



RADIO EXPOSURE TEST REPORT

FCC ID : 2AHKM-CODA5834

Equipment : DOCSIS 3.1 Wi-Fi 6E Tri-Band EMTA Gateway

Brand Name : Hitron

Model Name : CODA5X3X
(Please refer to section 1.1.5 of the test report for detailed information.)

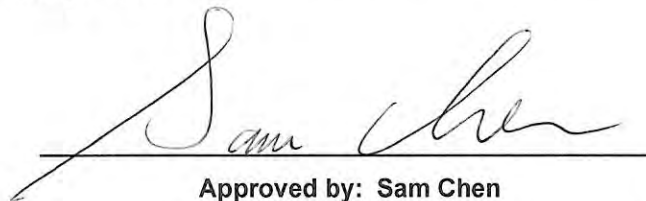
Applicant : Hitron Technologies Inc.
No. 1-8, Li-Hsin 1st Rd. Hsinchu Science Park,
Hsinchu 30078, Taiwan

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 05, 2022, and testing was started from Aug. 20, 2022 and completed on Dec. 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 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.)



Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
1 General Description	5
1.1 EUT General Information	5
1.2 Antenna Information	6
1.3 Table for Multiple Listing	7
1.4 Accessories	7
1.5 Applicable Standards	8
1.6 Testing Location	9
2 Maximum Permissible Exposure	10
2.1 Limit of Maximum Permissible Exposure	10
2.2 MPE Calculation Method	10
2.3 MPE Exemption	11
2.4 Calculated Result and Limit	12
Photographs of EUT v01	



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A1_1 Ver1.1

Page Number : 3 of 12
Issued Date : Dec. 21, 2022
Report Version : 01



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: Wendy Pan



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) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
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)
6GHz WLAN	5925-7125	6115-7115	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)



1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	SPEED	S-D5-49-6003-004-00	Dipole	I-PEX	Note
2	2	SPEED	S-D5-49-6003-003-00	Dipole	I-PEX	
3	3	SPEED	S-D5-49-6003-002-00	Dipole	I-PEX	
4	4	SPEED	S-D5-49-6003-001-00	Dipole	I-PEX	
5	1	SPEED	S-D5-49-6003-008-00	Dipole	I-PEX	
6	2	SPEED	S-D5-49-6003-007-00	Dipole	I-PEX	
7	3	SPEED	S-D5-49-6003-006-00	Dipole	I-PEX	
8	4	SPEED	S-D5-49-6003-005-00	Dipole	I-PEX	

Note

<Antenna Gain>

Ant.	Antenna Gain (dBi)				
	WLAN 2.4GHz	WLAN 5GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3
1	3.55	2.97	2.91	2.09	2.15
2	4.09	3.07	3.49	2.73	3.31
3	3.16	3.19	4	3.11	2.83
4	2.17	2.4	3.04	2.44	2.25

Frequency (MHz)	WLAN 6GHz Antenna Gain (dBi)			
	Ant.5	Ant.6	Ant.7	Ant.8
5925	4.4	5.8	5.3	3.1
6125	4.2	5.3	4.1	2.5
6225	5.0	5.6	4.8	2.9
6325	3.5	3.6	2.8	1.6
6425	3.7	5.1	4.6	3.2
6525	2.3	3.6	4.7	2.5
6625	3.4	5.9	5.4	3.8
6725	3.0	5.0	5.1	3.5
6875	4.1	5.8	5.6	3.2
6925	3.6	4.5	5.8	3.2
7125	3.8	5.0	5.3	3.1

< Directional Gain>

Directional Gain (dBi)					
Item	WLAN 2.4GHz	WLAN 5GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3
4T1S	5.17	4.87	4.61	3.59	4
4T2S	4.09	3.19	4	3.11	3.31
4T4S	4.09	3.19	4	3.11	3.31

Note: The above information (except gain of Ant.1~4) was declared by manufacturer.

The antenna gain and directional gain of the 2.4GHz/5GHz are measured which follow the procedure of KDB 662911 D03.



For WLAN 2.4GHz function:

For 802.11b/g/n/VHT/ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For WLAN 5GHz function:

For 802.11a/n/ac/ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For 6GHz function:

For 802.11ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

1.3 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Model Name	Description
CODA5X3X	CODA5X3X : The X in model name can be 0 to 9, A to Z or blank, for marketing purpose.

Note 1: From the above model: CODA5834 was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

1.4 Accessories

Accessories				
Equipment Name	Brand Name	Model Name	Rating	DC cable
Adapter	Frecom	F60X-120450SPA	INPUT: 100-240~50/60Hz, 1.6A OUTPUT: 12.0V, 4.5A, 54.0W	Non-shielding, 1.5m
Others				
Power cable*1: Non-shielding, 1.2m RJ-45 cable*1: Non-shielding, 1.5m				



1.5 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



1.6 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 45 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, <= 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	$19.2 R^2$.
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	5.17	29.81	34.98	0.50	35.48	3.53183	45	0.13879	1.00000
5.2G;D1D	4.87	25.08	29.95	0.50	30.45	1.10917	45	0.04359	1.00000
5.3G;D1D	4.61	23.90	28.51	0.50	29.01	0.79616	45	0.03129	1.00000
5.6G;D1D	3.59	23.95	27.54	0.50	28.04	0.63680	45	0.02502	1.00000
5.8G;D1D	4.00	28.72	32.72	0.50	33.22	2.09894	45	0.08248	1.00000
6.2G;D1D	2.94	-	26.54	0.50	27.04	0.50582	45	0.01988	1.00000
6.4G;D1D	3.38	-	26.91	0.50	27.41	0.55081	45	0.02164	1.00000
6.7G;D1D	4.75	-	26.99	0.50	27.49	0.56105	45	0.02205	1.00000
7.0G;D1D	4.39	-	26.51	0.50	27.01	0.50234	45	0.01974	1.00000

MPE Exemption Option C							
Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
2437	0.0196	0.45	35.48	33.33	2.153	3.888	Complies
5795	0.0082		33.22	31.07	1.279	3.888	Complies
6665	0.0072		27.49	25.34	0.342	3.888	Complies

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

Simultaneous Transmissions Option C							
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	0.45	35.48	33.33	2.153	3.888	0.971	<= 1
5795		33.22	31.07	1.279	3.888		
6665		27.49	25.34	0.342	3.888		

————THE END————