



Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.231 Test Data

EUT: 433.92 MHz 56-0042-03 RevF00 Siren

for

**Resolution Engineering, Inc.
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Hudson, WI 54016
Contact: Josh Gathje**

**Testing Conducted By
Rhein Tech Laboratories, Inc.
360 Herndon Parkway, Suite 1400
Herndon, VA 20170**

RTL Test Engineer: Dan Baltzell

RTL Project/Report Number: 2014210

December 9, 2014

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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.

Testing Represented in Report

The data and limits presented in this report are for radiated emissions per 15.231(b)(2) which references 15.35(b), and peak limiting for restricted bands per 15.209(e), which again references 15.35(b)(2), as procured by Resolution Engineering. No average data is presented in this report. Data is also presented for spurious, non-harmonic radiated emissions per 15.209. The Equipment Under Test (EUT) was the **433.92 MHz 56-0042-03 RevF00 Siren (RTL bar code 21186 for spurious emissions and 21187 for unintentional emissions).**

15.231 Radiated Emissions Spurious Test Data - Side Antenna – FCC Limits/ 3m Distance

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/Fail
433.920	Peak	H	80.6	17.7	98.3	100.8	-2.5	Pass
867.840	Peak	H	44.3	24.0	68.3	80.8	-12.5	Pass
1301.763	Peak	H	33.5	28.1	61.6	74.0	-12.4	Pass
1735.688	Peak	V	18.3	28.1	46.4	80.8	-34.4	Pass
2169.590	Peak	H	46.7	-8.8	37.9	80.8	-42.9	Pass
2603.510	Peak	V	59.5	-9.1	50.4	80.8	-30.4	Pass
3037.430	Peak	H	56.1	-9.0	47.1	80.8	-33.7	Pass
3471.350	Peak	V	49.3	-7.0	42.3	80.8	-38.5	Pass
3905.270	Peak	V	45.3	-2.6	42.7	74.0	-31.3	Pass
4339.190	Peak	V	32.7	-1.5	31.2	74.0	-42.8	Pass

15.231 Radiated Emissions Spurious Test Data - Bottom Antenna – FCC Limits/ 3m Distance

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/Fail
433.920	Peak	V	80.0	17.7	97.7	100.8	-3.1	Pass
867.840	Peak	H	32.4	24.0	56.4	80.8	-24.4	Pass
1301.763	Peak	V	21.4	28.1	49.5	74.0	-24.5	Pass
1735.688	Peak	H	23.6	28.1	51.7	80.8	-29.1	Pass
2169.590	Peak	V	44.8	-8.8	36.0	80.8	-44.8	Pass
2603.510	Peak	V	56.4	-9.1	47.3	80.8	-33.5	Pass
3037.430	Peak	V	54.9	-9.0	45.9	80.8	-34.9	Pass
3471.350	Peak	V	49.2	-7.0	42.2	80.8	-38.6	Pass
3905.270	Peak	V	45.9	-2.6	43.3	74.0	-30.7	Pass
4339.190	Peak	V	29.2	-1.5	27.7	74.0	-46.3	Pass

* FCC/IC restricted band

All spurious emissions in the applicable frequency range were investigated, only harmonic emissions were present as noted above

15.209 Radiated Emissions Unintentional Test Data – FCC Limits/ 3m Distance

Temperature: 43°F Humidity: 52%								
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/Fail
41.689	Qp	V	37.1	-16.8	20.3	40.0	-19.7	Pass
84.234	Qp	V	44.1	-24.7	19.4	40.0	-20.6	Pass
148.068	Qp	V	31.9	-22.5	9.4	43.5	-34.1	Pass
151.029	Qp	H	30.5	-22.6	7.9	43.5	-35.6	Pass
151.929	Qp	H	26.4	-22.6	3.8	43.5	-39.7	Pass
180.333	Qp	V	34.2	-22.0	12.2	43.5	-31.3	Pass
206.686	Qp	V	31.1	-20.2	10.9	43.5	-32.6	Pass

Test Procedure

Radiated fundamental and spurious emissions were tested at three meters. The EUT was tested in the three orthogonal planes with the receive antenna in both polarities. The emissions were maximized per ANSI C63.4:2003 8.3.1.2; that is, the measurement antenna height was varied between 1 and 4 m, and the EUT was rotated through 360° on a rotating turntable until the maximum emissions were found. Both horizontal and vertical measurement antenna polarizations were used. A resolution bandwidth of 100 kHz was used for frequencies less than 1000 MHz, and a resolution bandwidth of 1 MHz was used for frequencies greater than or equal to 1000 MHz. The video bandwidth was set to a value at least three times greater than the resolution bandwidth.

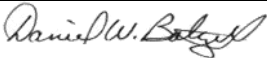
EUT Disposition

The EUT was adapted to continuously transmit for testing purposes, as well as a normal operating mode for unintentional emissions.

Radiated Emissions Test Equipment

RTL Bar Code	Manufacturer	Model	Part	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/15
900724	ARA	LPB-2520	Bilog Periodic Antenna (25 MHz-2000 MHz)	1037	4/19/15
900932	Hewlett Packard	8449B OPT H02	Preamplifier 1-26.5 GHz	3008A00505	9/5/15
900772	EMCO	3161-02	Horn Antenna (2.0-4.0 GHz)	9804-1044	4/20/15
900321	EMCO	3161-03	Horn Antenna (4.0-8.0 GHz)	9508-1020	4/20/17
900323	EMCO	3160-07	Horn Antenna (8.0-12.4 GHz)	9605-1054	4/20/17
900356	EMCO	3160-08	Horn Antenna (12.4-18.0 GHz)	9607-1044	4/20/17
901218	EMCO	RA42-K-F-43_C	Horn Antenna (18.0-26.5 GHz)	960281-003	4/20/17
N/A	Rhein Tech Laboratories, Inc.	Automated Emission Tester	Emissions Testing Software	Rev. 14.0.2	N/A
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	9/3/15
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	9/3/15

Test Personnel:

Dan Baltzell		December 5, 2014
Test Engineer	Signature	Date of Test

FCC/IC Cross Reference

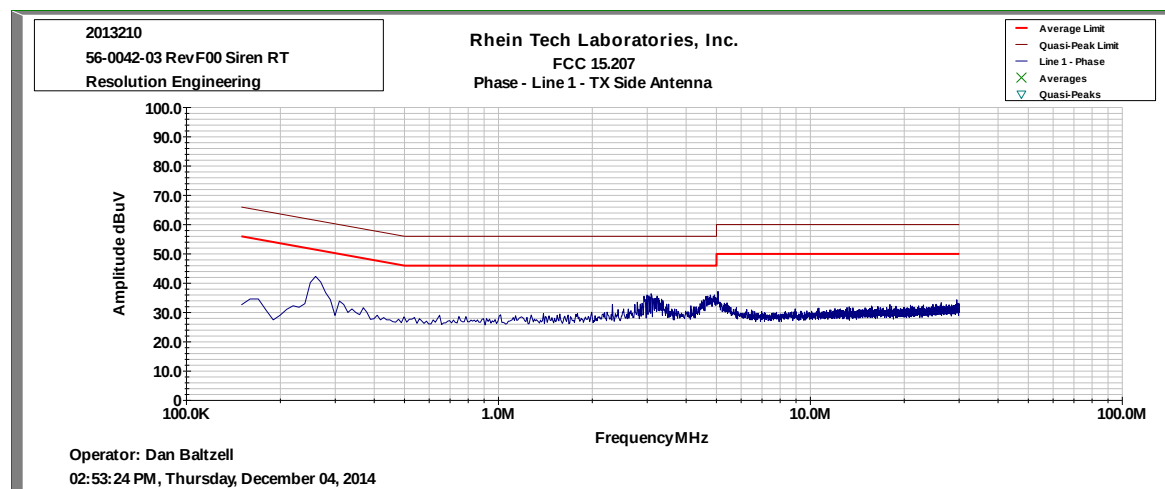
FCC 15.231(b)(2)	RSS-210 Issue 8 A1.1
FCC 15.35(b)	RSS-Gen Issue 4 8.1
FCC 15.205	RSS-Gen Issue 4 8.10
FCC 15.209	RSS-Gen Issue 4 8.9

15.207 Conducted Line Emissions Test Data – FCC Limits

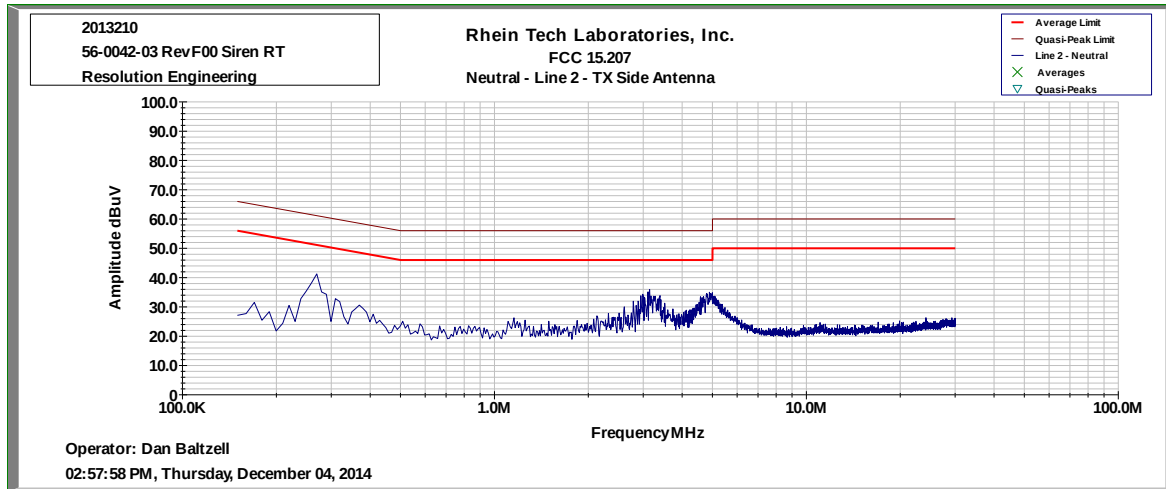
Procedure: C63.10-2009 6.2

The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz.

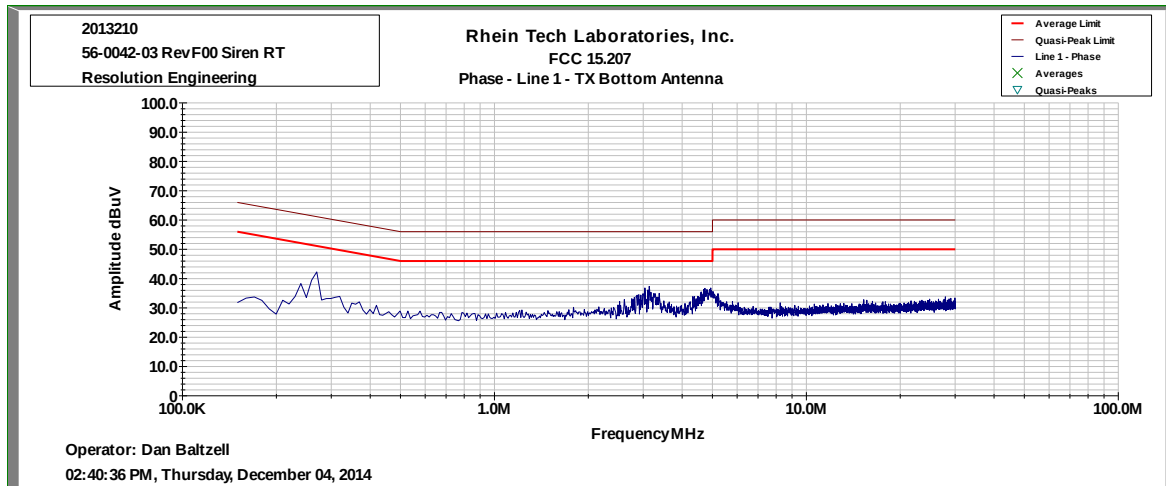
Phase, Transmit Mode – Side Antenna



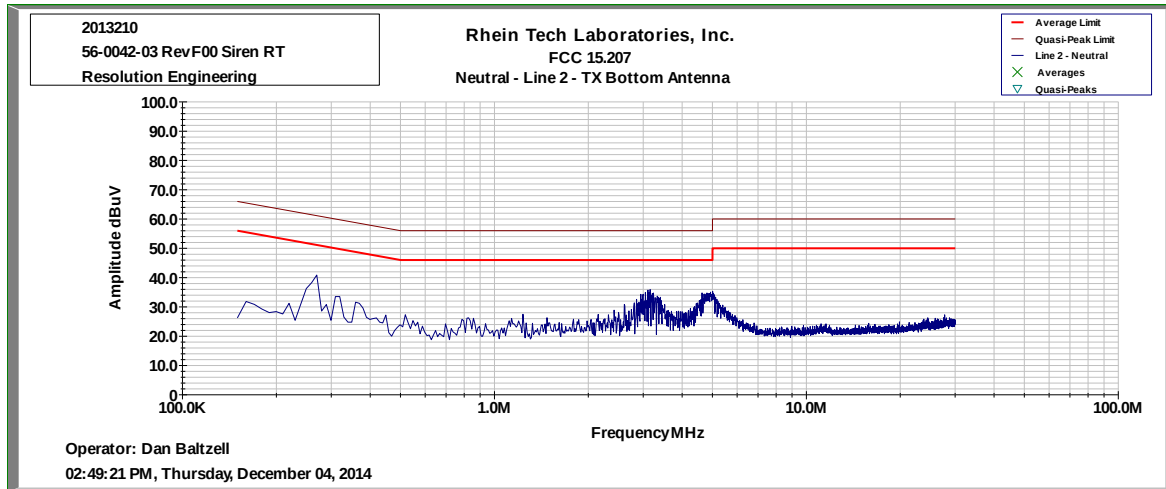
Neutral, Transmit Mode – Side Antenna



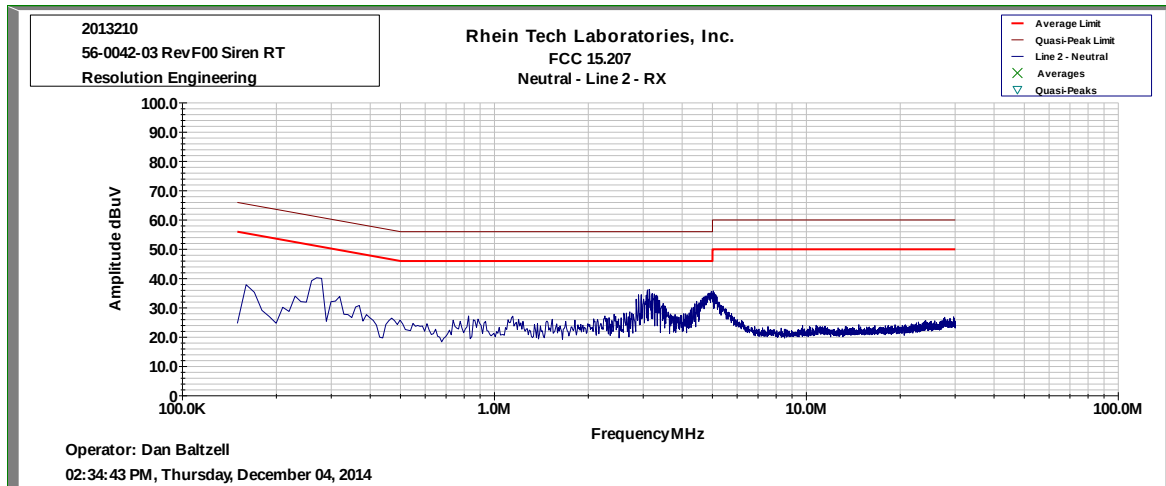
Phase, Transmit Mode – Bottom Antenna



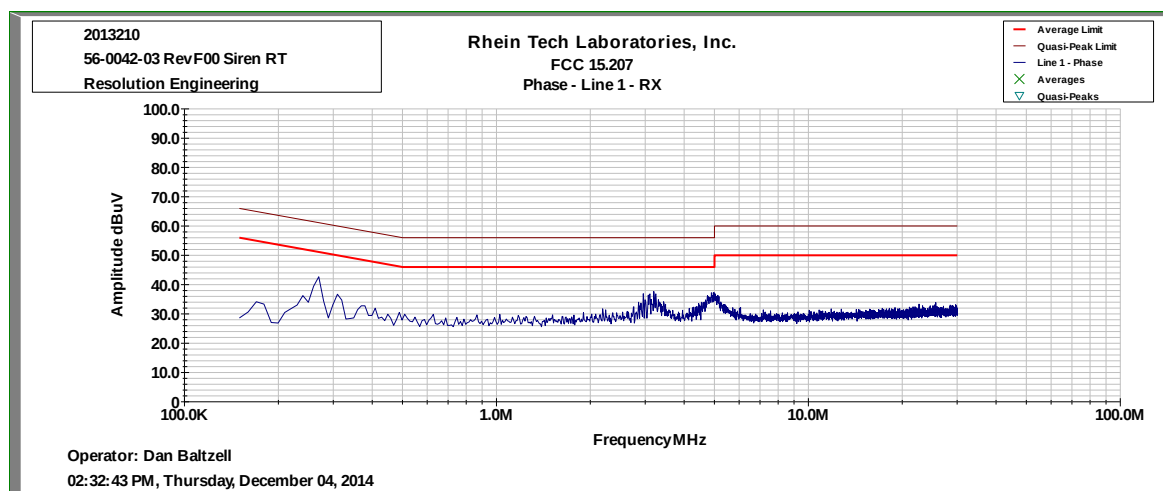
Neutral, Transmit Mode – Bottom Antenna



Neutral, Receive Mode



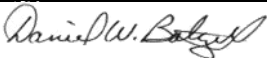
Phase, Receive Mode



Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900339	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz - 1 GHz)	2521A00743	2/17/16
901083	AFJ International	LS16	16A LISN	16010020080	8/27/15
900968	Hewlett Packard	8567A	Spectrum Analyzer (10 kHz - 1.5 GHz)	2602A00160	2/17/16
900970	Hewlett Packard	85662A	Spectrum Analyzer Display	2542A11239	2/17/16

Test Personnel:

Dan Baltzell		December 4, 2014
Test Engineer	Signature	Date of Test

Test Configuration Photograph

Radiated Unintentional Emissions





Radiated Spurious Emissions





Conducted AC Emissions



