

RF Exposure Report

Report No.: MFBERD-WTW-P22090179-1

FCC ID: TVE-391CBE0291

Test Model: FAP-U231G

Series Model: FortiAP U231Gxxxxxx, FAP-U231Gxxxxxx, FORTIAP-U231Gxxxxxx
(Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)

Received Date: 2022/9/6

Issued Date: 2023/3/21

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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., Kewi Shan Dist., Taoyuan City
33383, Taiwan

**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
MFBERD-WTW-P22090179-1	Original release	2023/3/21

1 Certificate of Conformity

Product: Secured Wireless Access Point

Brand: FORTINET

Test Model: FAP-U231G

Series Model: FortiAP U231Gxxxxxx, FAP-U231Gxxxxxx, FORTIAP-U231Gxxxxxx (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.

FCC Rule Part: FCC Part 2 (Section 2.1091)

Standards: KDB 447498 D01 General RF Exposure Guidance v06

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 : Pettie Chen , **Date:** 2023/3/21
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin , **Date:** 2023/3/21
Jeremy Lin / 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

pi = 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 23cm away from the body of the user. So, this device is classified as **Mobile Device**.

3 Calculation Result of Maximum Conducted Power

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	25.94	3.89	23	0.145	1
5500-5720	23.61	5.75	23	0.130	1
5745-5825	26.40	5.78	23	0.249	1
Beamforming Mode					
2412-2462	21.02	6.87	23	0.093	1
5500-5720	21.35	8.62	23	0.149	1
5745-5825	26.40	8.67	23	0.483	1
Radio 2					
CDD Mode					
5180-5240	25.53	5.19	23	0.178	1
5260-5320	23.18	4.93	23	0.097	1
5500-5720	23.70	5.56	23	0.127	1
5745-5825	24.61	5.59	23	0.158	1
Beamforming Mode					
5180-5240	25.53	7.94	23	0.334	1
5260-5320	22.13	7.85	23	0.150	1
5500-5720	21.43	8.56	23	0.150	1
5745-5825	24.51	8.43	23	0.296	1

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	25.42	3.78	23	0.125	1
5180-5240	26.27	5.47	23	0.225	1
5260-5320	23.46	5.28	23	0.113	1
5500-5720	23.81	5.78	23	0.137	1
5745-5825	26.60	5.42	23	0.240	1
Beamforming Mode					
2412-2462	22.31	6.78	23	0.122	1
5180-5240	26.27	7.78	23	0.382	1
5260-5320	22.03	7.93	23	0.149	1
5500-5720	21.17	8.79	23	0.149	1
5745-5825	26.60	8.38	23	0.474	1
BT					
2402-2482	9.23	3.96	23	0.003	1
Zigbee					
2405-2480	17.88	3.96	23	0.023	1

Frequency Band (MHz)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
CDD Mode				
5955-6415	24.11	23	0.039	1
6435-6525	23.62	23	0.035	1
6525-6875	23.87	23	0.037	1
6875-7115	23.66	23	0.035	1
Beamforming Mode				
5955-6415	23.84	23	0.036	1
6435-6525	23.41	23	0.033	1
6525-6875	23.84	23	0.036	1
6875-7115	23.63	23	0.035	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

2.4G:

Radio 1: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 6.87 dBi

Radio 3: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 6.78 dBi

5.0G

Radio 1:

5500-5720 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.62 dBi

5745-5825 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.67 dBi

Radio 2:

5180-5240 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 7.94 dBi

5260-5320 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 7.85 dBi

5500-5720 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.56 dBi

5745-5825 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.43 dBi

Radio 3:

5180-5240 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 7.78 dBi

5260-5320 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 7.93 dBi

5500-5720 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.79 dBi

5745-5825 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.38 dBi

6GHz:

5955-6415 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.62 dBi

6435-6525 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.30 dBi

6525-6875 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.76 dBi

6875-7115 MHz: Directional gain = $10 \log[(10^{\text{Chain0/20}} + 10^{\text{Chain1/20}})^2 / 2]$ = 8.72 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

No	Mode
1	2.4GHz radio (Radio 1) + 5GHz radio (Radio 2) + 2.4GHz radio (Radio 3) + BLE = 0.145 + 0.334 + 0.125 + 0.003 = 0.607
2	2.4GHz radio (Radio 1) + 5GHz radio (Radio 2) + 2.4GHz radio (Radio 3) + Zigbee = 0.145 + 0.334 + 0.125 + 0.023 = 0.627
3	2.4GHz radio (Radio 1) + 5GHz radio (Radio 2) + 5GHz radio (Radio 3) + BLE = 0.145 + 0.334 + 0.474 + 0.003 = 0.956
4	2.4GHz radio (Radio 1) + 5GHz radio (Radio 2) + 5GHz radio (Radio 3) + Zigbee = 0.145 + 0.334 + 0.474 + 0.023 = 0.976
5	2.4GHz radio (Radio 1) + 5GHz radio (Radio 2) + 6GHz radio (Radio 3) + BLE = 0.145 + 0.334 + 0.039 + 0.003 = 0.521
6	2.4GHz radio (Radio 1) + 5GHz radio (Radio 2) + 6GHz radio (Radio 3) + Zigbee = 0.145 + 0.334 + 0.039 + 0.023 = 0.541
7	5GHz radio (Radio 1) + 5GHz radio (Radio 2) + 2.4GHz radio (Radio 3) + BLE = 0.483 + 0.334 + 0.125 + 0.003 = 0.945
8	5GHz radio (Radio 1) + 5GHz radio (Radio 2) + 2.4GHz radio (Radio 3) + Zigbee = 0.483 + 0.334 + 0.125 + 0.023 = 0.965

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

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