

Prüfbericht-Nr.: <i>Test report no.:</i>	CN210UH4 (FCC-MPE) 001	Auftrags-Nr.: <i>Order no.:</i>	238494087	Seite 1 von 9 Page 1 of 9
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2020-11-11	
Auftraggeber: <i>Client:</i>	Protech Systems Co., Ltd. No. 24, Lane 365, Yang Kuang Street, Neihu District, Taipei 114, Taiwan, R.O.C.			
Prüfgegenstand: <i>Test item:</i>	WiFi 802.11 a/b/g/n/ac & BT 4.1 M.2 module			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	P-WFBT_AP6356SD			
Auftrags-Inhalt: <i>Order content:</i>	FCC Certification			
Prüfgrundlage: <i>Test specification:</i>	IEEE Std C95.1 47 CFR §2.1091 47 CFR §1.1310			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020-11-25			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A002956452-002			
Prüfzeitraum: <i>Testing period:</i>	2021-04-19 - 2021-06-11			
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>reviewed by:</i>			genehmigt von: <i>authorized by:</i>	
Datum: <i>Date:</i>	2021-06-16		Ausstellungsdatum: <i>Issue date:</i>	2021-06-16
Stellung / Position:	David Huang Project Manager		Stellung / Position:	Ryan Chen Senior Project Manager
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 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
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>				

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APPENDIX EP - PHOTOGRAPHS OF EUT

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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN210UH4 (FCC-MPE) 001	Original Release	2021-06-16

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 WiFi 802.11 a/b/g/n/ac & BT 4.1 M.2 module. It contains WLAN and Bluetooth compatible module 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	WiFi 802.11 a/b/g/n/ac & BT 4.1 M.2 module
Type Identification	P-WFBT_AP6356SD
FCC ID	2AMRAP-WFBT-AP6356

Technical Specification of EUT

Item	EUT Information
Operating Frequency	WLAN 2.4G: 2412 ~ 2462 MHz WLAN 5G: 5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5700 MHz, 5745 ~ 5825 MHz Bluetooth: 2402 ~ 2480 MHz
Modulation	802.11b: DSSS 802.11a/g/n/ac: OFDM Bluetooth® GFSK, $\pi/4$ -DQPSK, 8-DPSK
Operation Voltage	3.3 Vdc
Antenna Information	Refer to Antenna List as below

Note: Only WLAN 5 GHz and BT can transmit at the same time.

<Antenna List>

ANT	Brand	Product No.	Product Name	Antenna Gain (dBi)	Antenna Type	Antenna Position	Remark
ANT1	Radiation Technology, Inc.	C0486-ANG0016	MT-5750 2.4G/5G Antenna	2.5	PIFA	Main Antenna	Test antenna for WLAN
ANT2	Radiation Technology, Inc.	C0486-ANG0027	MH-5102 Wi-Fi 2.4G/5G Antenna	2.5	PIFA	Main Antenna	-
ANT3	Radiation Technology, Inc.	C0486-ANG0028	MH-5102 WiFi/BT Antenna	2.5	PIFA	Aux. Antenna	Test antenna for WLAN and BT
ANT4	Joymax Electronics Co., Ltd.	TBF-RT03MPB-W70	MT-5751 WiFi/BT Antenna B	2.24	PIFA	Aux. Antenna	-

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 Seq, E2 and H2 are averages over any 6 minutes.
- (4) For frequencies exceeding 10 GHz, Seq, the quantities E2 and H2 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	Band	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
WLAN 2.4GHz	802.11n HT20	2437	21.7	147.91	2.5	0.0523	1	Pass
WLAN 5GHz	802.11n HT20	5745	20.23	105.36	2.5	0.0373	1	Pass
BT	-	2480	-0.80	0.83	2.5	0.0003	1	Pass

Conclusion

The device complies with the FCC exposure requirements since the maximum transmitter power density is below the FCC limit.

The formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Bluetooth + WLAN 5GHz

$= 0.0373 / 1 + 0.0003 / 1 = 0.0376$

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