Radio Exposure Evaluation Report

FCC ID	:	**TVE-3417T0966**
Equipment	:	**Secured Wireless Access Point**
Brand Name	:	**FORTINET**
Model Name	:	**FortiAP 23JFxxxxxx, FAP-23JFxxxxxx, FORTIAP-23JFxxxxxx (where "x" can be "A-Z", or "0-9", or "-", or blank for software purposes or marketing purposes only)**
Applicant	:	**Fortinet, Inc. 899 Kifer Road, Sunnyvale, CA 94086, USA**
Manufacturer	:	**Fortinet, Inc. 899 Kifer Road, Sunnyvale, CA 94086, USA**
Standard	:	**47 CFR FCC Part 2 Subpart J, section 2.1091**

The product was received on Oct. 27, 2020, and testing was started from Nov. 03, 2020 and completed on Jan. 21, 2021. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR FCC Part 2 Subpart J, section 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. Hsinhua Laboratory, the test report shall not be reproduced except in full.

Approved by: Allen Lin

SPORTON INTERNATIONAL INC. Hsinhua Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FA0O2618-01	01	Initial issue of report	Jul. 20, 2021

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:
None

Reviewed by: Sam Tsai

Report Producer: Debby Hung

1 General Description

1.1 Information

Radio	Function	Beamforming Mode
0	2.4G	Support
1	5G	Support
2	2.4G & 5G(Scanning Radio)	N/A
3	Bluetooth & Zigbee	N/A

1.1.1 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) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5700 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	LE: DSSS (GFSK)
ZigBee	2400-2483.5	2405-2480	DSSS (O-QPSK)

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector
1	Senao	5718A0566300	Dipole	I-PEX
2	Senao	5718A0567300	Dipole	I-PEX
3	Senao	5718A0568300	Dipole	I-PEX
4	Senao	5718A0569300	Dipole	I-PEX

Ant.	2.4GHz		5GHz		BTLE/Zigbee	Remark
	Antenna Gain(dBi)	Beamforming Gain(dBi)	Antenna Gain(dBi)	Beamforming Gain(dBi)	Antenna Gain(dBi)	
1	4.17	3.01	4.35	3.01	-	Radio 0,1
2	3.74		3.84		-	Radio 0,1
3	3.99	-	4.16	-	-	Radio 2
4	-		-		3.63	Radio 3

For 2.4 GHz function:
Radio 0
For IEEE 802.11b/g/n/VHT/ax mode (2TX/2RX)
Ant. 1 and Ant. 2 could transmit/receive simultaneously.
Radio 2
For IEEE 802.11b/g/n mode (1TX/1RX)
Ant. 3 could transmit/receive.
For 5 GHz function:
Radio 1
For IEEE 802.11a/n/VHT/ax mode (2TX/2RX)
Ant. 1 and Ant. 2 could transmit/receive simultaneously.
Radio 2
For IEEE 802.11a/n/ac mode (1TX/1RX)
Ant. 3 could transmit/receive.
For Bluetooth/Zigbee function:
Radio 3
For Bluetooth/Zigbee mode (1TX/1RX)
Only Ant. 4 can be used as transmitting/receiving.

1.1.3 Table for Multiple Listing

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

Brand Name	Model Name	Description
FORTINET	FortiAP 23JFxxxxxx	All the models are identical, the difference model for difference brand served as marketing strategy.
	FAP-23JFxxxxxx	
	FORTIAP-23JFxxxxxx	

1.1.4 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA0O2618

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

Modifications	Performance Checking
Frequency bands U-NII-2A and U-NII-2C were added.	All

1.1.5 Accessories

Accessories				
BRACKET WALL JACK	Brand Name	Enrack	Model Name	6002Ad953000

Reminder: Regarding to more detail and other information, please refer to user manual.

1.2 Testing Location

Test Lab.：Sporton International Inc. Hsinhua Laboratory		
☒ Hsinhua **(TAF:** 3785**)**	**ADD:** No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
	TEL: 886-3-327-3456	**FAX:** 886-3-327-0973
Test site Designation No. TW1190 with FCC.		
☐ Wen 33rd.St. **(TAF:** 3785**)**	**ADD:** No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)	
	TEL: 886-3-318-0787	**FAX:** 886-3-318-0287
Test site Designation No. TW0008 with FCC.		

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^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/ 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^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 23 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

Radio 0:2.4G+ Radio 1:5G+ Radio 2:2.4G+Bluetooth Function

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)	Ratio (S/Limit)
2.4G;D1D	7.18	26.13	33.31	0.00	33.31	2.14289	23	0.32236	1.00000	0.32236
5.2G;D1D	7.36	28.63	35.99	0.00	35.99	3.97192	23	0.59750	1.00000	0.59750
2.4G;G1D	3.99	20.58	24.57	0.00	24.57	0.28642	23	0.04309	1.00000	0.04309
2.4G;BT-LE	3.63	11.79	15.42	0.00	15.42	0.03483	23	0.00524	1.00000	0.00524
									Sum Ratio	0.96819
									Ratio Limit	1

Radio 0:2.4G+ Radio 1:5G+ Radio 2:5G+ Bluetooth Function

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)	Ratio (S/Limit)
2.4G;D1D	7.18	26.13	33.31	0.00	33.31	2.14289	23	0.32236	1.00000	0.32236
5.2G;D1D	7.36	28.63	35.99	0.00	35.99	3.97192	23	0.59750	1.00000	0.59750
5.3G;D1D	4.16	22.05	26.21	0.00	26.21	0.41783	23	0.06285	1.00000	0.06285
2.4G;BT-LE	3.63	11.79	15.42	0.00	15.42	0.03483	23	0.00524	1.00000	0.00524
									Sum Ratio	0.98795
									Ratio Limit	1

Radio 0:2.4G+ Radio 1:5G+ Radio 2:2.4G+Zigbee Function

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)	Ratio (S/Limit)
2.4G;D1D	7.18	26.13	33.31	0.00	33.31	2.14289	23	0.32236	1.00000	0.32236
5.2G;D1D	7.36	28.63	35.99	0.00	35.99	3.97192	23	0.59750	1.00000	0.59750
2.4G;G1D	3.99	20.58	24.57	0.00	24.57	0.28642	23	0.04309	1.00000	0.04309
2.4G;G1D	3.63	11.65	15.28	0.00	15.28	0.03373	23	0.00507	1.00000	0.00507
									Sum Ratio	0.96802
									Ratio Limit	1

Radio 0:2.4G+ Radio 1:5G+ Radio 2:5G+Zigbee Function

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)	Ratio (S/Limit)
2.4G;D1D	7.18	26.13	33.31	0.00	33.31	2.14289	23	0.32236	1.00000	0.32236
5.2G;D1D	7.36	28.63	35.99	0.00	35.99	3.97192	23	0.59750	1.00000	0.59750
5.3G;D1D	4.16	22.05	26.21	0.00	26.21	0.41783	23	0.06285	1.00000	0.06285
2.4G;G1D	3.63	11.65	15.28	0.00	15.28	0.03373	23	0.00507	1.00000	0.00507
									Sum Ratio	0.98778
									Ratio Limit	1

————THE END————