

TEST REPORT

Report Number: 14749497-E31V1

Applicant : eero LLC
660 3rd Street 4th Floor
San Francisco, CA 94107, U.S.A.

Model : V010001

Brand : eero

FCC ID : 2AEM4-711917312

IC : 20631-711917312

EUT Description : Wireless Access point

Test Standard(s) : FCC 47 CFR PART 1 SUBPART I
FCC 47 CFR PART 2 SUBPART J
RSS 102 ISSUE 5

Date Of Issue:
2023-09-14

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2023-09-14	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: eero LLC
660 3rd Street 4th Floor
San Francisco, CA 94107, U.S.A.

EUT DESCRIPTION: Wireless Access point

MODEL: V010001

BRAND: eero

SERIAL NUMBER: Radiated: GGB2-1E06-3237-0089, GGB2-1E04-3062-004P,
GGB2-1E08-3287-0037
Conducted: GGB2-1E04-3057-00DA, GGB2-1E06-3237-OOBQ

SAMPLE RECEIPT DATE: 2023-04-05

DATE TESTED: 2023-04-10 TO 2023-08-10

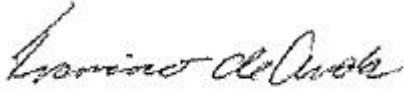
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 1 SUBPART I & PART 2 SUBPART J	Complies
RSS 102 ISSUE 5	Complies

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
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2. TEST METHODOLOGY

All calculations were made in accordance with FCC Parts 1.1310, 2.1091, 2.1093, KDB 447498 D01 v06, KDB 447498 D03 V01, IEEE Std C95.1-2005, IEEE Std C95.3-2002, IC Safety Code 6 and RSS 102 Issue 5.

3. REFERENCES

All measurements were made as documented in test reports UL Verification Services Inc.:

2.4GHz BLE Document 14749497-E1

2.4GHz 802.15.4 Document 14749497-E2

2.4GHz DTS Document 14749497-E3 and 14749497-E4

5GHz UNII 1 and UNII 3 Document 14749497-E5 and E6

5GHz UNII 2A and 2C Document 14749497-E32 and E33

6GHz 6ID Document 14749497-E7

Output power, Duty cycle and Antenna gain data is excerpted from the applicable test reports.

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
<input checked="" type="checkbox"/>	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	550739
<input type="checkbox"/>	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A			
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A			

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 $U_{LAB} \leq U_{MAX}$ 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

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}	U_{MAX}
Test method used to measure the power of the fundamental transmitting signal.	-ANSI C63.10 Subclause -11.9.1.3 -ANSI C63.10 Subclause -11.9.2.3.2 -KDB 789033 D02 v02r01, Section E.3.b (Method PM-G) and KDB 789033 D02 v02r01, Section E.2.b (Method SA-1): Radiated method made in lieu of conducted measurements (Report 14749497-E7, RSS248) and (Report 14749497-E5/E6 UNII band 1 RSS 247 only)	30%

Uncertainty figures are valid to a confidence level of 95%.

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/cm ²)	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

Notes:

- (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. ISED RULES

For the purpose of this standard, Innovation, Science and Economic Development (ISED) has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10 ⁻⁴ $f^{0.5}$	6.67 x 10 ⁻⁵ f	616000/ $f^{1.2}$

Note: f is frequency in MHz.

* Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR).

6.3. EQUATIONS

POWER DENSITY

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * D^2)$$

Where

S = Power density in mW/cm²

EIRP = Equivalent Isotropic Radiated Power in mW

D = Separation distance in cm

Power density in units of mW/cm² is converted to units of W/m² by multiplying by 10.

DISTANCE

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

Where

D = Separation distance in cm

EIRP = Equivalent Isotropic Radiated Power in mW

S = Power density in mW/cm²

SOURCE-BASED DUTY CYCLE

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

$$\text{Source-based time-averaged EIRP} = (\text{DC} / 100) * \text{EIRP}$$

Where

DC = Duty Cycle in %, as applicable

EIRP = Equivalent Isotropic Radiated Power in mW

MIMO AND COLOCATED TRANSMITTERS (IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the EIRP (in linear units) of each transmitter.

$$\text{Total EIRP} = (\text{EIRP1}) + (\text{EIRP2}) + \dots + (\text{EIRPn})$$

where

EIRPx = Source-based time-averaged EIRP of chain x or transmitter x

The total EIRP is then used to calculate the Power Density or the Distance as applicable.

MIMO AND COLOCATED TRANSMITTERS (NON-IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply:

The Power Density at the specified separation distance is calculated for each transmitter chain or transmitter.

The fraction of the exposure limit is calculated for each chain or transmitter as
(Power Density of chain or transmitter) / (Limit applicable to that chain or transmitter).

The fractions are summed.

Compliance is established if the sum of the fractions is less than or equal to one.

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.

non-colocated transmitters-Power Density												
Band	Mode	Transmitter	Separ. Distance	Output AVG Power	Ant. Gain	EIRP	Duty Cycle	EIRP	FCC PD	ISED PD	FCC PD Limit	ISED PD Limit
			(cm)	(dBm)	(dBi)	(dBm)	(%)	(mW)	(mW/cm ²)	(W/m ²)	(mW/cm ²)	(W/m ²)
2.4 GHz	BLE	1Tx	20	20.00	5.00	25.00	100.0	316.23	0.06	0.63	1.00	5.35
2.4 GHz	802.15.4	1Tx	20	18.00	5.00	23.00	100.0	199.53	0.04	0.40	1.00	5.35
2.4 GHz	WLAN	2Tx	20	30.00	3.80	33.80	100.0	2398.83	0.48	4.77	1.00	5.35
5 GHz	WLAN	4Tx	20	30.00	3.89	33.89	100.0	2449.06	0.49	4.87	1.00	8.83
6 GHz	WLAN	4Tx	20	24.87*	5.13	30.00	100.0	1000.00	0.20	1.99	1.00	10.00

*calculated based on radiated EIRP dBm measurement

non-colocated transmitters-Distance Separation											
Band	Mode	Transmitter	FCC Limit	IC Limit	Output AVG Power	Antenna Gain	EIRP	Duty Cycle	EIRP	Separ. Distance FCC	Separ. Distance ISED
			(mW/cm ²)	(W/m ²)	(dBm)	(dBi)	(dBm)	(%)	(mW)	(cm)	(cm)
2.4 GHz	BLE	1Tx	1.00	5.35	20.00	5.00	25.00	100.0	316.23	5.02	6.86
2.4 GHz	802.15.4	1Tx	1.00	5.35	18.00	5.00	23.00	100.0	199.53	3.99	5.45
2.4 GHz	WLAN	2Tx	1.00	5.35	30.00	3.80	33.80	100.0	2398.83	13.82	18.89
5 GHz	WLAN	4Tx	1.00	8.83	30.00	3.89	33.89	100.0	2449.06	13.96	14.86
6 GHz	WLAN	4Tx	1.00	10.00	24.87*	5.13	30.00	100.0	1000.00	8.92	8.92

*calculated based on radiated EIRP dBm measurement

Multiple chain or colocated transmitters

Band	(GHz)	2.4	5	6
Mode		BLE/802.15.4**	WLAN	WLAN
Transmitter		1Tx	4Tx	4Tx
Separation Distance	(cm)	20	20	20
Output Power	(dBm)	20.0	30.0	24.87*
Antenna Gain	(dBi)	5.00	3.89	5.13
Duty Cycle	(%)	100	100	100
Source Based EIRP	(mW)	316.2	2449.1	1000.0
FCC Power Density	(mW/cm^2)	0.06	0.49	0.20
FCC Power Density Limit	(mW/cm^2)	1	1	1
FCC Fraction of Limit	(%)	6.3	48.7	19.9
FCC Sum of Fractions (%)	74.9			
ISED Power Density	(W/m^2)	0.63	4.87	1.99
ISED Power Density Limit	(W/m^2)	5.35	8.83	10.00
ISED Fraction of Limit	(%)	11.8	55.2	19.9
ISED Sum of Fractions (%)	86.9			

*calculated based on radiated EIRP dBm measurement

**Worse power between BLE/802.15.4

Multiple chain or colocated transmitters

Band	(GHz)	2.4	5	6
Mode		WLAN	WLAN	WLAN
Transmitter		2TX	4Tx	4Tx
Separation Distance	(cm)	20	20	20
Output Power	(dBm)	20.0	30.0	24.87*
Antenna Gain	(dBi)	3.80	3.89	5.13
Duty Cycle	(%)	100	100	100
Source Based EIRP	(mW)	239.9	2449.1	1000.0
FCC Power Density	(mW/cm^2)	0.05	0.49	0.20
FCC Power Density Limit	(mW/cm^2)	1	1	1
FCC Fraction of Limit	(%)	4.8	48.7	19.9
FCC Sum of Fractions (%)	73.4			
ISED Power Density	(W/m^2)	0.477	4.875	1.990
ISED Power Density Limit	(W/m^2)	5.35	8.83	10.00
ISED Fraction of Limit	(%)	8.9	55.2	19.9
ISED Sum of Fractions (%)	84.0			

*calculated based on radiated EIRP dBm measurement

Notes:

- 1) 6GHz WLAN output power is declared as maximum 30dBm EIRP.
- 2) BLE/802.15.4 power is declared as peak conducted output power.
- 3) For MPE the KDB 447498 D01 v6 and RSS-102 the calculations use the maximum rated power declared by the manufacturer.
- 4) The manufacturer configures output power so that the maximum power, after accounting for manufacturing tolerances, will never exceed the maximum power level measured.
- 5) The output power in the tables above is the maximum power per chain among various channels and modes within the specific band.

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

END OF REPORT