

RF Exposure Report

Report No.: SA170113E13

FCC ID: KA2IR878A1

Test Model: DIR-878

Received Date: Jan. 16, 2017

Test Date: Mar. 16, 2017

Issued Date: Mar. 29, 2017

Applicant: D-Link Corporation

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Release Control Record

Issue No.	Description	Date Issued
SA170113E13	Original release.	Mar. 29, 2017

1 Certificate of Conformity

Product: AC1900 MU-MIMO Wi-Fi Gigabit Router

Brand: D-Link

Test Model: DIR-878

Sample Status: ENGINEERING SAMPLE

Applicant: D-Link Corporation

Test Date: Mar. 16, 2017

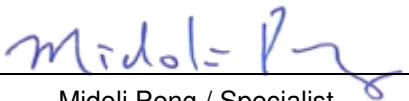
Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.


Prepared by :


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Date:

Mar. 29, 2017

Approved by :


May Chen / Manager

Date:

Mar. 29, 2017

2 RF Exposure

2.1 Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
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
300-1500	f/1500	30
1500-100,000	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 38cm away from the body of the user.

So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

The antennas provided to the EUT, please refer to the following table:

Set 1 Antenna				
Chain No.	Antenna Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type
Chain 0	2	2.4~2.4835	Dipole	i-pex (MHF)
	2	5.15~5.85		
Chain 1	2	2.4~2.4835	Dipole	i-pex (MHF)
	2	5.15~5.85		
Chain 2	2	2.4~2.4835	Dipole	i-pex (MHF)
	2	5.15~5.85		
Chain 3	2	2.4~2.4835	Dipole	i-pex (MHF)
	2	5.15~5.85		
Set 2 Antenna				
Chain No.	Antenna Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type
Chain 0	5	2.4~2.4835	Dipole	i-pex (MHF)
	5	5.15~5.85		
Chain 1	5	2.4~2.4835	Dipole	i-pex (MHF)
	5	5.15~5.85		
Chain 2	5	2.4~2.4835	Dipole	i-pex (MHF)
	5	5.15~5.85		
Chain 3	5	2.4~2.4835	Dipole	i-pex (MHF)
	5	5.15~5.85		

The Directional gain table:

Frequency (MHz)	Max Gain (dBi)
2412-2462	7.39 (for Set 1 Antenna) 10.06 (for Set 2 Antenna)
5180-5825	7.75 (for Set 1 Antenna) 10.90 (for Set 2 Antenna)

Note:

1. Non-TxBF mode & TxBF mode antenna gain refer to KDB 662911 F 2) f) (ii)

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

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the k th antenna is being fed by spatial stream j , or zero if it is not;

G_k is the gain in dBi of the k th antenna.

2. Above directional gain were calculated from actual measurement data.

2.5 Calculation Result of Maximum Conducted Power

For Antenna set 1

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2462	788.724	7.39	38	0.23831	1
5180-5240 5745-5825	995.277	7.75	38	0.32671	1

For Antenna set 2

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2462	788.724	10.06	38	0.44070	1
5180-5240 5745-5825	655.424	10.90	38	0.44437	1

NOTE:

For Antenna set 1

2.4GHz: Directional gain = 7.39dBi

5GHz: Directional gain = 7.75dBi

For Antenna set 2

2.4GHz: Directional gain = 10.06dBi

5GHz: Directional gain = 10.9dBi)

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

For Antenna set 1

WLAN 2.4GHz + WLAN 5GHz = $0.23831/1 + 0.32671/1 = 0.56502$

For Antenna set 2

WLAN 2.4GHz + WLAN 5GHz = $0.44070/1 + 0.44437/1 = 0.88507$

Therefore the maximum calculations of above situations are less than the "1" limit.

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