

FCC RF EXPOSURE REPORT

FCC ID: KA2IRX1870A1

Project No. : 2007H027A
Equipment : AX1800 Mesh Wi-Fi 6 Router
Brand Name : D-Link
Test Model : DIR-X1870
Series Model : N/A
Applicant : D-Link Corporation
Address : 17595 Mt. Herrmann, Fountain Valley, California United State 92708
Manufacturer : D-Link Corporation
Address : 17595 Mt. Herrmann, Fountain Valley, California United State 92708
Date of Receipt : Sep. 01, 2020
Date of Test : Sep. 01, 2020~Sep. 28, 2020
Issued Date : Oct. 30, 2020
Report Version : R01
Test Sample : Engineering Sample No.: SH20200716113-1, SH20200716113-6
Standard(s) : FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091
FCC Title 47 Part 2.1091, OET Bulletin 65 Supplement C

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue	Oct. 28,2020
R01	Revised report to address TCB's comments.	Oct. 30,2020

1. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

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

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

Table for Filed Antenna

For 5G :

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	N/A	N/A	Dipole	N/A	5	N/A
2	N/A	N/A	Dipole	N/A	5	N/A

Note:

(1) Beamforming:

All antennas have the same gain, Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi,

that is Directional gain = $5 + 10 \log(2)$ dBi = 8.01;

For UNII-1, UNII-3

Output power limit is $30 - 8.01 + 6 = 27.99$, the UNII-1 power density limit is $17 - (8.01 - 6) = 14.99$. the UNII-3 power density limit is $30 - 8.01 + 6 = 27.99$.

For UNII-2A, UNII-2C

Output power limit is $24 - 8.01 + 6 = 21.99$, the UNII-2A power density limit is $11 - (8.01 - 6) = 8.99$. the UNII-2C power density limit is $24 - 8.01 + 6 = 21.99$.

(2) CDD:

All antennas have the same gain, Directional gain = $G_{ANT} + \text{Array Gain}$,

For power spectral density measurements, $N_{ANT} = 2$, $N_{SS} = 1$.

So Directional gain = $G_{ANT} + \text{Array Gain} = 10 \log(N_{ANT}/N_{SS})$ dB = $5 + 10 \log(2/1)$ dBi = 8.01.

Then, UNII-1 power density limit is $17 - (11.02 - 6) = 14.99$. the UNII-3 power density limit is $30 - 8.01 + 6 = 27.99$

the UNII-2A power density limit is $11 - (8.01 - 6) = 8.99$. the UNII-2C power density limit is $24 - 8.01 + 6 = 21.99$

For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain = 5.

For 2.4G:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Dipole	N/A	5
2	N/A	N/A	Dipole	N/A	5

Note:

(1) Beamforming:

All antennas have the same gain, Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi,

that is Directional gain = $5 + 10 \log(2)$ dBi = 8.01;

So output power limit is $30 - 8.01 + 6 = 27.99$, the power density limit is $8 - (8.01 - 6) = 5.99$.

(2) CDD:

All antennas have the same gain, Directional gain = $G_{ANT} + \text{Array Gain}$,

For power spectral density measurements, $N_{ANT} = 2$, $N_{SS} = 1$. So Directional gain = $G_{ANT} + \text{Array Gain} = 10 \log(N_{ANT}/N_{SS})$ dB = $5 + 10 \log(2/1)$ dBi = 8.01. Then, the power density limit is $8 - (8.01 - 6) = 5.99$.

For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain = 5.

For 5G:

Operating Mode / TX Mode	Ant. 1	Ant. 2	Ant. 1 + Ant. 2
IEEE 802.11a	✓	✓	✗
IEEE 802.11n (HT20)	✓	✓	✓
IEEE 802.11n (HT40)	✓	✓	✓
IEEE 802.11ac (VHT20)	✓	✓	✓
IEEE 802.11ac (VHT40)	✓	✓	✓
IEEE 802.11ac (VHT80)	✓	✓	✓
IEEE 802.11ax (HE20)	✓	✓	✓
IEEE 802.11ax (HE40)	✓	✓	✓
IEEE 802.11ax (HE80)	✓	✓	✓

For 2.4G:

Operating Mode / TX Mode	Ant. 1	Ant. 2	Ant. 1 + Ant. 2
802.11b	✓	✓	✗
802.11g	✓	✓	✗
802.11n(20 MHz)	✓	✓	✓
802.11n(40 MHz)	✓	✓	✓
802.11ax (HE 20 MHz)	✓	✓	✓
802.11ax (HE 40 MHz)	✓	✓	✓

2. TEST RESULTS

For 2.4GHz:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.01	6.3241	24.50	281.83829	0.2930521	1	Complies

For 5GHz Band 1, Band4:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.01	6.3241	27.50	562.34133	0.5847157	1	Complies

For 5G Band 2, Band 3

Beamforming

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.01	6.3241	24.00	251.1886	0.2611820	1	Complies

CDD

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.00	3.1623	24.00	251.1886	0.2611820	1	Complies

For the max simultaneous transmission MPE:

2.4G+5G

Power Density (S) (mW/cm ²) 2.4GHz	Power Density (S) (mW/cm ²) 5GHz	Total	Limit of Power Density (S) (mW/cm ²)	Test Result
0.2930521	0.5847157	0.8777678	1	Complies

Note: The calculated distance is 22 cm.
Output power including tune up tolerance

End of Test Report