

FCC MPE Evaluation Report

Report No. : SA131113C05
Applicant : jjPlus Corporation
Address : 13F.-3, No 120, Qiaohe Rd. Zhonghe Dist., New Taipei
City 23584 Taiwan (R.O.C.)
Product : 802.11a/b/g/n 3T3R Mini-PCI Express Module
Brand : jjPlus
Model No. : JWX6082
Standards : FCC Part 2 (Section 2.1091)
KDB 447498 D01
Sample Received Date : Nov. 13, 2013
Date of Evaluation : Aug. 20, 2014

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, 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 SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Report No.	Reason for Change	Date Issued
SA131113C05	Initial release	Sep. 02, 2014

1. Description of Equipment Under Test

EUT Type	802.11a/b/g/n 3T3R Mini-PCI Express Module
Brand Name	jjPlus
Model Name	JWX6082
Tx Frequency Bands (Unit: MHz)	2412 ~ 2462, 5180 ~ 5240, 5745 ~ 5805
Uplink Modulations	802.11b : DSSS 802.11a/g/n : OFDM
ANTENNA TYPE	Dipole antenna with 2dBi gain
EUT Stage	ENGINEERING SAMPLE

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

2. MPE (Maximum Permissible Exposure) Assessment

2.1 Introduction

According to 47 CFR §2.1091, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitting antenna and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 cm separation requirement. The limits to be used for MPE evaluation are specified in §1.1310. All unlicensed personal communications service (PCS) devices and unlicensed NII devices shall be subject to the limits for general population/uncontrolled exposure.

2.2 RF Radiation Exposure Limits

According to 47 CFR §1.1310, the criteria listed in below table shall be used to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093.

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (min)
(A) Limits for Occupational / Controlled Exposures				
0.3 – 3.0	614	1.63	100	6
3.0 – 30	1842/f	4.89/f	900/f ²	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	-	-	f/300	6
1500 – 100000	-	-	5	6
(B) Limits for General Population / Uncontrolled Exposures				
0.3 – 1.34	614	1.63	100	30
1.34 – 30	824/f	2.19/f	180/f ²	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	-	-	f/1500	30
1500 – 100000	-	-	1.0	30

Limits for maximum permissible exposure (MPE)

Notes:

1. f = frequency in MHz
2. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided they are made aware of the potential for exposure.
3. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

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2.3 MPE Assessment Method

Calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations below. This equation is generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction.

$$\text{Power Density (S)} = \frac{PG}{4\pi R^2} = \frac{\text{EIRP}}{4\pi R^2}$$

Where

S = Power Density, unit in mW/cm²

P = Power input to the antenna, unit in mW

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna, unit in cm

EIRP = Effective isotropically radiated power

2.4 MPE Calculation for Standalone Operations

The manufacturer expects that the radiated component of this device will not close to the human body during normal usage and the warning statement was also stated in the user instruction. Since the transmitting antenna will be kept at least 30 cm away from the human body, the MPE level is calculated based on this condition and the result is listed in below table.

1TX

Band	Max. Time-averaged Power (dBm)	Peak Antenna Gain (dBi)	Max. Time-averaged EIRP (mW)	Max. Time-averaged ERP (W)	Calculated Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Result
WLAN 2.4G	21.66	2.00	232.27	0.14	0.02	1.00	PASS
WLAN 5.2G	15.95	2.00	62.37	0.04	0.01	1.00	PASS
WLAN 5.8G	19.77	2.00	150.31	0.09	0.01	1.00	PASS

2TX

Band	Max. Time-averaged Power (dBm)	Peak Antenna Gain (dBi)	Max. Time-averaged EIRP (mW)	Max. Time-averaged ERP (W)	Calculated Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Result
WLAN 2.4G	21.33	5.01	430.53	0.26	0.04	1.00	PASS
WLAN 5.2G	13.43	5.01	69.82	0.04	0.01	1.00	PASS
WLAN 5.8G	19.38	5.01	274.79	0.17	0.02	1.00	PASS

Note: Directional gain = 2dBi + 10log(2) = 5.01

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3TX

Band	Max. Time-averaged Power (dBm)	Peak Antenna Gain (dBi)	Max. Time-averaged EIRP (mW)	Max. Time-averaged ERP (W)	Calculated Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Result
WLAN 2.4G	23.56	6.77	1078.95	0.66	0.10	1.00	PASS
WLAN 5.2G	13.63	6.77	109.65	0.07	0.01	1.00	PASS
WLAN 5.8G	24.72	6.77	1409.29	0.86	0.12	1.00	PASS

Note: Directional gain = 2dBi + 10log(3) = 6.77

CONCLUSION:

Both of the WLAN 2.4G & WLAN 5G can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

$WLAN\ 2.4G + WLAN\ 5.0G = 0.04 + 0.12 = 0.16$

Therefore, the maximum calculation of this situation is 0.95 which is less than the "1" limit.

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3. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The road map of all our labs can be found in our web site also.

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