

Prüfbericht-Nr.: <i>Test report no.:</i>	CN21YVQP(FCC-MPE) 001	Auftrags-Nr.: <i>Order no.:</i>	238518387	Seite 1 von 10 Page 1 of 10
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-08-02	
Auftraggeber: <i>Client:</i>	Hon Hai Precision Industry Co., Ltd. No.151, Sec. 1, Nankan Rd., Lujhu Dist., Taoyuan City 33859, Taiwan (R.O.C.)			
Prüfgegenstand: <i>Test item:</i>	802.11a/b/g/n/ac WLAN 2T2R + BT v5.1 Combo Module			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	WBU063-VZ			
Auftrags-Inhalt: <i>Order content:</i>	FCC Certification			
Prüfgrundlage: <i>Test specification:</i>	47 CFR §2.1091 47 CFR §1.1310			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021-08-03			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003103482-001 A003103482-006			
Prüfzeitraum: <i>Testing period:</i>	2021-08-11 - 2021-09-09			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>compiled by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 2021-09-11	David Huang Project Manager	Ausstellungsdatum: <i>Issue date:</i> 2021-09-11	Ryan Chen Senior Project Manager	
Stellung / Position:		Stellung / Position:		
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN21YVQP(FCC-MPE) 001	Original Release	2021-09-11

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix EP - Photographs of EUT

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2 Test Sites

2.1 Test Facilities

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)

3 General Product Information

3.1 Product Function and Intended Use

The EUT is 802.11a/b/g/n/ac WLAN 2T2R + BT v5.1 Combo Module. It contains Bluetooth and WLAN compatible enabling the user to communicate data through Wireless interface. For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Basic Information of EUT

Item	EUT Information
Kind of Equipment/Test Item	802.11a/b/g/n/ac WLAN 2T2R + BT v5.1 Combo Module
Type Identification	WBU063-VZ
FCC ID	RX3-WBU063VZ

Technical Specification of EUT

Item	EUT Information
Operating Frequency	WLAN 2.4GHz: 2412 ~ 2462 MHz WLAN 5GHz: 5150 ~ 5240, 5260 ~ 5320, 5500 ~ 5720, 5745 ~ 5825MHz Bluetooth: 2402 ~ 2480 MHz
Modulation	802.11b: DSSS 802.11a/g/n/ac: OFDM Bluetooth® GFSK, $\pi/4$ -DQPSK, 8-DPSK
Operation Voltage	5 Vdc
Antenna Type	WLAN: PCB Antenna Bluetooth: PIFA Antenna
Antenna Gain	WLAN 2.4GHz ANT 1: -0.57 dBi ANT 2: 0.48 dBi WLAN 5GHz: ANT 1: 5150 ~ 5240: 3.61 dBi 5260 ~ 5320: 3.61 dBi 5500 ~ 5720: 4.5 dBi 5745 ~ 5825: 4.5 dBi ANT 2: 5150 ~ 5240: 1.85 dBi 5260 ~ 5320: 1.85 dBi 5500 ~ 5720: 1.49 dBi 5745 ~ 5825: 1.49 dBi Bluetooth: (Refer to Note 1 for the details) ANT 1 : 2.47 dBi ANT 2: 0.133 dBi ANT 3: 4.28 dBi ANT 4: 2.04 dBi ANT 5: 1.95 dBi ANT 6: 1.42 dBi

Note 1:

ANT	SN/Model #	Supplier Name	Cable Length	Placement
1	6903B0000P000	Foxconn	390mm	External
2	6903B0000V000	Foxconn	190mm	External
3	6903B0000N000	Foxconn	230mm	External
4	6903B0000Q000	Zhong Tian Xun	230mm	External
5	6903B0000U000	Zhong Tian Xun	190mm	External
6	6903B0000R000	Zhong Tian Xun	390mm	External

4 Maximum Permissible Exposure Evaluation

4.1 Introduction

This Standard specifies requirements for, and provides guidance on, assessing compliance with the exposure limits of radiofrequency (RF) safety standards such as IEEE Std C95.1. This includes methodologies for making an assessment (by measurement or computation) of human exposure to ambient RF fields and induced body currents in the frequency range of 0 kHz to 300 GHz.

This Standard may also be used as a guide for making low-level environmental exposure assessments in areas around RF sources listed above, as well as other sources such as Wi-Fi devices.

4.2 Reference Levels

Where appropriate, the reference levels are derived from the basic restrictions by mathematical modelling and by extrapolation from the results of laboratory investigations at specific frequencies. They are given for the condition of maximum coupling of the field to the exposed individual, thereby providing maximum protection.

According to FCC 1.1310, the criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b).

The FCC MPE limits from 47 CFR §1.1310 are shown in the table below

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]	Average Time [minutes]
(A) Limits for Occupational/Controlled Exposure				
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 Exposure				
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

NOTE –

- (1) f is the frequency in MHz.
- (2) Provided that basic restrictions are met and adverse indirect effects can be excluded, field strength values can be exceeded. For the specific case of occupational exposures at frequencies up to 100 kHz, the derived electric fields can be increased by a factor of 2 under conditions in which adverse indirect effects from contact with electrically charged conductors can be excluded.
- (3) For frequencies between 100 kHz and 10 GHz, the quantities S_{eq} , E_2 and H_2 are averages over any 6 minutes.
- (4) For frequencies exceeding 10 GHz, S_{eq} , the quantities E_2 and H_2 are averages over any $68/f$ 1.05 minutes (f in GHz).

4.3 Classification of the Assessment Methods

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.

MPE Calculation Method according to KDB 447487 D01 General RF Exposure Guidance v06

Power Density: $S_{(mW/cm^2)} = PG/4\pi R^2$ or $EIRP/4\pi R^2$

Where:

S = power density (mW/cm²)

P = power input to the antenna (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 (cm)

5 Test Results

5.1 Maximum Power Density

The maximum power density at a distance of 20 cm are shown as below:

Mode	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (mW)	Antenna Gain (dBi)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Pass / Fail
BLE	2480	8.83	7.64	4.28	0.00407	1.0	Pass
BR/EDR	2480	9.76	9.46	4.28	0.00504	1.0	Pass
WLAN 2.4GHz	2412	17.96	62.52	0.48	0.01389	1.0	Pass
WLAN 5GHz	5550	16.87	48.67	4.5	0.02727	1.0	Pass

Conclusion

Both of the Bluetooth and WLAN device 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

$$0.00504/1 + 0.01389/1 + 0.02727/1 = 0.0462$$

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