

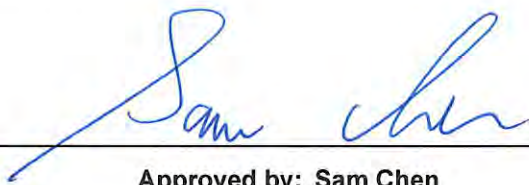


# RADIO EXPOSURE TEST REPORT

**FCC ID** : 2AYRA-03795  
**Equipment** : Linksys Velop Micro-Mesh 6  
**Brand Name** : LINKSYS  
**Model Name** : LN1200, LN1210, LN1215  
**Applicant** : Linksys USA, Inc.  
121 Theory, Irvine, CA. 92617, USA  
**Standard** : 47 CFR Part 2.1091

The product was received on Aug. 09, 2023, and testing was started from Aug. 14, 2023 and completed on Oct. 12, 2023. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

**Sporton International Inc. Hsinchu Laboratory**

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



## Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
<b>1 General Description .....</b>	<b>5</b>
1.1 EUT General Information .....	5
1.2 Antenna Information .....	6
1.3 Table for Multiple Listing .....	7
1.4 Accessories .....	7
1.5 Applicable Standards .....	8
1.6 Testing Location .....	8
<b>2 Maximum Permissible Exposure .....</b>	<b>9</b>
2.1 Limit of Maximum Permissible Exposure .....	9
2.2 MPE Calculation Method.....	9
2.3 MPE Exemption.....	10
2.4 Calculated Result and Limit.....	11
<b>Photographs of EUT v01</b>	





## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Sam Chen**

**Report Producer: Lavender Zeng**



# 1 General Description

## 1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 5500-5700 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: GFSK



## 1.2 Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	2.4GHz	5GHz	Bluetooth					
1	2	1	-	Galtronics	02102140-07935C1	PCB Antenna	U.FL	Note 1
2	1	2	-	Galtronics	02102140-07935C2	PCB Antenna	U.FL	
3	-	-	1	Gemtek	WRTQ-387AX	Printed Antenna	N/A	

Note 1:

Ant.	Gain (dBi)					
	2.4GHz	5GHz UNII 1	5GHz UNII 2A	5GHz UNII 2C	5GHz UNII 3	Bluetooth
1	3.35	4.90	4.90	4.92	4.92	-
2	3.72	4.70	4.70	4.79	4.79	-
3	-	-	-	-	-	2.82

Note 2: The above information was declared by manufacturer.

Note 3: Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{ANT}} \left[ \sum_{k=1}^{N_{ANT}} \xi_{j,k} \right]^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{ANT}} \left[ \sum_{k=1}^{N_{ANT}} \xi_{j,k} \right]^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{ANT}} \left[ \sum_{k=1}^{N_{ANT}} \xi_{j,k} \right]^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{ANT}} \left[ \sum_{k=1}^{N_{ANT}} \xi_{j,k} \right]^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ;$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2))^2 / N_{ANT}] \Rightarrow 10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$$

Where ;

$$2.4G \ G1 = 3.35 \text{ dBi} ; G2 = 3.72 \text{ dBi} ; DG = 6.55 \text{ dBi}$$

$$5G \text{ UNII-1} \ G1 = 4.9 \text{ dBi} ; G2 = 4.7 \text{ dBi} ; DG = 7.81 \text{ dBi}$$

$$5G \text{ UNII-2A} \ G1 = 4.9 \text{ dBi} ; G2 = 4.7 \text{ dBi} ; DG = 7.81 \text{ dBi}$$

$$5G \text{ UNII-2C} \ G1 = 4.92 \text{ dBi} ; G2 = 4.79 \text{ dBi} ; DG = 7.87 \text{ dBi}$$

$$5G \text{ UNII-3} \ G1 = 4.92 \text{ dBi} ; G2 = 4.79 \text{ dBi} ; DG = 7.87 \text{ dBi}$$



**For 2.4GHz function:**

**For IEEE 802.11b/g/n/VHT/ax (2TX/2RX):**

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

**For 5GHz function:**

**For IEEE 802.11a/n/ac/ax (2TX/2RX):**

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

**For Bluetooth function:**

**For Bluetooth mode (1TX/1RX):**

Only Port 1 can be use as transmit and receive antenna.

### 1.3 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Model Name	Description
LN1200	All the models are identical, the difference model served as marketing strategy.
LN1210	
LN1215	

Note 1: From the above models, model: LN1200 was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

### 1.4 Accessories

Accessories			
Power	Brand	Model	Rating
Adapter 1 (Fixed plug)	Ktec	KSA-18W-050300VU	Input: 100-240V ~ 50/60Hz, 0.5A Output: 5.0V, 3.0A
Adapter 2 (Fixed plug)	MOSO	MSA-C3000IC5.0-18P-US	Input: 100-240V ~ 50/60Hz, 0.7A max. Output: 5.0V, 3A
Adapter 3 (Removable plug)	Ktec	KSA-18W-050300D5	Input: 100-240V ~ 50/60Hz, 0.5A Output: 5.0V, 3.0A, 15.0W
Others			
Plug*1 (for Adapter 3 use)			



### 1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2.1091
- ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ 47 CFR Part 1.1307
- ♦ 47 CFR Part 1.1310

### 1.6 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065      FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.





## 2 Maximum Permissible Exposure

### 2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 2.2 MPE Calculation Method

The MPE was calculated at 41 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



### 2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

*d* = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where  $R > \lambda / 2 \pi$ .

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R <sup>2</sup> .
1.34-30	3,450 R <sup>2</sup> /f <sup>2</sup> .
30-300	3.83 R <sup>2</sup> .
300-1,500	0.0128 R <sup>2</sup> f.
1,500-100,000	19.2R <sup>2</sup> .
Note: R is in meters, f is in MHz.	



## 2.4 Calculated Result and Limit

### Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	6.55	23.64	30.19	0.50	30.69	41	0.05549	1.00000	C	37.237	0.2215
5.2G;D1D	7.81	25.91	33.72	0.50	34.22	41	0.12509	1.00000	C	37.237	0.4992
5.3G;D1D	7.81	21.85	29.66	0.33	29.99	41	0.04723	1.00000	C	37.237	0.1885
5.6G;D1D	7.87	21.97	29.84	0.15	29.99	41	0.04723	1.00000	C	37.237	0.1885
5.8G;D1D	7.87	27.60	35.47	0.50	35.97	41	0.18716	1.00000	C	37.237	0.7469
2.4G;BT-BR	2.82	13.25	16.07	0.50	16.57	41	0.00215	1.00000	C	37.237	0.0086
2.4G;BT-LE	2.82	1.84	4.66	0.50	5.16	41	0.00016	1.00000	C	37.237	0.0006

### Simultaneous Transmission Analysis Mode: WLAN 2.4GHz + WLAN 5GHz + Bluetooth

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Option	TL EIRP (dBm)	TL Ratio
2.4G;BT-BR	2.82	13.25	16.07	0.50	16.57	41	0.00215	1.00000	C	37.237	0.0086
2.4G;D1D	6.55	23.64	30.19	0.50	30.69	41	0.05549	1.00000	C	37.237	0.2215
5.8G;D1D	7.87	27.60	35.47	0.50	35.97	41	0.18716	1.00000	C	37.237	0.7469
Sum TL Ratio_C	0.977										
Ratio Limit	1										

Note: The above antenna gain was declared by manufacturer.

—————THE END—————