

Test Report # 319197 C (RFx)

Equipment Under Test: 982057

Test Date(s): December 3rd, 2019

Prepared for: Pass & Seymour, Inc. d/b/a Legrand
Attn: Joshua Haines
50 Boyd Avenue
Syracuse, NY 13209

Report Issued by: Zach Wilson, EMC Engineer

Signature: 

Date: 5/18/2020

Report Reviewed by: Adam Alger, Quality Manager

Signature: 

Date: 5/18/2020

Report Constructed by: Zach Wilson, EMC Engineer

Signature: 

Date: 5/18/2020

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Job: C-3272		Serial: Engineering Sample

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Laird Connectivity 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 17025:2017 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 Test Firm Registration Number: 953492

Recognition of two 3 meter Semi-Anechoic Chambers



**Government
of Canada**

Innovation, Science and Economic Development Canada

Accredited U.S. Identification Number: US0218

Recognition of two 3 meter Semi-Anechoic Chambers

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1 TEST REPORT SUMMARY

During **December 3rd, 2019** the Equipment Under Test (EUT), **982057**, as provided by **Pass & Seymour, Inc. d/b/a Legrand** was tested to the following requirements of the **Federal Communications Commission and Innovation, Science and Economic Development Canada** :

Test Requirements	Description	Specification	Method	Compliant
RSS-102	Radio Frequency Exposure Compliance of Radiocommunication Apparatus	Reported	RSS-102 Section 2.5.2	Reported
FCC Part 1.1307, 2.1091, 2.1093	RF Exposure and equipment authorization requirements	Reported	FCC KDB 447498 D01	Reported

Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

Measurement Type	Rule
Emissions – Amplitude	N/A
Emissions – Frequency	N/A
Immunity	N/A

2 CLIENT INFORMATION

Company Name	Pass & Seymour, Inc. d/b/a Legrand
Contact Person	Joshua Haines
Address	50 Boyd Avenue Syracuse, NY 13209

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	982057
Model Number	982057
Serial Number	Engineering Sample
FCC ID	2AU5D92057
IC ID	25764-982057

2.2 Product Description

Zigbee module using a custom PCB F-type antenna. The antenna gain is 1.7 dBi. Low channel set at 2405 MHz, Mid channel at 2440 MHz, and High channel at 2475 MHz.

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 Radio Programming

Channel increments by POR implemented by customer.

2.6 EUT Power

EUT powered by 5VDC on a lab power supply.

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3 REFERENCES

Publication	Edition	Date
CFR Title 47	-	2019
RSS-102	5	2015
FCC KDB 447498 D01	v06	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
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

5 TEST DATA

5.1 Zigbee Fundamental Emission

Operator	Zach Wilson	QA	Anthony Smith
Temperature	28.4°C	R.H. %	32.5
Test Date	12/3/2019	Location	Radio Bench
Requirement	FCC 15.247, RSS-247	Method	ANSI C63.10 Section 11.9.1.1

Test Parameters

Frequency	2405-2475 MHz
RBW	10 MHz
VBW	50 MHz
EUT Power	5VDC
EUT Mode	Zigbee Transmit
Example Calculation	Conducted Power (e.i.r.p.) = Conducted Power (dBm) + Antenna Gain (dBi)

Instrumentation



Date : 25-Nov-2019

Test : Conducted Radio

Job : C-3272

PE : Zach Wilson

Customer : Legrand

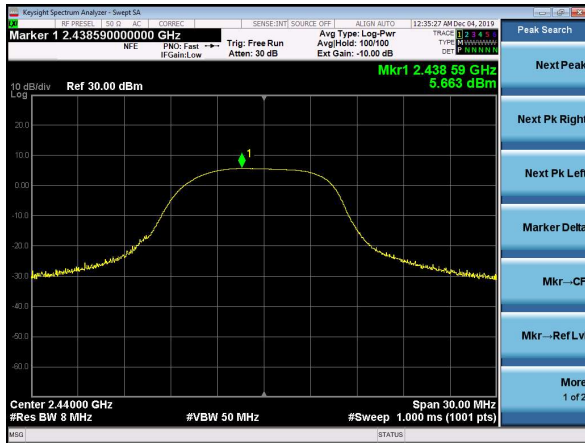
Quote : 319197

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	12/9/2018	12/9/2019	Active Verification

Table

Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
2405	5.6	30.0	24.4
2440	5.7	30.0	24.3
2475	5.7	30.0	24.3

Plots



Worst Case Conducted Peak Output Power
Mid Channel

6 EXCLUSION CALCULATION

6.1 FCC

Worst Case: **5.7 dBm (Pout) + 1 dB (Tune-Up Tolerance) = 6.7 dBm = 4.7 mW**

Test Separation Distance Used: **5 mm**

FCC RF Exposure Calculation

- 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:

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

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

$$[(4.7\text{mW})/(5\text{mm})] \cdot [2.45\text{GHz}] = 2.3 \text{ Numeric Threshold}$$

The result of the calculation, 2.3, is less than the numeric threshold of 3.0 and 7.5. Therefore, routine SAR testing is **excluded for FCC** if the end device is **greater than or equal to 5 mm** from the end user.

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6.2 ISED Canada

ISED Canada Limits

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

Module Worst Case: **5.7 dBm** (Pout) + **1 dB** (Tune-Up Tolerance) + **1.7 dBi** (Antenna Gain) = **8.4 dBm = 6.9 mW**

Test Separation Distance Allowed: **10 mm**

Routine SAR testing is **excluded for ISED Canada** if the end device is **greater than or equal to 10 mm** from the end user.

7 REVISION HISTORY

Version	Date	Notes	Person
v0.0	12-31-2019	Initial Draft	Zach Wilson
v0.1	5-12-2020	Added customer information	Zach Wilson
v0.2	5-18-2020	Added ISED	Zach Wilson

END OF REPORT