RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.231 Test Data

433.92 MHz 360PIR

Model: 56-0092-03 RevB00

for

Resolution Engineering, Inc.
1402 Heggen Street
Hudson, WI 54016
Contact: Josh Gathje

Testing Conducted By:

Rhein Tech Laboratories, Inc.
360 Herndon Parkway, Suite 1400
Herndon, VA 20170
RTL Test Engineer: Jon Wilson

RTL Project/Report Number: 2017247

December 4, 2017

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANAB. Refer to certificate and scope of accreditation AT-1445.

Radiated Spurious Harmonics Emissions

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 360PIR (RTL Bar Code 22682)**.

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; 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 120 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.

15.231 Radiated Spurious Harmonics Emissions Test Data – Peak

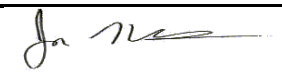
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
433.9	Peak	H	78.5	18.1	96.6	100.8	-4.2
867.8	Peak	H	57.7	-1.8	55.9	80.8	-24.9
1301.8	Peak	H	39.9	3.0	42.9	74.0	-31.1
1735.7	Peak	H	41.4	7.2	48.6	80.8	-32.2
2169.6	Peak	H	29.7	-0.7	29.0	80.8	-51.8
2603.5	Peak	H	48.3	0.4	48.7	80.8	-32.1
3037.4	Peak	H	45.7	1.1	46.8	80.8	-34.0
3471.4	Peak	V	47.8	2.1	49.9	80.8	-30.9
3905.3	Peak	H	39.0	3.8	42.8	74.0	-31.2
4339.2	Peak	H	33.1	4.9	38.0	74.0	-36.0

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

Radiated Emissions Test Equipment

RTL Bar Code	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901668	RF Depot	3-ft	Cable	N/A	8/24/18
901334	RF Depot	30-ft	Cable	N/A	8/24/18
900930	Hewlett Packard	85662A	Spectrum Analyzer Display	3144A20839	4/26/19
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz-22 GHz)	3138A07771	4/26/19
900905	Rhein Tech Laboratories, Inc.	PR-1040	Amplifier (20 MHz – 2 GHz)	900905	8/18/18
900932	Hewlett Packard	8449B OPT H02	Amplifier (1-26.5 GHz)	3008A00505	8/18/18
900791	Chase	CBL6112	Antenna (30 MHz – 2 GHz)	2099	10/4/20
901650	ETS Lindgren	3117	Antenna (1-18 GHz)	00152091	9/26/18

Test Personnel:

Jon Wilson		November 29-30, 2017
Test Engineer	Signature	Date of Test

FCC/IC Cross Reference

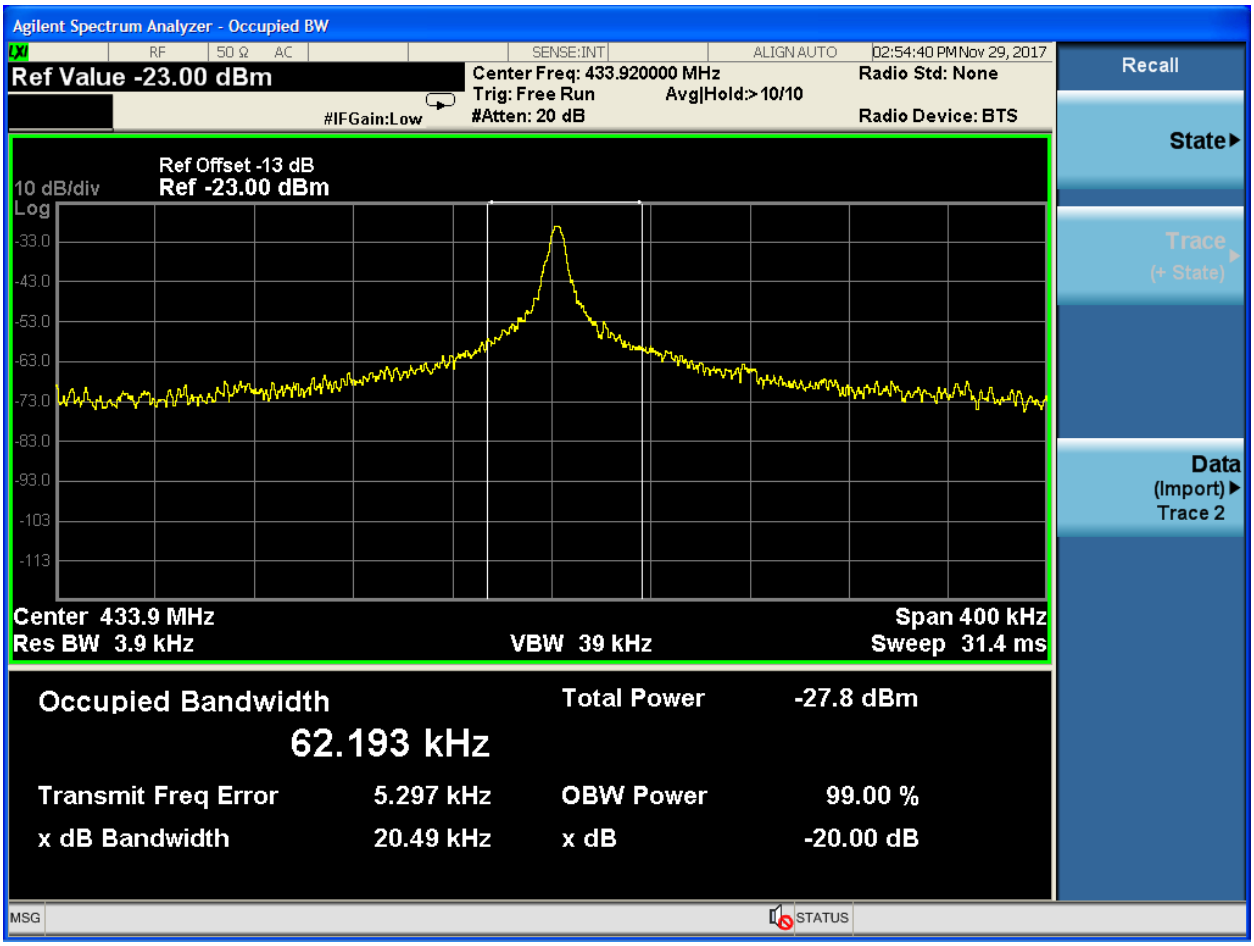
FCC 15.231(a)	RSS-210 Issue 9 A1.1
FCC 15.231(b)(2)	RSS-210 Issue 9 A1.2
FCC 15.35(b)	RSS-Gen Issue 4 6.10
FCC 15.205	RSS-Gen Issue 4 8.10
FCC 15.209	RSS-Gen Issue 4 8.9
FCC 15.231(c)	RSS-210 Issue 9 A1.3

Occupied Bandwidth

15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz

433.92 MHz * 0.25% = 1085 kHz = Limit

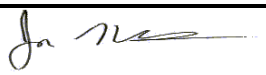
99% Bandwidth is 62.193 kHz
20 dB Bandwidth is 20.49 kHz



Occupied Bandwidth Test Equipment

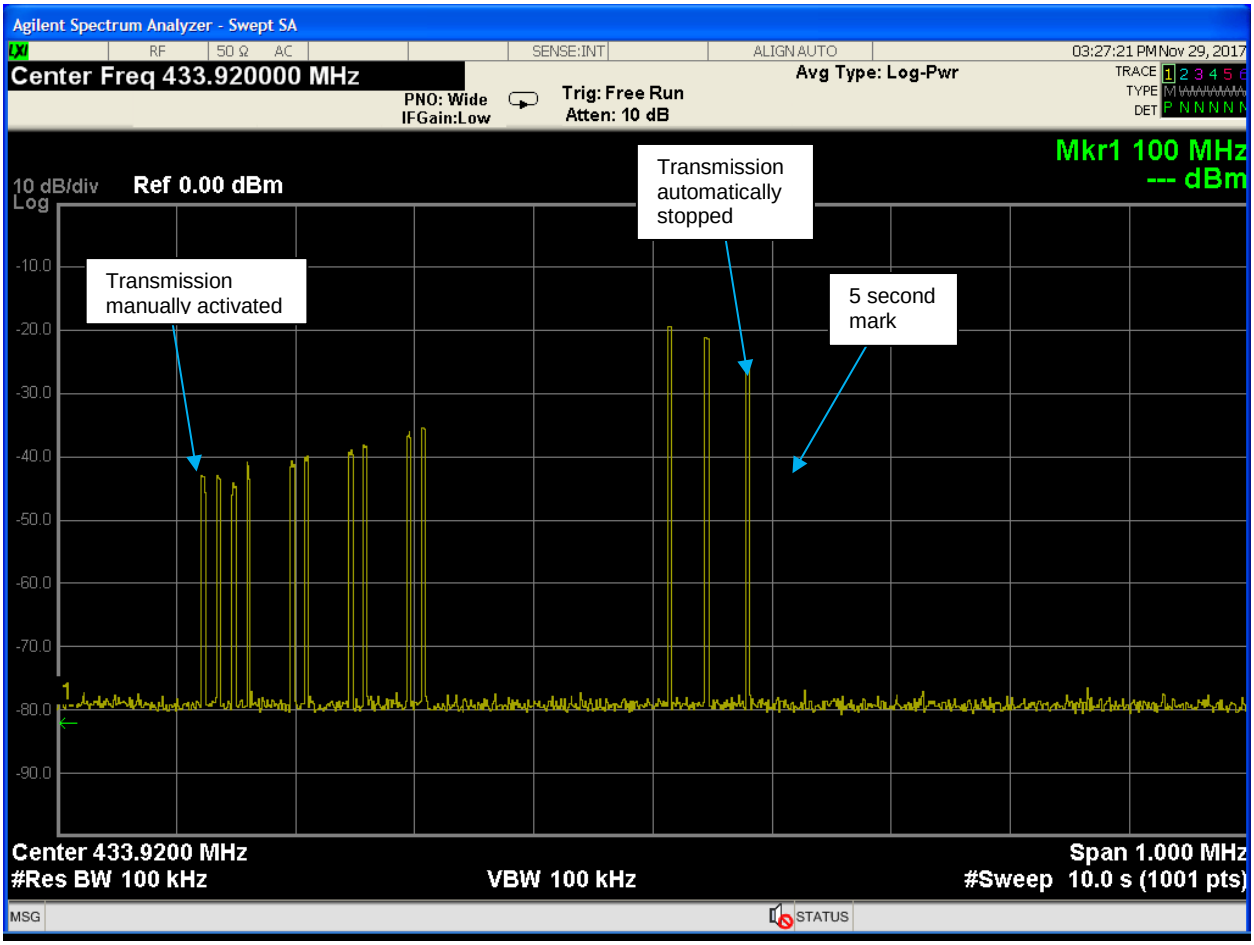
RTL Bar Code	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz-26.5 GHz)	MY51250846	4/21/18

Test Personnel:

Jon Wilson		November 29, 2017
Test Engineer	Signature	Date of Test

Transmitter Deactivation

15.231(a)
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.



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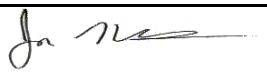
Test Personnel:

Jon Wilson		November 29, 2017
Test Engineer	Signature	Date of Test

Appendix A: Test Configuration Photographs

Radiated Emissions (Less Than 1 GHz)

Radiated Emissions (Greater Than 1 GHz)