

RF Exposure Report

Report No.: SA150803E06

FCC ID: C3K1682

Test Model: 1682

Received Date: Aug. 03, 2015

Test Date: Sep. 16 to 25, 2015

Issued Date: Nov. 11, 2015

Applicant: Microsoft Corporation

Address: One Microsoft Way Redmond WA 98052

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

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Release Control Record

Issue No.	Description	Date Issued
SA150803E06	Original release.	Nov. 11, 2015

1 Certificate of Conformity

Product: dual-band wireless accessory radio

Brand: Microsoft

Test Model: 1682

Sample Status: ENGINEERING SAMPLE

Applicant: Microsoft Corporation

Test Date: Sep. 16 to 25, 2015

Standards: FCC Part 2 (Section 2.1091)

447498 D01 General RF Exposure Guidance v06

IEEE Std C95.1-2005

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. 11, 2015

Midoli Peng / Specialist

Approved by :  , **Date:** Nov. 11, 2015

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/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 20cm away from the body of the user.

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

3 Antenna Gain

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

Antenna No.	Brand	Model	Gain (dBi)	Antenna Type	Connector Type	Frequency range (GHz to GHz)	Function
Ant. 1 (for WLAN 2.4GHz)	Microsoft	NA	2.7	PCB	NA	2.4~2.4835	TX/RX
Ant. 2 (for BT)			0.12			2.4~2.4835	TX/RX
Ant. 3 (for WLAN 5GHz) Chan (0)			2.2			5.15~5.85	TX/RX
Ant. 4 (for WLAN 5GHz) Chan (1)			2.2			5.15~5.85	RX

4 Calculation Result of Maximum Conducted Power

For WLAN

Frequency Band (MHz)	Max Power (dBm)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (W/cm ²)
2412-2462	23.00	199.526	2.7	20	0.07391	1
5180-5240	16.00	39.811	2.2	20	0.01314	1
5745-5825	19.00	79.433	2.2	20	0.02623	1

For BT-EDR

Frequency Band (MHz)	Max Power (dBm)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (W/cm ²)
2402-2478	10.50	11.22	0.12	20	0.00229	1

For BT-LE

Frequency Band (MHz)	Max Power (dBm)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (W/cm ²)
2402-2478	10.50	11.22	0.12	20	0.00229	1

NOTE: 1. This power include tune-up tolerance range (1.5dB) that specified by manufacturer.

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

$$\text{WLAN 2.4GHz} + \text{BT} = 0.07391 + 0.00229 = 0.076$$

$$\text{WLAN 5GHz} + \text{BT} = 0.02623 + 0.00229 = 0.029$$

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

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