KDB 447498 D03
47 C.F.R. Part 1, Subpart I, Section 1.1310
47 C.F.R. Part 2, Subpart J, Section 2.1091

RF EXPOSURE REPORT

For

ac2x2+BT5.0 USB2.0

Model: P31ASUS

Trade Name: CC&C

Issued to

CC&C Technologies, Inc.
8F, No.150, Jian Yi Rd, Zhonghe District, New Taipei City, 235, Taiwan

Issued by

Compliance Certification Services Inc.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan. (R.O.C.)
Issue Date: November 25, 2021

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 25, 2021	Initial Issue	ALL	Doris Chu

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1. TEST RESULT CERTIFICATION

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
KDB 447498 D03 47 C.F.R. Part 1, Subpart I, Section 1.1310 47 C.F.R. Part 2, Subpart J, Section 2.1091	No non-compliance noted
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

Approved by:

Kevin Tsai
Deputy Manager
Compliance Certification Services Inc.

2. LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

§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), except in the case of portable devices which shall be evaluated according to the provisions of FCC part 2.1093 of the chapter.

TABLE 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)	Averaging 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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Note 1 to Table 1: Occupational/controlled exposure 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 a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2 to Table 2: General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who 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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3. EUT SPECIFICATION

EUT	ac2x2+BT5.0 USB2.0
Model	P31ASUS
Trade Name	CC&C
Model Discrepancy	N/A
Received Date	September 10, 2021
Frequency band (Operating)	☒ Bluetooth: 2402MHz-2480MHz ☒ 802.11b/g/n HT20: 2412MHz ~ 2462 MHz ☒ 802.11a/n HT20: 5180MHz ~ 5240MHz / 5745MHz ~ 5825MHz ☒ 802.11n HT40: 5190MHz ~ 5230MHz / 5755MHz ~ 5795MHz ☒ 802.11ac VHT80: 5210MHz / 5775MHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)

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Antenna Specification	PCB Antenna BT: Main: WA-P-LB-02-914: Gain :2.93 dBi WIFI 2.4GHz: Main: WA-P-LB-02-914: Gain :2.93 dBi Aux: WA-P-LB-01-289: Gain :2.81 dBi Power Directional Gain: 5.88 dBi WIFI 5GHz: Main: WA-P-LB-02-914: 5150~5250: Gain: 3.37 dBi 5725~5850: Gain: 4.32 dBi Aux: WA-P-LB-01-289: 5150~5250: Gain: 3.47 dBi 5725~5850: Gain: 4.55 dBi Power Directional Gain: 5150~5250: Gain: 6.43 dBi 5725~5850: Gain: 7.45 dBi

BT:	Gain :	2.93 dBi	(Numeric gain:	1.96)	Worst
2.4GHz:	Main :	2.93 dBi	(Numeric gain:	1.96)	Worst
	Aux:	2.81 dBi	(Numeric gain:	1.91)	Worst
	Directional Gain :	5.88 dBi	(Numeric gain:	3.87)	Worst
5GHz:	Main :				
	5150~5250: Gain:	3.37 dBi	(Numeric gain:	2.17)	Worst
	5725~5850: Gain:	4.32 dBi	(Numeric gain:	2.70)	Worst
	Aux:				
	5150~5250: Gain:	3.47 dBi	(Numeric gain:	2.22)	Worst
	5725~5850: Gain:	4.55 dBi	(Numeric gain:	2.85)	Worst
	Directional Gain :				
	5150~5250: Gain:	6.43 dBi	(Numeric gain:	4.40)	Worst
	5250~5350: Gain:	7.45 dBi	(Numeric gain:	5.56)	Worst

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Maximum Measurement Average Power	

BT	6.59 dBm	(4.560 mW)
2.4GHz		
IEEE 802.11b Mode:	20.45 dBm	(110.917 mW)
IEEE 802.11g Mode:	13.25 dBm	(21.135 mW)
IEEE 802.11n HT 20 Mode:	11.95 dBm	(15.668 mW)
IEEE 802.11n HT 40 Mode:	9.37 dBm	(8.650 mW)
5GHz		
IEEE 802.11a Mode:	18.73 dBm	(74.645 mW)
IEEE 802.11n HT 20 Mode:	18.80 dBm	(75.858 mW)
IEEE 802.11n HT 40 Mode:	18.21 dBm	(66.222 mW)
IEEE 802.11ac VHT 80 Mode:	15.80 dBm	(38.019 mW)

Maximum tune up power	

BT	7.50 dBm	(5.623 mW)
2.4GHz		
IEEE 802.11b Mode:	21.00 dBm	(125.893 mW)
IEEE 802.11g Mode:	14.00 dBm	(25.119 mW)
IEEE 802.11n HT 20 Mode:	12.50 dBm	(17.783 mW)
IEEE 802.11n HT 40 Mode:	10.00 dBm	(10.000 mW)
5GHz		
IEEE 802.11a Mode:	19.50 dBm	(89.125 mW)
IEEE 802.11n HT 20 Mode:	19.50 dBm	(89.125 mW)
IEEE 802.11n HT 40 Mode:	19.00 dBm	(79.433 mW)
IEEE 802.11ac VHT 80 Mode:	16.50 dBm	(44.668 mW)

Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. The tune up power referred the AVG power of the test report TMWK2109000560KR, TMWK2109000561KR, TMWK2109000572KR and TMWK2109000573KR for RF Exposure assessment purpose.

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4. TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ **Equation 1**

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

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5. MAXIMUM PERMISSIBLE EXPOSURE

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

BT:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
39	2480	5.623	1.96	20	0.0022	1

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
1	2412	125.893	1.96	20	0.0491	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
6	2437	25.119	1.96	20	0.0098	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
1	2412	17.783	3.87	20	0.0137	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
3	2422	10.000	3.87	20	0.0077	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
165	5825	89.125	2.7	20	0.0479	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
149	5745	89.125	5.56	20	0.0986	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
151	5755	79.433	5.56	20	0.0879	1

IEEE 802.11ac VHT80 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
42	5210	44.668	4.4	20	0.0391	1

6. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

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

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WiFi + Bluetooth

Therefore, the worst-case situation is 0.0022 / 1 + 0.0986 / 1 = 0.1008, which is less than “1”.

--End of Report--