

RF Exposure Report

Report No.: SA160810E03D

FCC ID: Q87-WHW03

Test Model: WHW03

Received Date: Jan. 25, 2017

Test Date: Feb. 08, 2017

Issued Date: Mar. 13, 2017

Applicant: Linksys LLC

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Report Issue History Record

Issue No.	Reason for Change	Date Issued
SA160810E03	Original	Nov. 03, 2016
SA160810E03D	Add DFS band <5.26GHz ~ 5.32GHz, 5.50GHz ~ 5.70GHz>	Mar. 13, 2017

Release Control Record

Issue No.	Description	Date Issued
SA160810E03D	Original release.	Mar. 13, 2017

1 Certificate of Conformity

Product: Access Point

Brand: LINKSYS

Test Model: WHW03

Sample Status: ENGINEERING SAMPLE

Applicant: Linksys LLC

Test Date: Feb. 08, 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 : Wendy Wu , **Date:** Mar. 13, 2017
Wendy Wu / Specialist

Approved by : May Chen , **Date:** Mar. 13, 2017
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

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

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 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	Connector 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	Connector 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	Connector 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	Connector 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 2.4GHz, 5GHz (U-NII-1 & UNII-3 band), bluetooth and zigbee data was copied from the original test report (Report No.: SA160810E03)

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
5260-5320	198.398	7.00	30	0.08792	1

For WLAN (Radio 2):

Frequency (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5500-5700	242.048	6.15	30	0.08820	1
5745-5825	938.187	6.15	30	0.34185	1

NOTE:

2.4GHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.52\text{dBi}$

5GHz:

UNII-1, UNII-2A: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 7\text{dBi}$

UNII-3, UNII-2C: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.15\text{dBi}$

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:

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

CPD = Calculation power density

LPD = Limit of power density

$WLAN\ 2.4GHz + WLAN\ 5GHz\ (Radio\ 1) + WLAN\ 5GHz\ (Radio\ 2) + Bluetooth + Zigbee = 0.24693 / 1 + 0.33912 / 1 + 0.34185 / 1 + 0.00107 / 1 + 0.02283 / 1 = 0.95180$

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

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