

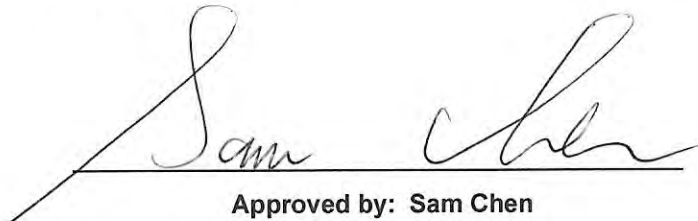


RADIO EXPOSURE TEST REPORT

FCC ID : 2AHKM-CGNV5U
Equipment : D3.0 24x8 P6 WAV654 2+2 DBCC WiFi GW
Brand Name : Hitron
Model Name : CGNV5-U, CGN5-U
Applicant : Hitron Technologies Inc.
No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,
Hsinchu 30078, Taiwan
Manufacturer : Hitron Technologies Inc.
No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,
Hsinchu 30078, Taiwan
Standard : 47 CFR Part 2.1091

The product was received on May 08, 2022, and testing was started from Mar. 09, 2022 and completed on Nov. 01, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FA230412-01	01	Initial issue of report	Nov. 17, 2022



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:

1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to report "Measurement Uncertainty".

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: **Sam Chen**

Report Producer: **Sandy Chuang**



1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)



1.2 Antenna Information

Ant.	Port		Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	2.4GHz	5GHz					
1	1	-	LNYwave	ALX21P-051AA6-00	Dipole Antenna	I-PEX	Note1
2	2	-	LNYwave	ALX22P-051AA0-00	Dipole Antenna	I-PEX	
3	-	1	LNYwave	ALX21P-092AA3-00	PIFA Antenna	I-PEX	
4	-	2	LNYwave	ALX22P-092AA0-00	PIFA Antenna	I-PEX	

Note1:

Port		Gain (dBi)						
2.4GHz	5GHz	2.4GHz	2.45GHz	2.5GHz	5.15~5.25GHz	5.25~5.35GHz	5.47~5.725GHz	5.725~5.85GHz
1	-	2.8	2.9	3	-	-	-	-
2	-	2.4	3	2.9	-	-	-	-
-	1	-	-	-	3.4	4.5	4.5	5
-	2	-	-	-	3.9	5	5	4.6

Note2: The above information was declared by manufacturer.

The EUT supports the antenna with TX and RX diversity functions.

For 2.4GHz function:

For IEEE 802.11 b mode (1TX/1RX)

Both Port 1 and Port 2 can be used as transmitting/receiving functions, but only one antenna can be used as transmitting/receiving functions at one time.

Both of them were tested and recorded in the report.

For IEEE 802.11 g/n/ax mode (2TX/2RX)

Both Port 1 and Port 2 can be used as transmitting/receiving antenna.

Both Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac/ax mode (2TX/2RX)

Both Port 1 and Port 2 can be used as transmitting/receiving antenna.

Both Port 1 and Port 2 could transmit/receive simultaneously.



Note3: Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$Directional\ IGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$Directional\ IGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ; NSS1(g1,3) = 10^{G3/20} ; NSS1(g1,4) = 10^{G4/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2 / N_{ANT}] => 10$$

$$\log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$$

Where ;

G1 = Ant 1 Gain ; G2 = Ant 2 Gain ;

2.412 & 2.422 GHz DG = 5.61 dBi

2.437 GHz DG = 5.96 dBi

2.452 & 2.462 GHz DG = 5.96 dBi

5 GHz U-NII-1 DG = 6.66 dBi

5 GHz U-NII-2A DG = 7.76 dBi

5 GHz U-NII-2C DG = 7.76 dBi

5 GHz U-NII-3 DG = 7.81 dBi

1.3 Table for Multiple Listing

EUT	Model	Adapter	Function		P/N of Casing	
			Voice	USB	Right	Left
1	CGNV5-U	Equip with Adapter 1~2	V	V	N2100104VN72	N2100105VN72
2	CGN5-U	Equip with Adapter 3~4	X	X	N2100108CN07	N2100109CN07

Note: The above information was declared by manufacturer.



1.4 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA230412.

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding the UNII 2A and UNII 2C (5250~5350MHz and 5470~5725MHz) for this device.	Maximum Permissible Exposure
2. Adding the 160MHz.	
3. Adding a model name "CGN5-U" for EUT 2	After evaluation, there is no need to re-test.
4. Adding an adapter 3 /4 for EUT 2. (1) Brand name: APD / Model: WB-24J12FU (2) Brand name: AtechOEM / Model: ADS0248T-W120200	

Note: RF Exposure Evaluation of 5GHz UNII 1/UNII 3 and 2.4GHz Band test results are based on original test report.

1.5 Accessories

Accessories				
No.	Equipment Name	Brand Name	Model Name	Rating
1	Adapter 1	APD	WA-30P12FU	INPUT: 100-240V~50-60Hz, 0.9A Max. OUTPUT: 12V, 2.5A
2	Adapter 2	MOSO	MSA-C2500IS12.0-30I-US	INPUT: 100-240V~50/60Hz, 1.0A max. OUTPUT: 12V, 2.5A
3	Adapter 3	APD	WB-24J12FU	INPUT: 100-240V~, 50-60Hz, 0.7A Max. OUTPUT: 12V, 2A
4	Adapter 4	AtechOEM	ADS0248T-W120200	INPUT: 100-240V~50-60Hz, 0.6A OUTPUT: 12V, 2A
Other				
RJ-45 cable*1: Non-shielded, 1.5m				



1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2.1091
- ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ 47 CFR Part 1.1307
- ♦ 47 CFR Part 1.1310

1.7 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.



2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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
1500-100,000	-	-	1.0	<30

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

2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

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



2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where $R > \lambda / 2 \pi$.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R ² .
1.34-30	3,450 R ² /f ² .
30-300	3.83 R ² .
300-1,500	0.0128 R ² f.
1,500-100,000	19.2R ² .

Note: R is in meters, f is in MHz.



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;D1D	3.00	29.32	32.32	0.50	32.82	20	0.38083	1.00000
5.2G;D1D	3.90	28.62	32.52	0.50	33.02	20	0.39878	1.00000
5.3G;D1D	5.00	23.91	28.91	0.50	29.41	20	0.17367	1.00000
5.6G;D1D	5.00	23.82	28.82	0.50	29.32	20	0.17011	1.00000
5.8G;D1D	5.00	28.72	33.72	0.50	34.22	20	0.52569	1.00000

MPE Exemption Option B					
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	ERP Threshold (W)	MPE Exemption
2437	0.2	32.82	30.67	3.060	Complies
5745		34.22	32.07	3.060	Complies

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz

Simultaneous Transmissions Option B						
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2437	0.2	32.82	30.67	3.060	0.91	<= 1
5745		34.22	32.07	3.060		

————THE END————