# RF Exposure Report

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|---|---|
| **Report No.:** | SA160810E03 |
| **FCC ID:** | Q87-WHW03 |
| **Test Model:** | WHW03 |
| **Received Date:** | Aug. 10, 2016 |
| **Test Date:** | Oct. 12 to 13, 2016 |
| **Issued Date:** | Nov. 03, 2016 |
| **Applicant:** | Linksys LLC |
| **Address:** | 121 Theory Drive Irvine California 92617 United States |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **Lab Address:** | E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C. |

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| SA160810E03 | Original release. | Nov. 03, 2016 |

## 1 Certificate of Conformity

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|---|---|
| **Product:** | Access Point |
| **Brand:** | LINKSYS |
| **Test Model:** | WHW03 |
| **Sample Status:** | ENGINEERING SAMPLE |
| **Applicant:** | Linksys LLC |
| **Test Date:** | Oct. 12 to 13, 2016 |
| **Standards:** | FCC Part 2 (Section 2.1091)<br>KDB 447498 D01 General RF Exposure Guidance v06<br>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 :** _____ , **Date:** Nov. 03, 2016

Wendy Wu / Specialist

**Approved by :** _____ , **Date:** Nov. 03, 2016

May Chen / Manager

## 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 | | | | |
| 300-1500 | … | … | F/1500 | 30 |
| 1500-100,000 | … | … | 1.0 | 30 |

F = Frequency in MHz

### 2.2 MPE Calculation Formula

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

where

Pd = power density in $mW/cm^2$

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 30cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

| BT Antenna Spec. | | | | | | |
|---|---|---|---|---|---|---|
| Antenna No | Brand | Model | Antenna Net Gain(dBi) | Frequency range (GHz) | Antenna Type | Connecter Type |
| 1 | galtronics | 60-2703-03 | 3.13 | 2.4~2.4835 | Dipole | i-pex(MHF) |

| Zigbee Antenna Spec. | | | | | | |
|---|---|---|---|---|---|---|
| Antenna No | Brand | Model | Antenna Net Gain(dBi) | Frequency range (GHz) | Antenna Type | Connecter Type |
| 2 | galtronics | 60-2699-03 | 2.52 | 2.4~2.4835 | Dipole | i-pex(MHF) |

| WLAN (Radio 2) Antenna Spec. | | | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna No | Transmitter Circuit | Brand | Model | Antenna Net Gain(dBi) | Frequency range (GHz) | Antenna Type | Connecter Type |
| 3 | 5GHz-Chain (1) (UNII-2C,UNII-3) | galtronics | 60-2704-03 | 3.86 | 5.5~5.825 | Dipole | i-pex(MHF) |
| 4 | 5GHz-Chain (0) (UNII-2C,UNII-3) | galtronics | 60-2708-03 | 2.36 | 5.5~5.825 | Dipole | i-pex(MHF) |

| WLAN (Radio 1) Antenna Spec. | | | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna No | Transmitter Circuit | Brand | Model | Antenna Net Gain(dBi) | Frequency range (GHz) | Antenna Type | Connecter Type |
| 5 | 2.4GHz-Chain (0) | galtronics | 60-2698-03 | 3.43 | 2.4~2.4835 | Dipole | i-pex(MHF) |
| | 5GHz-Chain (1) (UNII-1, UNII-2A) | | | 3.62 | 5.18~5.320 | | |
| 6 | 2.4GHz-Chain (1) | galtronics | 60-2697-03 | 1.49 | 2.4~2.4835 | Dipole | i-pex(MHF) |
| | 5GHz-Chain (0) (UNII-1, UNII-2A) | | | 4.35 | 5.18~5.320 | | |

## 2.5 Calculation Result Of Maximum Conducted Power

**For WLAN (Radio 1):**

| Frequency (MHz) | Max. Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2412-2462 | 783.486 | 5.52 | 30 | 0.24693 | 1 |
| 5180-5240 | 765.255 | 7.00 | 30 | 0.33912 | 1 |

**For WLAN (Radio 2):**

| Frequency (MHz) | Max. Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|
| 5745-5825 | 938.187 | 6.15 | 30 | 0.34185 | 1 |

NOTE:
2.4GHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.52dBi
5GHz:
UNII-1: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 7dBi
UNII-3: Directional gain = 10 log[(10G1/20 + 10G2/20)2 / 2] = 6.15dBi

**For Bluetooth:**

**BT-EDR**

| Frequency (MHz) | Max. Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2402-2480 | 5.875 | 3.13 | 30 | 0.00107 | 1 |

**BT-LE**

| Frequency (MHz) | Max. Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2402-2480 | 1.73 | 3.13 | 30 | 0.00031 | 1 |

**For Zigbee:**

| Frequency (MHz) | Max. Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|
| 2405-2475 | 144.544 | 2.52 | 30 | 0.02283 | 1 |

**Conclusion:**

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz (UNII-1) + WLAN 5GHz (UNII-3) + Bluetooth + Zigbee = 0.24693 / 1 + 0.33912 / 1 + 0.34185 / 1 + 0.00107 / 1 + 0.02283 / 1 = 0.95180

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

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