RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Class 2 Permissive Change Report

Harris Corporation
RF Communications Division
1680 University Avenue
Rochester, NY 14610

Model: CS-7000 Desktop Station, Local Control, with Unity XG-100M MultiBand Mobile Radio

FCC ID: AQZ-XG-100M00
IC: 122D-XG100M00

November 30, 2011

Standards Referenced for this Report	
Part 2: 2010	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 80: 2010	Stations in the Maritime Services
Part 90: 2010	Private Land Mobile Radio Services
TIA-EIA-603-C August 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.BAAA–1998	Project 25 FDMA Common Air Interface—New Technology Standards Project—Digital Radio Technical Standards
Industry Canada RSS-119 Issue 10	Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41- 960 MHz

Report Prepared By: Daniel Baltzell

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These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

Frequency Range (MHz)	Rated Transmit Power (W) (Conducted)	Frequency Tolerance (ppm)	Emission Designator (Transmit Mode)
136 – 150 (Federal) 150 – 174 (FCC) 138 – 174 (IC)	1 - 52.5	0.5	11K0F3E (Analog Voice; NB)
136 – 150 (Federal) 150 – 174 (FCC) 138 – 174 (IC)	1 - 52.5	0.5	8K40F1D/E (4-level C4FM; P25)
136 – 150 (Federal) 150 – 174 (FCC) 138 – 174 (IC)	1 - 52.5	0.5	12K0G1D/E (H-CPM)
378 – 406.1, 512 - 520 (Federal) 406.1 – 512 (FCC) 406.1 – 430, 450 – 470 (IC)	1 - 52.5	0.5	11K0F3E (Analog Voice; NB)
378 – 406.1, 512 - 520 (Federal) 406.1 – 512 (FCC) 406.1 – 430, 450 – 470 (IC)	1 - 52.5	0.5	8K40F1D/E (4-level C4FM; P25)
378 – 406.1, 512 - 520 (Federal) 406.1 – 512 (FCC) 406.1 – 430, 450 – 470 (IC)	1 - 52.5	0.5	12K0G1D/E (H-CPM)
769 – 775, 799 – 805 (FCC) 764 – 776, 794 – 806 (IC)	0.5 - 26.3	0.5	11K0F3E (Analog Voice; NB)
769 – 775, 799 – 805 (FCC) 764 – 776, 794 – 806 (IC)	0.5 - 26.3	0.5	8K40F1D/E (4-level C4FM; P25)
769 – 775, 799 – 805 (FCC) 764 – 776, 794 – 806 (IC)	0.5 - 26.3	0.5	12K0G1D/E (H-CPM)
769 – 775, 799 – 805 (FCC) 764 – 776, 794 – 806 (IC)	0.5 - 26.3	0.5	11K0F3E (Analog Voice; NB)
769 – 775, 799 – 805 (FCC) 764 – 776, 794 – 806 (IC)	0.5 - 26.3	0.5	8K40F1D/E (4-level C4FM; P25)
769 – 775, 799 – 805 (FCC) 764 – 776, 794 – 806 (IC)	0.5 - 26.3	0.5	12K0G1D/E (H-CPM)
806 – 824	0.5 - 37.2	0.5	11K0F3E (Analog Voice; NB)
806 – 824	0.5 - 37.2	0.5	8K40F1D/E (4-level C4FM; P25)
806 – 824	0.5 - 37.2	0.5	12K0G1D/E (H-CPM)
806 – 809	0.5 - 37.2	0.5	14K0F3E (Analog Voice; NPSPAC)
821 – 824	0.5 - 37.2	0.5	14K0F3E (Analog Voice; NPSPAC)
851 – 869	0.5 - 37.2	0.5	11K0F3E (Analog Voice; NB)
851 – 869	0.5 - 37.2	0.5	8K40F1D/E (4-level C4FM; P25)
851 – 869	0.5 - 37.2	0.5	12K0G1D/E (H-CPM)

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1 Test Result Summary

Test	FCC Reference	Result
RF Power Output	2.1046(a), 90.541(b), 90.542(a)(6), 80.215	Complies
Field strength of spurious radiation	2.1053(a), 90.543(c)	Complies

2 General Information

The following Class 2 Permissive Change Report is prepared on behalf of Harris Corporation in accordance with the Federal Communications Commission and Industry Canada rules and regulations. The Equipment Under Test (EUT) was the CS-7000 Desktop Station, Local Control, with Unity XG-100M Multiband Radio; FCC ID: AQZ-XG-100M00, IC: 122D-XG100M00.

The purpose of this Class 2 Permissive Change is the addition of the CS-7000 Desktop Station, Local Control, configuration of the XG-100M Unity Mobile radio.

The radio is subject to FCC DoC. DoC testing was performed and the data is contained in a separate DoC report.

All measurements contained in this application were conducted in accordance with the applicable sections of FCC Rules and Regulations CFR 47 Parts 2, 80 and 90. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

2.1 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.

2.2 Related Submittal(s)/Grant(s)

The original FCC certification was granted May 24, 2011 with a Class II permissive change application granted on October 24, 2011. The original IC certification was granted May 25, 2011, with a reassessment application granted on October 26, 2011.

2.3 Grant Notes

Request to add to existing grant notes:

This PC is to allow use of this device in fixed installations of desktop stations and base station test unit applications.

3 Tested System Details

The test sample was received on November 19, 2011. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this testing, as applicable.

The device is capable of multiple modes of operation and modulation types using ASCII commands sent via serial interface.

Table 3-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
CS-7000 Desktop Station, Local Control, w/ XG-100M Unity Mobile Radio	Harris Corporation	CT-013892-001 Rev B	100715	AQZ-XG-100M00	020246
Microphone	Harris Corporation	MC-014121-002 Rev 1122	VT-10001	N/A	020446

Table 3-2: Auxiliary Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Printer (RS232)	Hewlett Packard	C3150A	USFB2921520	DoC	N/A

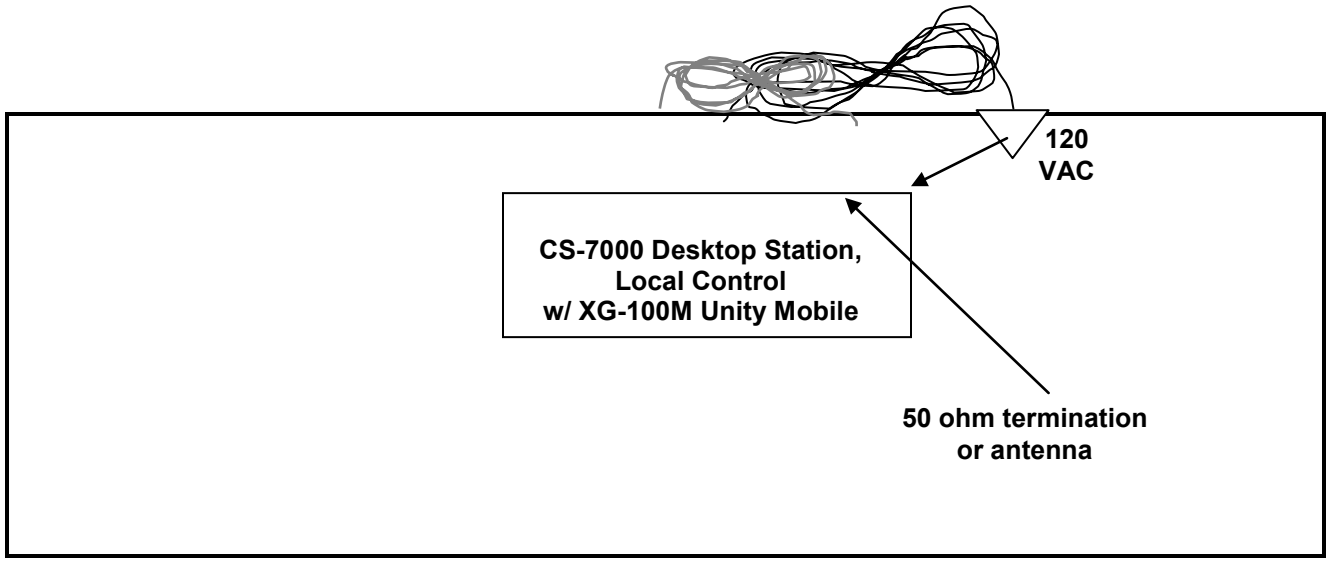

Figure 3-1: Configuration of Tested System

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

13.6V /8 A VHF/UHF/700/800 MHz

5 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 90.541(b)/90.542(a)(6): Transmitting Power Limits; Part 80.215: Transmitter Power; RSS-119 4.1 Transmitter Output Power

5.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.1

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

§80.215 Transmitter Power

(a) Transmitter power shown on the radio station authorization is the maximum power the licensee is authorized to use. Power is expressed in the following terms:

(5) For all other emissions: the carrier power multiplied by 1.67.

(e) Ship stations frequencies above 27500 kHz, the maximum power must not exceed the values listed below:

(1) Ship stations 156–162 MHz: 25 W
(2) Marine utility stations and hand-held portable transmitters: 156–162 MHz: 10 W

Maximum Power Authorized to Use: 10.02 W for VHF, 8.35 W for UHF

Manufacturer's Rated Power: 52.5 W for VHF and UHF, 26.3 W for 700 Band, and 37.2 W for 800 Band

5.2 Test Data

Table 5-1: RF Conducted Output Power – Measured

Frequency (MHz)	Power (dBm)	Power (W)
136.0125 (Federal)	47.7	58.9
138.0125 (IC)	47.6	57.5
141.0000 (IC)	47.5	56.2
143.9875 (IC)	47.4	55.0
148.0125 (IC)	47.6	57.5
150.0125 (FCC)	47.6	57.5
154.0125 (FCC)	47.8	60.3
162.0000 (FCC/IC)	47.9	61.7
173.1875 (FCC)	47.1	51.3
173.9875 (FCC/IC)	47.0	50.1
406.1125 (FCC/IC)	47.0	50.1
418.0000 (FCC/IC)	47.3	53.7
429.9875 (IC)	47.3	53.7
450.0125 (IC)	46.5	44.7
453.9875 (FCC/IC)	46.3	42.7
456.0125 (FCC)	46.2	41.7
469.9875 (FCC/IC)	46.2	41.7
511.9875 (FCC)	46.4	43.7
519.9875 (Federal)	46.0	39.8
764.0125 (IC)	44.4	27.5
769.0125 (FCC)	44.4	27.5
771.0000 (FCC/IC)	44.4	27.5
774.9875 (FCC)	44.4	27.5
775.9875 (IC)	44.4	27.5
794.0125 (IC)	44.4	27.5
799.0125 (FCC)	44.4	27.5
801.0000 (FCC/IC)	44.4	27.5
804.9875 (FCC)	44.4	27.5
805.9875 (IC)	45.4	34.7
806.0125 (FCC/IC)	45.4	34.7
815.0000 (FCC/IC)	45.4	34.7
823.9875 (FCC/IC)	45.4	34.7
851.0125 (FCC/IC)	45.4	34.7
860.0000 (FCC/IC)	45.4	34.7
868.9875 (FCC/IC)	45.2	33.1

Notes: Data presented is for Analog mode. All other modes were investigated and found to have equivalent power within measurement tolerances.

Table 5-2: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	1/11/13
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	1/20/13
901339	MCE Weinschel	47-40-34	Attenuator, 40 dB, DC-18 GHz, 50 W	BM4864	7/15/12

Test Personnel:

Daniel Baltzell		November 28, 2011
EMC Test Engineer	Signature	Date of Test

6 FCC Rules and Regulations Part 90.210(g) and Part 2.1053(a): Field Strength of Spurious Radiation; Part 90.543(f): Out of Band Emissions Limit; RSS-119 5.8.9.2 Out-of-band Emission Limit

6.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.12

Analog Modulation: The transmitter is terminated with a 50Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

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 (dBi) was added to achieve the EIRP level, then converted from the corrected signal generator level (dBm) to dBW and compared to the limit.

For emissions in the 1559-1610 MHz band, Part 15.543(f) states: "For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation."

6.2 Test Data

6.2.1 CFR 47 Part 90.210 Requirements

The following channels (in MHz) were investigated:

VHF (MHz)	UHF (MHz)	700 MHz	800 MHz
136, 155, 174	380, 425, 430, 470	764, 776, 795, 805 794.0125, 799.0125, 801, 804.9875 (GNSS)	806, 825, 851, 870

All modes were investigated and analog mode is presented as representative data.

Per 2.1051(c), the magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded. No spurious data was found to be within 20 dB except for Part 90.543 data which is presented below.

6.2.2 CFR 47 Part 90.543(f) Requirements

The worst-case emissions test data are shown. Limit: -80 dBW EIRP for discrete emissions

Table 6-1: Field Strength of Spurious Radiation – Worst Case Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBW)	Margin (dB)
1588.025	38.3	-60.0	1.2	8.8	-82.4	-2.4
1598.025	37.2	-60.1	1.1	8.8	-82.4	-2.4
1602.000	33.5	-63.5	1.1	8.9	-85.7	-5.7
1609.975	30.8	-66.5	1.1	8.9	-88.7	-8.7

Table 6-2: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901364	Rhein Tech Laboratories	PR-1042	Preamplifier (1 - 26.5 GHz)	N/A	2/22/12
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	OATS1	N/A
901516	Insulated Wire Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/14/12
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/14/12
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	N/A
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	1/31/13
900321	EMCO	3161-03	Horn Antennas (4 – 8 GHz)	9508-1020	6/14/12
900323	EMCO	3160-07	Horn Antennas (8.2 – 12 GHz)	9605-1054	6/14/12
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/12
901235	Insulated Wire Inc.	KPS-1503-360-KPS-09302008	RF cable 36"	NA	4/5/12
900928	Hewlett Packard	83752A	Synthesized Sweeper, 0.01 to 20 GHz	3610A00866	2/17/12
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	1/13/12

Test Personnel:

Daniel Baltzell		November 28-30, 2011
Test Engineer	Signature	Date of Tests

7 Conclusion

The data in this measurement report shows that the Harris Corporation Model XG-100M Unity Multiband Mobile Radio in the CS-7000 Desktop Station, Local Control, configuration, FCC ID: AQZ-XG-100M00, IC: 122D-XG100M00, complies with all the applicable requirements of Parts 80, 90, 15 and 2 of the FCC Rules and Industry Canada RSS-119.