

RF Exposure Report

Report No.: SABDYS-WTW-P20110911A

FCC ID: TVE-371CBE0271

Test Model: FAP-U234F

Series Model: FortiAP U234Fxxxxxx, FAP-U234Fxxxxxx, FORTIAP-U234Fxxxxxx (Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)

Received Date: Nov. 29, 2020

Date of Evaluation: May 28, 2021

Issued Date: Oct. 21, 2021

Applicant: Fortinet, Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
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FCC Registration / Designation Number: 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

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Release Control Record

Issue No.	Description	Date Issued
SABDYS-WTW-P20110911A	Original Release	Oct. 21, 2021

1 Certificate of Conformity

Product: Secured Wireless Access Point

Brand: Fortinet

Test Model: FAP-U234F

Series Model: FortiAP U234Fxxxxxx, FAP-U234Fxxxxxx, FORTIAP-U234Fxxxxxx (Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)

Sample Status: Engineering Sample

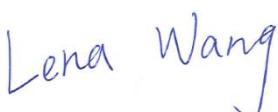
Applicant: Fortinet, Inc.

Date of Evaluation: May 28, 2021

Standards: FCC Part 2 (Section 2.1091)

**References Test KDB 447498 D01 General RF Exposure Guidance v06
Guidance:**

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.


Prepared by : _____, **Date:** _____ Oct. 21, 2021

Lena Wang / Specialist


Approved by : _____, **Date:** _____ Oct. 21, 2021

Dylan Chiou / Senior Project Engineer

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
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

f = Frequency in MHz; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

r = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 39 cm away from the body of the user. So, this device is classified as **Mobile Device**.

3 Calculation Result of Maximum Conducted Power

Radio	Frequency Band (MHz)	Max AV Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 1	CDD Mode					
	2412-2462	25.61	13.25	39	0.402	1
	5500-5720	19.00	13.54	39	0.094	1
	5745-5825	25.15	13.54	39	0.387	1
	Beamforming Mode					
	2412-2462	21.17	13.25	39	0.145	1
	5500-5720	15.99	13.54	39	0.047	1
	5745-5825	22.14	13.54	39	0.193	1
Radio 2	CDD Mode					
	5180-5240	22.98	13.43	39	0.229	1
	5260-5320	18.29	13.43	39	0.078	1
	5500-5720	19.38	13.43	39	0.100	1
	5745-5825	25.42	13.43	39	0.401	1
	Beamforming Mode					
	5180-5240	19.97	13.43	39	0.114	1
	5260-5320	15.28	13.43	39	0.039	1
	5500-5720	16.37	13.43	39	0.050	1
	5745-5825	22.41	13.43	39	0.201	1

Radio	Frequency Band (MHz)	Max AV Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 3	CDD Mode					
	2412-2462	28.16	7.5	39	0.193	1
	5180-5240	25.38	7.75	39	0.108	1
	5260-5320	23.22	7.75	39	0.065	1
	5500-5720	23.01	7.75	39	0.062	1
	5745-5825	25.20	7.75	39	0.103	1
	Beamforming Mode					
	2412-2462	20.92	7.5	39	0.036	1
	5180-5240	22.16	7.75	39	0.051	1
	5260-5320	20.21	7.75	39	0.033	1
	5500-5720	20.00	7.75	39	0.031	1
	5745-5825	22.19	7.75	39	0.052	1
BT LE	2402-2480	10.36	4.22	39	0.002	1
Zigbee	2405-2480	10.34	4.22	39	0.001	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

Radio 1:

2.4GHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 13.25 \text{dBi}$

5.0GHz Band 3: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 13.54 \text{dBi}$

5.0GHz Band 4: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 13.54 \text{dBi}$

Radio 2:

5.0GHz Band 1 & 4: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 13.43 \text{dBi}$

5.0GHz Band 2 & 3: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 13.43 \text{dBi}$

Radio 3:

2.4GHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.50 \text{dBi}$

5.0GHz Band 1 & 4: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.75 \text{dBi}$

5.0GHz Band 2 & 3: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 7.75 \text{dBi}$

Conclusion:

The formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

The simultaneous operation mode was determined by client.

No	Mode
1	2G traffic radio (Radio 1) + 5GHz traffic radio (Radio 2) + 5G Scanning radio (Radio 3) + BLE $= 0.402/1 + 0.401/1 + 0.103/1 + 0.002 = 0.908$
2	5G traffic radio (Radio 1) + 5GHz traffic radio (Radio 2) + 2G Scanning radio (Radio 3) + BLE $= 0.387/1 + 0.401/1 + 0.193/1 + 0.002 = 0.983$
3	5G traffic radio (Radio 1) + 5GHz traffic radio (Radio 2) + 5G Scanning radio (Radio 3) + BLE $= 0.387/1 + 0.401/1 + 0.103/1 + 0.002 = 0.893$
4	2G traffic radio (Radio 1) + 5GHz traffic radio (Radio 2) + 5G Scanning radio (Radio 3) + Zigbee $= 0.402/1 + 0.401/1 + 0.103/1 + 0.001 = 0.907$
5	5G traffic radio (Radio 1) + 5GHz traffic radio (Radio 2) + 2G Scanning radio (Radio 3) + Zigbee $= 0.387/1 + 0.401/1 + 0.193/1 + 0.001 = 0.982$
6	5G traffic radio (Radio 1) + 5GHz traffic radio (Radio 2) + 5G Scanning radio (Radio 3) + Zigbee $= 0.387/1 + 0.401/1 + 0.103/1 + 0.001 = 0.892$

* 5GHz traffic radio (Radio 2) and 5G Scanning radio (Radio 3) cannot transmit in the same band at same time. 2G traffic radio (Radio 1) and 2G Scanning radio (Radio 3) cannot transmit at same time.

* 5GHz traffic radio (Radio1) and 5GHz traffic radio (Radio2) cannot transmit at the same time in the UNII-3 band.

* Zigbee and BT technologies cannot transmit at same time.

Therefore the maximum calculations of above situations are less than the "1" limit.

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