RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC Certification Application Report Part 15.249

Test Lab:	Applicant:
Rhein Tech Laboratories, Inc. 360 Herndon Parkway Suite 1400 Herndon, VA 20170 E-Mail: atcbinfo@rheintech.com Tel: 703-689-0368 Fax: 703-689-2056 www.rheintech.com	Zonoff, Inc. 115 Charlestown Hunt Drive Phoenixville, PA 19460 www.zonoff.com Contact: Ryan Buchert

FCC ID:	Z82-EMBY001	**Test Report Date:**	March 20, 2012
Platform:	N/A	**RTL Work Order #:**	2011197
Model:	Embassy	**RTL Quote #:**	QRTL11-263B
American National Standard Institute:	ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
FCC Classification:	DXX – Part 15 Low Power Communication Device Transmitter		
FCC Rule Part(s)/Guidance:	Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz (10-01-09)		
Digital Interface Information:	Digital Interface was found to be compliant		

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
908.4	N/A	N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15 and ANSI C63.4.

Signature: _____ Date: March 20, 2012

Typed/Printed Name: Desmond A. Fraser Position: President

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 General Information

1.1 Scope

This is an original certification application request.

Applicable Standards:

- FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25

1.2 Description of EUT

Equipment Under Test	Transceiver
Model	Embassy
Power Supply	115 VAC 60 Hz
Modulation Type	FSK
Frequency Range	908.4 MHz
Antenna Type	Permanent PCB trace antenna

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4-2003).

1.4 Related Submittal(s)/Grant(s)

This is an original application for certification for Zonoff, Inc. Model: Embassy, FCC ID: Z82-EMBY001.

1.5 Required Grant Notes

N/A

1.6 Modifications

No modifications were made to the equipment during testing in order to achieve compliance with these standards.

2 Test Information

2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. 908.4 MHz was tested and investigated from 9 kHz to 9 GHz.

2.2 Exercising the EUT

The EUT was provided with software to continuously transmit during testing. The carrier was also checked to verify that the information was being transmitted. There were no deviations from the test standard(s) and/or methods. The IF, LO, and up to the 2nd LO, were investigated and tested, and found to be compliant.

2.3 Test Result Summary

Table 2-1: Test Result Summary with FCC Rules and Regulations

Standard	Test	Pass/Fail or N/A
FCC 15.249(a)	Radiated Emissions	Pass
FCC 15.207	AC Line Conducted Emissions	Pass

2.4 Test System Details

The test samples were received on December 13, 2011. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are in the table below.

Table 2-2: Equipment under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Transceiver	Zonoff, Inc.	Embassy	N/A	Z82-EMBY001	20311

Table 2-3: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
AC/DC Power Adapter	Emerson	DA12-050US-M	Power Supply	N/A	20312

2.5 Configuration of Tested System

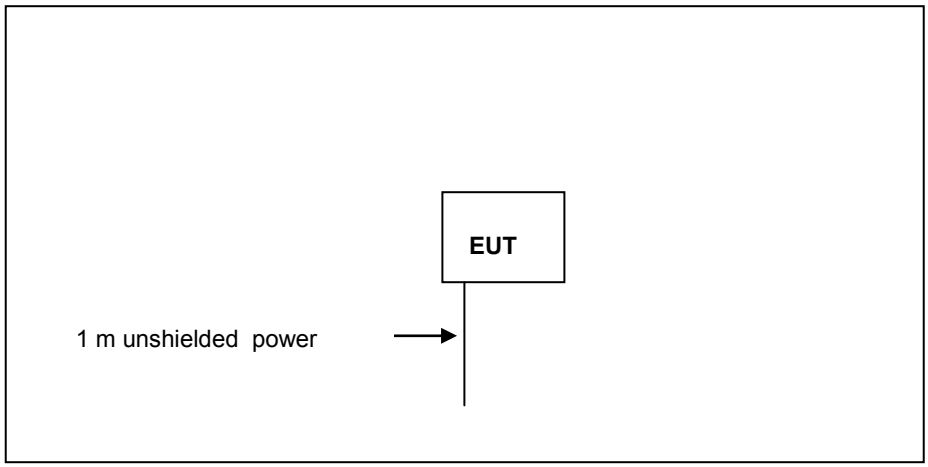


Figure 2-1: Worst Case Configuration of System under Test

3 Conducted AC Emissions – FCC 15.207: Conducted Limits

3.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. 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. Video filter less than 10 times the resolution bandwidth is not 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. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

3.2 Test Limits

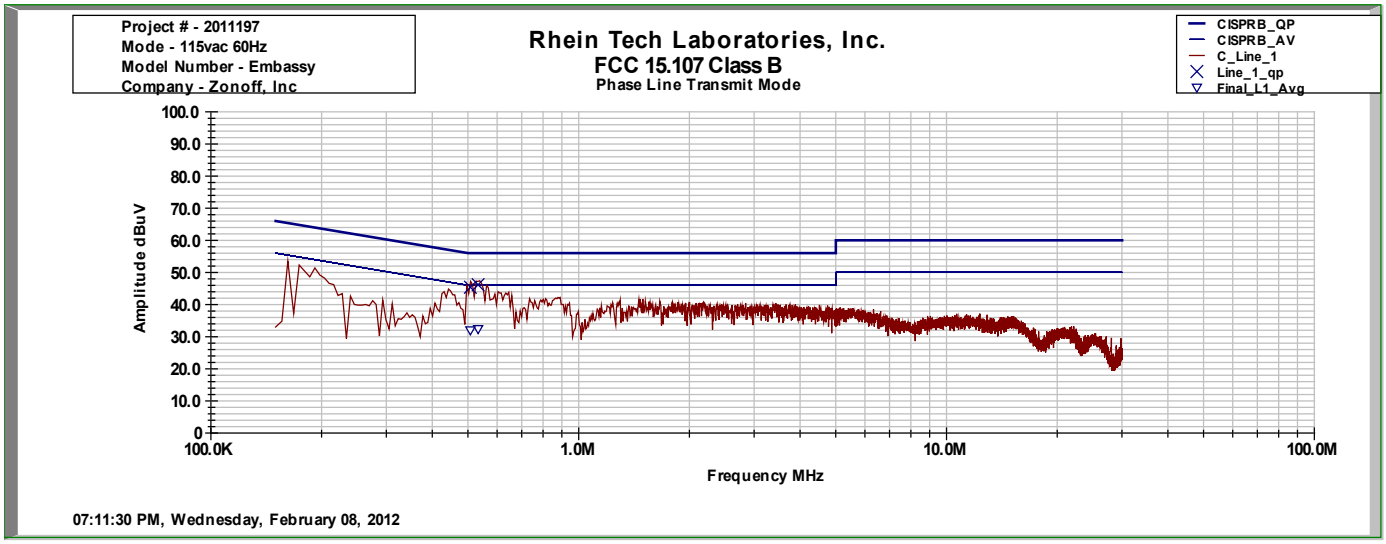
Line-Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

Table 3-1: Conducted Emissions Test Equipment

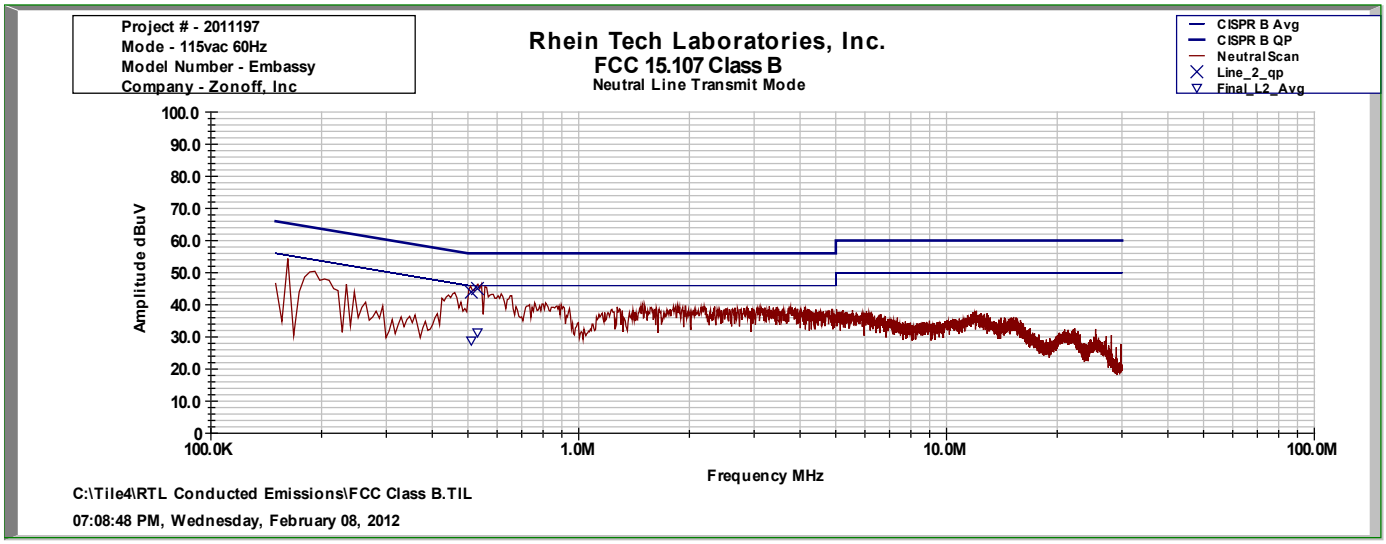
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8566B	Spectrum Analyzer (30Hz - 18 GHz)	3138A07771	02/06/2013
901082	AFJ International	LS16	16A LISN (110 V)	16010020081	12/01/2012

3.3 Conducted AC Emissions Test Data

Plot 3-1: Conducted AC Emissions; Line, Transmit Mode



Plot 3-2: Conducted AC Emissions; Neutral; Transmit Mode



Test Personnel:

Rick McLay		February 8, 2012
Test Engineer	Signature	Date of Tests

4 Radiated Emission Limits Fundamental Emissions – FCC 15.249

4.1 Radiated Emission Limits Test Procedure

Radiated Emissions of the Fundamentals were tested at three meters, and meet the quasi-peak limit of 50 mV/m. The EUT was tested in all three orthogonal planes for the channel in power control setting of -1.0 dBm; the worst case emissions are shown. Peak measurements were taken and are compared to the quasi-peak limit.

Table 4-1: Radiated Fundamental Emissions Test Equipment

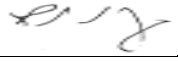
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	01/31/2013
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz – 6.5 GHz)	3325A00159	08/02/2012
900914	Hewlett Packard	8546OA	RF Filter Section, (100 kHz - 6.5 GHz)	3330A00107	08/02/2012
901399	Times Microwave	SFT-205	RF cable, 30'	NA	07/19/2012
900878	Rhein Tech Laboratories	AM3-1197-0005	4 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories	WRT-000-0003	Polystyrene rotating table	N/A	Not Required

4.2 Radiated Emission Limits Test Data

Table 4-2: Radiated Emissions Fundamental Emissions – External Antenna

Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
908.4	Qp	55.2	37.8	93.0	94.0	-1.0

Test Personnel:

Rick McLay		February 2, 2012
Test Engineer	Signature	Date of Test

5 Radiated Emission Limits Radiated Harmonics – FCC 15.249

5.1 Radiated Emission Limits Test Procedure

Radiated emissions of the harmonics were tested at three meters, and meet the requirements of 500 microvolts/meter in average mode, and 20 dB higher in peak mode, per 15.249(e). The EUT was tested by rotating through three orthogonal planes, each at 360º rotation with the receive antenna in both vertical and horizontal polarity.

Table 5-1: Radiated Spurious Emissions - Average

Emission Frequency (MHz)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1816.8	34.4	9.3	43.7	54.0	-10.3
2725.2	46.7	4.9	51.6	54.0	-2.4
3633.6	37.7	4.5	42.2	54.0	-11.8
4542.0	35.9	7.7	43.6	54.0	-10.4
5450.4	36.3	5.9	42.2	54.0	-11.8
6358.8	35.8	4.5	40.3	54.0	-13.7
7267.2	35.3	5.0	40.3	54.0	-13.7
8175.6	33.5	7.1	40.6	54.0	-13.4
9084.0	33.0	8.9	41.9	54.0	-12.1

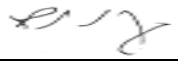
Table 5-2: Radiated Spurious Emissions - Peak

Emission Frequency (MHz)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1816.8	44.9	9.3	54.2	74.0	-19.8
2725.2	55.6	4.9	60.5	74.0	-13.5
3633.6	52.7	4.5	57.2	74.0	-16.8
4542.0	49.8	7.7	57.5	74.0	-16.5
5450.4	49.6	5.9	55.5	74.0	-18.5
6358.8	49.0	4.5	53.5	74.0	-20.5
7267.2	48.6	5.0	53.6	74.0	-20.4
8175.6	46.6	7.1	53.7	74.0	-20.3
9084.0	47.8	8.9	56.7	74.0	-17.3

Table 5-3: Radiated Spurious Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	01/31/2013
901364	Rhein Tech Laboratories	PR-1042	40dB PreAmplifier, (1 - 18 GHz)	1003	07/14/2012
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	06/14/2012
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	06/14/2012
900323	EMCO	3160-07	Horn Antenna (8.2 – 12.4 GHz)	9605-1054	07/31/2012
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz – 6.5 GHz)	3325A00159	08/02/2012
900914	Hewlett Packard	8546OA	RF Filter Section, (100 kHz - 6.5 GHz)	3330A00107	08/02/2012
901397	Times Microwave	SFT-205	RF cable, 1'	NA	07/19/2012
901399	Times Microwave	SFT-205	RF cable, 30'	NA	07/19/2012
901581	Rohde & Schwarz	1166.1660.50	FSU Spectrum Analyzer (20 Hz – 50 GHz)	200106	01/19/2013
900905	Rhein Tech Laboratories	PR-1040	Preamplifier 40dB (30 MHz – 2 GHz)	1006	07/14/2012
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories	WRT-000-0003	Polystyrene rotating table	N/A	Not Required

Test Personnel:

Rick McLay		February 2, 2012
Test Engineer	Signature	Date of Tests

6 In-Band Emissions Requirement – FCC 15.215(c)

6.1 Test Procedure

The 20 dB bandwidth was measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz (1% of span), and the video bandwidth set at 1 MHz. The spectrum analyzer's automated display markers adjusted to -20 dBc using max hold until the spectrum was filled and a plot taken.

6.2 FCC 15.215(c) Requirement

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.3 Test Data

Plot 6-1: 20 dB Bandwidth

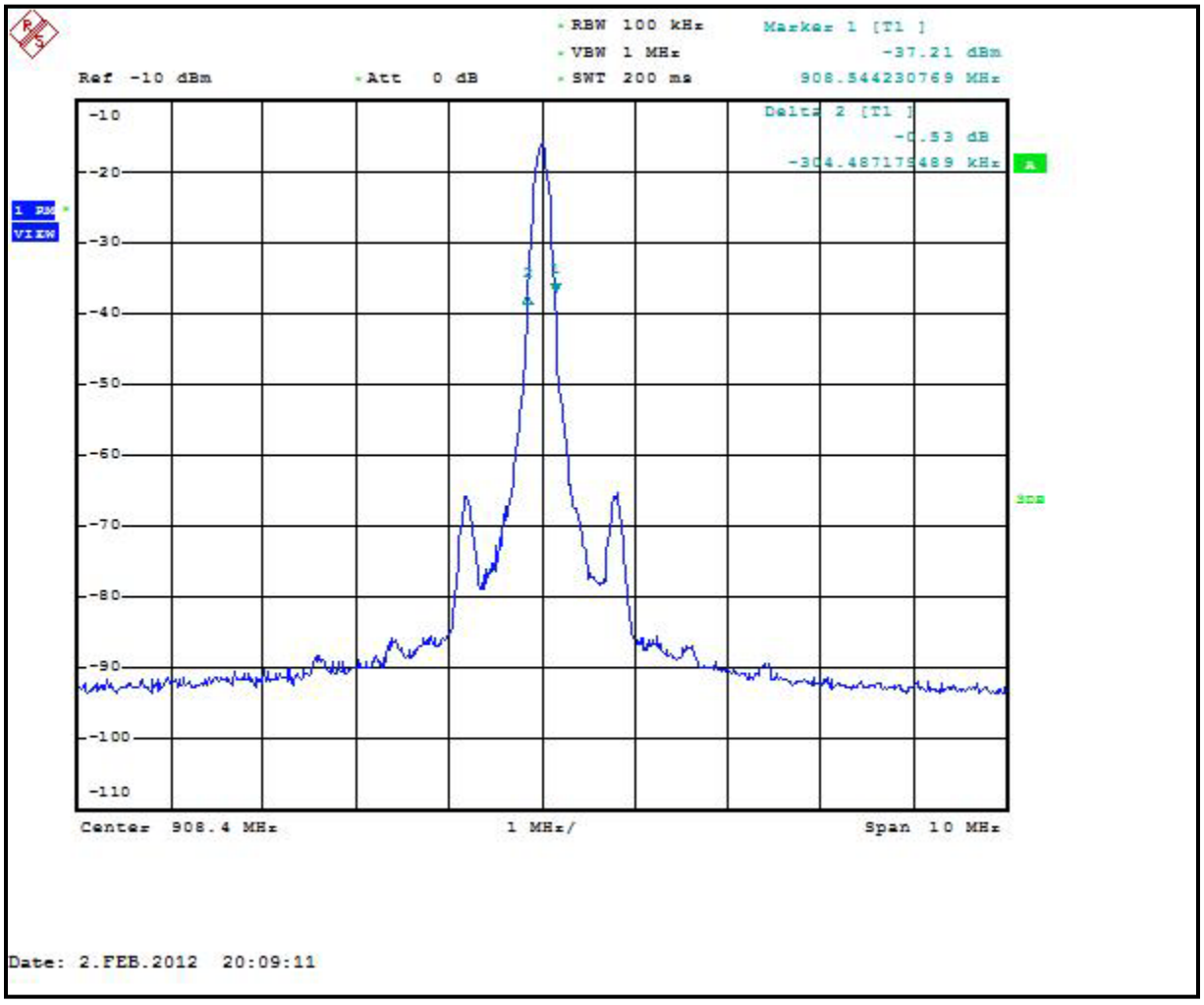
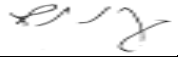


Table 6-1: In-band Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	FSU Spectrum Analyzer (20 Hz – 50 GHz)	200106	01/19/2013

Test Personnel:

Rick McLay		February 2, 2012
Test Engineer	Signature	Date of Tests

7 Conclusion

The data in this measurement report shows that the EUT as tested, for Zonoff, Inc. Model: Embassy, FCC ID: Z82-EMBY001 complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.