RF Exposure Evaluation Report
(Class II Permissive Change)

FCC 47 CFR § 2.1091

for

(1) AX1500 Wi-Fi 6 AI Range Extender
(2) AX1500 Mesh Range Extender

Model Name.: E15

Prepared for:

D-Link Corporation
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California 92606, United States

Prepared by

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Issue Date: June 30, 2022

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 30, 2022	Initial Issue	ALL	Allison Chen

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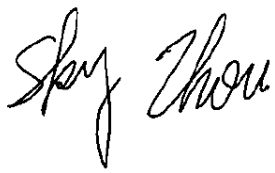
1 Attestation of Test Results

Applicant Name	D-Link Corporation
Model Name	14420 Myford Road Suite 100, Irvine, California 92606, United States
Applicable Standards	FCC 47 CFR § 2.1091 KDB 447498 D04 FCC 47 CFR § 1.1307 FCC 47 CFR § 1.1310 Published RF exposure KDB procedures
Receive EUT Date:	March 19, 2021
Compliance Certification Services Inc. , tested the above equipment in accordance with the requirements set forth in the above standards. Determination of compliance is based on the results of the compliance measurement,not taking into account measurement instrumentation uncertainy.All indications of Pass/Fail in this report are opinions expressed by Compliance Certification Services Inc, based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.	
Approved & Released By: 	
Sky Zhou Asst. Section Manager Compliance Certification Services Inc.	

2 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1091, the following FCC Published RF exposure KDB procedures:

- 447498 D04 Interim General RF Exposure Guidance v01
- 865664 D02 RF Exposure Reporting v01r02

3 Device Under Test (DUT) Information

3.1 DUT Description

Product	(1) AX1500 Wi-Fi 6 AI Range Extender (2) AX1500 Mesh Range Extender
Trade Name	D-Link
Model No.	E15
Model Discrepancy	N/A
Hardware Version	N/A
Software Version	N/A
Sample Stage	Identical prototype

3.2 Wireless Technologies

Frequency bands	☐ Bluetooth: 2402MHz-2480MHz ☒ 802.11b/g/n HT20: 2412MHz ~ 2462 MHz ☒ 802.11n HT40: 2422MHz ~ 2452 MHz ☒ 802.11a/n HT20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz / 5500 ~ 5700MHz / 5745MHz ~ 5825MHz ☒ 802.11n HT40: 5190 MHz ~ 5230 MHz / 5270 MHz ~ 5310 MHz / 5510 MHz ~ 5670 MHz / 5755 MHz ~ 5795MHz ☒ 802.11ac VHT20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz / 5500 ~ 5700MHz / 5745MHz ~ 5825MHz ☒ 802.11ac VHT40: 5190 MHz ~ 5230 MHz / 5270 MHz ~ 5310 MHz / 5510 MHz ~ 5670 MHz / 5755 MHz ~ 5795MHz ☒ 802.11ac VHT80: 5210 MHz / 5290 MHz / 5530 MHz / 5775 MHz ☒ 802.11ax HE20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz / 5500 ~ 5700MHz / 5745MHz ~ 5825MHz ☒ 802.11ax HE40: 5190 MHz ~ 5230 MHz / 5270 MHz ~ 5310 MHz / 5510 MHz ~ 5670 MHz / 5755 MHz ~ 5795MHz ☒ 802.11ax HE80: 5210 MHz / 5290 MHz / 5530 MHz / 5775 MHz ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm2) ☒ General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna Specification	**embedded Antenna** WIFI 2.4GHz: Chain 0: 3.1 dBi Chain 1: 3.1 dBi Power direction gain: 6.11 dBi WIFI 5GHz: Chain 0: 3.1 dBi Chain 1: 3.3 dBi Power direction gain: 6.21 dBi 2.4GHz: Gain : 6.11 dBi (Numeric gain: 4.08) Worst 5GHz: Gain : 6.21 dBi (Numeric gain: 4.18) Worst

Maximum Measurement Average Power	2.4GHz		
	IEEE 802.11b Mode:	16.09 dBm	(40.644 mW)
	IEEE 802.11g Mode:	24.66 dBm	(292.415 mW)
	IEEE 802.11n HT 20 Mode:	23.97 dBm	(249.459 mW)
	IEEE 802.11n HT 40 Mode:	24.55 dBm	(285.102 mW)
	5GHz		
	IEEE 802.11a Mode:	22.27 dBm	(168.655 mW)
	IEEE 802.11n HT 20 Mode:	22.17 dBm	(164.816 mW)
	IEEE 802.11n HT 40 Mode:	21.17 dBm	(130.918 mW)
	IEEE 802.11ac VHT 20 Mode:	22.12 dBm	(162.930 mW)
	IEEE 802.11ac VHT 40 Mode:	21.12 dBm	(129.420 mW)
	IEEE 802.11ac VHT 80 Mode:	21.00 dBm	(125.893 mW)
	IEEE 802.11ax 20 Mode:	20.37 dBm	(108.893 mW)
	IEEE 802.11ax 40 Mode:	22.13 dBm	(163.305 mW)
	IEEE 802.11ax 80 Mode:	20.36 dBm	(108.643 mW)
Maximum tune up power	2.4GHz		
	IEEE 802.11b Mode:	16.50 dBm	(44.668 mW)
	IEEE 802.11g Mode:	25.00 dBm	(316.228 mW)
	IEEE 802.11n HT 20 Mode:	24.00 dBm	(251.189 mW)
	IEEE 802.11n HT 40 Mode:	25.00 dBm	(316.228 mW)
	5GHz		
	IEEE 802.11a Mode:	22.50 dBm	(177.828 mW)
	IEEE 802.11n HT 20 Mode:	22.50 dBm	(177.828 mW)
	IEEE 802.11n HT 40 Mode:	21.50 dBm	(141.254 mW)
	IEEE 802.11ac VHT 20 Mode:	22.50 dBm	(177.828 mW)
	IEEE 802.11ac VHT 40 Mode:	21.50 dBm	(141.254 mW)
	IEEE 802.11ac VHT 80 Mode:	21.00 dBm	(125.893 mW)
	IEEE 802.11ax 20 Mode:	20.50 dBm	(112.202 mW)
	IEEE 802.11ax 40 Mode:	22.50 dBm	(177.828 mW)
	IEEE 802.11ax 80 Mode:	20.50 dBm	(112.202 mW)

Notes:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. The tune up power referred the AVG power of the test report T210319W02-RP1 and T210319W02-RP2 for RF Exposure assessment purpose.

4 Maximum Permissible Exposure

4.1 Limits for Maximum Permissible Exposure (MPE)

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

4.2 MPE Calculation Method

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

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

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ **Equation 1**

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

If, Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

4.3 MPE EXEMPTION

(A) The available maximum time-averaged power is no more than 1 mW

(B) The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold *Pth* (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). *Pth* is given by:

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

Where

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

and

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

d = the separation distance (cm);

(C) Using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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

4.4 Multiple RF sources

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation),

$$\sum_{i=1}^{a} \frac{P_i}{P_{\mathrm{th},i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{\mathrm{th},j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

5 Radio Frequency Radiation Max Exposure Evaluation

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

WIFI 2.4GHz

Mode	Frequency (MHz)	Max Tune-up power(dBm)	Max Tune-up power(mW)	G(dBi)	G(num.)	D(cm)	Power Density in mW/cm2	Limit Power Density in mW/cm2
IEEE 802.11b mode	2462.00	16.50	44.67	6.11	4.08	20.0	0.036	1.000
IEEE 802.11 g mode	2462.00	25.00	316.23	6.11	4.08	20.0	0.257	1.000
IEEE 802.11n HT20 mode	2462.00	24.00	251.19	6.11	4.08	20.0	0.204	1.000
IEEE 802.11n HT40 mode	2452.00	25.00	316.23	6.11	4.08	20.0	0.257	1.000

MPE Exemption	Mode	Frequency (MHz)	R(m)	Max Tune-up EIRP (dBm)	Max Tune-up ERP (dBm)	Max Tune-up ERP (mW)	ERP Threshold (mW)
Option B	2.4G WIFI; B	2462.00	0.2	22.61	20.46	111.17317	3060
Option B	2.4G WIFI; G	2462.00	0.2	31.11	28.96	787.04579	3060
Option B	2.4G WIFI; HT20	2462.00	0.2	30.11	27.96	625.17269	3060
Option B	2.4G WIFI; HT40	2452.00	0.2	31.11	28.96	787.04579	3060

WIFI 5GHz

Mode	Frequency (MHz)	Max Tune-up power(dBm)	Max Tune-up power(mW)	G(dBi)	G(num.)	D(cm)	Power Density in mW/cm2	Limit Power Density in mW/cm2
IEEE 802.11a mode	5825.00	22.50	177.83	6.21	4.18	20.0	0.148	1.000
IEEE 802.11n HT20 mode	5825.00	22.50	177.83	6.21	4.18	20.0	0.148	1.000
IEEE 802.11n HT40 mode	5795.00	21.50	141.25	6.21	4.18	20.0	0.117	1.000
IEEE 802.11ac VHT20 mode	5825.00	22.50	177.83	6.21	4.18	20.0	0.148	1.000
IEEE 802.11ac VHT40 mode	5795.00	21.50	141.25	6.21	4.18	20.0	0.117	1.000
IEEE 802.11ac VHT80 mode	5775.00	21.00	125.89	6.21	4.18	20.0	0.105	1.000
IEEE 802.11ax 20 mode	5825.00	20.50	112.20	6.21	4.18	20.0	0.093	1.000
IEEE 802.11ax 40 mode	5795.00	22.50	177.83	6.21	4.18	20.0	0.148	1.000
IEEE 802.11ax 80 mode	5775.00	20.50	112.20	6.21	4.18	20.0	0.093	1.000

MPE Exemption	Mode	Frequency (MHz)	R(m)	Max Tune-up EIRP (dBm)	Max Tune-up ERP (dBm)	Max Tune-up ERP (mW)	ERP Threshold (mW)
Option B	IEEE 802.11a mode	5825.00	0.2	28.71	26.56	452.89758	3060
Option B	IEEE 802.11n HT20 mode	5825.00	0.2	28.71	26.56	452.89758	3060
Option B	IEEE 802.11n HT40 mode	5795.00	0.2	27.71	25.56	359.74934	3060
Option B	IEEE 802.11ac VHT20 mode	5825.00	0.2	28.71	26.56	452.89758	3060
Option B	IEEE 802.11ac VHT40 mode	5795.00	0.2	27.71	25.56	359.74934	3060
Option B	IEEE 802.11ac VHT80 mode	5775.00	0.2	27.21	25.06	320.62693	3060
Option B	IEEE 802.11ax 20 mode	5825.00	0.2	26.71	24.56	285.75905	3060
Option B	IEEE 802.11ax 40 mode	5795.00	0.2	28.71	26.56	452.89758	3060
Option B	IEEE 802.11ax 80 mode	5775.00	0.2	26.71	24.56	285.75905	3060

6 Simultaneous Transmission MPE Analysis

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation),

$$\sum_{i=1}^{a}\frac{P_i}{P_{\mathrm{th},i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{\mathrm{th},j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations
	1	DTS + U-NII

6.1 Sum of the MPE for WIFI 2.4GHz & WIFI 5GHz

WIFI 2.4GHz + WIFI 5GHz

Simultaneous Transmission Mode:									
Mode	Frequency (MHz)	Max Tune-up power (dBm)	G (dBi)	Max Tune-up EIRP (dBm)	Max Tune-up ERP (dBm)	Max Tune-up ERP (mW)	ERP Threshold (mW)	simultaneous Transmission	simultaneous Transmission Limit
WIFI 2.4GHz	2462.00	25.00	6.11	31.11	28.96	787.05	3060.00	0.41	1.00
WIFI 5GHz	5825.00	22.50	6.21	28.71	26.56	452.90	3060.00		

7 Facilities

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

END OF REPORT