Radio Exposure Evaluation Report

FCC ID	:	**TVE-2417T212**
Equipment	:	**Secured Wireless Access Point**
Brand Name	:	**FORTINET**
Model Name	:	**FortiAP 221Exxxxxx, FORTIAP-221Exxxxxx, FAP-221E++xxxxxx, FortiAP 223Exxxxxx, FORTIAP-223Exxxxxx, FAP-223E++xxxxxx, (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes 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 Apr. 30, 2021, and testing was started from May 17, 2021 and completed on Jun. 18, 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 partial 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
FA142904	01	Initial issue of report	Aug. 13, 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: Michelle Tsai

1 General Description

1.1 Information

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)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Bluetooth	2400-2483.5	2402-2480	LE: DSSS (GFSK)

1.1.2 Antenna Information

Internal Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Antenna Gain (dBi)		
					2.4GHz	5GHz	BLE
1	Senao	5718A0268300	PIFA	I-Pex	4.24	-	-
2	Senao	5718A0268300	PIFA	I-Pex	4.11	-	-
3	Senao	5718A0268300	PIFA	I-Pex	-	5.05	-
4	Senao	5718A0268300	PIFA	I-Pex	-	5.06	-
5	Senao	5718A0642300	Dipole	I-Pex	-	-	4.33

External Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Antenna Gain (dBi)			Cable Loss
					2.4GHz	5GHz	BLE	
1	YONG-SHUN	7102A0485000	Dipole	Reverse SMA	5	-	-	0.5
2	YONG-SHUN	7102A0485000	Dipole	Reverse SMA	5	-	-	0.5
3	YONG-SHUN	7102A0485000	Dipole	Reverse SMA	-	5	-	0.8
4	YONG-SHUN	7102A0485000	Dipole	Reverse SMA	-	5	-	0.7
5	Senao	5718A0642300	Dipole	I-Pex	-	-	4.33	-

For 2.4GHz function:
For IEEE 802.11 b/g/n mode (2TX/2RX)
Ant. 1 (port 1) and Ant. 2 (port 2) could transmit/receive simultaneously.
For BT function:
For IEEE 802.15.1 Bluetooth mode (1TX/1RX)
Ant. 5 (port 1) could transmit/receive.

For 5GHz function:
For IEEE 802.11 a/n/ac mode (2TX/2RX)
Ant. 3 (port 1) and Ant. 4 (port 2) could transmit/receive simultaneously.

1.1.3 Table for Multiple Listing

Sample No.	Model Name	Description
1	FortiAP 221Exxxxxx FORTIAP-221Exxxxxx FAP-221E++xxxxxx	FAP-221E++ indicates that it comes with internal antennas and FAP-223E++ indicates that the access point comes with external antenna connectors. Series models serve different marketing.
2	FortiAP 223Exxxxxx FORTIAP-223Exxxxxx FAP-223E++xxxxxx	
where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software changes or marketing purposes only.		

1.1.4 Accessories

Accessories				
BRACKET CEILING MOUNT LOCK	Brand Name	MOST Technique Co., LTD.	Model Name	ABS PA757

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	**ADD:** No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
	(TAF: 3785**)**	**TEL:** 886-3-327-3456	**FAX:** 886-3-327-0973
Test site Designation No. TW3785 with FCC.			
☐	Wen 33rd.St.	**ADD:** No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)	
	(TAF: 3785**)**	**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

Multiple Transmitters Condition
Co-location as simultaneously transmitting (co-transmitting) and the evaluation shall be consider that simultaneous transmissions from co-located devices the individual transmitters are evaluated separately. After sum of the individual value (basic restriction / reference level) are measured/calculated also have to under basic restriction / reference level.
Co-transmitting mode: WLAN 2.4G+ WLAN 5G+ Bluetooth

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

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm2)	Limit (mW/cm2)	Ratio (S/Limit)
2.4G;D1D	4.5	25.1	29.60	0.00	29.60	0.91201	20	0.18144	1.00000	0.18144
5.8G;D1D	8.07	25.12	33.19	0.00	33.19	2.08449	20	0.41470	1.00000	0.41470
2.4G;BT-LE	4.33	11.84	16.17	0.00	16.17	0.04140	20	0.00824	1.00000	0.00824
									Sum Ratio	0.60438
									Ratio Limit	1

THE END