

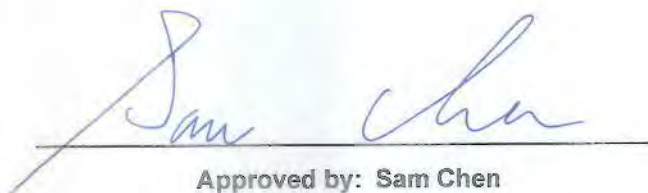


RADIO EXPOSURE TEST REPORT

FCC ID : 2AHKM-CGNV5U
Equipment : D3.0 24x8 P6 WAV654 2+2 DBCC WIFI GW
Brand Name : Hitron
Model Name : CGNV5-U
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 Mar. 08, 2022, and testing was started from Mar. 09, 2022 and completed on Mar. 14, 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 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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Photographs of EUT v01



History of this test report

[illegible]



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: Jessie Wei



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 5725-5850	5180-5240 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	-	LNWave	ALX21P-051AA6-00	Dipole Antenna	I-PEX	Note1
2	2	-	LNWave	ALX22P-051AA0-00	Dipole Antenna	I-PEX	
3	-	1	LNWave	ALX21P-092AA3-00	PIFA Antenna	I-PEX	
4	-	2	LNWave	ALX22P-092AA0-00	PIFA Antenna	I-PEX	

Note1:

Port		Gain (dBi)				
2.4GHz	5GHz	2400MHz	2450MHz	2500MHz	5150~5250MHz	5725~5850MHz
1	-	2.8	2.9	3	-	-
2	-	2.4	3	2.9	-	-
-	1	-	-	-	3.4	5
-	2	-	-	-	3.9	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	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} g_{j,k} \right)^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} g_{j,k} \right)^2}{N_{ANT}} \right]$$

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

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

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

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

Where ;

G1 = Ant 1 Gain ; G2 = Ant 2 Gain ; G3 = Ant 3 Gain ; G4 = Ant 4 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-3 DG = 7.81 dBi

1.3 Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
Adapter 1	APD	WA-30P12FU	INPUT: 100-240V~50-60Hz, 0.9A Max. OUTPUT: 12V, 2.5A
Adapter 2	MOSO	MSA-C2500IS12.0-30I-US	INPUT: 100-240V~50/60Hz, 1.0A max. OUTPUT: 12V, 2.5A
Others			
RJ-45 cable*1: Non-shielded, 1.5m			



1.4 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

1.5 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 ISCED.



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:

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

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, <= P_{th}.

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

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	$19.2 R^2$.
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)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;D1D	3.00	29.32	32.32	0.50	32.82	1.91426	20	0.38083	1.00000
5.2G;D1D	3.90	28.62	32.52	0.50	33.02	2.00447	20	0.39878	1.00000
5.8G;D1D	5.00	28.72	33.72	0.50	34.22	2.64241	20	0.52569	1.00000

MPE Exemption Option B						
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
2437	0.2	32.82	30.67	1.167	3.060	Complies
5745		34.22	32.07	1.611	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)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2437	0.2	32.82	30.67	1.167	3.060	0.91	<= 1
5745		34.22	32.07	1.611	3.060		

————THE END————