Testing Laboratory 3787

RADIO EXPOSURE TEST REPORT

FCC ID	:	ZQ6-WL72917
Equipment	:	AIoT Module
Brand Name	:	AMPAK Technology Inc, SPARKLAN COMMUNICATIONS INC
Model Name	:	WL72917
Applicant	:	AMPAK Technology Inc. 3F, No. 1, Jen Al Road, Hsinchu Industrial Park,Hsinchu City 30352 , Taiwan (R.O.C.)
Manufacturer	:	BILLIONTON SYSTEMS INC. No. 21, Sui-Lih Rd., Hsin-Chu City 300, Taiwan (R.O.C.)
Standard	:	47 CFR Part 2.1091

The product was received on Jul. 05, 2024, and testing was started from Aug. 20, 2024 and completed on Dec. 05, 2024. 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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History of this test report

Report No.	Version	Description	Issued Date
FA461102	01	Initial issue of report	Dec. 12, 2024
FA461102	02	Add a PIFA antenna with the same type and gain (No. 9). (Please refer to section 1.2 for detail information.)	Jan. 16, 2025

Summary of Test Result

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

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. 2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

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, 1024QAM)
Bluetooth	2400-2483.5	2402-2480 (1Mbps) 2402-2478 (2Mbps)	LE: GFSK

1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Cable loss (dB)	Net Gain (dBi)	Equip EUT
1	1	SparkLAN	AD-305N	Dipole	Reverse SMA	5.00	0.4	4.60	2
2		SparkLAN	AD-103AG	Dipole	Reverse SMA	2.02	0.4	1.62	2
3		SparkLAN	AD-301N	Dipole	Reverse SMA	4.40	0.4	4.00	2
4		SparkLAN	AD-302N	Dipole	Reverse SMA	3.14	0.4	2.74	2
5		SparkLAN	AD-303N	Dipole	Reverse SMA	3.14	0.4	2.74	2
6		Pulse	TZ2412W	Dipole	Reverse SMA	3.60	0.4	3.20	2
7	-	Pulse	ANT8010LL04R2400A	Chip	N/A	0.70	-	0.70	1
8	1	TSKY	A8-A006-00XXX	PIFA	I-PEX	1.02	-	1.02	2
9	-	TSKY	A8-A006-00739	PIFA	I-PEX	1.02	-	1.02	2

Note: The above information was declared by manufacturer.

<WLAN 2.4GHz>
For IEEE 802.11b/g/n/ax (1TX/1RX):
Only Port 1 can be used as transmitting antenna.

<Bluetooth> (1TX/1RX):
Only Port 1 can be used as transmitting antenna.

1.3 Table for Multiple Listing

Brand Name	Model Name	Description
AMPAK Technology Inc	WL72917	All the brands are identical, the difference brand for difference served as marketing strategy.
SPARKLAN COMMUNICATIONS INC		

Note 1: From the above, brand: AMPAK Technology Inc 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 Table for EUT Information

EUT	Equip Antenna
1	Ant. 7
2	Ant. 1~6 (with I-PEX cable), Ant. 8~9

Note: The above information was declared by manufacturer.

1.5 Accessories

N/A

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/ 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/f²)	<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/f²)	<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 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.

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

Where

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

and

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

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 > λ / 2 π.

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^2f.
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)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)
2.4G;D1D	4.60	15.65	18.10	0.50	72.444	20	B	3060.0
2.4G;BT-LE	4.60	7.50	9.95	0.50	11.092	20	B	3060.0

Note: The above antenna gain was declared by manufacturer.

———THE END———