TEST REPORT

Report Number: 15314553-E3V3

Applicant : LEVITON MANUFACTURING CO., INC.
10385 SW AVERY
TUALATIN, OR 97062-2210
USA

Models : LRF3-C3648-1, LRF3-C3648-2, LRF3-C3648-3, LRF3-C3648-4,
LRF3-C3648-5, LRF3-C3648-6, LRF3-C3648-7, LRF3-C3648-8

Brand : Leviton

FCC ID : 2ASLN-C3648

EUT Description : Logic Board C3648 - BLE and Zigbee

Test Standard(s) : FCC 47 CFR PART 1 SUBPART I
FCC 47 CFR PART 2 SUBPART J

Date Of Issue:
2024-09-09

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-06-28	Initial Issue	---
V2	2024-08-22	Updated Model Numbers on Cover Page and Section 1	Tina Chu
V3	2024-09-09	Updated antenna gain on Section 7	Tina Chu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LEVITON MANUFACTURING CO., INC.
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EUT DESCRIPTION: Logic Board C3648 - BLE and Zigbee

MODELS: LRF3-C3648-1, LRF3-C3648-2, LRF3-C3648-3, LRF3-C3648-4,
LRF3-C3648-5, LRF3-C3648-6, LRF3-C3648-7, LRF3-C3648-8

BRAND: Leviton

SERIAL NUMBER: ZBM00-10z: 1MR (Radiated)
ZKM00-10z: 2MR (Radiated)
ZBM00-10z: 1MC (Conducted)
ZKM00-10z: 2MC (Conducted)

SAMPLE RECEIPT DATE: 2024-06-10
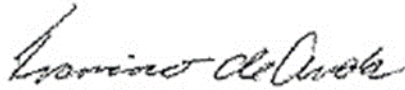
DATE TESTED: 2024-06-10 – 2024-06-25

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 1 SUBPART I & PART 2 SUBPART J	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.

Approved & Released For
UL Verification Services Inc. By:

Prepared By:

Francisco de Anda
Staff Engineer
CONSUMER TECHNOLOGY DIVISION
UL Verification Services Inc.

Tina Chu
Senior Project Engineer
CONSUMER TECHNOLOGY DIVISION
UL Verification Services Inc.

2. TEST METHODOLOGY

All calculations were made in accordance with FCC Parts 1.1310, 2.1091, 2.1093, KDB 447498 D01, KDB 447498 D03, IEEE Std C95.1-2005, IEEE Std C95.3-2002.

3. REFERENCES

All measurements were made as documented in test reports UL Verification Services Inc.:
2.4GHz BLE Document 15314553-E1
2.4GHz Zigbee Document 15314553-E2

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA			
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. DECISION RULES

For all tests where the applicable U_{LAB} <= U_{MAX} the Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2, where U_{MAX} = 30% (0.3) for RF Exposure evaluations. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

For all tests where the applicable U_{LAB} > U_{MAX} the Decision Rule is based on Guarded Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.3.2, with a guard band equal to ($U_{LAB} - U_{MAX}$), where U_{MAX} = 30% (0.3) for RF Exposure evaluations. (Test results are adjusted by the value of the guard band to determine conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Not applicable – calculations are based on the maximum output power and, where applicable, nominal antenna gains as declared by the manufacturer.

6. MAXIMUM PERMISSIBLE EXPOSURE (LIMITS AND EQUATIONS)

6.1.   FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	$1842/f$	$4.89/f$	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			$f/300$	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	$824/f$	$2.19/f$	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			$f/1500$	30
1,500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

<u>Notes:</u>

   (1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

   (2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

6.2.   EQUATIONS

POWER DENSITY

Power density is given by:

S = EIRP / (4 * Pi * D^2)

Where

S = Power density in mW/cm^2
EIRP = Equivalent Isotropic Radiated Power in mW
D = Separation distance in cm

Power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by 10.

DISTANCE

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

Where

D = Separation distance in cm
EIRP = Equivalent Isotropic Radiated Power in mW
S = Power density in mW/cm^2

SOURCE-BASED DUTY CYCLE

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

Source-based time-averaged EIRP = (DC / 100) * EIRP

Where

DC = Duty Cycle in %, as applicable
EIRP = Equivalent Isotropic Radiated Power in mW

7. RF EXPOSURE RESULTS

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc is only responsible for the validity of results after the integration of the data provided by the customer.

Below is a list of the data provided by the customer:
1. Antenna gain

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

Single Chain and non-colocated transmitters -Power Density

Band	Mode	Transmitter	Separ. Distance (cm)	Output AVG Power (dBm)	Ant. Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (mW)	FCC PD (mW/cm^2)	FCC PD Limit (mW/cm^2)
2.4 GHz	BLE	1Tx	20	9.50	1.60	11.10	100.0	12.88	0.003	1.00
2.4 GHz	Zigbee	1Tx	20	8.50	1.60	10.10	100.0	10.23	0.002	1.00

Single Chain and non-colocated transmitters- Distance separation

Band	Mode	Transmitter	FCC Limit (mW/cm^2)	Output AVG Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (mW)	Separ. Distance FCC (cm)
2.4 GHz	BLE	1Tx	1.00	9.50	1.60	11.10	100.0	12.88	1.01
2.4 GHz	Zigbee	1Tx	1.00	8.50	1.60	10.10	100.0	10.23	0.90

Notes:

1) For MPE the KDB 447498 D01 v6 , the calculations use the maximum rated power declared by the manufacturer.

2) The manufacturer configures output power so that the maximum power, after accounting for manufacturing tolerances, will never exceed the maximum power level measured.

3) The output power in the tables above is the maximum power per chain among various channels and modes within the specific band.

4) The antenna gain in the tables above is the maximum antenna gain among various channels within the specified band.

END OF REPORT