

## 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

**Address:** 17595 Mt. Herrmann Street Fountain Valley, CA92708 USA

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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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

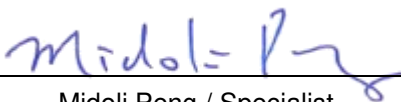
**Standards:** FCC Part 2 (Section 2.1091)

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.

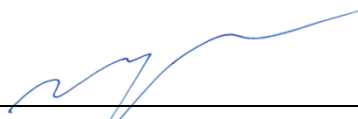
**Prepared by :**

  
Midoli Peng / Specialist

**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 <sup>2</sup> ) | 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 <sup>2</sup> )*              | 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

$$Pd = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

Pd = power density in mW/cm<sup>2</sup>

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)<br>10.06 (for Set 2 Antenna) |
| 5180-5825       | 7.75 (for Set 1 Antenna)<br>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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|------------------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412-2462              | 788.724        | 7.39               | 38            | 0.23831                             | 1                           |
| 5180-5240<br>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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|------------------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412-2462              | 788.724        | 10.06              | 38            | 0.44070                             | 1                           |
| 5180-5240<br>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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