

Prüfbericht-Nr.: <i>Test report no.:</i>	CN22VVN0(FCC-MPE) 001	Auftrags-Nr.: <i>Order no.:</i>	238519748	Seite 1 von 10 Page 1 of 10
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-09-06	
Auftraggeber: <i>Client:</i>	EnGenius Technologies 1580 Scenic Avenue, Costa Mesa, CA 92626			
Prüfgegenstand: <i>Test item:</i>	11ax Cloud Managed AP			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	ECW230S			
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>	2021-09-06			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003123611-011, 012 A003123611-014, 016			
Prüfzeitraum: <i>Testing period:</i>	2022-01-21 - 2022-06-02			
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			
zusammengestellt von: <i>compiled by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 2022-06-13	 Ethan Shao	Ausstellungsdatum: <i>Issue date:</i> 2022-06-13	 Ryan Chen	
Stellung / Position:	Assistant Project Engineer	Stellung / Position:	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 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
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</i> v05 <i>aplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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APPENDIX EP - PHOTOGRAPHS OF EUT

HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN22VVN0(FCC-MPE) 001	Original Release	2022-06-13

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 11ax Cloud Managed AP. It contains BLE & WLAN compatible enabling the user to communicate data through wireless interface.

This equipment has two radio modules, one module is 2.4GHz + 5GHz with 4T4R and the other one is scanning radio; the scanning radio has two configurations of 1T1R and RX only. For the scanning radio in this application we just apply the RX only mode for FCC ID: A8J-ECW230S; and we also put the 1T1R test data in the report for reference only.

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	11ax Cloud Managed AP
Type Identification	ECW230S
FCC ID	A8J-ECW230S

Technical Specification of EUT

Item	EUT Information
Operating Frequency	BLE: 2402 ~ 2480 WLAN 2.4G: 2412 MHz ~ 2462 MHz WLAN 5G: Band 1: 5180 MHz ~ 5240 MHz Band 2: 5260 MHz ~ 5320 MHz Band 3: 5500 MHz ~ 5700 MHz Band 4: 5745 MHz ~ 5825 MHz
Modulation	BLE: GFSK 802.11b: DSSS-DBPSK, DQPSK, CCK 802.11g, 802.11a, 802.11n HT20, 802.11n HT40: OFDM-BPSK, QPSK, 16QAM, 64QAM 802.11ac VHT20, 802.11ac VHT40, 802.11ac VHT80: OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM 802.11ax HE20, 802.11ax HE40, 802.11ax HE80 OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Operation Voltage	Adapter: Input: 100~240Vac; Output: 12 Vdc POE: Input: 100~240Vac; Output: 44~57 Vdc
Antenna Information	Refer to Note as below

Note:

ANT	Antenna Type	Gain (dBi)				
		Traffic Mode				
		2412~ 2472 MHz	5180~ 5240 MHz	5260~ 5320 MHz	5500~ 5700 MHz	5745~ 5825 MHz
1	PIFA	3.70	5.13	5.13	5.19	5.19
2	PIFA	4.08	4.26	4.26	4.26	3.81
3	PIFA	4.12	4.03	4.03	4.56	4.56
4	PIFA	5.01	5.04	5.04	5.04	5.04
Max Peak Gain (dBi)		5.01	5.13	5.13	5.13	5.19
CDD Mode	Power Directional Gain =	5.01	5.13	5.13	5.19	5.19
	PSD Directional Gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] =$	10.26	10.65	10.65	10.79	10.69
Beamforming Mode	Power Directional Gain =	10.26	10.65	10.65	10.79	10.69
	PSD Directional Gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] =$	10.26	10.65	10.65	10.79	10.69
Antenna Type		Scanning Mode				
PIFA		4.33	6.17	6.17	5.72	6.17
Antenna Type		BLE Mode				
		2402~2480 MHz				
Dipole		5.9				

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	Average Output Power	Average Output Power	Antenna Gain	Power Density	Limit of Power Density	Pass / Fail
	(MHz)	(dBm)	(mW)	(dBi)	(mW/cm ²)	(mW/cm ²)	
BLE	2402	5.14	3.27	5.9	0.002	1.00	Pass

Mode		Frequency	Average Output Power	Average Output Power	Antenna Gain	Power Density	Limit of Power Density	Pass / Fail
		(MHz)	(dBm)	(mW)	(dBi)	(mW/cm ²)	(mW/cm ²)	
Scanning (1T1R)	WiFi 2.4GHz	2462	15.17	32.89	4.33	0.017	1.00	Pass
	WiFi 5GHz	5260	14.64	29.11	6.17	0.024	1.00	Pass

Mode		Frequency	Average Output Power	Average Output Power	Antenna Gain	Power Density	Limit of Power Density	Pass / Fail	
		(MHz)	(dBm)	(mW)	(dBi)	(mW/cm ²)	(mW/cm ²)		
Traffic (4T4R)	CDD	WiFi 2.4GHz	2437	25.06	320.98	5.01	0.202	1.00	Pass
		WiFi 5GHz	5795	25.31	339.26	5.19	0.223	1.00	Pass
	BFM	WiFi 2.4GHz	2437	19.04	80.26	10.26	0.169	1.00	Pass
		WiFi 5GHz	5795	19.29	84.83	10.69	0.198	1.00	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

WiFi 2.4G(Traffic) +WiFi 5G(Traffic) + WiFi 2.4G(Scanning) +BLE:

$$0.202/1 + 0.223/1 + 0.017/1 + 0.002/1 = 0.444$$

WiFi 2.4G(Traffic) +WiFi 5G(Traffic) + WiFi 5G(Scanning) +BLE:

$$0.202/1 + 0.223/1 + 0.024/1 + 0.002/1 = 0.451$$

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