Test Report # 316375 C

Equipment Under Test:	Entry Station
Test Date(s):	6/1/2020
Prepared for:	Dmitriy Moskovkin Leviton Manufacturing Co., Inc. Energy Management, Controls and Automation (EMC&A) 20497 SW Teton Avenue Tualatin, OR 97062

Report Issued by: Shane Dock, EMC Engineer

Signature:

Date:6/03/2020

Report Reviewed by: Adam Alger, Quality Manager

Signature:

Date: 06/03/2020

Report Constructed by: Shane Dock, EMC Engineer

Signature:

Date: 12/20/2018

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Laird Connectivity Test Services in Review

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

TESTING CERT #1255.01

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

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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

1 TEST REPORT SUMMARY

During **6/1/20** the Equipment Under Test (EUT), **Entry Station**, as provided by **Leviton LES** 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	Radiofrequency Radiation Exposure Evaluation: Portable	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 Ave Tualatin, OR 97062

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Entry Station
Model Number	DLDNK-01W, DLDNK-02W, DLDNK – 04W, DLDNK-08W ZLDNK-01W, ZLDNK-02W, ZLDNK – 04W, ZLDNK-08W
Serial Number	Engineering Sample
FCC/IC Number	FCC: QGH-DLDNK IC: 2473A-DLDNK

2.2 Product Description

Lumina RF/Intellect Room Controller

1/2/4/8 Button multi-function Bluetooth keypad with room controller and LED feedback functionality. NEMA form factor.

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 - Zigbee

EUT programmed via Ember Desktop per channel plan listed below.

CH11 – 2405 MHz – Power Setting of 8

CH18 – 2440 MHz – Power Setting of 8

CH25 – 2475 MHz – Power Setting of 8

CH26 – 2480 MHz – Power Setting of -2

2.6 Additional Information - BLE

EUT programmed via Smart RF Studio per channel plan listed below.

Low – 2402 MHz

Mid – 2440 MHz

High – 2480 MHz

All power settings set in test software to 0.

3 REFERENCES

Publication	Edition	Date
CFR 47 Part 15	-	2020
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 ±
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. ±	U.C. ±
Radio Frequency, from F0	$1x10^{-7}$	$0.55x10^{-7}$
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 Fundamental Emission – Zigbee

Operator	Shane Dock
Test Date	11/16/16
Location	Conducted measurement area
Temp. / R.H.	70-74 degrees F/ 30-42% RH
Requirement	FCC: 15.247 (b)(3) IC: RSS-247 5.4 (d)
Method	ANSI C63.10 Section 11.9.1.1

Limits:

Maximum Conducted Output Power (watts)	Maximum Conducted Output Power (dBm)
1	30

Test Parameters

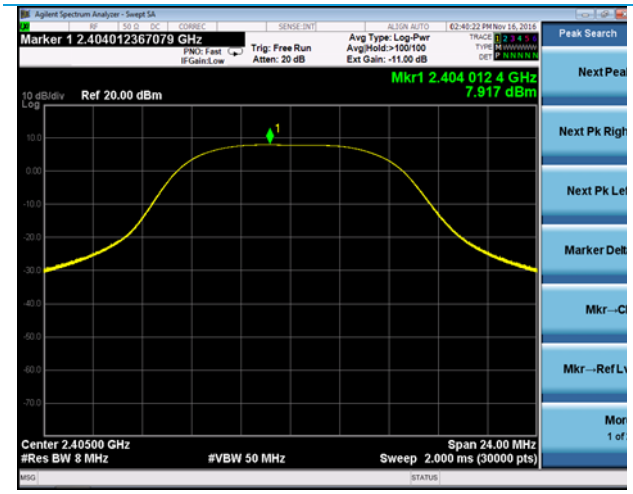
Frequency	2405, 2440, 2480 MHz
RBW	8 MHz
Notes	On 6/4/18, original data was affirmed to be equivalent or lower within the bounds of the uncertainty of the measurement. 11/16/16 data reported as worst-case.

Table

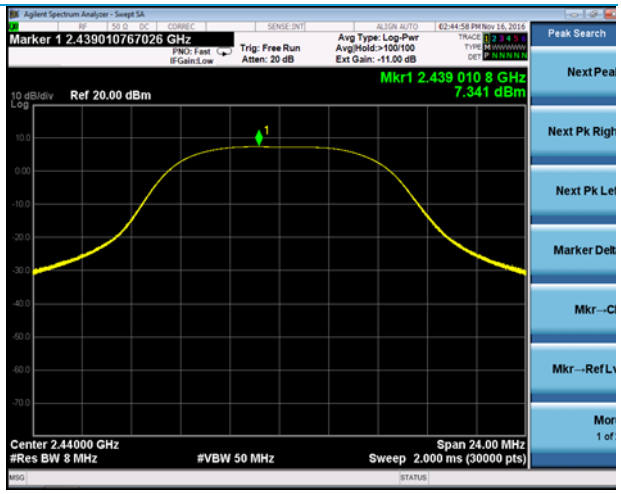
Channel	11	18	25	26
Power Setting	8	8	8	-2
Pout Conducted (dBm)	7.917	7.341	6.648	-2.213

Worst Case Margin = 30.000 dBm – (7.917 dBm) = 22.083 dB

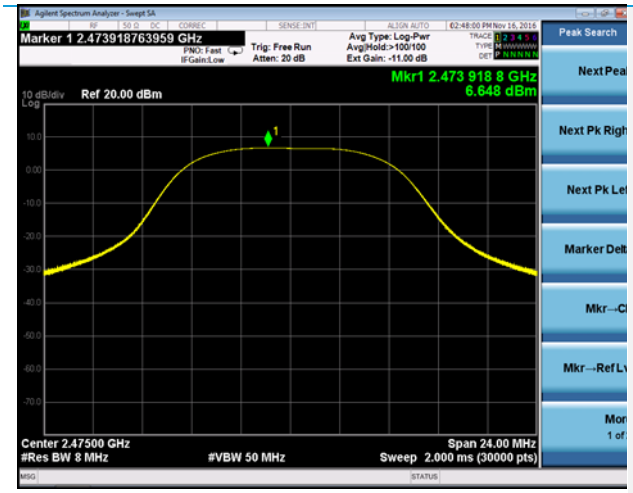
Plots



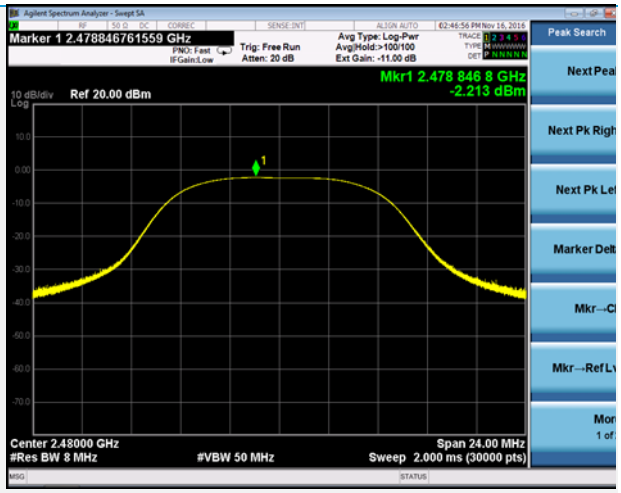
Channel 11 Pout



Channel 18 Pout



Channel 25 Pout



Channel 26 Pout

5.2 Fundamental Emission – BLE

Operator	Shane Dock
Test Date	11/16/16, 6/4/18
Location	Conducted RF Measurement Area
Temp. / R.H.	70-74 degrees F/ 30-42% RH
Requirement	FCC: 15.247 (b)(3) IC: RSS-247 5.4 (d)
Method	ANSI C63.10 Section 11.9.1.1

Limits:

Maximum Conducted Output Power (watts)	Maximum Conducted Output Power (dBm)
1	30

Test Parameters

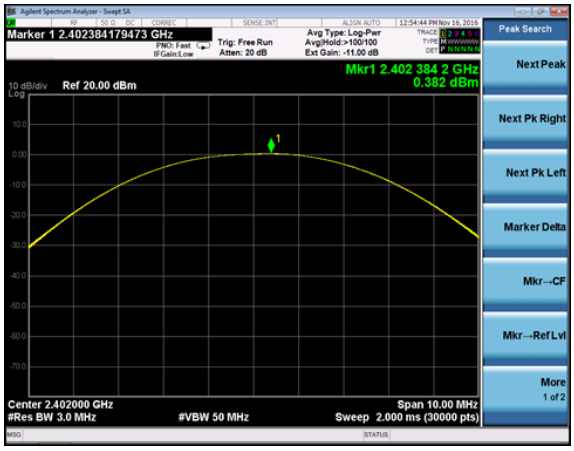
Frequency	2402, 2440, 2480 MHz
RBW	3 MHz
Notes	On 6/4/18, original data was affirmed to be equivalent or lower within the bounds of the uncertainty of the measurement. 11/16/16 data reported as worst-case.

Table

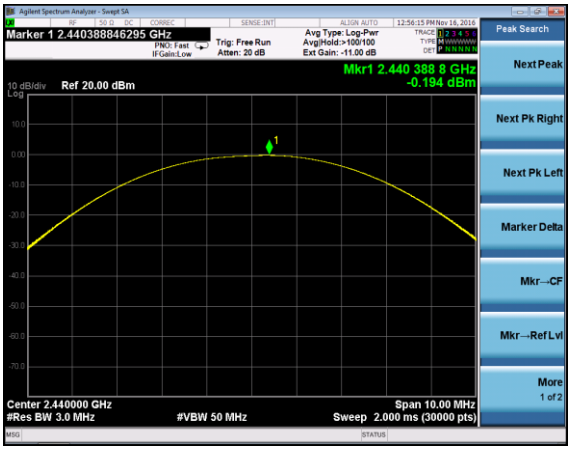
Channel	Low	Mid	High
Power Setting	0	0	0
Pout Conducted (dBm)	0.382	-0.194	-0.927

Worst Case Margin = 30.000 dBm – (0.382 dBm) = 29.618 dB

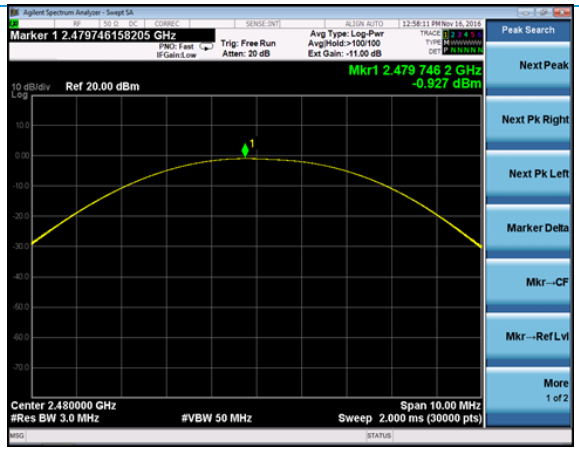
Plots



Low Channel Pout



Mid Channel Pout



High Channel Pout

6 EXCLUSION CALCULATION

6.1 FCC

Compliance to 2.1091 is to be demonstrated via MPE calculations at a customer-provided 20 cm separation distance.

Output Power (dBm) = Measured Value (dBm) + Antenna Gain (dBi) + Tune-up Tolerance (dB)

Zigbee Output Power = 7.9 dBm + 1.5 dBi + 0.4 dB = 9.8 dBm = 9.5 mW at 2405 MHz

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	8.30	(dBm)
Maximum peak output power at antenna input terminal:	6.761	(mW)
Antenna gain(typical):	1.5	(dBi)
Maximum antenna gain:	1.413	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2405	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)

Power density at prediction frequency: 0.001900 (mW/cm^2)

BLE Output Power = 0.4 dBm + 1.5 dBi + 0.3 dB = 2.2 dBm = 1.7 mW at 2402 MHz

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	0.70	(dBm)
Maximum peak output power at antenna input terminal:	1.175	(mW)
Antenna gain(typical):	1.5	(dBi)
Maximum antenna gain:	1.413	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2402	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at prediction frequency:	0.000330	(mW/cm^2)

As the power density value is lower than the MPE limit at the prediction frequency, the unit is excluded from routine SAR testing.

6.2 Industry Canada

Per RSS-102 Section 2.52:

- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

Zigbee is worst-case.

For 2402 and 2405 MHz, the Exemption Limit is .0131* f(MHz)^.6834 = 2.7 W

Since 9.5 mW < 2.7 W, the EUT is exempt from routine SAR evaluation.

7 REVISION HISTORY

Version	Date	Notes	Person
V0	12/20/18	Rough Draft	Shane Dock
V1	6/1/20	Customer Information Added	Shane Dock
V2	6/3/20	Updated report, calculations	Shane Dock
V3	6/3/20	Final Draft	Shane Dock

END OF REPORT