RADIO EXPOSURE TEST REPORT

FCC ID	:	RAXWN9711
Equipment	:	Wireless LAN Network Module
Brand Name	:	Arcadyan
Model Name	:	WN9711BTAAC-YA
Applicant	:	Arcadyan Technology Corporation No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Manufacturer	:	Arcadyan Technology Corporation No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Standard	:	47 CFR Part 2.1091

The product was received on Jun. 05, 2017, and testing was started from Jul. 28, 2017 and completed on Apr. 19, 2018. 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.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FA770523-11	01	Initial issue of report	Jan. 25, 2022

Summary of Test Result

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

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
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: Penny Kao

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)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / π/4-DQPSK / 8DPSK) LE: DSSS (GFSK)

1.2 Antenna information

Set	Ant.	Brand	Model Name	Type	Connector	Gain (dBi)		Cable Length (mm)
						2.4GHz	5GHz	
1	1	ACON	AEMEE-10000	Dipole	Reversed-SMA	3.24	4.54	Note 1
	2		AEMEE-10000	Dipole	Reversed-SMA	3.24	4.54	
Set	Ant.	Brand	Model Name	Type	Connector	Gain (dBi)		Cable Length (mm)
						2.4GHz	5GHz	
2	3	ACON	AEP6P-10000(Black)	PIFA	I-PEX	3.15	3.15	300
	4		AEP6P-10001(Gray)	PIFA	I-PEX	2.30	3.15	400
3	5	Walsin Technology Corporation	RFMTA370615IMLB302 (Black)	PIFA	I-PEX	3.10	4.32	150
	6		RFMTA270710IM5B301 (Gray)	PIFA	I-PEX	-	4.26	99
4	7	Walsin Technology Corporation	RFMTA370620IMLB302 (Black)	PIFA	I-PEX	2.39	3.91	206
	8		RFMTA270718IM5B301 (Gray)	PIFA	I-PEX	-	2.89	180
5	9	WNC	81XCBA15.G01(Black)	PIFA	I-PEX	2.49	3.91	400
	10		81XCBA15.G02(Gray)	PIFA	I-PEX	-	1.86	400
6	11	WNC	81XCBA15.G03(Black)	PIFA	I-PEX	1.96	2.52	300
	12		81XCBA15.G04(Gray)	PIFA	I-PEX	-	4.18	250
7	13	Walsin Technology Corporation	RFMTA370629IMLB301 (Black)	PIFA	I-PEX	3.01	3.99	290
	14		RFMTA270726IM5B301 (Gray)	PIFA	I-PEX	-	3.62	260

Note 1:

Dipole Cable	Brand	Model Name	Cable Length (mm)	Cable Loss (dB)		True Gain (dBi)	
				2.4GHz / BT	5GHz	2.4GHz / BT	5GHz
1	ACON	AEC8P-1000000 (Gray) AEC8P-1000001 (Black)	30	0.08	0.12	3.16	4.42
2	ACON	AEC8P-1000002 (Gray) AEC8P-1000003 (Black)	50	0.13	0.19	3.11	4.35
3	ACON	AEC8P-1000004 (Gray) AEC8P-1000005 (Black)	70	0.19	0.27	3.05	4.27
4	ACON	AEC8P-1000006 (Gray) AEC8P-1000007 (Black)	90	0.24	0.35	3.00	4.19
5	ACON	AEC8P-1000008 (Gray) AEC8P-1000009 (Black)	120	0.32	0.46	2.92	4.08
6	ACON	AEC8P-1000010 (Gray) AEC8P-1000011 (Black)	160	0.43	0.62	2.81	3.92
7	ACON	AEC8P-1000012 (Gray) AEC8P-1000013 (Black)	200	0.54	0.77	2.70	3.77
8	ACON	AEC8P-1000014 (Gray) AEC8P-1000015 (Black)	240	0.64	0.93	2.60	3.61
9	ACON	AEC8P-1000016 (Gray) AEC8P-1000017 (Black)	280	0.75	1.08	2.49	3.46

Dipole Cable	Brand	Model Name	Cable Length (mm)	Cable Loss (dB)		True Gain (dBi)	
				2.4GHz / BT	5GHz	2.4GHz / BT	5GHz
10	ACON	AEC8P-1000018 (Gray) AEC8P-1000019 (Black)	320	0.86	1.24	2.38	3.30
11	ACON	AEC8P-1000020 (Gray) AEC8P-1000021 (Black)	360	0.96	1.39	2.28	3.15
12	ACON	AEC8P-1000022 (Gray) AEC8P-1000023 (Black)	400	1.07	1.54	2.17	3.00
13	ACON	AEC8P-1000024 (Gray) AEC8P-1000025 (Black)	450	1.21	1.74	2.03	2.80
14	ACON	AEC8P-1000026 (Gray) AEC8P-1000027 (Black)	500	1.34	1.93	1.90	2.61

Note 2: 1. The EUT has two radios.

Radio 1 supports WLAN 2.4GHz, WLAN 5GHz and Bluetooth function, Radio 2 supports WLAN 5GHz function only.

Radio 1 collocate with Black antenna cable, Radio 2 collocate with Gray antenna cable.

2. The EUT has two type antennas, and there are two antennas for each set.

Dipole Antenna collocate with 14 set cable selling, only the higher gain antenna “cable 1” was tested and recorded in the report for SKU1.

Dipole Antenna collocate with 14 set cable selling, only the higher gain antenna “cable 14” was tested and recorded in the report for SKU 2.

PIFA Antenna collocate with 6 set selling, the higher gain antennas “set 2 for 2.4GHz and set 3 for 5GHz for CTX, set 3 for Normal Link” were tested and recorded in the report.

For Radio 1 (WLAN 2.4GHz, WLAN 5GHz and Bluetooth):

For IEEE 802.11a/b/g/n/ac mode (1TX/1RX):

Dipole Antenna: Only Ant. 1 (Port 1) can be used as transmitting/receiving antenna.

PIFA Antenna: Only Ant. 3 (Port 1) can be used as transmitting/receiving antenna.

For Radio 2 (WLAN 5GHz):

For IEEE 802.11a/n/ac mode (1TX/1RX):

Dipole Antenna: Only Ant. 2 (Port 1) can be used as transmitting/receiving antenna.

PIFA Antenna: Only Ant. 6 (Port 1) can be used as transmitting/receiving antenna.

1.3 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA770523-03

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

Modifications	Performance Checking
1. Adding second source DDR and Flash for SKU 1, please refer to section 1.5 for detail information. 2. Adding the SKU 2, please refer to section 1.4 for detail information. 3. Adding 1 set of same type PIFA antenna (set 7) with lower gain than the original report, and the set 7 antenna is not the smallest gain antenna.	After evaluating, it does not need to re-test.

Note: All test results were based on original report.

1.4 Table for SKU Information

SKU	Radio 1 (WLAN 2.4GHz, WLAN 5GHz and Bluetooth)	Radio 2 (WLAN 5GHz)	Antennas	Remark
1	V	V	1~14	There is no change in hardware or in existing RF relevant portion between these two SKUs.
2	V	Disable	1,13	

Note: The above information was declared by manufacturer.

1.5 Table for DDR and Flash Detail Information for SKU 1

SKU	Source	Item	Arcadyan P/N	Brand	Model Name	Capacity
1	Main	DDR	109100303400J	SAMSUNG	K4B2G1646F-BYK0	256MB
		Flash	107100262600J	TOSHIBA	TC58NVG1S3HTAI0	256MB
	Second	DDR	109100305500J	SAMSUNG	K4B4G1646E-BYMA	512MB
		Flash	107100267000J	TOSHIBA	TH58NVG2S3HTAI0	512MB

Note 1: The above information was declared by manufacturer

1.6 Accessories

N/A

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/ cm²)	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)*	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/ cm²)	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)*	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 (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

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 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For Radio 1:

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)
2.4G;G1D	3.16	19.87	23.03	0.20091	20	0.03997	1.00000
5.2G;D1D	4.42	20.15	24.57	0.28642	20	0.05698	1.00000
2.4G;BT-EDR	3.16	4.55	7.71	0.0059	20	0.00117	1.00000

For Radio 2:

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)
5.3G;D1D	4.42	20.59	25.01	0.31696	20	0.06306	1.00000

Simultaneous Transmission Analysis Mode:

For SKU 1

1. Radio 1 (2.4GHz + Bluetooth) + Radio 2 (5GHz)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)	Ratio (S/Limit)
(Radio 1) 2.4G;G1D	3.16	19.87	23.03	0.20091	20	0.03997	1.00000	0.03997
(Radio 1) 2.4G;BT-EDR	3.16	4.55	7.71	0.00590	20	0.00117	1.00000	0.00117
(Radio 2) 5.3G;D1D	4.42	20.59	25.01	0.31696	20	0.06306	1.00000	0.06306
							Sum Ratio	0.1042
							Ratio Limit	1

2. Radio 1 (5GHz + Bluetooth) + Radio 2 (5GHz)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)	Ratio (S/Limit)
(Radio 1) 5.2G;D1D	4.42	20.15	24.57	0.28642	20	0.05698	1.00000	0.05698
(Radio 1) 2.4G;BT-EDR	3.16	4.55	7.71	0.00590	20	0.00117	1.00000	0.00117
(Radio 2) 5.3G;D1D	4.42	20.59	25.01	0.31696	20	0.06306	1.00000	0.06306
							Sum Ratio	0.12121
							Ratio Limit	1