RF Exposure Report

Report No.:	SA141225E06
FCC ID:	MCLT77H566
Test Model:	T77H566
Received Date:	Dec. 24, 2014
Test Date:	Jan. 20 to 21, 2015
Issued Date:	Feb. 10, 2015
Applicant:	HON HAI PRECISION IND.CO.,LTD
Address:	5F-1,5 Hsin-An Road Hsinchu, Science-Based Industrial Park Taiwan, R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
Test Location (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
SA141225E06	Original release.	Feb. 10, 2015

1 Certificate of Conformity

Product:	WiFi/BT Module
Brand:	FOXCONN
Test Model:	T77H566
Sample Status:	ENGINEERING SAMPLE
Applicant:	HON HAI PRECISION IND.CO.,LTD
Test Date:	Jan. 20 to 21, 2015
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D03 IEEE C95.1

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:** Feb. 10, 2015
Lori Chung / Specialist

Approved by : _____ , **Date:** Feb. 10, 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/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**.

3 Antenna Gain

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

Antenna No	PCB Chain No.	Brand	Model	Gain (dBi)	Antenna Type	Connector Type	Frequency range (GHz to GHz)
1	Chain (0) Main	NA	NA	1.88	PCB	i-pex(MHF)	2.4~2483.5
				2.51			5.15~5.25
				2.27			5.25~5.35
				1.77			5.47~5.725
				1.54			5.725~5.825
2	Chain (1) Aux	NA	NA	1.73	PCB	i-pex(MHF)	2.4~2483.5
				3.02			5.15~5.25
				3.4			5.25~5.35
				2.48			5.47~5.725
				-0.16			5.725~5.825
Note: For Bluetooth configuration mode will fix transmission on Chain (0).							

4 Calculation Result Of Maximum Conducted Power

For WLAN: 15.247(2.4GHz)

802.11b

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2412 - 2462	231.739	1.88	20	0.06866	1

802.11g

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2412 - 2462	378.935	4.82	20	0.22871	1

Note:

Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 4.82dBi

802.11n (HT20)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2412 - 2462	344.836	4.82	20	0.20813	1

Note:

Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 4.82dBi

For WLAN: 15.407(5GHz)

802.11a

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5180 ~ 5240	156.507	5.78	20	0.06736	1
5260 ~ 5320	157.233	5.86	20	0.12058	1
5500 ~ 5700	160.175	5.14	20	0.10407	1
5745 ~ 5825	162.194	3.74	20	0.07634	1

Note:

5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.78dBi
5250~5350MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.86dBi
5470~5725MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.14dBi
5725~5825MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 3.74dBi

802.11ac (VHT20)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5180 ~ 5240	155.437	5.78	20	0.11703	1
5260 ~ 5320	156.163	5.86	20	0.11976	1
5500 ~ 5700	112.032	5.14	20	0.07279	1
5745 ~ 5825	167.513	3.74	20	0.07885	1

Note:

5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.78dBi
5250~5350MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.86dBi
5470~5725MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.14dBi
5725~5825MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 3.74dBi

802.11ac (VHT40)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5190 ~ 5230	142.577	5.78	20	0.10734	1
5270 ~ 5310	152.067	5.86	20	0.11662	1
5510 ~ 5670	154.719	5.14	20	0.10052	1
5755 ~ 5795	67.624	3.74	20	0.03183	1

Note:

5150~5250MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.78dBi
5250~5350MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.86dBi
5470~5725MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.14dBi
5725~5825MHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 3.74dBi

802.11ac (VHT80)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
5210	38.155	5.78	20	0.02873	1
5290	53.586	5.86	20	0.04109	1
5530 ~ 5690	125.758	5.14	20	0.08171	1
5775	25.063	3.74	20	0.01180	1

Note:

5150~5250MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 5.78dBi
5250~5350MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 5.86dBi
5470~5725MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 5.14dBi
5725~5825MHz: Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 3.74dBi

For Bluetooth:

GFSK

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2402-2480	9.638	1.88	20	0.00296	1

8DPSK

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2402-2480	5.957	1.88	20	0.00183	1

BT-LE (GFSK)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
2402-2480	3.776	1.88	20	0.00116	1

Conclusion:

Both of the Bluetooth and WLAN can transmit simultaneously, the formula of calculated the MPE is:

$CPD_1 / LPD_1 + CPD_2 / LPD_2 + ……etc. < 1$

CPD = Calculation power density

LPD = Limit of power density

For 1x1 WLAN (2.4GHz) and Bluetooth:

Therefore, the worst-case situation is 0.22871 / 1 + 0.00296 / 1 = 0.232, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

For 2x2 WLAN (5GHz) and Bluetooth:

Therefore, the worst-case situation is 0.12058/ 1 + 0.00296 / 1 = 0.124, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

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