

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

RapidSE Zigbee Smart Energy Module

ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0



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	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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.....	6
Applicable Standards, Specifications and Methods.....	7
Sample calculation(s).....	8
Document Revision Status.....	8
Definitions and Acronyms	9
Testing Facility	10
Calibrations and Accreditations.....	10
Testing Environmental Conditions and Dates	11
Detailed Test Results Section	12
Maximum Permissible Exposure	13
Appendix A – EUT Summary.....	14
Appendix B – EUT and Test Setup Photographs.....	15

Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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 RapidSE Zigbee Smart Energy Module, ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0 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	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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:	XFFMMBPA10
EUT Industry Canada Certification #, IC:	8365AMMBPA10
EUT Passed all tests performed.	Yes (see test results summary)
Tests conducted by	Ashwani Malhotra


Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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 '*'.


Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Justifications, Descriptions, or Deviations

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


There are two product variants for this device (ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0). ZGB.MMB-PA-LNA.1.0 has a low noise amplifier while the ZGB.MMB.-PA.1.0 variant does not. All tests were performed with the unit that has the low noise amplifier, spurious emissions were verified on the unit that has no low noise amplifier.

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	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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 - Sept 16th, 2009

Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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 is 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	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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)
Sept 9 - 13, 2008	All	AM	23.5-24.1°C	39-42%	99.8 -100.5 kPa

Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Detailed Test Results Section

Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
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 0.022 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 $P_t = 17.5$ dbm or 56.23mW as per Peak power conducted output


Where $G = 3.0$ dBi, or numerically 2.0

Where $R = 20$ cm

$$P_d = (56.23 \times 2.0) / (4 \times \pi \times 20\text{cm}^2)$$

$$P_d = 112.2 \text{ mW} / 5026 \text{ cm}^2$$

$$P_d = 0.022 \text{ mW/cm}^2$$


Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Appendix A – EUT Summary


General EUT Description

Client	
Organization	MMB Research
Contact	Mark Borins
Phone	416.636.3145
Email	mark.borins@mmbresearch.com
EUT Details	
EUT Model number	ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0
Equipment Category	Wireless module for energy management applications.
Basic EUT Functionality	RapidSE™ is an embedded software package preloaded onto a ZigBee module. Integrated with your hardware, RapidSE acts as a gateway between your device and the local HAN. RapidSE maps ZigBee Smart Energy and Home Automation functions to a simple serial protocol, allowing you to issue and receive commands using your existing microcontroller.
Input Voltage and Frequency	5 Vdc
Connectors available on EUT	None.
Peripherals Required for Test	None.
Release type	Final
Intentional Radiator Frequency	2400 – 2480.0 MHz for Zigbee applications as described above.

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	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

Appendix B – EUT and Test Setup Photographs

Client	MMB Research	
Product	RapidSE Zigbee Smart Energy Module ZGB.MMB-PA-LNA.1.0 and ZGB.MMB.-PA.1.0	
Standard(s)	RSS 210 Issue 6:2005 / FCC Part 15 Subpart C 15:2006	

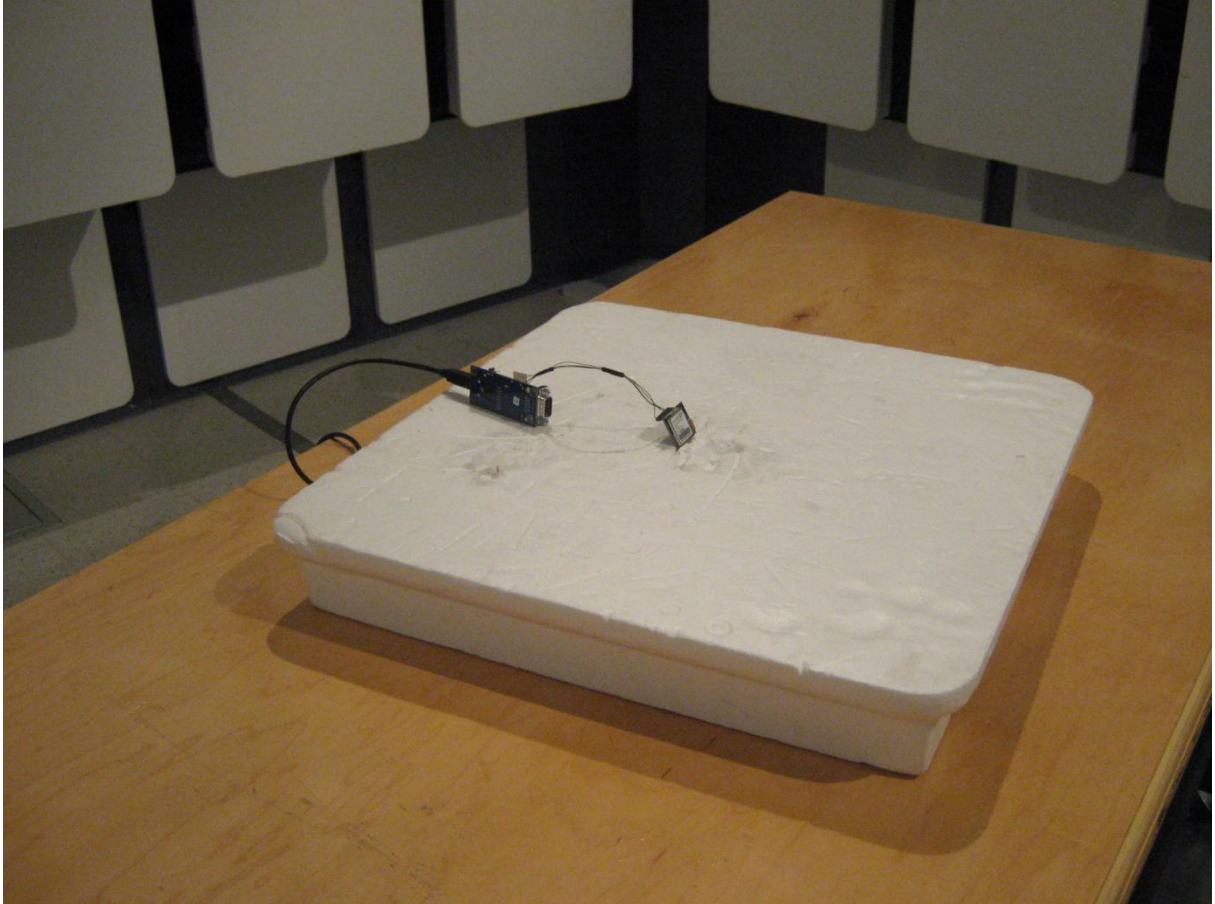


Figure 1 – EUT

Note: These photos are for information purposes only. Also refer to PDF files that are separate from this test report.