

# Test Report # 318011 B

Equipment Under Test:	Sensorhead Phase 2
Test Date(s):	12/04/19
Prepared for:	Dmitriy Moskovkin Leviton Manufacturing Co., Inc. Energy Management, Controls and Automation (EMC&A) 20497 SW Teton Avenue Tualatin, OR 97062

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Report Constructed by: Shane Dock, EMC Engineer Signature: Jame Jack	Date: 12/4/2019

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Job: C-2913		Serial: Engineering Sample



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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:



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



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 **12/20/18** the Equipment Under Test (EUT), **Sensorhead Phase 2**, 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	Radiofrequency Radiation Exposure Evaluation: 102 Portable		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.

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### 2 CLIENT INFORMATION

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

### 2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Sensorhead Phase 2
ZL00J-T0W
Engineering Sample
FCC: 2ASLN-ZLOOJ IC: 25037-ZLOOJ

#### 2.2 Product Description

Intellect Intelligent Sensor for double-d mount inside fixture

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

Unit Powered up with 5.5 VDC. Power Setting for all channels set to 16. Channels tested are 11, 18, and 26. EUT programmed with Simplicity Studio through a serial connection.

Low – Channel 11 – 2405 MHz Mid – Channel 18 – 2440 MHz High – Channel 26 – 2480 MHz

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# **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	-	2020
FCC KDB 447498	6	2015

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### 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 <sup>-7</sup>	0.55x10 <sup>-7</sup>
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 %

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# 5 TEST DATA

#### 5.1 Fundamental Emission

Operator	Shane Dock
Test Date	1/31/18
Location	Conducted RF Area
Temp. / R.H.	72 degrees F/ 36% RH
Requirement	FCC: 15.247 (b)(3) IC: RSS-247 5.4 (d)
Method	ANSI C63.10 Section 11.9.1.1

### Limits: (Measured as Average)

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

#### **Test Parameters**

Frequency	2405-2475 MHz
Settings	Low, Mid, and High Channels Measured
Settings	Unit measured at full power

#### Table

### Max Power (dBm)

Channel	Low	Mid	High
Power Setting (dBm)	16	16	16
Output Power (dBm)	15.370	15.287	15.046

Worst Case Margin = Limit - Closest Measurement = 30.0 dBm - 15.370 dBm = 14.630 dB

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#### Plots

**Maximum Power** 



High Channel

VBW 50 MHz

enter 2.480000 GH tes BW 3.0 MHz Span 9.000 MHz Sweep 2.000 ms (30000 pts)

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### 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)

Output Power = 15.37 dBm + 0.5 dBi + 0.4 dB = 16.27 dBm = 42.3 mW

#### Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

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:	<u>15.80</u> (dBm)
Maximum peak output power at antenna input terminal:	<u>38.019</u> (mW)
Antenna gain(typical):	0.5 (dBi)
Maximum antenna gain:	<u>1.122</u> (numeric)
Prediction distance:	<u> </u>
Prediction frequency:	<u>2405</u> (MHz)
MPE limit for uncontrolled exposure at prediction frequency:	<u>    1.0 (</u> mW/cm^2)
Power density at prediction frequency:	0.008487 (mW/cm^2)
Maximum allowable antenna gain:	21.2 (dBi)
Margin of Compliance at 20 cm =	20.7 dB

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

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### 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 x 10<sup>-2</sup> f<sup>0.6834</sup> W (adjusted for tune-up tolerance), where f is in MHz;

For 2405 MHz, the Exemption Limit is  $.0131* f(MHz)^{.6834} = 2.7 W$ 

Since 38.0 (15.4 dBm) + 0.4 dB mW < 2.7 W, the EUT is exempt from routine SAR evaluation.

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# 7 REVISION HISTORY

Version	Date	Notes	Person
V0	12/4/19	Rough Draft	Shane Dock
V1	3/18/20	Final Draft	Shane Dock
V2	4/7/20	TCB Responses	Shane Dock
V3	5/20/20	Updated Calculations	Shane Dock

# **END OF REPORT**

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