



Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Certification Report

Harris Corporation
RF Communications Division
221 Jefferson Ridge Parkway
Lynchburg, VA 24501
Contact: Jeremy Johnson

Model #: XG-100LPA

FCC ID: AQZ-XG-100LPA
IC: 122D-XG100LPA

August 28, 2014

Standards Referenced for this Report	
Part 2: 2013	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2013	Private Land Mobile Radio Services
TIA-EIA-603-C August 2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards
RSS-119 Issue 11	Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Frequency Range (MHz)	Rated Conducted Output Power (W)	Frequency Tolerance (ppm)	Transmit Mode	Emission Designator
33 – 48	100	AMP	N/A	16K0F3E

Report Prepared By: Daniel Baltzell

Document Number: 2014152

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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.

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1 Test Result Summary

Test	FCC Reference	IC Reference	Result
RF Power Output	2.1046(a), 90.205	RSS-119 5.4	Complies
Spurious Emissions at Antenna Terminals	2.1046(a), 90.210	RSS-119 5.5, 5.8	Complies
Field Strength of Spurious Radiation	2.1053(a), 90.210	RSS-119 5.5, 5.8	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.210	RSS-119 5.5, 5.8	Complies
Voltage Frequency Stability	2.1055, 90.213	RSS-119 5.3	Complies
Modulation Characteristics	2.1047(a)(b)	N/A	N/A
Transient Frequency Response	90.214	RSS-119 5.9	N/A

2 General Information

The following Type Certification 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 **XG-100LPA**, a Mobile LPA; **FCC ID: AQZ-XG-100LPA, IC: 122D-XG100LPA.**

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 Parts 2 and 90, and Industry Canada RSS-119. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

The EUT contains a transmit signal path providing gain over the frequency range of 33-48 MHz and a bypass receive signal path supporting the frequency range of 33-48 MHz.

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)

This is a new certification application for FCC and Industry Canada. .

2.3 Grant Notes

Power is continuously variable from 30 - 100 W. The grant listed power is rated power.

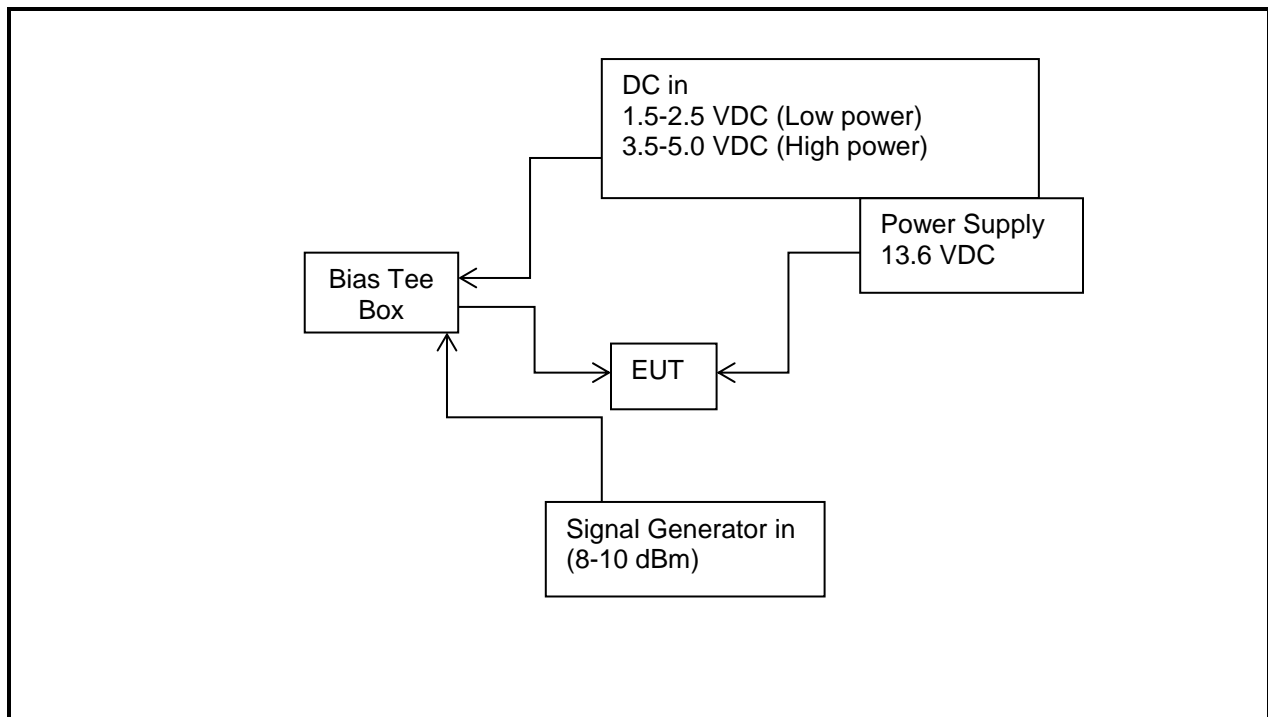
2.4 Tested System Details

The test sample was received on August 13, 2014. Listed below are the identifiers and descriptions of all equipment, cables, and devices used with the EUT for this test, as applicable.

Table 2-1: Equipment Under Test (EUT)

Model	Manufacturer	Model #	Serial Number	FCC ID	RTL Bar Code
VHF Low Band Power Amplifier	Harris Corporation	XG-100LPA	W17741507	AQZ-XG-100LPA	21157
VHF Low Band Power Amplifier	Harris Corporation	XG-100LPA	W17741490	AQZ-XG-100LPA	21158
Unshielded DC Power Cable	Harris Corporation	Power Cable	N/A	N/A	N/A
Bias Tee Box	Harris Corporation	N/A	N/A	N/A	21159

Figure 2-1: Configuration of Tested System



3 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 90.205 Transmitting Power Limits; RSS-119 5.4: Transmitter Output Power

3.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.1

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

Manufacturer's Rated Power: 100 W

3.2 Test Data

Table 3-1: RF Conducted Output Power - Measured

Frequency (MHz)	High Power (dBm)	High Power (W)	Low Power (dBm)	Low Power (W)
33.5	50.6	114.8	45.6	36.3
40.5	50.8	120.2	45.8	38.0
47.5	50.7	117.5	45.7	37.2

Note: Data presented is for analog mode.

Table 3-2: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	11/22/14
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	3/25/16
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14

Test Personnel:

Daniel Baltzell EMC Test Engineer	 Signature	August 14, 2014 Date of Test
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4 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.210: Emission Limitations; RSS-119 5.8: Transmitter Unwanted Emissions

4.1 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.

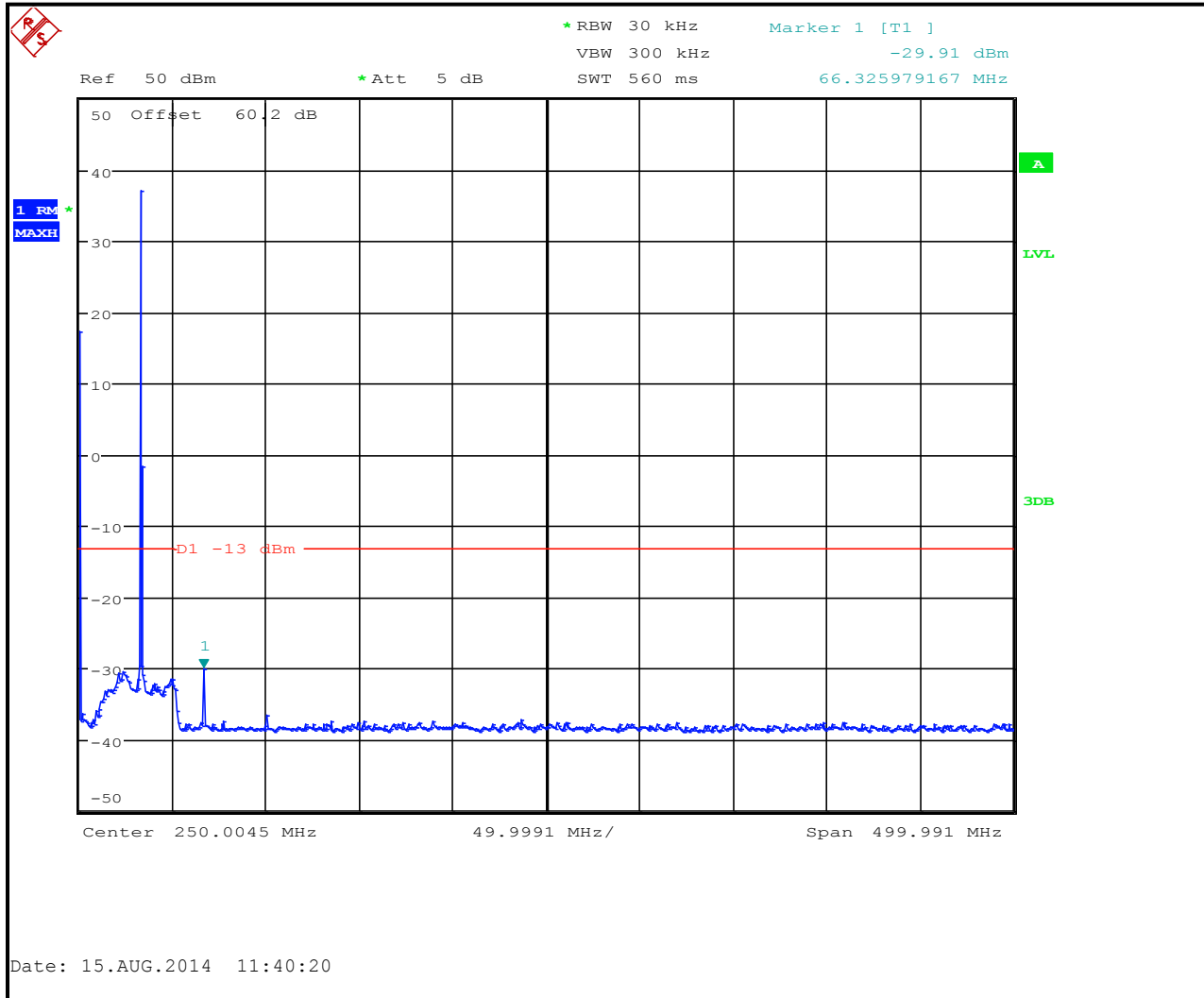
4.2 Test Data

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

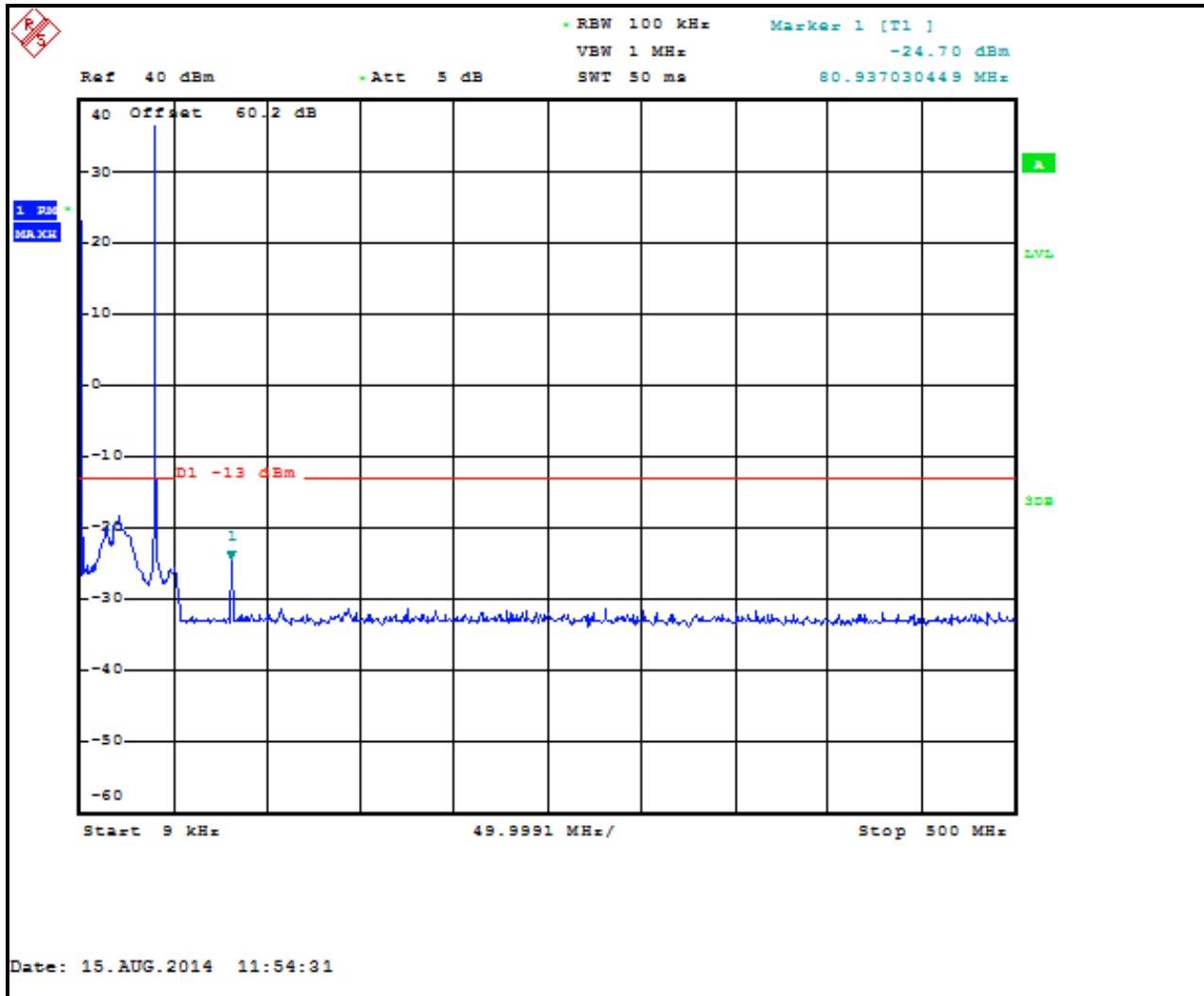
Limits: (43 + 10 LOG P(W))

The following channels were investigated: 33.5, 40.5, and 47.5 MHz. Both high and low power settings were checked; high power was found to be worst case. All modes were investigated, and analog mode is presented as representative data.

Plot 4-1: Spurious Emissions at Antenna Terminals – 33.5 MHz



Plot 4-2: Spurious Emissions at Antenna Terminals – 40.5 MHz



Plot 4-3: Spurious Emissions at Antenna Terminals – 47.5 MHz

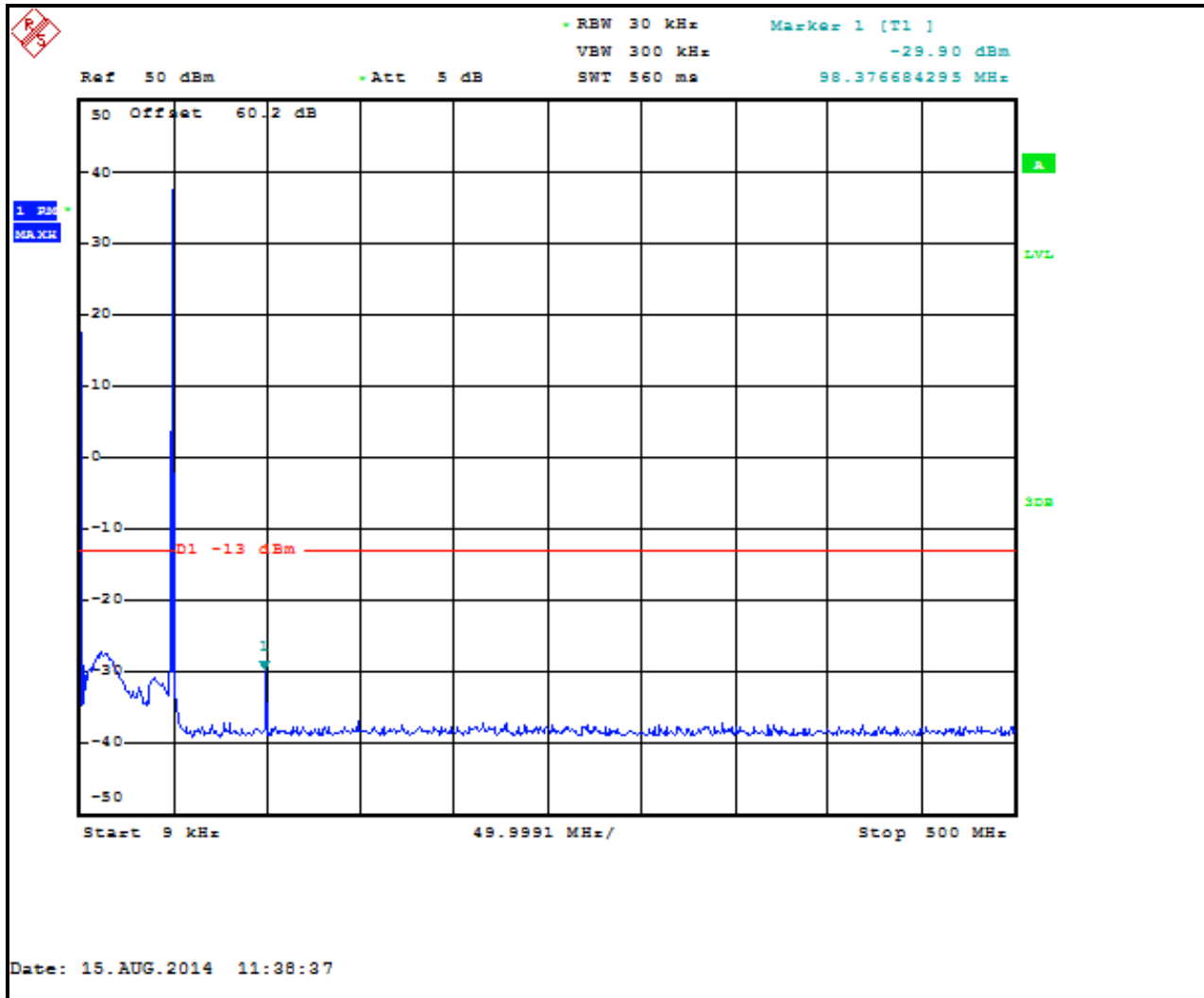


Table 4-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	11/22/14
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	3/25/16
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14

Test Personnel:

Daniel Baltzell		August 15, 2014
EMC Test Engineer	Signature	Date of Test

5 FCC Rules and Regulations Part 2.1053(a): Field Strength of Spurious Radiation; Part 90 90.210 Out of Band Emissions Limit; RSS-119 5.8: Unwanted Emissions

5.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 Ω 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.

The spurious emissions levels were measured, and the EUT 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. The narrowband limit of 43+10 log(P) was used.

5.2 Test Data

5.2.1 CFR 47 Part 90.210 Requirements

The worst-case emissions test data are shown.

Table 5-1: Field Strength of Spurious Radiation – 33.5 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
67.000	98.1	-27.5	0.1	-0.7	78.3	-15.3
100.500	101.9	-27.5	0.2	-0.4	78.1	-15.1
134.000	103.4	-22.2	0.2	-0.6	73.0	-10.0
167.500	76.5	-48.8	0.2	0.1	98.9	-35.9
201.000	79.9	-47.8	0.2	-0.6	98.6	-35.6
234.500	80.9	-50.5	0.2	-0.3	101.0	-38.0
268.000	69.8	-55.6	0.2	-0.4	106.2	-43.2
301.500	77.9	-50.8	0.2	-0.7	101.7	-38.7
335.000	78.3	-49.2	0.2	-0.5	100.0	-37.0

Table 5-2: Field Strength of Spurious Radiation – 40.5 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
81.000	102.9	-28.1	0.1	-0.4	78.7	-15.7
121.500	107.6	-20.0	0.2	-0.6	70.7	-7.7
162.000	94.0	-30.9	0.2	0.0	81.1	-18.1
202.500	87.8	-40.0	0.2	-0.6	90.8	-27.8
243.000	83.9	-43.1	0.2	-0.3	93.6	-30.6
283.500	76.7	-47.7	0.2	-0.6	98.5	-35.5
324.000	90.0	-34.6	0.2	-0.6	85.4	-22.4
364.500	85.3	-41.3	0.2	-0.4	91.9	-28.9
405.000	78.0	-47.5	0.2	-0.4	98.1	-35.1

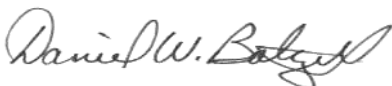
Table 5-3: Field Strength of Spurious Radiation –47.5 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
95.000	103.2	-26.6	0.2	-0.3	77.1	-14.1
142.500	88.4	-35.2	0.2	-0.6	86.0	-23.0
190.000	94.3	-37.3	0.2	-0.5	88.0	-25.0
237.500	70.9	-56.4	0.2	-0.3	106.9	-43.9
285.000	72.5	-51.8	0.2	-0.6	102.6	-39.6
332.500	67.5	-57.2	0.2	-0.5	108.0	-45.0
380.000	93.0	-33.2	0.2	-0.3	83.8	-20.8
427.500	88.5	-36.4	0.2	-0.4	87.1	-24.1
475.000	77.2	-44.8	0.2	-0.5	95.6	-32.6

Table 5-4: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900724	Antenna Research Associates, Inc.	LPB-2520	BiLog Antenna (25-1000 MHz)	1037	4/19/15
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/27/15
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/27/15
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/27/15
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	Not Required
900928	Hewlett Packard	83752A	Synthesized Sweeper, (0.01-20 GHz)	3610A00866	3/20/15
901158	Compliance Design, Inc.	Roberts Dipole Antenna	Adjustable Elements Dipole 25-1000 MHz Antennas	00401	6/27/15

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	August 15, 2014 Date of Test
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6 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 90.210 Authorized Bandwidth; RSS-119 5.8: Transmitter Unwanted Emissions

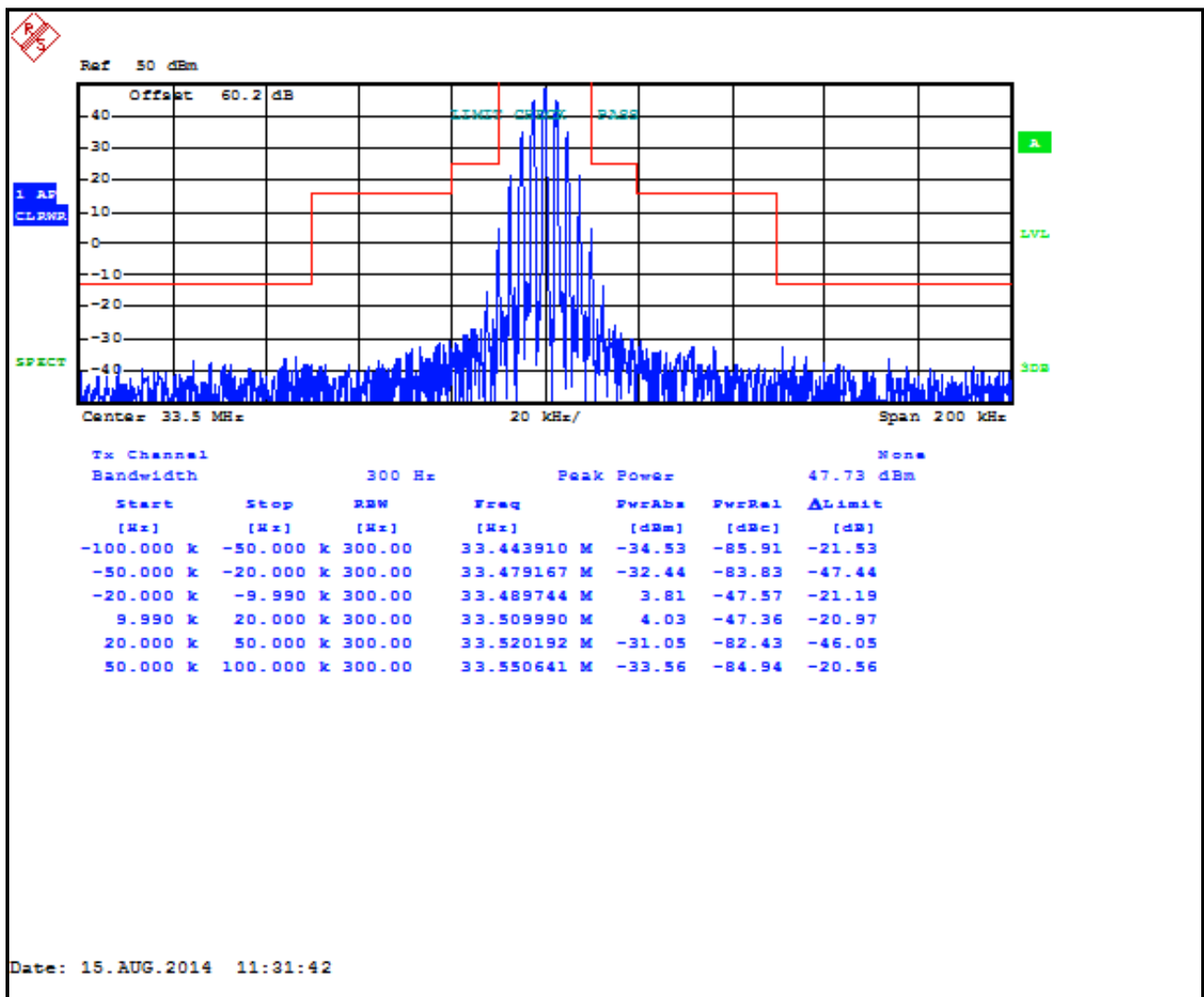
Occupied Bandwidth - Compliance with the Emission Masks

6.1 Test Procedure

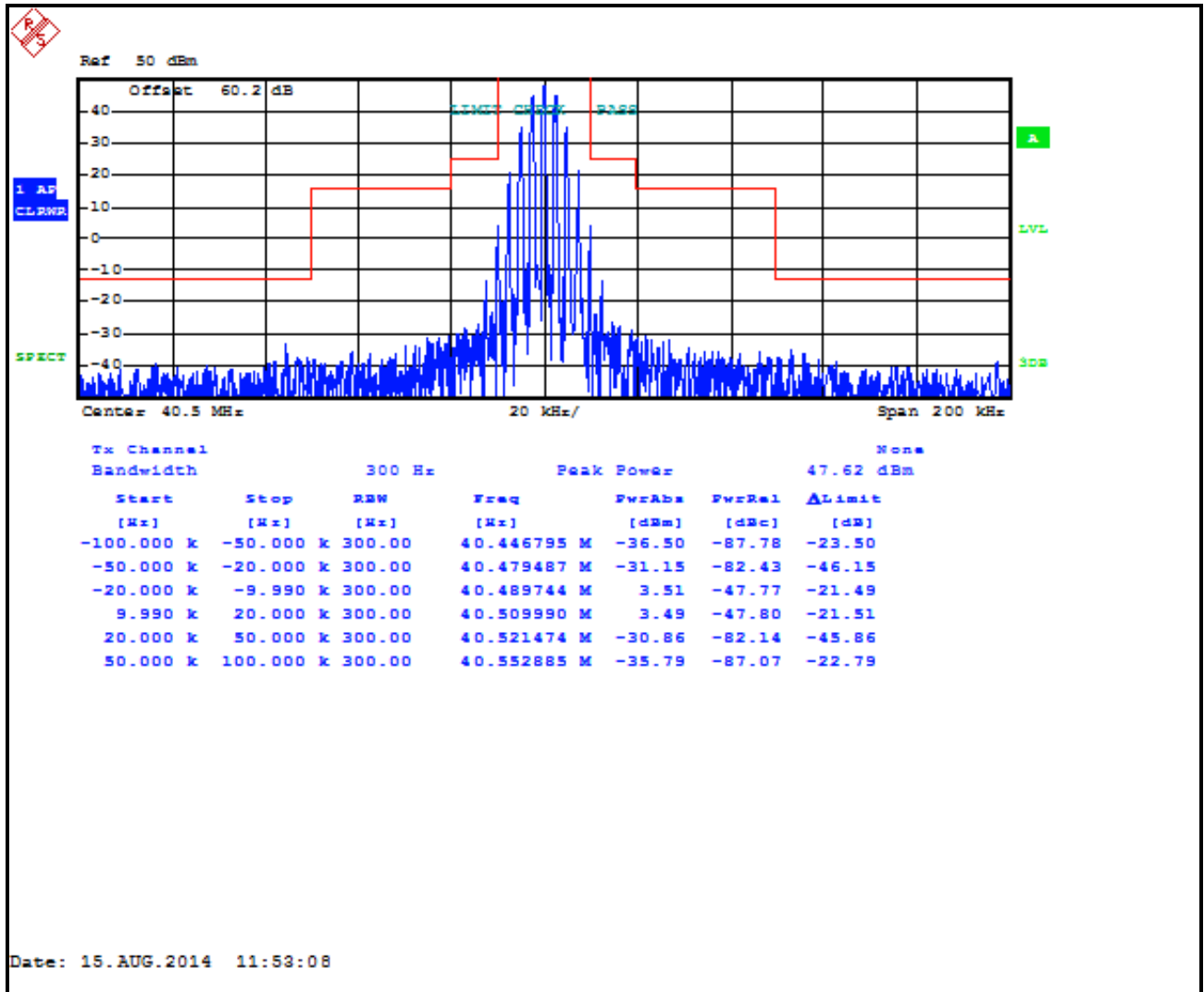
ANSI/TIA-603-C-2004 Section 2.2.11 and TIA/EIA-102.CAAA-2002 Section 2.2.5

6.2 Test Data

Plot 6-1: Occupied Bandwidth – 33.5 MHz - Mask B



Plot 6-2: Occupied Bandwidth – 40.5 MHz - Mask B



Plot 6-3: Occupied Bandwidth – 47.5 MHz - Mask B

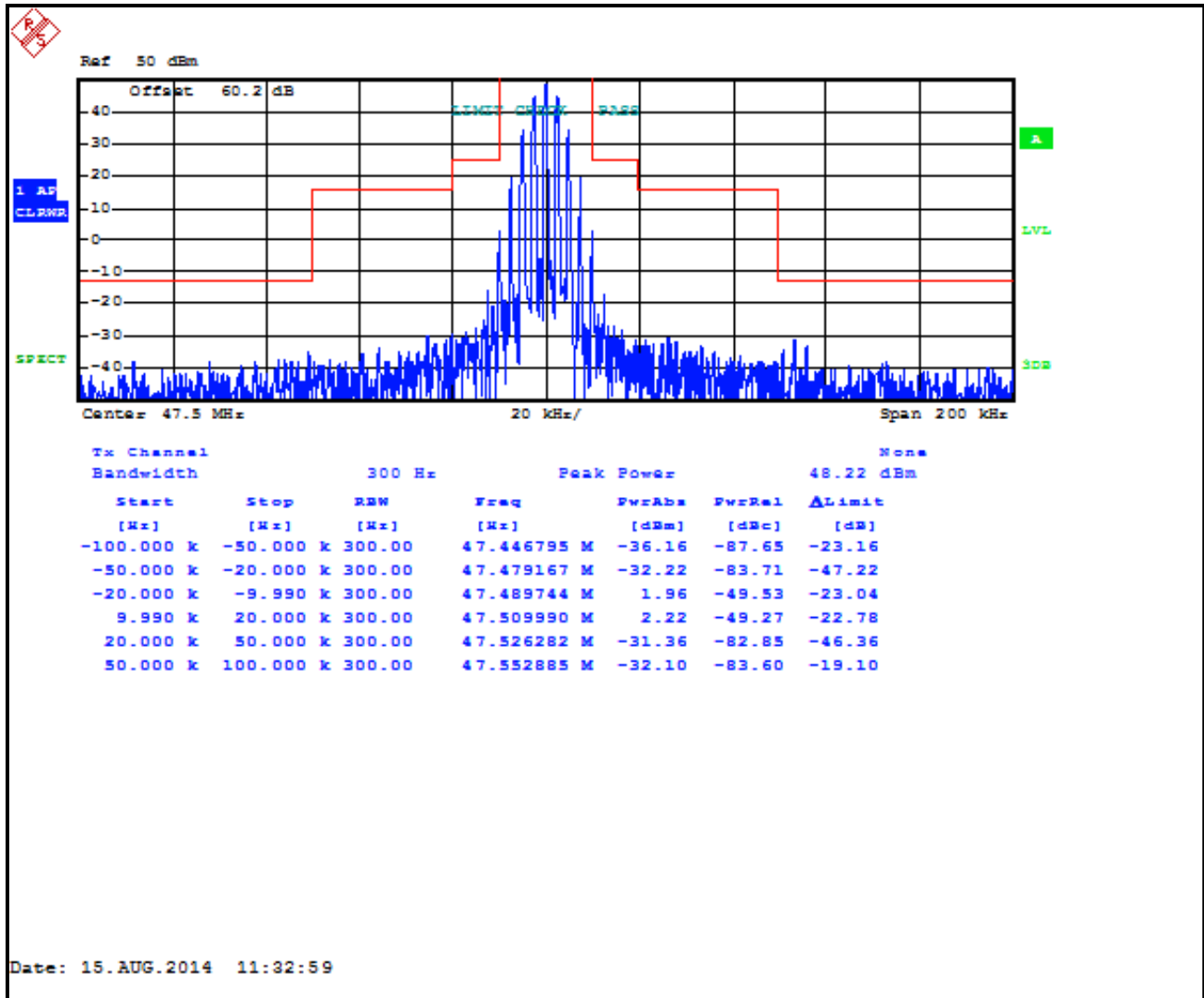


Table 6-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	11/22/14
901355	JFW Industries	50FH-003-300	300W 3DB DC1000 MHz Attenuator	N/A	3/25/16
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	August 15, 2014 Date of Test
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7 FCC Rules and Regulation Part 2.1055: Frequency Stability; Part 90.213: Frequency Stability; RSS-119 5.3: Transmitter Frequency Stability

7.1 Test Procedure

ANSI/TIA-603-C-2004 Section 3.2.2

Limit: FCC Part 90: The frequency range from 25-50 MHz is 20 ppm for fixed/base stations and mobile radios over 2 Watts.

RSS-119 Limits:

Frequency Band (MHz)	Channel Spacing (kHz)	Frequency Stability (ppm)		
		Base/Fixed	Mobile Station	
			>2 watts	≤ 2 watts
29.7-50	20	20	20	50

7.2 Test Data

7.2.1 Frequency Stability/Voltage Variation

Manufacturer's stated voltage range is 10.9 to 16.3 VDC, 13.6 VDC nominal.

Table 7-1: Frequency Stability/Voltage Variation – 40.5 MHz

Voltage (VDC)	Frequency (Hz)	ppm
10.90	40.5	0.00
11.56	40.5	0.00
13.6 (reference)	40.5	0.00
15.64	40.5	0.00
16.30	40.5	0.00

The worst-case deviation was found to be 0.0 ppm.

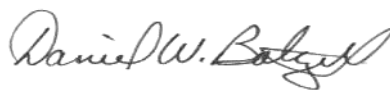
Result: The EUT is compliant.

Table 7-2: Test Equipment Used For Testing Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901350	Meterman	33XR	MultiMeter	040402802	3/20/15
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14

Test Personnel:

Daniel Baltzell
 Test Engineer



Signature

August 15, 2014
 Date of Test

8 FCC Part 2.1047(a): Modulation Characteristics - Audio Frequency Response

8.1 Test Procedure

Not applicable, there is no modulation mixing circuitry for the RF.

9 Conclusion

The data in this measurement report shows that the **Harris Corporation Model XG-100LPA, FCC ID: AQZ-XG-100LPA, IC: 122D-XG100LPA**, complies with the applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119.