

Global EMC Inc. Labs

MPE Evaluation

As per

Industry Canada Safety Code 6

&

FCC Part 15 Subpart C: 2007 15.247i

FCC Part 1, Section 1.1310 Table 1 (B)

On the

EnviroGrid Controller – RM2-0001



Ashwani Malhotra
Global EMC Inc.
180 Brodie Dr. Unit 2
Richmond Hill, ON L4B 3K8
Canada
Ph: (905) 883-3919

Testing produced for



See Appendix A for full customer & EUT details.





Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Table of Contents

Table of Contents	2
Report Scope	3
Summary	4
Test Results Summary	5
Justifications, Descriptions, or Deviations.....	5
Applicable Standards, Specifications and Methods.....	6
Sample calculation(s).....	7
Sample calculation(s).....	7
Document Revision Status.....	7
Definitions and Acronyms	8
Testing Facility	9
Calibrations and Accreditations.....	9
Testing Environmental Conditions and Dates	10
Detailed Test Results Section	11
Maximum Permissible Exposure	12
Appendix A – EUT Summary.....	13
Appendix B – EUT and Test Setup Photographs.....	14

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Report Scope

This report addresses the EMC verification testing and test results of the EnviroGrid Controller RM2-0001 Zigbee module, herein referred to as EUT (Equipment Under Test) performed at Global EMC Labs.


The EUT was evaluated for compliance against the following standards:

IC Safety Code 6 & FCC Part 1, Section 1.1310 Table 1 (B)

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report. The results contained in this report relate only to the item(s) tested.

This report does not imply product endorsement by A2LA or any other accreditation agency, any government, or Global EMC Inc.


Opinions/interpretations expressed in this report, if any, are outside the scope of Global EMC Inc accreditation. Any opinions expressed do not necessarily reflect the opinions of Global EMC Inc, unless otherwise stated.

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Summary

The results contained in this report relate only to the item(s) tested.

EUT FCC Certification #, FCC ID:	WMB – RM2-0001
EUT IC Certification #, IC:	7894A – RM2-0001
EUT Passed all tests performed.	Yes (see test results summary)
Tests conducted by	Ashwani Malhotra

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Test Results Summary

Standard/Method	Description	Class/Limit	Result
FCC 15.247(i) IC Safety code 6	Maximum Permissible Exposure	> 20 cm separation.	Pass See justification and calculations
Overall Result			PASS


All tests were performed by Ashwani Malhotra

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties. A 'PASS' / 'FAIL' grade within measurement uncertainty is marked with a '*'.

Justifications, Descriptions, or Deviations


The following justifications for tests not performed or deviations from the above listed specifications apply:

For maximum permissible exposure, this device operates at less than 1 Watt at 2400 – 2480.0 MHz and is designed to operate greater than 20 cm from personnel during normal operation. No testing is required, however worst case calculated exposure compliance follows later in this report.

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Applicable Standards, Specifications and Methods

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
CFR 47 FCC 15	- Code of Federal Regulations – Radio Frequency Devices
CISPR 22:1997	- Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
ICES-003:2004	- Digital Apparatus - Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard
ISO 17025:2005	- General Requirements for the competence of testing and calibration laboratories
RSS 210:2005	- Issue 6: Spectrum Management and Telecommunications Policy. Radio Standards Specification Low Power Licence-Exempt Radiocommunication Devices
IC Safety Code 6	- Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 KHZ to 300 GHZ

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Sample calculation(s)


Margin = limit – (received signal + antenna factor + cable loss – pre-amp gain)

Margin = 50.5dBuV/m – (50dBuV + 10dB + 2.5dB – 20dB)

Margin = 8.5 dB

Document Revision Status

Revision 1 - August 13, 2008

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

AE – Auxillary Equipment.

BW – Bandwidth. Unless otherwise stated, this refers to the 6 dB bandwidth.

EMC – Electro-Magnetic Compatibility

EMI – Electro-Magnetic Immunity


EUT – Equipment Under Test

ITE – Information Technology Equipment with a primary function(s) of entry, storage, display, retrieval, transmission, processing, switching, or control, of data.

LISN – Line impedance stabilization network

NCR – No Calibration Required

RF – Radio Frequency


Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Testing Facility

Testing for EMC on the EUT was carried out at Global EMC labs in Toronto, Ontario, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on an EUT with a maximum width or length of up to 2m and height up to 3m. The chamber is equipped with a turn table that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120 Vac and 240Vac single phase, or 208 Vac 3 phase input. DC capability is also available. The chamber is equipped with an antenna mast that controls polarization and height from the control room adjoining the shielded chamber. Radiated emissions measurements are performed using a Bilog, and Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN.

Calibrations and Accreditations


The measurement site used is registered with Federal Communications Commission (FCC) and Industry Canada (IC). This site is calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The semi-anechoic chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	


Testing Environmental Conditions and Dates

Following were the environmental conditions in the facility during time of testing –

Date	Test	Init.	Temperature (°C)	Humidity (%)	Pressure (kPa)
August 9 - 13, 2008	All	AM	22-24°C	38-43%	101.1 -101.5 kPa

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Detailed Test Results Section

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Maximum Permissible Exposure

Purpose

The purpose of this test is to ensure that the RF energy intentionally transmitted, in terms of power density emitted from the EUT at a stated operating distance does not exceed the limits listed below as defined in the applicable test standard, as calculated based upon readings obtained during testing. This helps protect human exposure to excessive RF fields.

Limit(s) and Method

The limits, as defined in FCC 15.247(i) and FCC 1.1310 Table 1 (B) limits for general public exposure was applied. The limit for the frequency range of 1.5 GHz to 100 GHz was applied. This is a limit of 1.0 mW/cm². The distance used for calculations was 20cm, as this is the minimum distance an operator will be from the EUT during normal operation, as stated by the manufacturer.

Results

The EUT passed the requirements. The worst case calculated power density was 0.0017 mW/cm², this is significantly under the 1.0 mW/cm² requirement.

Calculations

Method 1 (conducted power)

$$P_d = (P_t * G) / (4 * \pi * R^2)$$

Where P_t = 18.9 dbm or 77.6mW as per Peak power conducted output


Where G = 5.5 dBi, or numerically 3.55

Where R = 20 cm

$$P_d = (77.6 \times 3.55) / (4 \times \pi \times 20\text{cm}^2)$$

$$P_d = 275.4 \text{ mW} / 5026 \text{ cm}^2$$

$$P_d = 0.055 \text{ mW/cm}^2$$


Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Appendix A – EUT Summary


General EUT Description

Client	
Organization	Regen Energy
Contact	Roman Kulyk
Phone	1-416-934-1040
Email	roman.kulyk@regenenergy.com
EUT Details	
EUT Model number	RM2-0001
Equipment Category	Wireless module for energy management applications.
Basic EUT Functionality	RM2-0001 is a energy management wireless switch that is used to control high current devices. The current clamp on the unit is used to measure the current of the machine being monitored and based on a algorithm it is switched.
Input Voltage and Frequency	120V 60Hz
Connectors available on EUT	None.
Peripherals Required for Test	None.
Release type	Final
Intentional Radiator Frequency	2400 – 2480.0 MHz for Zigbee protocol.

Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see ‘Appendix B – EUT & Test Setup Photographs’.

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Appendix B – EUT and Test Setup Photographs

Client	Regen Energy	
Product	EnviroGrid Controller – RM2-0001	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

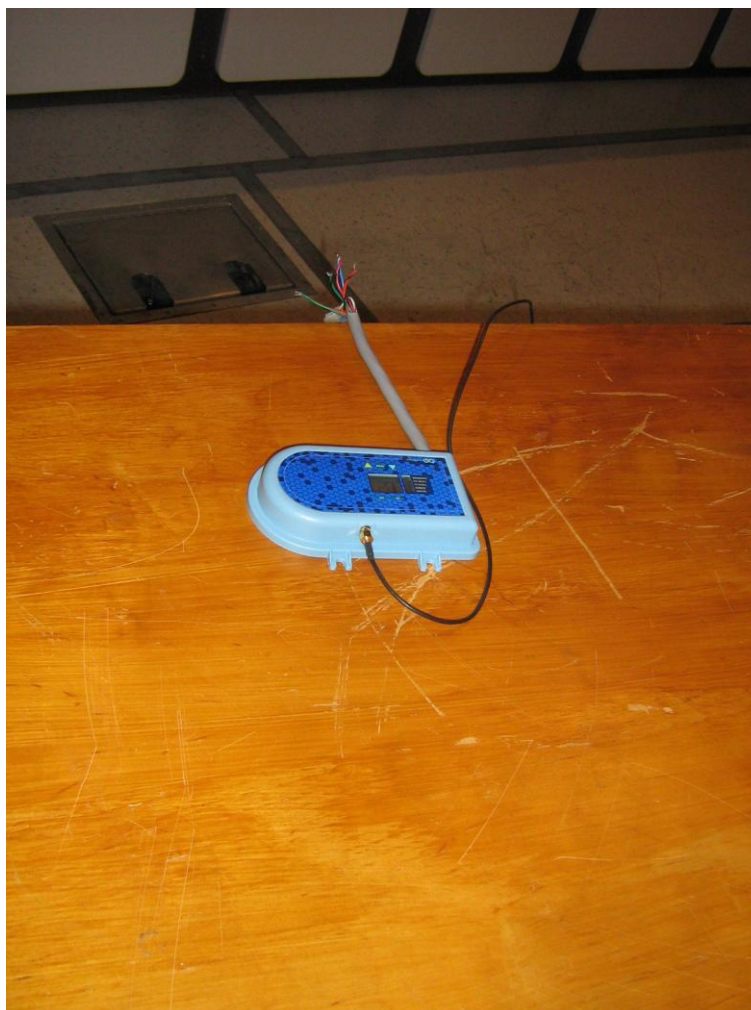


Figure 1 – EUT