RF Exposure Report

Report No.: SA161216E08

FCC ID: UAY-W8997-M1216

Test Model: W8997-M1216

Received Date: Dec. 16, 2016

Test Date: Dec. 22 to 28, 2016

Issued Date: Jan. 18, 2017

Applicant: Marvell Semiconductor

Address: 5488 Marvell Lane, Santa Clara CA95054 USA

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
SA161216E08	Original release.	Jan. 18, 2017

1   Certificate of Conformity

Product: IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN + Bluetooth NGFF Module

Brand: Marvell

Test Model: W8997-M1216

Sample Status: ENGINEERING SAMPLE

Applicant: Marvell Semiconductor

Test Date: Dec. 22 to 28, 2016

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:** Jan. 18, 2017

Wendy Wu / Specialist

Approved by : _____ , **Date:** Jan. 18, 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

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

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 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Antenna Set.	Brand	Model	Chain No.	Antenna Net. Gain(dBi)	Frequency range (MHz)	Antenna Type	Connecter Type
1	MAG.LAYERS	MSA-4008-25GC1-A1	Chain 0(Aux)	2.98	2400~2500	PIFA	i-pex(MHF)
				5.16	4900~5900		
			Chain 1(Main)	2.98	2400~2500		
				5.16	4900~5900		

2.5   Calculation Result of Maximum Conducted Power

For WLAN:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	931.528	5.99	20	0.73608	1
5180-5240	151.716	8.17	20	0.19804	1
5260-5320	148.092	8.17	20	0.19331	1
5500-5700	136.98	8.17	20	0.17881	1
5745-5825	194.363	8.17	20	0.25371	1

NOTE:

2.4GHz: Directional gain = 2.98dBi + 10log(2) = 5.99dBi

5GHz: Directional gain = 5.16dBi + 10log(2) = 8.17dBi

For BT-EDR:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	4.592	2.98	20	0.00181	1

For BT-LE:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	2.754	2.98	20	0.00109	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 + Bluetooth = 0.73608 / 1 + 0.00181 / 1 = 0.73789

WLAN 5GHz + Bluetooth = 0.25371 / 1 + 0.00181 / 1 = 0.25552

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

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