



RADIO EXPOSURE TEST REPORT

FCC ID : TVE-241101

Equipment : Secured Wireless Access Point

Brand Name : FORTINET

Model Name : FAP-23JKxxxxxxxxxx, FortiAP 23JKxxxxxxxxxx,
FORTIAP-23JKxxxxxxxxxx
(Please refer to section 1.3 for detailed information.)

Applicant : Fortinet, Inc.
909 Kifer Road, Sunnyvale, CA 94086, USA

Manufacturer : Fortinet, Inc.
909 Kifer Road, Sunnyvale, CA 94086, USA

Standard : 47 CFR Part 2.1091

The product was received on Nov. 26, 2024, and testing was started from Dec. 03, 2024 and completed on Feb. 13, 2025. 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

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Photographs of EUT v01



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	2.1091/1.1310/1.1307	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/manufacture 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) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850 5725-5895	5180-5250 5250-5320 5500-5720 5745-5825 5815-5885	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
6GHz WLAN	5925-7125	5955-7115	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM) EHT240: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
Bluetooth	2400-2483.5	2402-2480	LE: GFSK
Zigbee	2400-2483.5	2405-2480	O-QPSK



1.2 Antenna Information

Ant.	Port				Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	Bluetooth Zigbee					
1	2	2	-	-	WNC	95XPAD15.G78	Dipole	IPEX MHF1	Note 1
2	1	1	-	-	WNC	95XPAD15.G79	Dipole	IPEX MHF1	
3	-	-	2	1	WNC	95XPAD15.G82	Dipole	IPEX MHF1	
4	-	-	1	-	WNC	95XPAD15.G83	Dipole	IPEX MHF1	

Note 1:

Ant.	Gain (dBi)			
	WLAN 2.4GHz	WLAN 5GHz UNII1~4	WLAN 6GHz UNII5~8	Bluetooth Zigbee
1	3.6	6.3	-	-
2	3.6	6.3	-	-
3	-	-	4.2	4.2
4	-	-	4.2	-

Note 2: The above information was declared by manufacturer.

Note 3: Directional gain information

<For 2.4GHz and 5GHz>

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 $N_{ANT} \leq 4$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} \xi_{j,k} \right)^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} \xi_{j,k} \right)^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} \xi_{j,k} \right)^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

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

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

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

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

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

Where ;

$$2.4G \ G1 = 3.6 \text{ dBi} ; G2 = 3.6 \text{ dBi} ;$$

$$5G \text{ UNII-1 } G1 = 6.3 \text{ dBi} ; G2 = 6.3 \text{ dBi} ;$$

$$5G \text{ UNII-2A } G1 = 6.3 \text{ dBi} ; G2 = 6.3 \text{ dBi} ;$$

$$5G \text{ UNII-2C } G1 = 6.3 \text{ dBi} ; G2 = 6.3 \text{ dBi} ;$$

$$5G \text{ UNII-3 } G1 = 6.3 \text{ dBi} ; G2 = 6.3 \text{ dBi} ;$$

$$5G \text{ UNII-4 } G1 = 6.3 \text{ dBi} ; G2 = 6.3 \text{ dBi} ;$$

$$2.4G \ DG = 6.61 \text{ dBi}$$

$$5G \text{ UNII-1 } DG = 9.31 \text{ dBi}$$

$$5G \text{ UNII-2A } DG = 9.31 \text{ dBi}$$

$$5G \text{ UNII-2C } DG = 9.31 \text{ dB}$$

$$5G \text{ UNII-3 } DG = 9.31 \text{ dBi}$$

$$5G \text{ UNII-4 } DG = 9.31 \text{ dBi}$$

**<For WLAN 2.4GHz>****For IEEE 802.11b/g/n/VHT/ax/be mode (2TX/2RX)**

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For WLAN 5GHz UNII1~4>**For IEEE 802.11a/n/ac/ax/be mode (2TX/2RX)**

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For WLAN 6GHz UNII 5~8>**For IEEE 802.11ax/be mode (2TX/2RX)**

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For Bluetooth or Zigbee> mode (1TX/1RX)

Only Port 1 can be used as transmitting/receiving antenna.

1.3 Table for Multiple Listing

Model Name	Description
FAP-23JKxxxxxxxxxx, FortiAP 23JKxxxxxxxxxx, FORTIAP-23JKxxxxxxxxxx	Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only

Note 1: From the above models, model: FAP-23JK 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

Wall-mounted*1

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 50 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)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	6.61	29.28	33.74	0.10	2421.029	50	C	4800.0	0.5046
5.2G;D1D	6.30	26.48	30.63	0.50	1297.179	50	C	4800.0	0.2703
5.3G;D1D	9.31	20.52	27.68	0.16	608.135	50	C	4800.0	0.1267
5.6G;D1D	6.30	23.61	27.76	0.08	608.135	50	C	4800.0	0.1267
5.8G;D1D	6.30	27.81	31.96	0.50	1761.976	50	C	4800.0	0.3672
5.81G;D1D	6.30	25.08	29.23	0.50	939.723	50	C	4800.0	0.1958
6.2G;D1D	4.20	-	24.98	0.50	353.183	50	C	4800.0	0.0736
6.4G;D1D	4.20	-	23.96	0.50	279.254	50	C	4800.0	0.0582
6.7G;D1D	4.20	-	24.19	0.50	294.442	50	C	4800.0	0.0614
7.0G;D1D	4.20	-	21.35	0.50	153.109	50	C	4800.0	0.0319
2.4G;BT-LE	4.20	17.19	19.24	0.50	94.189	50	C	4800.0	0.0196
2.4G;Zigbee	4.20	17.36	19.41	0.50	97.949	50	C	4800.0	0.0204

Simultaneous Transmission Analysis Mode:

Mode 1: EUT_WLAN 2.4GHz+WLAN 5GHz+WLAN 6GHz+Bluetooth

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	6.61	29.28	33.74	0.10	2421.029	50	C	4800.0	0.5046
5.8G;D1D	6.30	27.81	31.96	0.50	1761.976	50	C	4800.0	0.3672
6.2G;D1D	4.20	-	24.98	0.50	353.183	50	C	4800.0	0.0736
2.4G;BT-LE	4.20	17.19	19.24	0.50	94.189	50	C	4800.0	0.0196
Sum TL Ratio_C	0.9650								
Ratio Limit	1								

Mode 2: EUT_WLAN 2.4GHz+WLAN 5GHz+WLAN 6GHz+Zigbee

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	6.61	29.28	33.74	0.10	2421.029	50	C	4800.0	0.5046
5.8G;D1D	6.30	27.81	31.96	0.50	1761.976	50	C	4800.0	0.3672
6.2G;D1D	4.20	-	24.98	0.50	353.183	50	C	4800.0	0.0736
2.4G;Zigbee	4.20	17.36	19.41	0.50	97.949	50	C	4800.0	0.0204
Sum TL Ratio_C	0.9712								
Ratio Limit	1								

Note 1: The above antenna gain was declared by manufacturer.

Note 2: The EUT meets FCC RF exposure requirement at 50 cm distance.

————THE END————