

Radio Exposure Evaluation Report

FCC ID : TVE-2417T112

Equipment : Secured Wireless Access Point

Brand Name : FORTINET

Model Name : FAP-221E+, FAP-223E+
FortiAP 221Exxxxxxx, FORTIAP-221Exxxxxxx, FAP-221Exxxxxxx
FortiAP 223Exxxxxxx, FORTIAP-223Exxxxxxx, FAP-223Exxxxxxx
(where "x" can be used as "A-Z", or "0-9", or "-", or blank for
software changes or marketing purposes only)

Applicant / : Fortinet, Inc.

Manufacturer : 899 Kifer Road, Sunnyvale, CA 94086, USA

Standard : 47 CFR Part 2.1091

The product was received on Apr. 26, 2018, and testing was started from May 03, 2018 and completed on May 28, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of United States government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Report Template No.: HE1-A1 Ver2.0
FCC ID: TVE-2417T112

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	5250-5350 5470-5725	5260-5320 5500-5700	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)

1.2 Table for Multiple Listing

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

Brand Name	Model Name	Difference	
		Internal antenna	External antenna
Fortinet	FAP-221E+	V	
Fortinet	FAP-223E+		V

Note 1: The only difference between FAP-221E+ and FAP-223E+ is the layout of the antenna.

1.3 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA841009

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

Modifications	Performance Checking
UNII-2A and UNII-2C was added	N/A

1.4 Testing Location

Testing Location			
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			
<input type="checkbox"/>	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085
Test site Designation No. TW0006 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/ 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 20 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 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/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	3.89	25.40	29.29	0.50	29.79	0.95280	20	0.18955	1.00000	0.18955
2.4G;BT-LE	2.93	3.41	6.34	0.50	6.84	0.00483	20	0.00096	1.00000	0.00096
5.2G;D1D	5.55	25.87	31.42	0.50	31.92	1.55597	20	0.30955	1.00000	0.30955
									Sum Ratio	0.50006
									Ratio Limit	1

————THE END————