

Test Report # 317328 C

Equipment Under Test: Leviton 0XB1803 ZigBee/Bluetooth LE PCA Transceiver Module, MGx

Test Date(s): 2/25/19

Prepared for: Dmitriy Moskovkin
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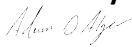
Report Issued by: Shane Dock, EMC Engineer

Signature:



Date: 11/4/2019

Report Reviewed by: Adam Alger, Quality Manager

Signature: 

Date: 3/22/2019

Report Constructed by: Shane Dock, EMC Engineer

Signature:



Date: 8/7/2019

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Laird Technologies Test Services in Review

The Laird Technologies, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope

A2LA Certificate Number: 1255.01

Scope of accreditation includes all test methods listed herein, unless otherwise noted.



Federal Communications Commission (FCC) – USA

Accredited recognition of two 3 meter Semi-Anechoic Chambers

Accredited Test Firm Registration Number: 953492



**Government
of Canada**

Innovation, Science and Economic Development Canada

ISED Site listing of two 3 meter Semi-Anechoic Chambers based on RSS-GEN – Issue 4

File Number: IC 3088A-2

File Number: IC 3088A-3

Company: Leviton Manufacturing Co., Inc.	Page 3 of 15	Name: Leviton 0XB1803 ZigBee/Bluetooth LE PCA Transceiver Module, MGx
Report: 317328C		Model: 0XB1803 Module, Zigbee protocol
Job: C-2856		Serial: Engineering Samples

1 TEST REPORT SUMMARY

During **2/25/19** the Equipment Under Test (EUT), **Leviton 0XB1803 ZigBee/Bluetooth LE PCA Transceiver Module, MGx**, as provided by **Leviton Manufacturing Co., Inc.** was tested to the following requirements:

Requirement	Description	Specification	Method	Result
FCC Part 1.1307, 2.1091, 2.1093	RF Exposure and equipment authorization requirements	Reported	FCC KDB 447498	Reported
ISED Canada RSS-102	Radio Frequency Radiation Exposure Evaluation	Reported	RSS-102 Section 2.5.2	Reported

Notice:

The results relate only to the item tested and described in this report. Any modifications made to the equipment under test after the specified test date(s) may invalidate the data herein.

If the resulting measurement margin is seen to be within the uncertainty value, as listed in this report, the possibility exists that this unit may not meet the required limit specification if subsequently tested.

2 CLIENT INFORMATION

Company Name	Leviton Manufacturing Co., Inc.
Contact Person	Dmitriy Moskovkin
Address	20497 SW Teton Avenue Tualatin, OR 97062

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Leviton OXB1803 ZigBee/Bluetooth LE PCA Transceiver Module, MGx
Model Number	OXB1803 Module, Zigbee protocol
Serial Number	Engineering Samples
FCC/IC ID	FCC: QGH-ZBMG IC ID:2473A-ZBMG

2.2 Product Description

Zigbee and Bluetooth low energy module using B1803 PCA and Silicon Labs EFR series MG1, MG12, or MG13

2.3 Modifications Incorporated for Compliance

None noted at time of test

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 Additional Information

AC Adapter used to power Board with 5 VDC. EUT programmed via Laptop and WSTK Board using Gecko SDK Suite V1.1.1 and Adapter firmware version 1v0p3b664. The MG12 module was tested, and the MG1 and MG13 modules feature an identical layout on the PCB.

2.6 Channels Tested

2405 MHz – Power Setting 20
2440 MHz - Power Setting 20
2475 MHz - Power Setting 20
2480 MHz - Power Setting 10

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Minimum power tested with a setting of 8 for each channel.

3 REFERENCES

Publication	Edition	Date
CFR 47 Part 15	-	2018
ANSI C63.10	-	2013
RSS-247	2	2017
RSS GEN	5	2014
RSS-102	5	2015
CFR 47 Part 1 and 2	-	2018
FCC KDB 447498	6	2015

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k = 2$.

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty \pm
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

Parameter	ETSI U.C. \pm	U.C. \pm
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C

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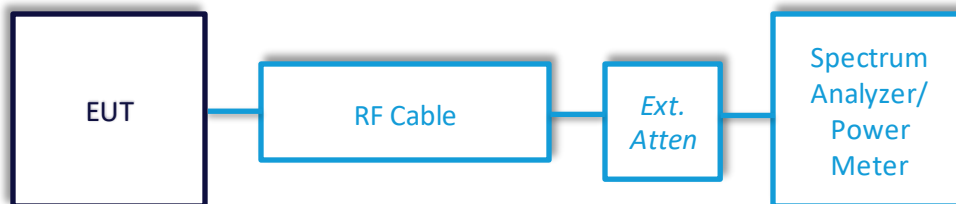
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

5 TEST DATA

5.1 Antenna Port Conducted Emissions

Description of Measurement	<p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p>
Example Calculations	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

Block Diagram



Date : 30-Oct-2017 Test : Conducted RF Measurements Job : C-2856
 PE : Sha ne Dock Customer : Leviton LES Quote : 317328

No.	Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due Date	Equipment Status
1	EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/24/2019	4/24/2020	Active Calibration
2	AA 960172	Cable	A.H. Systems, Inc	SAC-26G-1	387	11/15/2017	11/12/2018	Active Verification

Table

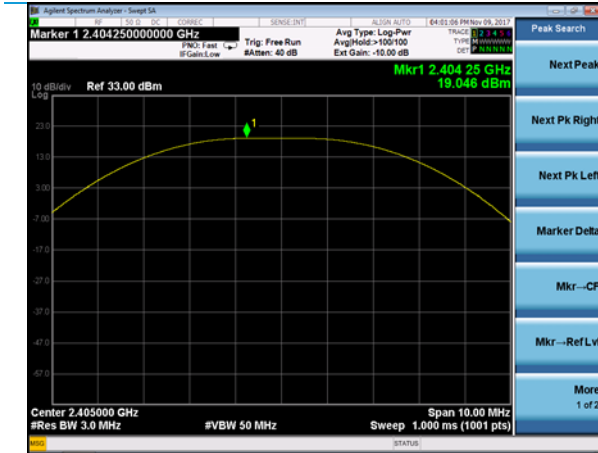
Channel	2405 MHz	2440 MHz	2475 MHz	2480 MHz
Conducted Output Power (dBm)	19.0	18.8	18.6	7.6

Table – Minimum Test Power

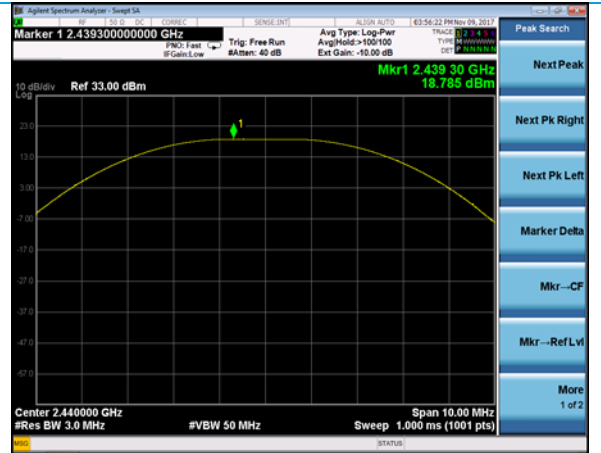
Channel	2405 MHz	2440 MHz	2480 MHz
Conducted Output Power (dBm)	6.127	5.826	5.230

Plots

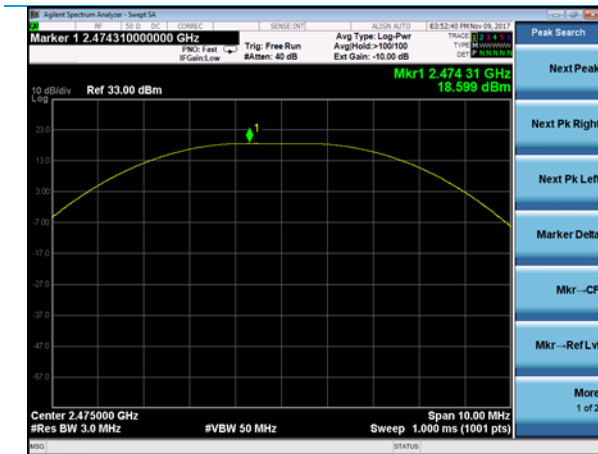
Conducted Output Power



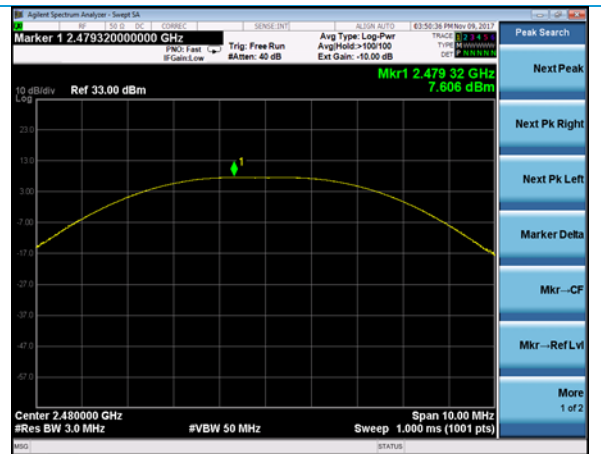
2405 MHz



2440 MHz



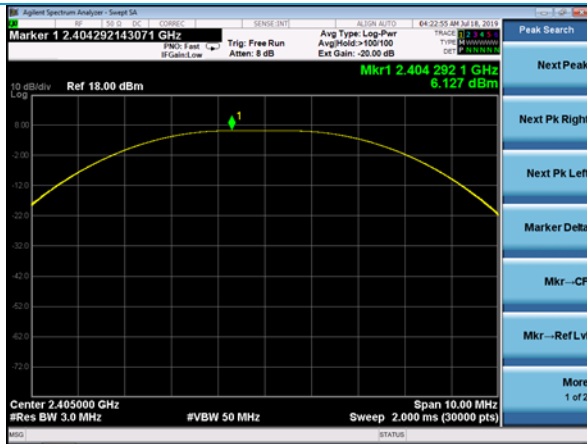
2475 MHz



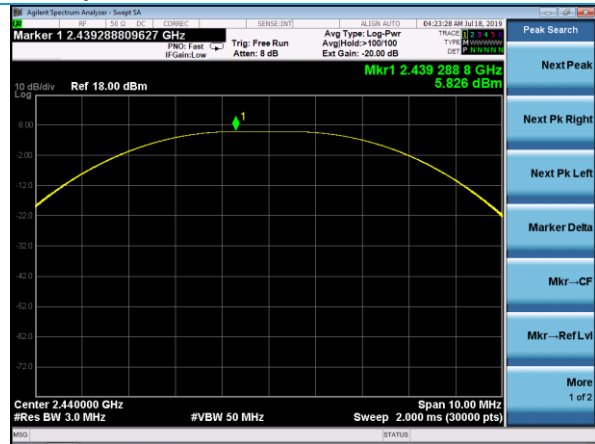
2480 MHz

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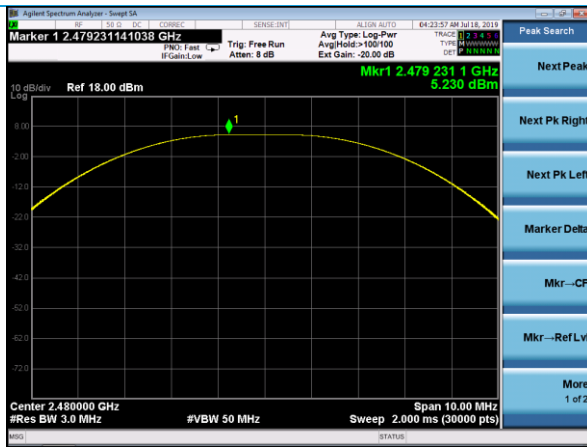
Minimum Conducted Output Power



2405 MHz



2440 MHz



2480 MHz

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6 EXCLUSION CALCULATION

6.1 FCC

Worst Case Scenario: 19.0 dBm at 2405 MHz

Tune-Up Tolerance: 0.4 dB

Total Power: 19.4 dBm = 87.1 mW

Peak Antenna Gain: 1.5 dBi

Minimum test separation distance: To be calculated (EUT is a module).

From OET KDB 447498 Section 4.3.1.a:

For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{(\text{GHz})}}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,³⁰ where

- $f_{(\text{GHz})}$ is the RF channel transmit frequency in GHz

$$(87.1 \text{ mW} / X \text{ mm}) * \text{sqrt}(2.405 \text{ GHz}) \leq 3.0$$

Minimum test separation distance = 45 mm

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6.2 ISED Canada

Per Section 2.5.1:

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance^{4,5}

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤ 5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤ 300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥ 50 mm
≤ 300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Exemption limit at 30 mm for 2402 MHz (interpolated): 84.4 mW

Exemption limit at 35 mm for 2402 MHz (interpolated): 125.6 mW

Since 87.1 mW is above the 30 mm limit but not the 35 mm limit, the EUT is exempt from routine for all test separation distances at 35 mm or greater.

7 REVISION HISTORY

Version	Date	Notes	Person
V0	3/18/19	First Draft	Shane Dock
V1	4/10/19	Revised Draft	Shane Dock
V2	5/2/2019	Final Draft	Shane Dock
V3	8/7/19	Low Power Data Added	Shane Dock
V4	11/4/19	Updated for TCB Responses	Shane Dock

END OF REPORT