RF EXPOSURE EVALUATION REPORT

FCC ID	**: TVE-3417T0695A**
Equipment	**: Network Security Gateway**
Brand Name	**: FORTINET**
Model Name	**: FWF-80F-2Rxxxxxx, FortiWiFi 80F-2Rxxxxxx, FORTIWIFI-80F-2Rxxxxxx FWF-81F-2Rxxxxxx, FortiWiFi 81F-2Rxxxxxx, FORTIWIFI-81F-2Rxxxxxx FWF-80F-2R-3G4G-DSLxxxxxx, FortiWiFi 80F-2R-3G4G-DSLxxxxxx, FORTIWIFI-80F-2R-3G4G-DSLxxxxxx FWF-81F-2R-3G4G-DSLxxxxxx, FortiWiFi 81F-2R-3G4G-DSLxxxxxx, FORTIWIFI-81F-2R-3G4G-DSLxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)**
Marketing Name	**: FortiWiFi 80F-2R, FortiWiFi 81F-2R, FortiWiFi 80F-2R-3G4G-DSL, FortiWiFi 81F-2R-3G4G-DSL**
Applicant	**: Fortinet Inc. 899 KIFER RD SUNNYVALE CA 94086 UNITED STATES**
Manufacturer	**: Fortinet Inc. 899 KIFER RD SUNNYVALE CA 94086 UNITED STATES**
Standard	**: 47 CFR Part 2.1091**

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

The 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: Cona Huang / Deputy Manager

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) 4

2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS 5

3. RF EXPOSURE LIMIT INTRODUCTION 8

4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION 9

4.1. Standalone Power Density Calculation 9

History of this test report

Report No.	Version	Description	Issued Date
FA11826	Rev. 01	Initial issue of report	Mar. 09, 2021

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Network Security Gateway
Brand Name	FORTINET
Model Name	FWF-80F-2Rxxxxxx, FortiWiFi 80F-2Rxxxxxx, FORTIWIFI-80F-2Rxxxxxx FWF-81F-2Rxxxxxx, FortiWiFi 81F-2Rxxxxxx, FORTIWIFI-81F-2Rxxxxxx FWF-80F-2R-3G4G-DSLxxxxxx, FortiWiFi 80F-2R-3G4G-DSLxxxxxx, FORTIWIFI-80F-2R-3G4G-DSLxxxxxx FWF-81F-2R-3G4G-DSLxxxxxx, FortiWiFi 81F-2R-3G4G-DSLxxxxxx, FORTIWIFI-81F-2R-3G4G-DSLxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)
Marketing Name	FortiWiFi 80F-2R, FortiWiFi 81F-2R, FortiWiFi 80F-2R-3G4G-DSL, FortiWiFi 81F-2R-3G4G-DSL
FCC ID	TVE-3417T0695A
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5825 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Reviewed by: Jason Wang

Report Producer: Daisy Peng

2. Maximum RF average output power among production units

	Mode	Channel	Frequency (MHz)	Ant 1+3 (Non-Tx BF) Tune-up Limit	Ant 1+3 (Tx BF) Tune-up Limit	Ant 2 Tune-up Limit
2.4GHz WLAN	802.11b 1Mbps	1	2412	29.00		21.50
		6	2437	29.00		21.50
		11	2462	27.00		21.00
	802.11g 6Mbps	1	2412	24.50		19.00
		6	2437	26.00		16.50
		11	2462	21.50		16.50
	802.11n-HT20 MCS0	1	2412	21.00		16.50
		6	2437	25.50		16.00
		11	2462	22.50		16.50
	802.11n-HT40 MCS0	3	2422	20.50		17.50
		6	2437	19.00		16.00
		9	2452	18.00		9.00
	802.11ac-VHT20 MCS0	1	2412	21.00	21.00	
		6	2437	25.50	25.50	
		11	2462	22.00	22.50	
	802.11ac-VHT40 MCS0	3	2422	20.50	20.50	
		6	2437	19.00	19.00	
		9	2452	18.00	18.00	
	802.11ax-HE20 MCS0	1	2412	21.50	21.00	
		6	2437	25.50	25.50	
		11	2462	22.50	22.50	
	802.11ax-HE40 MCS0	3	2422	20.50	20.50	
		6	2437	19.00	19.00	
		9	2452	18.50	18.00	

	Mode	Channel	Frequency (MHz)	Ant 1+3 (Non-Tx BF) Tune-up Limit	Ant 1+3 (Tx BF) Tune-up Limit	Ant 2 Tune-up Limit
5.2GHz WLAN	802.11a 6Mbps	36	5180	25.50		16.50
		40	5200	25.50		19.50
		44	5220	27.00		22.50
		48	5240	26.00		24.00
	802.11n-HT20 MCS0	36	5180	25.00		16.00
		40	5200	25.00		19.50
		44	5220	26.00		22.50
		48	5240	26.00		24.00
	802.11n-HT40 MCS0	38	5190	21.00		15.50
		46	5230	23.50		20.00
	802.11ac-VHT20 MCS0	36	5180	25.00	25.00	16.00
		40	5200	25.00	25.00	19.00
		44	5220	26.00	26.00	22.00
		48	5240	26.00	26.00	23.50
	802.11ac-VHT40 MCS0	38	5190	20.50	20.50	15.50
		46	5230	23.50	23.50	19.50
	802.11ac-VHT80 MCS0	42	5210	19.50	19.00	10.50
	802.11ax-HE20 MCS0	36	5180	25.00	25.00	
		44	5220	26.50	26.00	
		48	5240	26.50	26.00	
	802.11ax-HE40 MCS0	38	5190	20.50	20.50	
		46	5230	24.00	23.50	
	802.11ax-HE80 MCS0	42	5210	19.50	19.50	

	Mode	Channel	Frequency (MHz)	Ant 1+3 (Non-Tx BF) Tune-up Limit	Ant 1+3 (Tx BF) Tune-up Limit	Ant 2 Tune-up Limit
5.8GHz WLAN	802.11a 6Mbps	149	5745	26.00		22.50
		157	5785	29.00		22.00
		165	5825	29.00		22.00
	802.11n-HT20 MCS0	149	5745	27.50		22.50
		157	5785	28.50		22.00
		165	5825	28.50		22.00
	802.11n-HT40 MCS0	151	5755	28.00		21.50
		159	5795	27.00		22.00
	802.11ac-VHT20 MCS0	149	5745	27.50	27.50	22.50
		157	5785	28.50	28.50	22.00
		165	5825	28.50	28.50	22.00
	802.11ac-VHT40 MCS0	151	5755	28.00	27.50	21.50
		159	5795	27.00	26.50	22.00
	802.11ac-VHT80 MCS0	155	5775	24.50	24.50	18.50
	802.11ax-HE20 MCS0	149	5745	28.00	27.50	
		157	5785	28.50	28.50	
		165	5825	28.50	28.50	
	802.11ax-HE40 MCS0	151	5755	28.00	28.00	
		159	5795	27.00	26.50	
	802.11ax-HE80 MCS0	155	5775	24.50	24.50	

3. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	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				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

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:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

<Non-beamforming mode>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN2.4GHz Band	3.24	29.00	32.2	1.67	1674.94	0.333	1.000	0.333
WLAN5GHz Band	3.27	29.00	32.3	1.69	1686.55	0.336	1.000	0.336

<Beamforming mode>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN2.4GHz Band	6.25	25.50	31.8	1.50	1496.24	0.298	1.000	0.298
WLAN5GHz Band	6.28	28.50	34.8	3.01	3006.08	0.598	1.000	0.598

Note:

1. For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.
2. This device supports Beamforming for WLAN 2.4GHz VHT20/VHT40/HE20/HE40 and WLAN 5GHz a/ HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80 only; therefore, in the table above which consider maximum directional Gain 6.25dBi for WLAN 2.4GHz Beamforming mode and 6.28dBi for WLAN 5GHz Beamforming mode.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.