

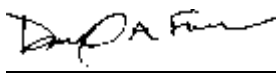


Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.249 Certification Application Report

Test Lab: Rhein Tech Laboratories, Inc. Tel: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 www.rheintech.com Herndon, VA 20170 E-Mail: atcbinfo@rheintech.com		Applicant: HomeoLux LLC 152 West 57 th St. 18 th Floor New York, NY 10019	
FCC ID	2AUWD-40C2019	Test Report Date	October 29, 2019
		RTL Work Order #	2019151
Model	Controller	RTL Quote #	QRTL19-151A
American National Standard Institute	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices		
FCC Classification	DXT – Part 15 Low Power Transceiver		
FCC Rule Part(s)/ Guidance	15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz (10/01/2018)		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
2475	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 C63.10.

Signature: 

Date: October 29, 2019

Typed/Printed Name: Desmond A. Fraser

Position: President

*This report may not be reproduced, except in full, without the written approval of Rhein Tech Laboratories, Inc. and HomeoLux LLC. The test results relate only to the item(s) tested.
This replaces DRAFT R0.2.*

These test(s) are accredited under Rhein Tech Laboratories, Inc. ISO/IEC 17025 accreditation issued by ANAB. Refer to certificate and scope of accreditation AT-1445.

Table of Contents

1	General Information.....	4
1.1	Scope	4
1.2	Description of EUT	4
1.3	Test Facility.....	4
1.4	Related Submittal(s)/Grant(s)	4
1.5	Modifications	4
2	Test Information	5
2.1	Description of Test Modes.....	5
2.2	Exercising the EUT.....	5
2.3	Test Result Summary.....	5
2.4	Test System Details	5
2.5	Configuration of Tested System.....	6
3	Radiated Emissions – FCC 15.209, 15.249(a)	7
3.1	Radiated Emissions Measurement Test Procedure.....	7
3.2	Radiated Emissions Test Results	8
3.3	Radiated Emissions Harmonics/Spurious Test Data	9
4	AC Conducted Emissions - FCC 15.207	10
5	Conclusion	10

Figure Index

Figure 2-1: Configuration of System Under Test	6
------------------------------------------------------	---

Table Index

Table 2-1: Channels Tested	5
Table 2-2: Test Result Summary	5
Table 2-3: Equipment Under Test	5
Table 3-1: Radiated Emissions Test Equipment.....	8
Table 3-2: Radiated Emissions Test Data	8
Table 3-3: Radiated Emissions Harmonics/Spurious – 2475 MHz; Peak	9
Table 3-4: Radiated Emissions Harmonics/Spurious – 2475 MHz; Average	9

Appendix Index

Appendix A: FCC Agency Authorization Letter.....	11
Appendix B: FCC Confidentiality Request Letter	12
Appendix C: Technical Operational Description.....	13
Appendix D: Schematics.....	14
Appendix E: Block Diagram	15
Appendix F: ID Label and Location.....	16
Appendix G: User Manual	17
Appendix H: External Photographs	18
Appendix I: Internal Photographs	19
Appendix J: Test Photographs	20

Photograph Index

Photograph 1: Radiated Emissions Testing – Front View (Digital Emissions, <1 GHz).....	20
Photograph 2: Radiated Emissions Testing – Back View (Digital Emissions, <1 GHz)	21
Photograph 3: Radiated Emissions Testing – Front View (Spurious Emissions, >1 GHz).....	22
Photograph 4: Radiated Emissions Testing – Back View (Spurious Emissions, >1 GHz)	23

1 General Information

1.1 Scope

This is an original FCC certification application report.

Applicable Standards:

FCC Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz

1.2 Description of EUT

Equipment Under Test/Model	Controller
Power Supply	4 x 1.5 VDC cell (AAA)
Modulation Type	FSK
Frequency Range	2475 MHz
Antenna Type	Trace

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.

1.4 Related Submittal(s)/Grant(s)

None.

1.5 Modifications

None.

2 Test Information

2.1 Description of Test Modes

In accordance with FCC 15.31(m), the following frequencies were tested.

Table 2-1: Channels Tested

Frequency (MHz)
2475

2.2 Exercising the EUT

The EUT was programmed for continuous transmission at 2475 MHz. The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The carrier was also checked to verify that information was being transmitted.

2.3 Test Result Summary

Table 2-2: Test Result Summary

Test	FCC Reference	Pass/Fail or N/A
AC Power Conducted Emissions	15.207	N/A
Radiated Emissions	15.209	Pass
Field Strength of Fundamental and Harmonics	15.249(a)	Pass

2.4 Test System Details

The test samples were received on September 11, 2019. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following table.

Table 2-3: Equipment Under Test

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
2475 MHz Controller	HomeoLux LLC	Controller	C0002	2AUWD-40C2019	N/A	23462

2.5 Configuration of Tested System

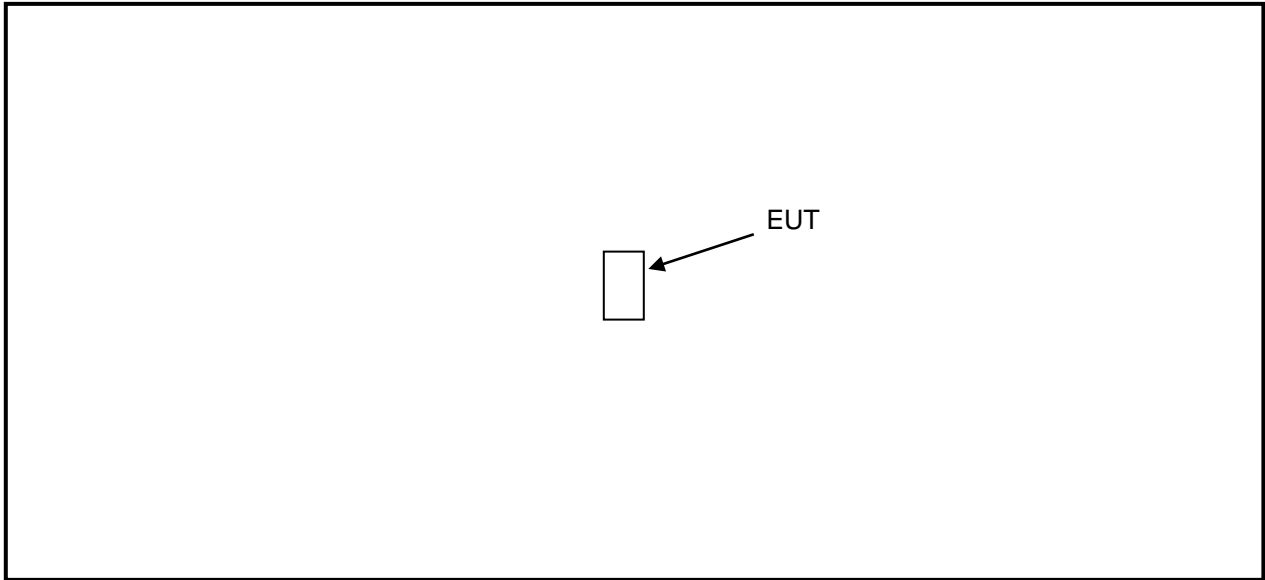


Figure 2-1: Configuration of System Under Test

3 Radiated Emissions – FCC 15.209, 15.249(a)

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009-0.490	2400/f (kHz)	300
0.490-1.705	2400/f (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any circumstances of modulation.

3.1 Radiated Emissions Measurement Test Procedure

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 m (< 1 GHz) / 1.5 m (> 1 GHz) above the ground plane. The spectrum was examined from 9 kHz to the 10th harmonic of the highest fundamental transmitter frequency (9.16 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Table 3-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Chase	CBL6112	Antenna (30 MHz – 2 GHz)	2099	10/4/20
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/17/21
900321	EMCO	3161-03	Horn Antenna (4 - 8.2 GHz)	9528-1020	5/17/21
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1024	5/17/21
900356	EMCO	3160-08	Horn Antenna 12.4 - 18 GHz	9607-1044	5/17/21
901218	EMCO	3160-09	Horn Antenna (18 - 26.5 GHz)	960281-003	5/5/21
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	4/26/21
901729	Insulated Wire Inc.	KPS-1503-3150-KPR	SMK RF Cables 20'	NA	8/21/20

3.2 Radiated Emissions Test Results

Table 3-2: Radiated Emissions Test Data

Emission Frequency (MHz)	Detector Type	Analyzer Level (dBuV/m) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2475	Average	65.9	26.8	92.7	94.0	-1.3
2475	Peak	66.2	26.8	93.0	114.0	-21.0

Note: Testing performed at 3m

3.3 Radiated Emissions Harmonics/Spurious Test Data

Table 3-3: Radiated Emissions Harmonics/Spurious – 2475 MHz; Peak

Emission Frequency (MHz)	Peak Detector (dBuV/m) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
4950	28.1	25.1	53.2	74.0	-20.8
7425	25.3	27.8	53.1	74.0	-20.9
9900	14.3	42.3	56.6	74.0	-17.4
12375	26.5	24.2	50.7	74.0	-23.3
14850	13.3	48.5	61.8	74.0	-12.2
17325	13.5	49.5	63.0	74.0	-11.0
19800	26.1	27.2	53.3	74.0	-20.7
22275	26.7	28.5	55.2	74.0	-18.8
24750	5.4	55.8	61.2	74.0	-12.8

Table 3-4: Radiated Emissions Harmonics/Spurious – 2475 MHz; Average

Emission Frequency (MHz)	Average Detector (dBuV/m) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Average Corrected (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4950	19.7	25.1	44.8	54.0	-9.2
7425	15.4	27.8	43.2	54.0	-10.8
9900	2.3	42.3	44.6	54.0	-9.4
12375	16.1	24.2	40.3	54.0	-13.7
14850	1.7	48.5	50.2	54.0	-3.8
17325	2.3	49.5	51.8	54.0	-2.2
19800	16.1	27.2	43.3	54.0	-10.7
22275	16.7	28.5	45.2	54.0	-8.8
24750	-6.2	55.8	49.6	54.0	-4.4

Note: Testing performed at 3m

Measurement uncertainty: Measurement uncertainties shown for these tests are expanded uncertainties expressed at 95% confidence level using a coverage factor $k = 2$. ± 4.6 dB

Result: Pass

Test Personnel

Daniel W. Baltzell
 Test Engineer



Signature

October 24, 2019
 Date of Test

4 AC Conducted Emissions - FCC 15.207

Device is battery operated; no AC conducted emissions are required.

5 Conclusion

The data in this measurement report shows that the EUT as tested, HomeoLux LLC Controller, FCC ID: 2AUWD-40C2019, complies with the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.