

R8000 SERIES COMMUNICATIONS SYSTEM ANALYZER

AUTOTUNE USER GUIDE

Harris XG-100 Mobile

Freedom Communication Technologies 2002 Synergy Blvd, Suite 200 Kilgore, Texas 75662

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FCT-1001A

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TABLE OF CONTENTS

1. Introduction	
2. Scope	1
3. Conventions	1
3.1. PPM	
3.2. Rated Audio	1
4. Important Notes	
4.1. Required firmware	
4.2. Conventional channel selection	1
4.3. Supported models	
5. Harris XG-100 Mobile Radio Test Setup	
5.1. XG-100 Mobile Test Setup	
6. Harris XG-100 Mobile Alignment and Test Descriptions	
6.1. TCXO Frequency	
6.2. TX Power	
6.3. Tx Analog Modulation	
6.4. Tx CTCSS/CDCSS Modulation and Composite Deviation	
6.5. P25 Phase 1 Tx Modulation (C4FM) Test	
6.6. Tx P25 Phase 2 Tx Modulation (TDMA) Test	
6.7. Rx Audio Level and Distortion	
6.8. RX Sensitivity (SINAD)	
6.9. P25 Phase 1 Rx Sensitivity (C4FM) Test	
6.10. P25 Phase 2 Rx Sensitivity (TDMA) Test	
6.11. Basic Troubleshooting	
7. Support Information	
7.1. Technical Support	
7.2. Sales	
APPENDIX A. Test Limits	
APPENDIX B. Sample Test Result Report	
APPENDIX C. Revision History	

LIST OF FIGURES

Figure 7-1.	XG-100 Mobile Front Mount Test Setup Diagram	1
Figure 7-2.	XG-100 Mobile Remote Mount Test Setup Diagram	2
3 -		
Figure B-1	Sample Test Result Report	B-2
i iguic D i.		D 2

LIST OF TABLES

Table 6-1. Analyzer Configuration for Reference Frequency	4
Table 6-2. TCXO Frequency alignment results	
Table 6-3. TCXO Frequency test results	
Table 6-4. Analyzer Configuration for TX Power	
Table 6-6. TX Power test results	6
Table 6-7. Analyzer Configuration for Tx Analog Modulation test	7
Table 6-8. Tx Analog Modulation test results	7
Table 6-8. Analyzer Configuration for Tx CTCSS/CDCSS Modulation test	8
Table 6-9. Tx CTCSS/CDCSS Modulation test results	8
Table 6-9. Analyzer Configuration for P25 Phase 1 Tx Modulation (C4FM) tes	st9
Table 6-10. Tx P25 Phase 1 Modulation (C4FM) test results	9
Table 6-11. Analyzer Configuration for P25 Phase 2 Tx Modulation (TDMA) to	est
	10
Table 6-12. Tx P25 Phase 2 Tx Modulation (TDMA) test results	10
Table 6-13. Analyzer Configuration for Rx Audio Level and Distortion test	11
Table 6-14. Rx Audio Level and Distortion test results	11
Table 6-17. Analyzer Configuration for RX Sensitivity test	
Table 6-18. RX Sensitivity test results	
Table 6-22. Analyzer Configuration for P25 Phase 1 Rx Sensitivity (C4FM) te	st13
Table 6-23. P25 Phase 1 Rx Sensitivity (C4FM) test results	
Table 6-24. Analyzer Configuration for P25 Phase 2 Rx Sensitivity (TDMA) te	
Table 6-25. P25 Phase 2 Rx Sensitivity (TDMA) test results	
Table 6-26. Harris XG-100 Mobile Series Troubleshooting Chart	16
Table A-1. Default Harris XG-100 Mobile Limits	
Table A-2. Default Harris XG-100 Mobile Limits	. A-3

1. Introduction

The Freedom Communication Technologies R8000 Series Communications System Analyzer AutoTune™ (hereafter "AutoTune") provides an automated test and alignment solution for supported two-way radios.

2. Scope

This document includes information regarding the tests and alignments performed for supported radios by AutoTune. This document is restricted to radio-specific information for Harris XG-100 Mobile series radios.

Please refer to the R8000 Series Communications System Analyzer Owner's Manual (FCT-1365) for an overview and basic operating instructions for AutoTune itself.

3. Conventions

3.1. PPM

"ppm" is "parts per million". This specification is generally limited to frequency-related measurements. If the frequency units are in MHz, then the ppm specification is in Hz. For example, a 169.075 MHz frequency with a ±1.5 ppm specification is allowed to vary by 1.5 * 169.075 MHz, or about ±254 Hz.

3.2. Rated Audio

Rated audio voltage target is $2\ V_{RMS}$ for portable models and $7.745\ V_{RMS}$ for mobile models.

4. Important Notes

4.1. Required firmware

All Harris XG-100 Mobile series radios must be running **XGP or XLP** firmware for AutoTune to successfully service them. Older ECP firmware is not currently supported. Contact Harris Technical Assistance Center (TAC) for information on acquiring XGP firmware.

4.2. Conventional channel selection

The radio must have a conventional channel selected before AutoTune servicing begins. A trunked channel if selected is known to cause radio communication initialization failures.

4.3. Supported models

The following Harris XG-100 Mobile series models are supported by AutoTune:

- XM-100F
- XM-100F-D01
- XM-100F-D02
- XM-100F-D03
- XM-100LPA

5. Harris XG-100 Mobile Radio Test Setup

In order to perform the test and alignment procedures, the XG-100 Mobile radio must be connected to the R8000 Communications System Analyzer as shown in the figures below. Note that connections differ between CH-721 and CH-100 control heads.



Make certain that the radio under test is configured as described in the corresponding diagram **before** attempting to perform the indicated alignment or test. Failure to do so may result in poor radio performance and/or damage to the analyzer or radio equipment under test.

5.1. XG-100 Mobile Test Setup

Refer to the diagrams below for proper test setup.

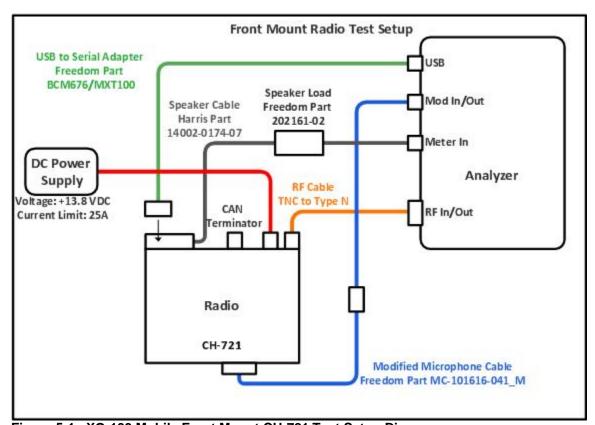


Figure 5-1. XG-100 Mobile Front Mount CH-721 Test Setup Diagram

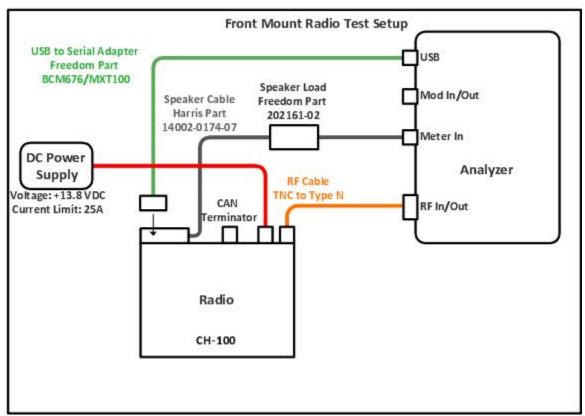


Figure 5-2. XG-100 Mobile Front Mount CH-100 Test Setup Diagram

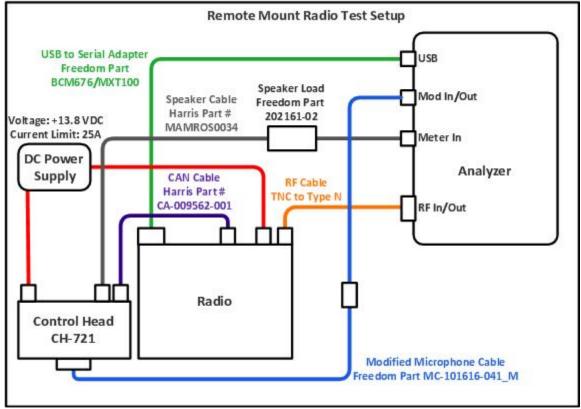


Figure 5-3. XG-100 Mobile Remote Mount CH-721 Test Setup Diagram

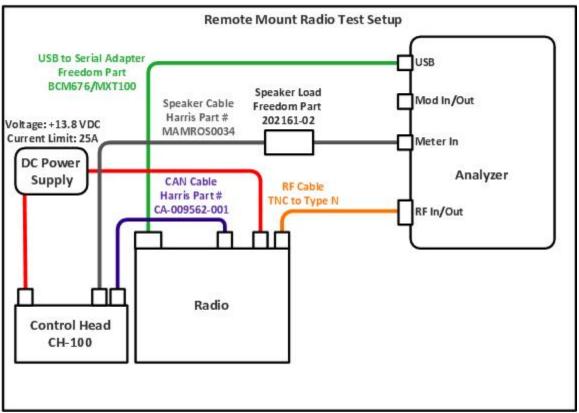


Figure 5-4. XG-100 Mobile Remote Mount CH-100 Test Setup Diagram

6. Harris XG-100 Mobile Alignment and Test Descriptions

Note: Throughout this section are references to Test Frequency that are band- and mode -specific. A table of the frequencies used by each band may be found in the respective radio service manual.

Note: All analyzer Mode settings are Standard unless otherwise indicated.

6.1. TCXO Frequency

RF Control	Port	Frequency	Modulation	Attenuation
Monitor	RF	Test	FM	30 dB
	IN/OUT	Frequency		

Table 6-1. Analyzer Configuration for Reference Frequency

6.1.1. Alignment

The radio is placed into Test Mode at a Tx Test Frequency and commanded to transmit. Using a best linear fit algorithm, two frequency error measurements are taken at two different radio softpot values. These frequency error measurements are used to calculate the softpot value which minimizes frequency error. After programming this new softpot value into the radio, the radio softpot is fine tuned until minimum frequency error is detected. The frequency error is compared against test limits and the final results written to the log file.

Name	Description
Result	Pass or Fail. Frequency Error within Max Limit, Min Limit.
Frequency	Test Frequency
Freq Error	Measured frequency error
Min Limit	Minimum Limit (inclusive) for frequency error alignment
Max Limit	Maximum Limit (inclusive) for frequency error alignment
Old Softpot	Radio softpot before alignment
New Softpot	Radio softpot after alignment

Table 6-2. TCXO Frequency alignment results

6.1.2. Test

The radio is placed into Test Mode at a Tx Test Frequency and commanded to transmit. The frequency error is measured by the analyzer and compared to test limits. The final results are written to the log file.

Harris XG-100 Mobile Series AutoTune™ User Guide

Name	Description
Result	Pass or Fail. Frequency Error within Max Limit, Min Limit.
Frequency	Test Frequency
Freq Error	Measured frequency error
Min Limit	Minimum Limit (inclusive) for frequency error
Max Limit	Maximum Limit (inclusive) for frequency error
Softpot	Radio softpot producing the Freq Error

Table 6-3. TCXO Frequency test results

6.2. TX Power

RF Control	Port	Frequency	Modulation	Attenuation
Monitor	RF IN/OUT	Test Frequency	FM	40 dB

Table 6-4. Analyzer Configuration for TX Power

6.2.1. Test

The radio is placed into Test Mode and commanded to transmit. Beginning at the first Tx Test Frequency, the output level is measured at each TX Test Frequency, for the current radio power configuration (Low or High Power), and compared against test limits. The final results are written to the log file.

To change current radio power level configuration, refer to the radio maintenance manual.

Name	Description
Result	Pass or Fail. Power Out within Max Limit, Min Limit
Power Out	Measured radio output level
Min Limit	Minimum Limit (inclusive) for Power Out
Max Limit	Maximum Limit (inclusive) for Power Out

Table 6-5. TX Power test results

6.3. Tx Analog Modulation

The Tx Analog Modulation test measures the radio's 60% and maximum deviation levels, audio distortion, and peak deviation differences for each test frequency.

Note: This test is not currently supported for XG-100M radios with CH-100 control heads. Running it on a XG-100M with a CH-100 will always return a 'Pass' with a test report note about its exclusion.

RF Control	Port	Frequency	Modulation	Attenuation	Dev Avg
Monitor	RF IN/OUT	Test Frequency	FM	30 dB	+/-Peak / 2

Table 6-6. Analyzer Configuration for Tx Analog Modulation test

6.3.1. Tx Analog Modulation Test

The radio is placed into Test Mode. For each test frequency and bandwidth (Wide, Narrow, NPSPAC) supported, the radio transmits analyzer-generated tones at both 60% and maximum deviation levels. The ±Peak / 2-averaged deviations of these tones are measured with the analyzer, along with the audio distortion and ±peak deviation level differences. The test results are written to the log file.

Name	Description
Result	Pass or Fail. 60% and maximum deviation levels are both
	within limits AND audio level is within limits and audio
	distortion is within limits and ± peak deviation level
	differences are within limits.
Frequency	Test Frequency
60% Dev	Measured deviation level at 60% rated channel deviation
Aud Lvl <test limit<="" td=""><td>Analyzer audio level used to achieve 60% Dev</td></test>	Analyzer audio level used to achieve 60% Dev
Dist <test limit<="" td=""><td>Measured audio distortion at 60% Dev</td></test>	Measured audio distortion at 60% Dev
Min Test Limit <meas< td=""><td>Measured maximum deviation level, along with minimum and</td></meas<>	Measured maximum deviation level, along with minimum and
Dev <max limit<="" td="" test=""><td>maximum test limits</td></max>	maximum test limits
Pk Dev Diff <test< td=""><td>Peak positive deviation – peak negative deviation.</td></test<>	Peak positive deviation – peak negative deviation.
Limit	

Table 6-7. Tx Analog Modulation test results

6.4. Tx CTCSS/CDCSS Modulation and Composite Deviation

The Tx CTCSS/CDCSS Modulation test measures the radio's CTCSS, CDCSS and composite deviation levels, and tone or code accuracy for each test frequency.

Note: This test is not currently supported for CH-100 control heads. Running it on a XG-100M with a CH-100 will always return a 'Pass' with a test report note about its exclusion.

RF Control	Port	Frequency	Modulation	Attenuation	Dev Avg
Monitor	RF IN/OUT	Test Frequency	FM	30 dB	+/-Peak / 2

Table 6-8. Analyzer Configuration for Tx CTCSS/CDCSS Modulation test

6.4.1. Tx CTCSS/CDCSS Modulation Test

The radio is placed into Test Mode. For each test frequency and bandwidth (Wide, Narrow, NPSPAC) supported, the radio transmits analyzer-generated CTCSS tones and CDCSS codes at rated deviation levels. The ±Peak / 2-averaged deviations of these individual tones/codes and the composite levels are measured with the analyzer, CTCSS tone and CDCSS code accuracy. The test results are written to the log file.

Name	Description
Result	Pass or Fail. CTCSS deviation levels are within limits and
	CTCSS tone is accurate AND CDCSS deviation levels are
	within limits and CDCSS code is accurate AND composite
	deviation levels are within test limits.
Frequency	Test Frequency
CTCSS Dev	Measured CTCSS or CDCSS deviation level
Aud LvI <test limit<="" td=""><td>Analyzer audio level used to achieve 60% Dev</td></test>	Analyzer audio level used to achieve 60% Dev
Min Dev	Minimum CTCSS or CDCSS deviation level (inclusive)
Max Dev	Maximum CTCSS or CDCSS deviation level (inclusive)
Meas Tone Meas Code	Measured CTCSS tone frequency OR CDCSS code
Comp Dev	Measured composite CTCSS CDCSS and 1 kHz tone @ 3
-	kHz deviation level
Min Dev	Minimum composite deviation level (inclusive)
Max Dev	Maximum composite deviation level (inclusive)
Meas Tone Meas Code	Measured CTCSS tone OR CDCSS code during composite
	test

Table 6-9. Tx CTCSS/CDCSS Modulation test results

6.5. P25 Phase 1 Tx Modulation (C4FM) Test

The Tx P25 Phase 1 Tx Modulation (C4FM) test measures the radio's P25 Phase 1 C4FM modulation level at a specific test frequency for both High and Low Patterns.

RF Control	Port	Frequency	Modulation	Attenuation	Dev Avg
Monitor	RF IN/OUT	Test Frequency	FM	30 dB	Peak Avg

Table 6-10. Analyzer Configuration for P25 Phase 1 Tx Modulation (C4FM) test

6.5.1. P25 Phase 1 Tx Modulation (C4FM) Test

The radio is placed into Test Mode at low power at the last Tx Test Frequency and commanded to transmit both Low and High deviation patterns. The Peak-averaged deviation of this tone is measured with the analyzer. This test is performed at a single Tx Test Frequency. The test results are written to the log file.

Name	Description
Result	Pass or Fail. Deviation is between Min Limit and Max Limit.
Frequency	Test Frequency
Meas Dev	Measured P25 Phase 1 C4FM deviation
Min Dev	Minimum passable deviation level
Max Dev	Maximum passable deviation level

Table 6-11. Tx P25 Phase 1 Modulation (C4FM) test results

6.6. Tx P25 Phase 2 Tx Modulation (TDMA) Test

The Tx P25 Phase 2 Tx Modulation (TDMA) test measures the radio's P25 Phase 2 TDMA modulation level at a specific test frequency.

RF Control	Port	Frequency	Modulation	Attenuation	Dev Avg
Monitor	RF IN/OUT	Test Frequency	FM	30 dB	+/-Peak / 2

Table 6-12. Analyzer Configuration for P25 Phase 2 Tx Modulation (TDMA) test

6.6.1. Tx P25 Phase 2 Tx Modulation (TDMA) Test

The radio is placed into Test Mode at low power at the last Tx Test Frequency and commanded to transmit a P25 Phase 2 TDMA High Deviation pattern. The analyzer measures the +/-Peak / 2-averaged deviation of this pattern. This test is performed at a single Tx Test Frequency. The test results are written to the log file.

Name	Description
Result	Pass or Fail. Deviation is between Min Limit and Max Limit.
Frequency	Test Frequency
Meas Dev	Measured P25 Phase 2 TDMA deviation
Min Dev	Minimum passable deviation level
Max Dev	Maximum passable deviation level

Table 6-13. Tx P25 Phase 2 Tx Modulation (TDMA) test results

6.7. Rx Audio Level and Distortion

Rx Audio Level and Distortion test verifies the receiver audio amplitude and distortion are at appropriate levels.

RF Control	Port	Frequency	Modulation	Output
Generate	RF IN/OUT	Test Frequency	FM	-47 dBm

Table 6-14. Analyzer Configuration for Rx Audio Level and Distortion test

6.7.1. RX Audio Level and Distortion Test

The radio is placed into Test Mode, receive operation at Wide bandwidth and highest Rx Test Frequency. The analyzer generates a modulation tone and the audio voltage and distortion of the radio's demodulated signal is measured with the analyzer. Both the audio level and the distortion are compared against test limits and written to the log file.

Name	Description
Result	Pass or Fail. Distortion is less than or equal to Max Limit.
Frequency	Test Frequency
Min Vol Lvl	Minimum audio voltage level required to pass the test
Meas Volume	Audio volume level generated by the radio near max volume setting
Max Vol Lvl	Maximum audio voltage level required to pass the test
Distortion	Measured distortion percentage at mid volume setting
Max Limit	Maximum passable distortion (inclusive)

Table 6-15. Rx Audio Level and Distortion test results

6.8. RX Sensitivity (SINAD)

Rx Sensitivity (SINAD) test verifies the receiver analog audio sensitivity is at an appropriate level.

RF Control	Port	Frequency	Modulation	Output Level
Generate	RF IN/OUT	Test Freq	1 kHz @ 3 kHz	-47 dBm

Table 6-16. Analyzer Configuration for RX Sensitivity test

6.8.1. Test

The analyzer is setup by applying the Modulation signal in Table 6-16Error! Reference source not found. to the radio and then adjusting radio volume for Rated Audio. The radio is placed into Test Mode at the first bandwidth and first RX Test Frequency. The output level of the analyzer is then adjusted until the radio audio signal's SINAD level measures about 12 dB. The current analyzer output level is then compared against test limits. The final results are written to the log file. This process is repeated for each bandwidth and each RX Test Frequency.

Name	Description
Result	Pass or Fail. Sensitivity (SINAD) level within Max Limit
Frequency	Test Frequency
12dB SINAD	Analyzer output level at which the radio SINAD level measures about 12 dB
Max Limit	Maximum Limit (inclusive) for RX Sensitivity to Pass

Table 6-17. RX Sensitivity test results

6.9. P25 Phase 1 Rx Sensitivity (C4FM) Test

The P25 Phase 1 Rx Sensitivity (C4FM) test measures the radio's P25 Phase 1 C4FM sensitivity level at several Rx test frequencies.

RF Control	Port	Frequency	Modulation	Output Level
Generate	RF IN/OUT	Test Frequency	C4FM	-116 dBm

Table 6-18. Analyzer Configuration for P25 Phase 1 Rx Sensitivity (C4FM) test

6.9.1. Test

The analyzer is setup by applying the Modulation signal in Table 6-18 to the radio. The radio is placed into Test Mode at C4FM bandwidth and first RX Test Frequency. The radio's reported BER level is measured and compared against test limits. The final results are written to the log file. This process is repeated for each Test Frequency.

Name	Description
Result	Pass or Fail. BER level within Max Limit
Frequency	Test Frequency
BER	Radio Bit Error Rate (BER) level
Max Limit	Maximum Limit (inclusive) for Rx Sensitivity (C4FM) to Pass
Min Limit	Minimum Limit (exclusive) for Rx Sensitivity (C4FM) to Pass

Table 6-19. P25 Phase 1 Rx Sensitivity (C4FM) test results

6.10. P25 Phase 2 Rx Sensitivity (TDMA) Test

The P25 Phase 2 Rx Sensitivity (TDMA) test measures the radio's P25 Phase 2 TDMA sensitivity level at several Rx test frequencies.

RF Control	Port	Frequency	Modulation	Output Level
Generate	RF IN/OUT	Test Frequency	TDMA	-116 dBm

Table 6-20. Analyzer Configuration for P25 Phase 2 Rx Sensitivity (TDMA) test

6.10.1. Test

The analyzer is setup by applying the Modulation signal in Table 6-20 to the radio. The radio is placed into Test Mode at the first RX Test Frequency. The radio's reported BER level is measured and compared against test limits. The final results are written to the log file. This process is repeated for each Test Frequency.

Name	Description
Result	Pass or Fail. BER level within Max Limit
Frequency	Test Frequency
BER	Radio Bit Error Rate (BER) level
Max Limit	Maximum Limit (inclusive) for Rx Sensitivity (TDMA) to Pass
Min Limit	Minimum Limit (exclusive) for Rx Sensitivity (TDMA) to Pass

Table 6-21. P25 Phase 2 Rx Sensitivity (TDMA) test results

6.11. Basic Troubleshooting

Symptom	Possible Cause	Possible Solution
Analyzer consistently fails to communicate with radio	Radio not running XGP or XLP firmware	AutoTune only supports test and alignment on XG-100 series radios running XGP or XLP firmware. Update radio firmware to use one of these supported firmware generations.
	Unsupported USB to serial adapter (mobiles only)	Approved USB to serial adapters for connecting the R8000 analyzer to the Harris XG-100 Mobile series radio under test include any adapters which utilize an FTDI FT232_USB to serial UART interface OR Prolific Technology Inc. PL-2303 USB to serial controller interface. See Amazon for a compatible adapter example.
	Radio on a trunking channel	 Change radio channel to a conventional channel. Trunking channel mode can prevent AutoTune from placing radio into test mode.
Analyzer occasionally fails to communicate with radio	USB hub in use	USB hubs are known to occasionally prevent or drop radio communication. Connect the radio programming cable directly to an analyzer USB port.

	Cable Sweep. Change cable attenuation values to correspond with the RF cable in use. For example, if 0.5 dB of loss expected at 100 MHz and 1.5 dB of loss is expected at 1 GHz, enter "-0.5 dB" as the 100 MHz loss value and "-1.5 dB" as the 1 GHz loss value. Cable losses are entered as negative values.
--	--

Table 6-22. Harris XG-100 Mobile Series Troubleshooting Chart

7. Support Information

7.1. Technical Support

Telephone/Fax: 903.985.8999 Email: service@freedomcte.com Web: http://freedomcte.com/support/

7.2. Sales

Telephone/Fax: 903.985.8999 Email: sales@freedomcte.com Web: http://freedomcte.com/sales/

APPENDIX A. Test Limits

The factory limits contain the default limits as defined by the radio manufacturer and generally should not be modified. However, if extenuating circumstances cause a need to modify the limits this is accommodated by AutoTune. Refer to the R8000 Series Communications System Analyzer Owner's Manual (FCT-1365) for modification instructions.

The following tables list the default test limits for each Harris XG-100 Mobile radio model supported by AutoTune.

Table A-1. Default Harris XG-100 Mobile Limits

Section	Test Name	Limit	Default Value
6.1	TCXO Frequency	Reference Oscillator Align	Min= -0.1 ppm
	, ,		
		Reference Oscillator Test	Min= -0.25 ppm
			Max= 0.25 ppm
6.2	TX Power (Test)	TX Power Test VHF Low	Min = 4.45 W
	, ,		Max = 5.61 W
		TX Power Test UHF Low	Min = 4.45 W
			Max = 5.61 W
		TX Power Test 700MHz Low	Min = 1.78 W
			Max = 2.24 W
		TX Power Test 800MHz Low	Min= 1.78 W
			Max= 2.24 W
		TX Power Test VHF High	Min=47.2 W
			Max=53.0 W
		TX Power Test UHF High	Min=47.2 W
			Max=53.0 W
		TX Power Test 700MHz High	Min=25.1 W
			Max=30.9 W
		TX Power Test 800MHz High	Min=33.0 W
			Max=37.1 W
6.3	Tx Analog Modulation	Tx Analog Modulation Deviation	Min = 4.0 kHz
		Wide	Max = 4.8 kHz
		Tx Analog Modulation Deviation	Min=2.0 kHz
		Narrow	Max=2.4 kHz
		Tx Analog Modulation Deviation	Min=3.2 kHz
		NPSPAC	Max=3.9 kHz
		Tx Analog Modulation 60% Deviation	Min=2.9 kHz
		Wide	Max=3.1 kHz
		Tx Analog Modulation 60% Deviation	Min=1.4 kHz
		Narrow	Max=1.6 kHz
		Tx Analog Modulation 60% Deviation	Min=2.3 kHz
		NPSPAC	Max=2.5 kHz
		Tx Analog Modulation Distortion	Max=1.25%
		Tx Analog Modulation Audio Level	Min=50 mV _{RMS} Max=120
			mV _{RMS}
		Tx Analog Modulation Peak	Max=100 Hz
		Deviation Difference	IVIAX-100112
6.4	Tx CTCSS/CDCSS	Tx CTCSS/CDCSS Modulation	Min=0.5 kHz
0.4	Modulation and	Deviation Wide	Max=1.0 kHz
	Composite Deviation	Tx CTCSS/CDCSS Modulation	Min=0.35 kHz
		Deviation Narrow	Max=0.5 kHz
1		Tx CTCSS/CDCSS Modulation	Min=0.4 kHz
		Deviation NPSPAC	Max=0.8 kHz
6.5	P25 Phase1 Tx	P25 Phase1 Tx Modulation C4FM	Min=2.545 kHz
	Modulation C4FM	High	Max=3.111 kHz
		P25 Phase1 Tx Modulation C4FM	Min=0.849 kHz
1		Low	Max=3.111 kHz
6.6	P25 Phase2 Tx	P25 Phase2 Tx Modulation TDMA	Min=2.995 kHz
1	Modulation TDMA	High	Max=3.310 kHz
6.7	Rx Audio Level and	Rx Audio Distortion CH-721	Max=5 %
	Distortion	Rx Audio Distortion CH-100	Max=3 %
	1		

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		Rx Audio Voltage	Max=8.1 V _{RMS}
			Min=7.5 V _{RMS}
6.8	RX Sensitivity (SINAD)	SINAD	Max=-119 dBm
6.9	P25 Phase1 Rx	P25 Phase1 Rx Sensitivity C4FM	Min=0 %
	Sensitivity (C4FM)	-	Max=5 %
6.10	P25 Phase2 Rx	P25 Phase2 Rx Sensitivity TDMA	Min=0 %
	Sensitivity (TDMA)	-	Max=5 %

Table A-2. Default Harris XG-100 Mobile Limits

APPENDIX B. Sample Test Result Report

Note: Results shown below are representative of actual results. Actual results and report format may vary.

Pass 519,9750 Miz 1.5 kitz 98 mVrms 0.48 % 2.2 kitz 2.0 kitz 2.4 kitz 5 Hz									=	
Company Comp	====== Model #	YC100M					17 4: 08 AM		=	
Result Frequency Align Freq Error Min Limit Max Limit Old Softpot New Softpot Result Frequency Test Result Frequency Test Result Frequency Test Result Frequency Test Result Frequency For Min Limit Max Limit Softpot Result Frequency Test Result Frequency For Min Limit Max Limit Softpot Result Frequency Test Result Frequency For Min Limit Max Limit Softpot Result Frequency For Min Limit Max Limit Soft Min	Seri al	#: A4020101145	9				17 4.08 AM			
Result Frequency Freq Frow Min Limit Max Limit Old Softpot New Softpot			XGPRO6D13							
Pass 860, 9875 Miz 15 Nz 97 Niz 87 Niz 50 146	======		Frog Frre	e Min Ii	mit Mov I	imit Old S	oftnot Nov	w Softnot		
Result Frequency Freq Error Min Limit Max Limit Softpot										
Pass 794.0123 Mile 18 lz	======									
Result Frequency	Pass Pass Pass Pass Pass	869. 9875 MHz 794. 0125 MHz 520. 0000 MHz 380. 0000 MHz 174. 0000 MHz	18 Hz 16 Hz 11 Hz 8 Hz 3 Hz	- 217 H: - 199 H: - 130 H: - 95 Hz - 44 Hz	z 217 H z 199 H z 130 H 95 Hz 44 Hz	z 146 z 146 z 146 z 146 146	ot 			
Pass 199, 975 MIP 1.9 N										
Pass 520,0000 Miz 4.8 W 4.5 W 5.6 W 7 Pass 130,0000 Miz 4.9 W 4.5 W 5.6 W 7 Pass 174,0000 Miz 4.9 W 4.5 W 5.6 W 7 Pass 1730,0000 Miz 5.1 W 4.5 W 5.6 W 7 Pass 130,0000 Miz 5.1 W 4.5 W 5.6 W 7 Pass 130,0000 Miz 5.1 W 4.5 W 5.6 W 7 Pass 130,0000 Miz 5.1 W 4.5 W 5.6 W 7 Pass 130,0000 Miz 5.1 W 4.5 W 5.6 W 7 Pass 173,075 Miz 2.0 kilz 95 m/yras 0.46 % 4.5 kilz 4.0 kilz 4.8 kilz 32 Hz 7 Pass 173,075 Miz 2.0 kilz 95 m/yras 0.18 % 4.5 kilz 4.0 kilz 4.8 kilz 32 Hz 7 Pass 173,075 Miz 2.0 kilz 95 m/yras 0.18 % 4.5 kilz 4.0 kilz 4.8 kilz 11 Hz 7 Pass 380,0250 Miz 3.0 kilz 95 m/yras 0.18 % 4.5 kilz 4.0 kilz 4.8 kilz 10 Hz 7 Pass 816.0125 Miz 3.0 kilz 95 m/yras 0.18 % 4.5 kilz 4.0 kilz 4.8 kilz 10 Hz 7 Pass 816.0125 Miz 3.0 kilz 95 m/yras 0.18 % 4.5 kilz 4.0 kilz 4.8 kilz 32 Hz 7 Pass 816.0125 Miz 3.0 kilz 95 m/yras 0.55 % 4.5 kilz 4.0 kilz 4.8 kilz 32 Hz 7 Pass 816.0125 Miz 1.0 kilz 95 m/yras 0.55 % 4.5 kilz 4.0 kilz 4.8 kilz 32 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.55 % 4.5 kilz 4.0 kilz 4.8 kilz 32 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.45 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.5 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.5 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.5 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.5 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.5 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.5 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,075 Miz 1.5 kilz 98 m/yras 0.5 % 2.2 kilz 2.0 kilz 2.4 kilz 3 Hz 7 Pass 173,000 Miz 0.7 kilz 98 m/yras 0.5 % 3.5 kilz 3.2 kilz 3.0 kilz 2.4 kilz 7 Hz 7 Hz 7 Pass 860.0125 Miz 1.5 kilz 98 m/yras 0.5 % 3.5 kilz 3.2 kilz 3.0 kilz 2.4 kilz 7 Hz 7 Hz 7 Pass 860.000 Miz 0.7 kilz 0.5 kilz 1.0 kilz 6.7 Hz 6.0 kilz 4.3 kilz 1.0 kilz 6.7 Hz 6.0 kilz 6.7 kilz 1.0 k	Result	Frequency	Power Out	Min Lim	it MaxLi	mi t				
Result Frequency	Pass Pass Pass Pass	520.0000 MHz 380.0000 MHz 174.0000 MHz	4. 8 W 4. 6 W 4. 9 W	1. 8 W 4. 5 W 4. 5 W 4. 5 W	2. 2 W 5. 6 W 5. 6 W 5. 6 W					
Pass 193, 0220 Mtz 3.0 kHz 25 wVrms 0.45 % 4.5 kHz 4.0 kHz 4.8 kHz 32 Hz	======		=====							
Pass 173, 9750 Mtz 3.0 kHz 55 myrms 0.3 fs 4.5 kHz 4.0 kHz 4.8 kHz 11 Hz Pass 810, 2020 Mtz 3.0 kHz 55 myrms 0.3 fs 4.5 kHz 4.0 kHz 4.0 kHz 4.8 kHz 10 Hz Pass 815, 0125 Mtz 3.0 kHz 55 myrms 0.4 fs 4.5 kHz 4.0 kHz 4.8 kHz 10 Hz Pass 815, 0125 Mtz 3.0 kHz 55 myrms 0.4 fs 4.5 kHz 4.0 kHz 4.8 kHz 16 Hz Pass 815, 0125 Mtz 3.0 kHz 55 myrms 0.45 fs 4.5 kHz 4.0 kHz 4.8 kHz 16 Hz Pass 820, 0250 Mtz 1.5 kHz 98 myrms 0.45 fs 4.5 kHz 4.0 kHz 4.8 kHz 3 Hz Pass 173, 9750 Mtz 1.5 kHz 98 myrms 0.45 fs 2.2 kHz 2.0 kHz 2.4 kHz 3 Hz Pass 173, 9750 Mtz 1.5 kHz 98 myrms 0.45 fs 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 173, 9750 Mtz 1.5 kHz 98 myrms 0.45 fs 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 190, 0250 Mtz 1.5 kHz 98 myrms 0.45 fs 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 191, 0125 Mtz 1.5 kHz 98 myrms 0.71 fs 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 191, 0125 Mtz 1.5 kHz 98 myrms 0.71 fs 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 191, 0125 Mtz 1.5 kHz 98 myrms 0.71 fs 2.2 kHz 2.0 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 181, 0125 Mtz 2.4 kHz 96 myrms 0.71 fs 3.6 kHz 3.2 kHz 3.9 kHz 77 Hz Pass 180, 0125 Mtz 2.4 kHz 96 myrms 0.6 fs 3.5 kHz 3.2 kHz 3.9 kHz 77 Hz Pass 174, 0000 Mtz 2.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.3 Hz Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.3 Hz Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.3 Hz Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 157.3 Hz Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 2.0 kHz 4.8 kHz 627 Pass 174, 0000 Mtz 0.30 kHz 0.35 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 2.0 kHz 2.4 kHz 627 Pass 174, 0000 Mtz 0.30 kHz 0.										Diff <100Hz
Result Frequency	Pass Pass Pass Pass	173. 9750 MHz 380. 0250 MHz 519. 9750 MHz 815. 0125 MHz	3. 0 kHz 3. 0 kHz 3. 0 kHz 3. 0 kHz	95 mVrms 95 mVrms 95 mVrms 95 mVrms	0.38 % 0.51 % 0.40 % 0.48 %	4. 5 kHz 4. 5 kHz 4. 5 kHz 4. 5 kHz	4. 0 kHz 4. 0 kHz 4. 0 kHz 4. 0 kHz	4. 8 kHz 4. 8 kHz 4. 8 kHz 4. 8 kHz	11 Hz 10 Hz 23 Hz 16 Hz	
Result Frequency 60% bev Aud LVI Dist <1.25% Meas Dev Min Dev Max Dev Pt Dev Diff <100Hz Pass 130, 0550 MHz 1.5 kHz 98 mVrms 0.45 % 2.2 kHz 2.0 kHz 2.4 kHz 31 Hz Pass 39, 0750 MHz 1.5 kHz 98 mVrms 0.48 % 2.2 kHz 2.0 kHz 2.4 kHz 31 Hz Pass 519, 0750 MHz 1.5 kHz 98 mVrms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794 (125 MHz 1.5 kHz 98 mVrms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794 (125 MHz 1.5 kHz 98 mVrms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794 (125 MHz 1.5 kHz 98 mVrms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794 (125 MHz 1.5 kHz 98 mVrms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794 (125 MHz 1.5 kHz 98 mVrms 0.68 % 2.2 kHz 2.0 kHz 2.4 kHz 5 Hz TX Anal og Modul atton NPSPAC Result Frequency 60% Dev Aud Lv1 Dist <1.25% Meas Dev Min Dev Max Dev Pk Dev Diff <100Hz Pass 800.0125 MHz 2.4 kHz 96 mVrms 0.60 % 3.5 kHz 3.2 kHz 3.9 kHz 31 Hz TX CTCSS (156.7 Hz) Modul atton and Composite Devi atton W de Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Tone Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev	Tx Anal									
Pass 173, 9750 Mtz 1.5 kHz 98 m/rms 0.45 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 340, 0250 Mtz 1.5 kHz 98 m/rms 0.51 % 2.2 kHz 2.0 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794, 0125 Mtz 1.5 kHz 98 m/rms 0.71 % 2.2 kHz 2.0 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794, 0125 Mtz 1.5 kHz 98 m/rms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794, 0125 Mtz 1.5 kHz 98 m/rms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 13 Hz Pass 794, 0125 Mtz 2.4 kHz 98 m/rms 0.71 % 2.2 kHz 2.0 kHz 2.4 kHz 3 Hz Pass 815, 0125 Mtz 2.4 kHz 96 m/rms 0.51 % 3.6 kHz 3.2 kHz 3.9 kHz 3.7 Hz Pass 810, 0125 Mtz 2.4 kHz 96 m/rms 0.51 % 3.6 kHz 3.2 kHz 3.9 kHz 3.7 Hz Pass 810, 0125 Mtz 2.4 kHz 96 m/rms 0.60 % 3.5 kHz 3.2 kHz 3.9 kHz 3.7 Hz Pass 74, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 156.4 Hz Pass 520, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.2 Hz Pass 809, 9875 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.2 Hz Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 157.2 Hz Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627 Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627 Pass 174, 0000 Mtz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627 Pass 174, 0000 Mtz 0.3 kHz 0.35 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627 Pass 174, 0000 Mtz 0.30 kHz 0.35 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 2.0 kHz 2.4 kHz 157.2 Hz Pass 174, 0000 Mtz 0.30 kHz 0.35 kHz 0.5 kHz 1.0 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 155.9 Hz Pass 174, 0000 Mtz 0.30 kHz 0.35 kHz 0.5 kHz 1.0 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 155.9 Hz Pass 174, 0000 Mtz 0.30 kHz 0.35 kHz 0.5 kHz 1.0 kHz		Frequency	60% Dev							Diff <100Hz
TX Analog Modulation NPSPAC Result Frequency 60% Dev And Lvl Dist <1.25% Meas Dev Min Dev Max Dev Pk Dev Diff <100Hz Pass 860.0125 MHz 2.4 kHz 96 m/vms 0.51 % 3.6 kHz 3.2 kHz 3.9 kHz 3 Hz Frequency CTCSS Dev Min Dev Max Dev Max Dev Max Dev Min Dev Max Dev Max Dev Meas Tone Result Frequency CTCSS Dev Min Dev Max Dev Max Dev Max Dev Min Dev Min Dev Max Dev Meas Tone Result Frequency CTCSS Dev Min Dev Max Dev Max Dev Max Dev Min Dev Min Dev Min Dev Max Dev Meas Tone Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Result Frequency CTCSS Dev Min Dev Max Dev Meas Code Result Frequency Meas Dev Min Dev Max De	Pass Pass	173. 9750 MHz 380. 0250 MHz 519. 9750 MHz	1. 5 kHz 1. 5 kHz 1. 5 kHz	98 mVrms 98 mVrms 98 mVrms	0. 45 % 0. 51 % 0. 48 %	2. 2 kHz 2. 2 kHz 2. 2 kHz	2. 0 kHz 2. 0 kHz 2. 0 kHz	2. 4 kHz 2. 4 kHz 2. 4 kHz	13 Hz 4 Hz 13 Hz	
Result Frequency 60% Dev Aud Lv Dist 1.25% Mas Dev Max Dev Max Dev Diff 100Hz										
Pass	Result		60% Dev							
Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Tone Pass 174.0000 Miz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.3 Hz Pass 869.9875 MHz 0.7 kHz 0.5 kHz 1.0 kHz 156.8 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.2 Hz Tx CDCSS (627) Modulation and Composite Deviation Wide Result Frequency CDCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Pass 174.0000 MHz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 157.2 Hz Ass 869.9875 MHz 0.39 kHz 0.35 kHz 0.5 kHz 150 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627 Tx CTCSS (156.7 Hz) Modulation and Composite Deviation Narrow Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Code Comp		815.0125 MHz 860.0125 MHz	2. 4 kHz 2. 4 kHz	96 mVrms 96 mVrms	0.51 %	3.6 kHz	3. 2 kHz 3. 2 kHz	3. 9 kHz 3. 9 kHz	3 Hz 77 Hz	
Pass 174.0000 MHz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.3 Hz							Comp Dev	Min Dev	Max Dev	Meas Tone
Pass 869.9875 MHz 0.7 kHz 0.5 kHz 1.0 kHz 156.7 Hz 4.3 kHz 4.0 kHz 4.8 kHz 157.2 Hz TX CDCSS (627) Modul ati on and Composite Devi ati on Wide Result Frequency CDCSS Dev Mn n Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Pass 174.0000 MHz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627 Pass 869.9875 MHz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627 TX CTCSS (156.7 Hz) Modul ati on and Composite Devi ati on Narrow Result Frequency CTCSS Dev Mn Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Tone Pass 174.0000 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.8 Hz 2.2 kHz 2.0 kHz 2.4 kHz 157.4 Hz Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 157.5 Hz Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 155.9 Hz TX CDCSS (627) Modul ati on and Composite Devi ati on Narrow Result Frequency CDCSS Dev Mn Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Pass 174.0000 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 157.5 Hz Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 166.8 Hz 2.2 kHz 2.0 kHz 2.4 kHz 155.9 Hz TX CDCSS (627) Modul ati on and Composite Devi ati on Narrow Result Frequency CDCSS Dev Mn Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Pass 174.0000 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 TX CTCSS (156.7 Hz) Modul ati on and Composite Devi ati on NPSPAC Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Tone Result Frequency Meas Dev Min Dev Max Dev Max Dev Max Dev Meas Tone Result Frequency Meas Dev Min Dev Max Dev Max Dev Max Dev Pass 869.9875 MHz 0.5 kHz 0.54 kHz 1.037 kHz P25 Phase 2 Tx Modul ati on TDMA Hi gh Pattern Result Frequency Meas Dev Min Dev Max Dev Max D	Pass			0. 5 kHz	1.0 kHz		4. 3 kHz		4. 8 kHz	156. 4 Hz
Result Frequency		520.0000 MHz 869.9875 MHz	0.7 kHz 0.7 kHz	0.5 kHz 0.5 kHz		156. 8 Hz 156. 7 Hz	4.3 kHz 4.3 kHz	4.0 kHz 4.0 kHz	4.8 kHz 4.8 kHz	
Pass 174.0000 MHz 0.7 kHz 0.5 kHz 1.0 kHz 627 4.3 kHz 4.0 kHz 4.8 kHz 627	Tx CDCS	S (627) Modul a	tion and (Composite l	Devi at i on	Wi de				
Pass 820.0000 MHz 0.7 kHz 0.5 kHz 1.0 kHz 627										
Result Frequency	Pass	174.0000 MHz 520.0000 MHz 869.9875 MHz	0. 7 kHz 0. 7 kHz 0. 7 kHz	0.5 kHz	1.0 kHz	627		4.0 kHz	4.8 kHz	627
Pass 174.0000 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.8 Hz 2.1 kHz 2.0 kHz 2.4 kHz 157.4 Hz Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 157.2 Hz Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 157.9 Hz Tx CDCSS (627) Modulation and Composite Deviation Narrow Result Frequency CDCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Pass 174.0000 MHz 0.38 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Pass 520.0000 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Tx CTCSS (156.7 Hz) Modulation and Composite Deviation NPSPAC Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Tone Pass 869.9875 MHz 0.5 kHz 0.4 kHz 0.8 kHz 156.7 Hz 3.4 kHz 3.2 kHz 3.9 kHz 155.8 Hz P25 Phase 1 Tx Modulation C4FM High Pattern Result Frequency Meas Dev Min Dev Max Dev Max Dev Pass 869.9875 MHz 0.93 kHz 0.84 kHz 1.037	======						=	May De	Mov. D.	Moos To
Pass 520.0000 MIz 0.39 kHz 0.35 kHz 0.5 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 157.2 Hz Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 155.9 Hz 2.4 kHz 157.2 Hz Pass 794.0125 MHz 2.0 kHz 156.6 Hz 2.2 kHz 2.0 kHz 2.4 kHz 155.9 Hz Tx CDCSS (627) Modulation and Composite Deviation Narrow Result Frequency CDCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Pass 174.0000 MHz 0.38 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Pass 794.0125 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.0 kHz 2.4 kHz 627 Pass 869.9875 MHz 0.5 kHz 0.5 kHz 0.5 kHz 156.7 Hz 3.4 kHz 3.2 kHz 3.9 kHz 155.8 Hz Pass 869.9875 MHz 0.5 kHz 0.4 kHz 0.8 kHz 156.7 Hz 3.4 kHz 3.2 kHz 3.9 kHz 155.8 Hz Pass 869.9875 MHz 2.733 kHz 2.545 kHz 3.111 kHz Pass 869.9875 MHz 0.531 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz Pass 869.9875 MHz 0.931 kHz 0.849 kHz 0.840 kHz 0.840 kHz 0.840 kHz 0.840 kHz 0.840 kH										
Result Frequency CDCSS Dev Min Dev Max Dev Meas Code Comp Dev Min Dev Max Dev Meas Code Pass 174.0000 MHz 0.38 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 Pass 520.0000 MHz 0.39 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 TX CTCSS (156.7 Hz) Modulation and Composite Deviation NPSPAC Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Tone Pass 869.9875 MHz 0.5 kHz 0.4 kHz 0.8 kHz 156.7 Hz 3.4 kHz 3.2 kHz 3.9 kHz 155.8 Hz P25 Phase 1 Tx Modulation C4FM High Pattern Result Frequency Meas Dev Min Dev Max Dev Max Dev Pass 869.9875 MHz 2.733 kHz 2.545 kHz 3.111 kHz P25 Phase 1 Tx Modulation C4FM Low Pattern Result Frequency Meas Dev Min Dev Max Dev Max Dev Max Dev Max Dev Max Dev Max Dev Max Dev Max D	Pass Pass	520.0000 MHz 794.0125 MHz	0. 39 kHz 0. 39 kHz	0. 35 kHz 0. 35 kHz	z 0.5 kHz z 0.5 kHz	156.8 Hz 156.6 Hz	2.2 kHz	2.0 kHz	2.4 kHz	157. 2 Hz
Pass 174.0000 MIz Pass 520.0000 MIz Pass 520.0000 MIz 0.38 kHz 0.35 kHz 0.35 kHz 0.5 kHz 627 2.1 kHz 2.0 kHz 2.0 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz 2.4 kHz 627 2.4 kHz 627 2.1 kHz 2.0 kHz kHz 627 2.1 kHz 627 2.1 kHz 2.0 kHz 627 2.1 kHz							Comp Dev	Min Dev	Max Dev	Meas Code
Tx CTCSS (156. 7 Hz) Modulation and Composite Deviation NPSPAC Result Frequency CTCSS Dev Min Dev Max Dev Meas Tone Comp Dev Min Dev Max Dev Meas Tone Pass 869.9875 MHz 0.5 kHz 0.4 kHz 0.8 kHz 156. 7 Hz 3.4 kHz 3.2 kHz 3.9 kHz 155.8 Hz P25 Phase 1 Tx Modulation C4FM High Pattern Result Frequency Meas Dev Min Dev Max Dev Pass 869.9875 MHz 2.733 kHz 2.545 kHz 3.111 kHz P25 Phase 1 Tx Modulation C4FM Low Pattern Result Frequency Meas Dev Min Dev Max Dev Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev	Pass Pass						2.1 kHz 2.1 kHz			
Pass 869,9875 MHz 0.5 kHz 0.4 kHz 0.8 kHz 156.7 Hz 3.4 kHz 3.2 kHz 3.9 kHz 155.8 Hz P25 Phase 1 Tx Modulation C4FM High Pattern Result Frequency Meas Dev Min Dev Max Dev Pass 869,9875 MHz 2.733 kHz 2.545 kHz 3.111 kHz P25 Phase 1 Tx Modulation C4FM Low Pattern Result Frequency Meas Dev Min Dev Max Dev Pass 869,9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev								_	_	
P25 Phase 1 Tx Modulation C4FM High Pattern Result Frequency Meas Dev Min Dev Max Dev Pass 869.9875 MHz 2.733 kHz 2.545 kHz 3.111 kHz P25 Phase 1 Tx Modulation C4FM Low Pattern Result Frequency Meas Dev Min Dev Max Dev Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev	Result	Frequency	CTCSS Dev	Min Dev	Max Dev	Meas Tone	Comp Dev	Min Dev	Max Dev	Meas Tone
Result Frequency Meas Dev Min Dev Max Dev Pass 869.9875 Miz 2.733 kHz 2.545 kHz 3.111 kHz P25 Phase 1 Tx Modulation C4FM Low Pattern Result Frequency Meas Dev Min Dev Max Dev P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev	Pass					156. 7 Hz	3. 4 kHz	3.2 kHz	3.9 kHz	155. 8 Hz
Result Frequency Meas Dev Min Dev Max Dev Pass 869.9875 MHz 0.931 kHz 0.849 kHz 1.037 kHz P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev	Result	Frequency	Meas Dev	Min Dev	Max De					
Pass 869,9875 MHz 0,931 kHz 0.849 kHz 1.037 kHz P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev	P25 Pha	se 1 Tx Modula	tion C4FM	Low Patter	rn					
P25 Phase 2 Tx Modulation TDMA High Pattern Result Frequency Meas Dev Min Dev Max Dev	Result	Frequency	Meas Dev	Min Dev	Max De	v				
Result Frequency Meas Dev Min Dev Max Dev	Pass					kHz				
	Result	Frequency	Meas Dev	Min Dev	Max De					

Harris XG-100 Mobile Series AutoTune™ User Guide

Result	Frequency	Min Vo	l Lvl Meas	s Volume	Max Vol Lvl	Distorti on	Max Limit
Pass	136. 000000 MH	z 7.5 Vr	ms 8.05	Vrms	8.1 Vrms	3.0 %	5. 0 %
	itivity (SINAD						
	Frequency	12dB S	I NAD Max I	.i mi t			
Pass Pass Pass Pass Pass Pass	136. 000000 MH 174. 000000 MH 380. 000000 MH 520. 000000 MH 764. 012500 MH 869. 987500 MH	z -122.6 z -123.5 z -123.7 z -121.3	dBm - 119. dBm - 119. dBm - 119. dBm - 119.	0 dBm 0 dBm 0 dBm 0 dBm			
	Sensitivity BE						
	Frequency	BER	Max Limit	Min Lin	ni t		
Pass Pass Pass Pass Pass Pass	380.0000 MHz	1. 573 % 2. 271 % 2. 219 % 1. 906 % 3. 271 % 3. 990 %	5. 0 % 5. 0 % 5. 0 % 5. 0 % 5. 0 % 5. 0 %	0. 0 % 0. 0 % 0. 0 % 0. 0 % 0. 0 % 0. 0 %			
	se2 Rx Sensiti						
Result	Frequency	BER	= Max Limit	Min Lin	ni t		
Pass Pass Pass Pass Pass Pass	136.0000 MHz 174.0000 MHz 380.0000 MHz 520.0000 MHz 764.0125 MHz 869.9875 MHz	0. 949 % 1. 324 % 0. 908 % 0. 799 % 2. 707 % 2. 748 %	5. 0 % 5. 0 % 5. 0 % 5. 0 % 5. 0 % 5. 0 %	0. 0 % 0. 0 % 0. 0 % 0. 0 % 0. 0 % 0. 0 %			

Figure B-1. Sample Test Result Report

APPENDIX C. Revision History

A – Original Release	M. Mullins	M. Humphries	07/25/17	<u>0130</u>
Revision - Change	Requested By	Approved By	Rel. Date	ECO#