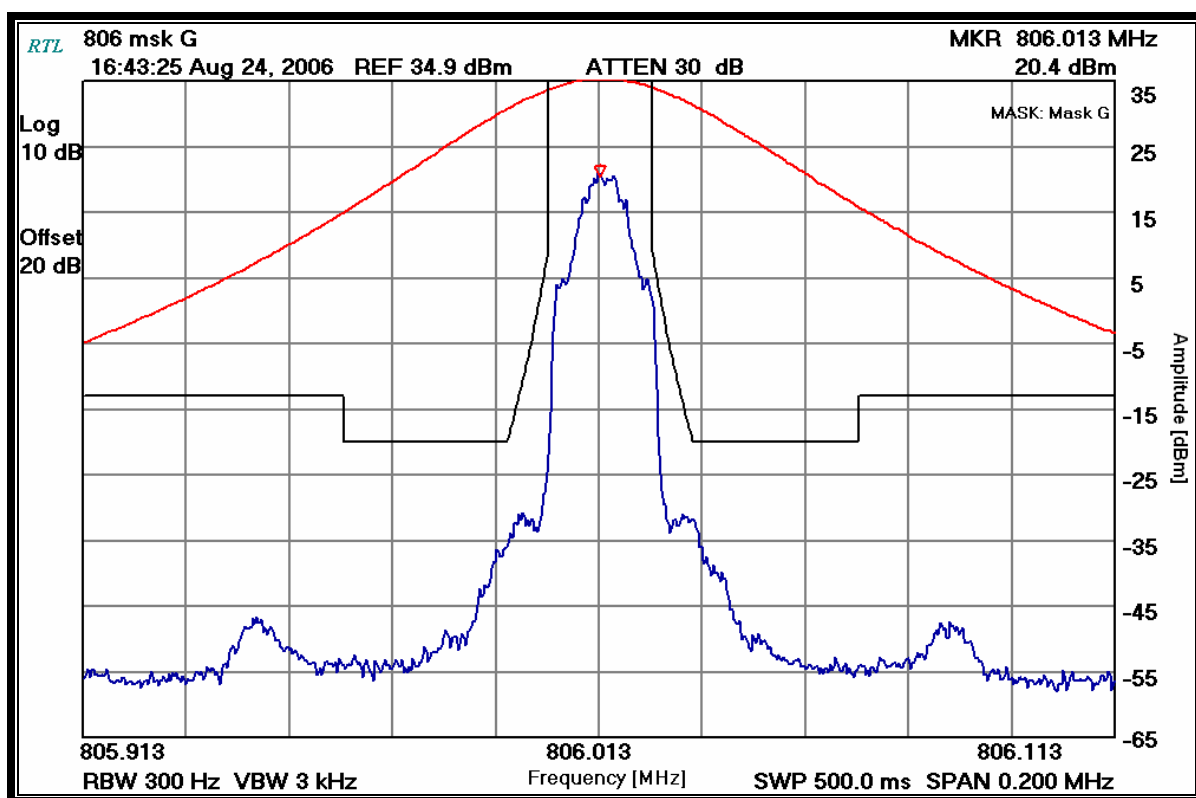
6.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.11.

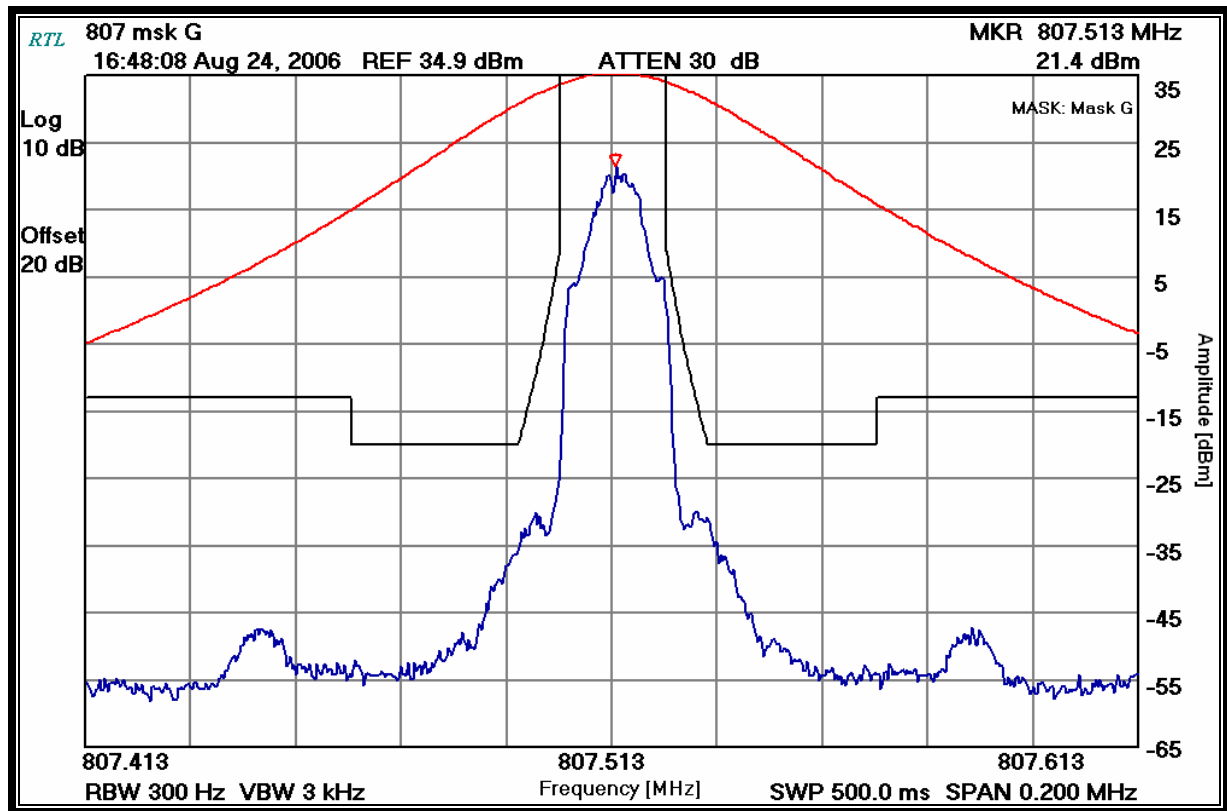
Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence –19200 bps for OTP mode.

6.2 Test Data

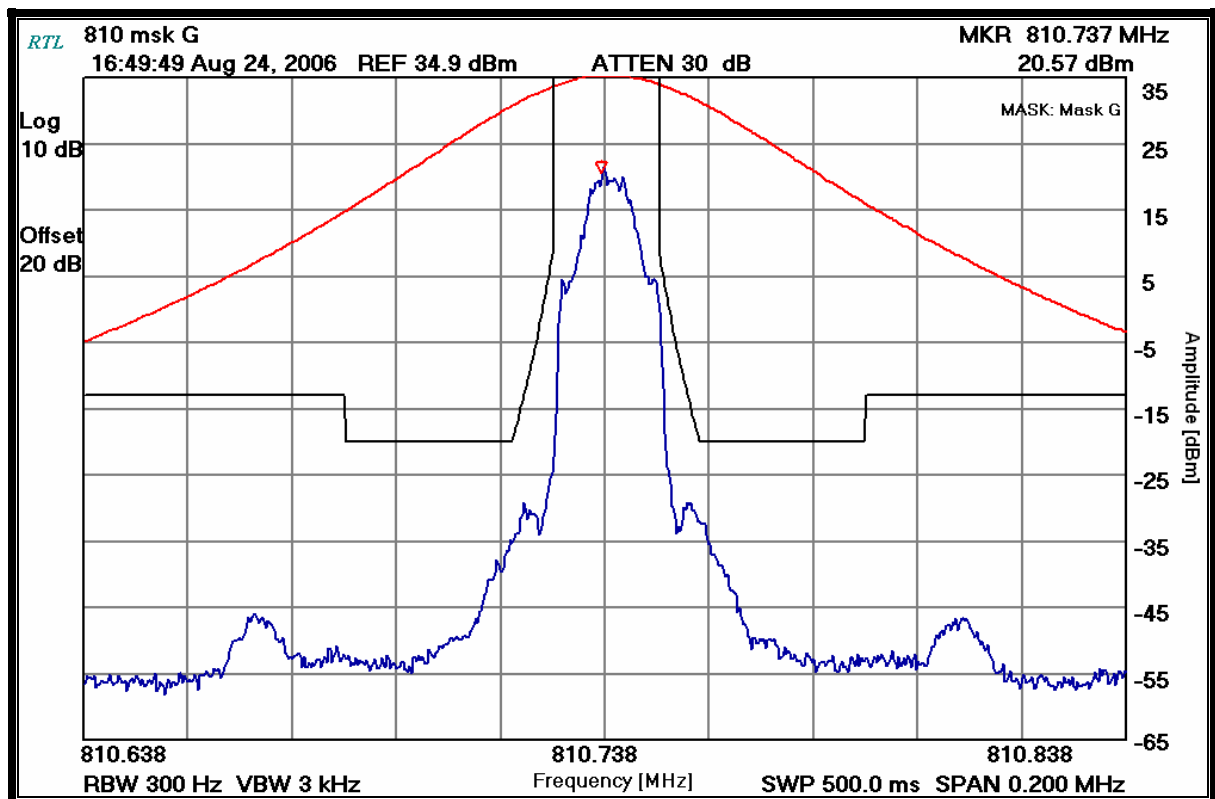
Plot 6-1: Occupied Bandwidth – 806.0125 MHz; Wideband; OTP



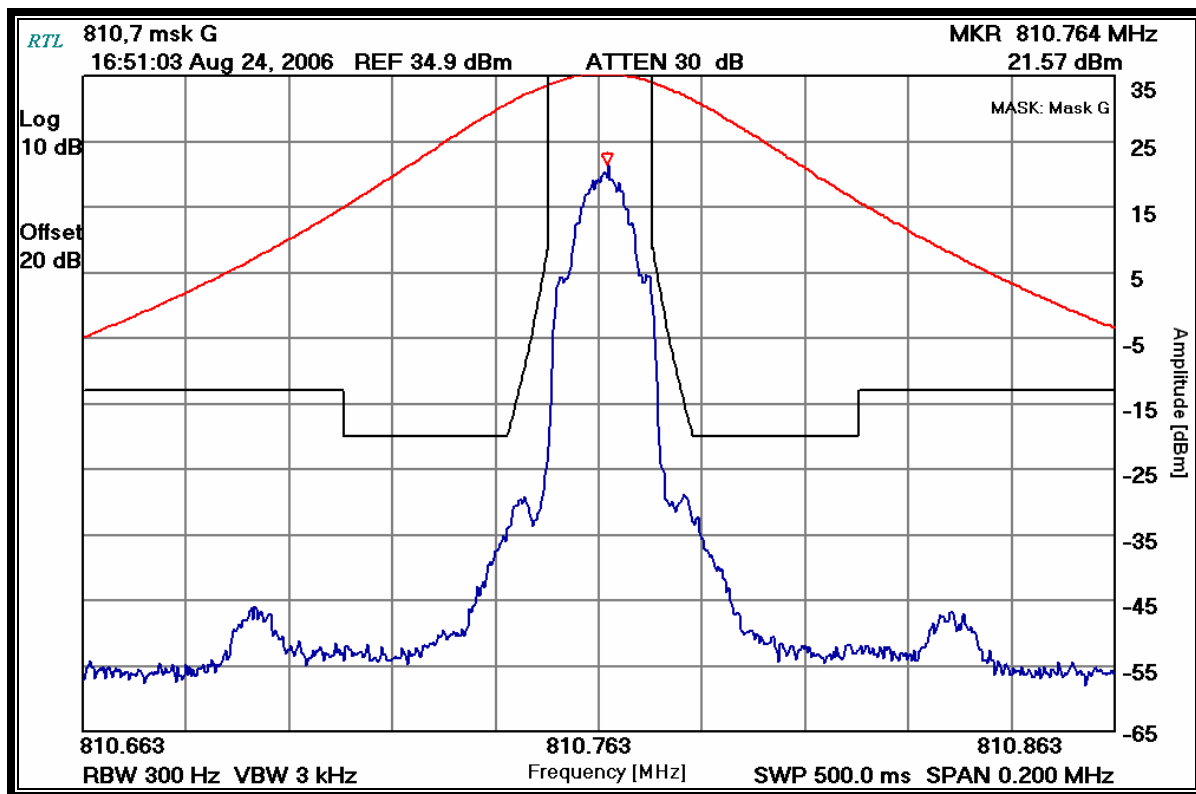
Plot 6-2: Occupied Bandwidth – 807.5125 MHz; Wideband; OTP



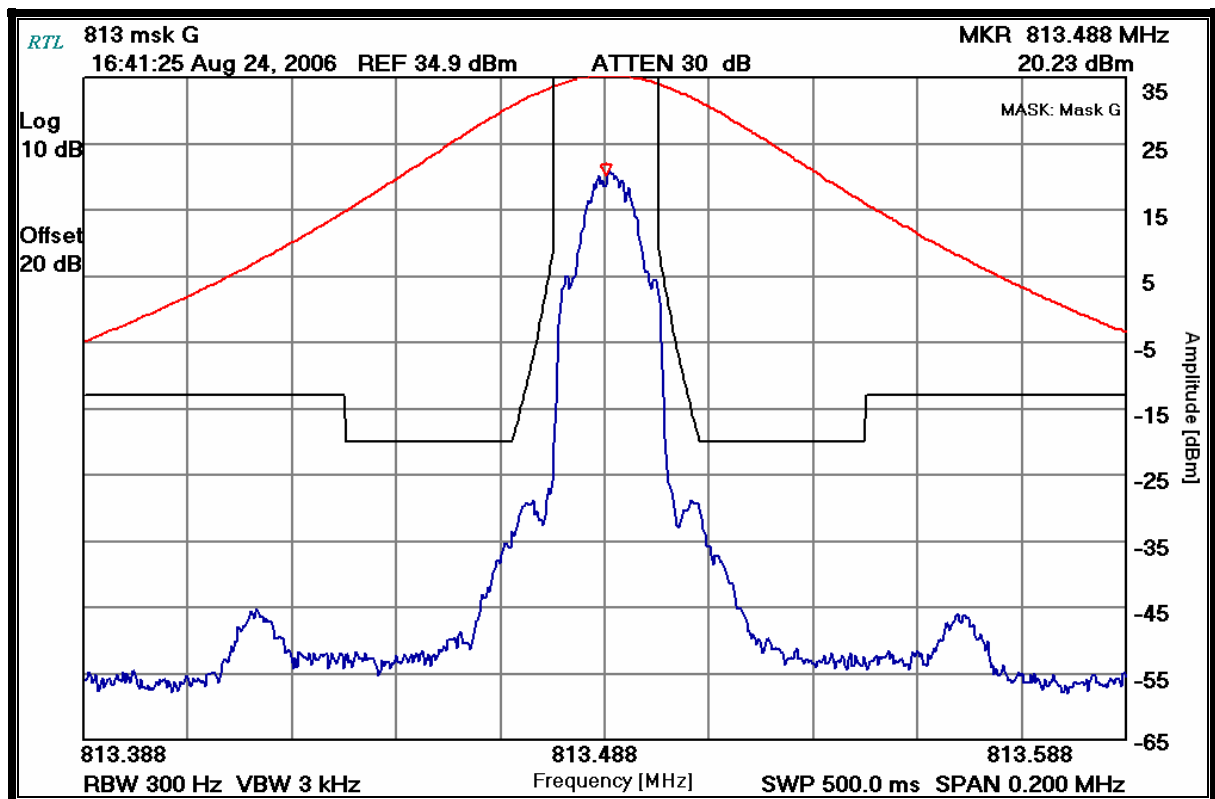
Plot 6-3: Occupied Bandwidth – 810.7375 MHz; Wideband; OTP



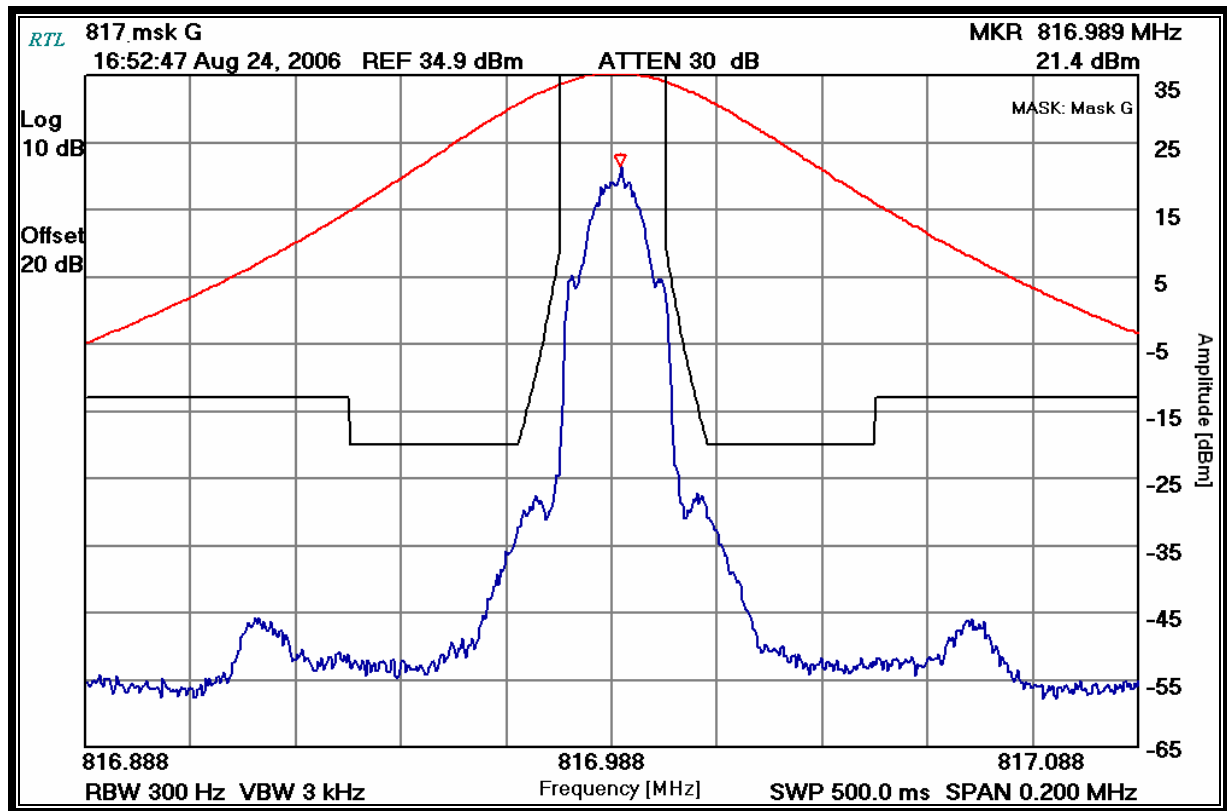
Plot 6-4: Occupied Bandwidth – 810.7625 MHz; Wideband; OTP



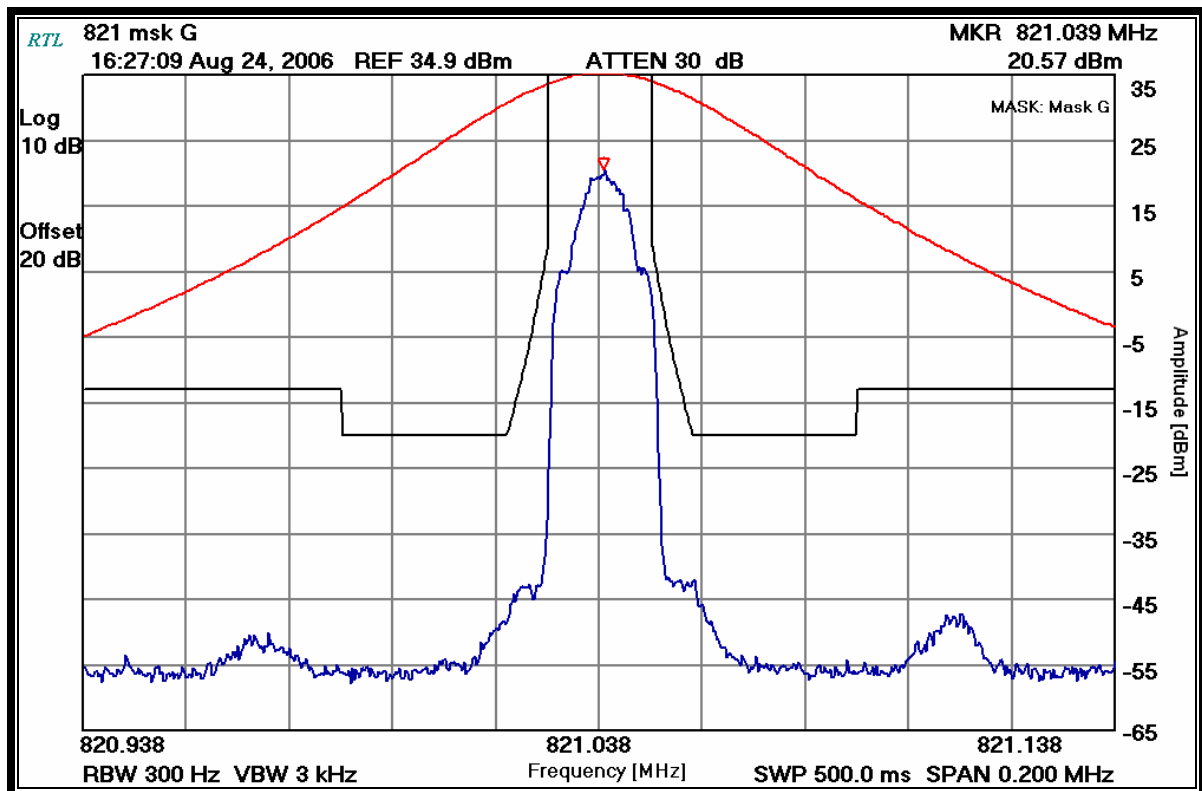
Plot 6-5: Occupied Bandwidth – 813.4875 MHz; Wideband; OTP



Plot 6-6: Occupied Bandwidth – 816.9875 MHz; Wideband; OTP



Plot 6-7: Occupied Bandwidth – 821.0375 MHz; Wideband; OTP



Plot 6-8: Occupied Bandwidth – 823.9875 MHz; Wideband; OTP

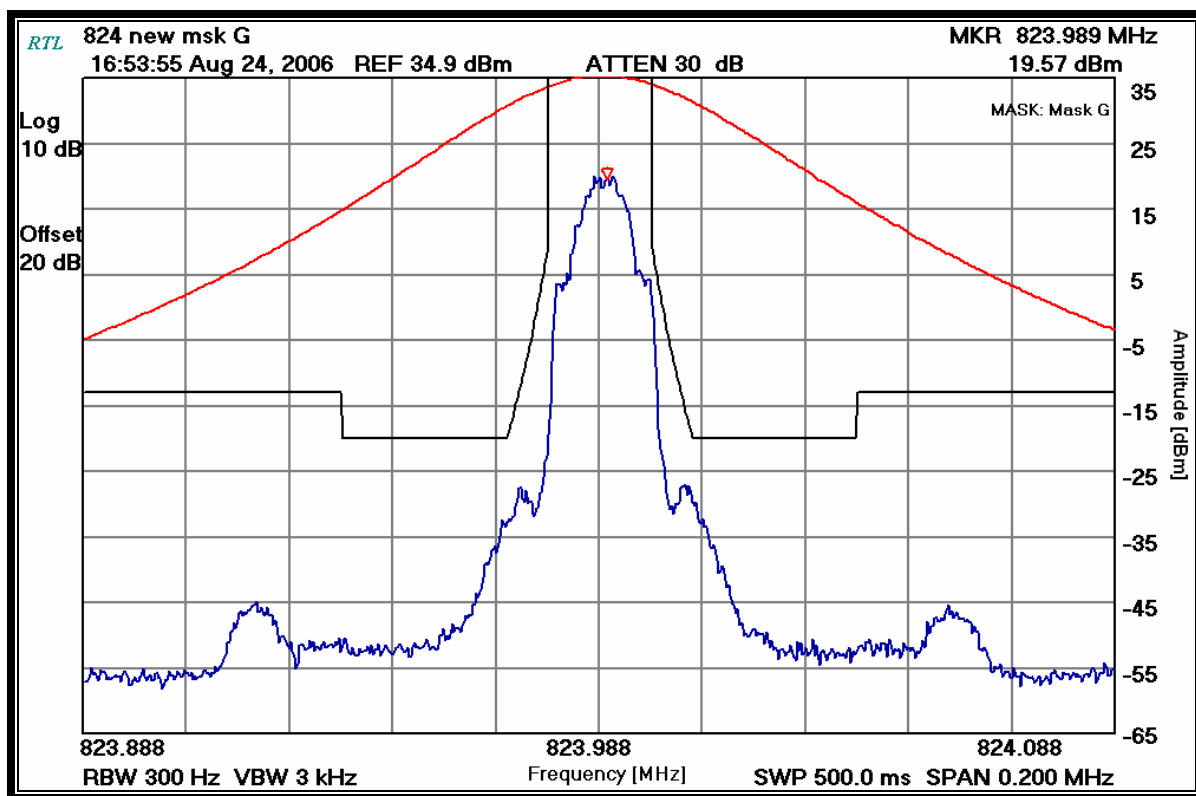


Table 6-1: Test Equipment for Testing Occupied Bandwidth

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
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/02/08

Test Personnel:

Daniel Biggs		August 24, 2006
Test Technician/Engineer	Signature	Date 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):
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 = 4.0 kHz [FM Deviation]

K = 0.84

$B(n) = [19200/\log_2(4) + 2(4000)(0.84)] = 16.3 \text{ kHz}$

$B(n) = 16,300 \text{ or } 16\text{K}3$

FCC Emission Designator: 16K3F9W

8 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc. Model P7200 700/800 MHz Portable Radio; FCC ID: BV8P7200, IC: 3670A-P7200**, complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119, Issue 7, 2006.