

RF EXPOSURE EVALUATION REPORT

FCC ID : TVE-121757B
Equipment : Network Security Gateway
Brand Name : FORTINET 
Model Name : FWF-41Fxxxxxx, FortiWiFi 41Fxxxxxx, FORTIWIFI-41Fxxxxxx
FWF-40Fxxxxxx, FortiWiFi 40Fxxxxxx, FORTIWIFI-40Fxxxxxx
FWF-41F-3G4Gxxxxxx, FortiWiFi 41F-3G4Gxxxxxx,
FORTIWIFI-41F-3G4Gxxxxxx
FWF-40F-3G4Gxxxxxx, FortiWiFi 40F-3G4Gxxxxxx,
FORTIWIFI-40F-3G4Gxxxxxx
(Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software purposes or marketing purposes only)
Marketing Name : FortiWiFi 41F, FortiWiFi 40F, FortiWiFi 41F-3G4G, FortiWiFi 40F-3G4G
Applicant : Fortinet Inc.
899 KIFER RD
SUNNYVALE CA 94086-5301
UNITED STATES
Manufacturer : Fortinet Inc.
899 KIFER RD
SUNNYVALE CA 94086-5301
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.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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.

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.



Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA992436-01	Rev. 01	Initial issue of report	Jan. 17, 2020

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Network Security Gateway
Brand Name	FORTINET
Model Name	FWF-41Fxxxxxx, FortiWiFi 41Fxxxxxx, FORTIWIFI-41Fxxxxxx FWF-40Fxxxxxx, FortiWiFi 40Fxxxxxx, FORTIWIFI-40Fxxxxxx FWF-41F-3G4Gxxxxxx, FortiWiFi 41F-3G4Gxxxxxx, FORTIWIFI-41F-3G4Gxxxxxx FWF-40F-3G4Gxxxxxx, FortiWiFi 40F-3G4Gxxxxxx, FORTIWIFI-40F-3G4Gxxxxxx (Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software purposes or marketing purposes only)
Marketing Name	FortiWiFi 41F, FortiWiFi 40F, FortiWiFi 41F-3G4G, FortiWiFi 40F-3G4G
FCC ID	TVE-121757B
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz
Mode	WLAN: 802.11a/b/g/n/ac HT20 / HT40 / VHT20 / VHT40 / VHT80
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

<Non-beamforming mode>

2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit
	802.11b 1Mbps	1	2412	22.00
		6	2437	26.00
		11	2462	23.00
	802.11g 6Mbps	1	2412	19.00
		6	2437	23.00
		11	2462	21.00
	802.11n-HT20 MCS0	1	2412	19.00
		6	2437	23.00
		11	2462	20.00
	802.11n-HT40 MCS0	3	2422	12.00
		6	2437	18.00
		9	2452	16.00

5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit
	802.11a 6Mbps	36	5180	22.00
		40	5200	25.00
		44	5220	25.00
		48	5240	25.00
	802.11n-HT20 MCS0	36	5180	22.50
		40	5200	25.50
		44	5220	25.50
		48	5240	25.00
	802.11n-HT40 MCS0	38	5190	20.50
		46	5230	24.00
	802.11ac-VHT20 MCS0	36	5180	22.50
		40	5200	25.50
		44	5220	25.50
		48	5240	25.00
	802.11ac-VHT40 MCS0	38	5190	20.50
		46	5230	24.00
	802.11ac-VHT80 MCS0	42	5210	20.00

5.8GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit
	802.11a 6Mbps	149	5745	26.00
		157	5785	25.00
		165	5825	25.00
	802.11n-HT20 MCS0	149	5745	26.00
		157	5785	26.00
		165	5825	25.00
	802.11n-HT40 MCS0	151	5755	25.00
		159	5795	25.00
	802.11ac-VHT20 MCS0	149	5745	26.00
		157	5785	26.00
		165	5825	25.00
	802.11ac-VHT40 MCS0	151	5755	25.00
		159	5795	25.00
	802.11ac-VHT80 MCS0	155	5775	21.00

<Beamforming mode>

	Mode	Channel	Frequency (MHz)	Tune-Up Limit
2.4GHz WLAN	802.11n-HT20 MCS0	1	2412	25.00
		6	2437	27.00
		11	2462	26.00
	802.11n-HT40 MCS0	3	2422	18.00
		6	2437	25.00
		9	2452	23.00

	Mode	Channel	Frequency (MHz)	Tune-Up Limit
5.2GHz WLAN	802.11n-HT20 MCS0	36	5180	22.00
		40	5200	25.00
		44	5220	25.00
		48	5240	25.00
	802.11n-HT40 MCS0	38	5190	20.00
		46	5230	24.00
	802.11ac-VHT20 MCS0	36	5180	22.00
		40	5200	25.00
		44	5220	25.00
		48	5240	25.00
	802.11ac-VHT40 MCS0	38	5190	20.00
		46	5230	24.00
	802.11ac-VHT80 MCS0	42	5210	19.00

	Mode	Channel	Frequency (MHz)	Tune-Up Limit
5.8GHz WLAN	802.11n-HT20 MCS0	149	5745	25.00
		157	5785	25.00
		165	5825	25.00
	802.11n-HT40 MCS0	151	5755	25.00
		159	5795	25.00
	802.11ac-VHT20 MCS0	149	5745	25.00
		157	5785	25.00
		165	5825	25.00
	802.11ac-VHT40 MCS0	151	5755	25.00
		159	5795	25.00
	802.11ac-VHT80 MCS0	155	5775	21.00

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/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				
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

The MPE was calculated at 27 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	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 27cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
2.4GHz WLAN	2412.0	4.16	26.00	30.160	1.038	1037.528	0.113	1.000	0.113
5GHz WLAN	5180.0	3.58	26.00	29.580	0.908	907.821	0.099	1.000	0.099

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band

<Beamforming mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 27cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
2.4GHz WLAN	2412.0	8.93	27.00	35.930	3.917	3917.419	0.428	1.000	0.428
5GHz WLAN	5180.0	8.35	25.00	33.350	2.163	2162.719	0.236	1.000	0.236

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 HT20/HT40 and WLAN 5GHz HT20 / HT40 / VHT20 / VHT40 / VHT80 only; therefore, in the table above which consider maximum directional Gain 8.93dBi for WLAN 2.4GHz Beamforming mode and 8.35dBi for WLAN 5GHz Beamforming mode.

Conclusion:

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