RF EXPOSURE EVALUATION REPORT

FCC ID	**: TVE-3901M12**
Equipment	**: Network Security Gateway**
Brand Name	**: FORTINET**
Model Name	**: FortiWiFi 50G-5Gxxxxxxxxxx, FORTIWIFI-50G-5Gxxxxxxxxxx, FWF-50G-5Gxxxxxxxxxx, FortiWiFi 51G-5Gxxxxxxxxxx, FORTIWIFI-51G-5Gxxxxxxxxxx, FWF-51G-5Gxxxxxxxxxx**
	(where "x" can be used as "A-Z", or "0-9", or "-", or blank for software purposes or marketing purposes only)
Marketing Name	**: FortiWiFi 50G-5G, FortiWiFi 51G-5G**
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 Part2.1091 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. Laboratory, the test report shall not be reproduced except in full.

Cona Huang

Approved by: Cona Huang / Deputy Manager

ilac-MRA TAF Testing Laboratory 1190

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FA3D0631-01	Rev. 01	Initial issue of report	Feb. 10, 2024

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Network Security Gateway
Brand Name	FORTINET
Model Name	FortiWiFi 50G-5Gxxxxxxxxxx, FORTIWIFI-50G-5Gxxxxxxxxxx, FWF-50G-5Gxxxxxxxxxx, FortiWiFi 51G-5Gxxxxxxxxxx, FORTIWIFI-51G-5Gxxxxxxxxxx, FWF-51G-5Gxxxxxxxxxx (where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software purposes or marketing purposes only)
Marketing Name	FortiWiFi 50G-5G, FortiWiFi 51G-5G
FCC ID	TVE-3901M12
Wireless Technology and Frequency Range	WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz
Mode	WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 WLAN 11ax HE20/HE40/HE80
EUT Stage	Production Unit
Remark: 1. Variant report to enable 5.3GHz / 5.6GHz WLAN.	

Integrated Bluetooth Module	
Brand Name	FORTINET
Model Name	FBLE-2024TI
Wireless Technology and Frequency Range	Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	Bluetooth LE
Remark: 1. The Bluetooth operation is also integrated into this host, additional power density result Sim-Tx analysis is meet FCC requirement. The Bluetooth RF Exposure were referred from Sporton report, report number FA3D0610, FCC ID: TVE-110T17	

Integrated WWAN Module	
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3450 MHz ~ 3550 MHz, 3550 MHz ~ 3600 MHz LTE Band 43: 3600 MHz ~ 3700 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n30 : 2305 MHz ~ 2315 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3980 MHz 5G NR n78: 3450 MHz ~ 3550 MHz, 3700 MHz ~ 3800 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM
Remark: 1. The WWAN operation is also integrated into this host, additional power density result Sim-Tx analysis please refer to Sporton report: FA3D0631, FCC ID: TVE-3901M12 to meets FCC requirement.	

Reviewed by: Jason Wang

Report Producer: Wan Liu

2. Maximum RF average output power among production units

<non-Beamforming mode>

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.3GHz WLAN	802.11a 6Mbps	52	5260	20.00	20.00	23.00
		60	5300	20.00	20.00	23.00
		64	5320	20.00	20.00	23.00
	802.11n-HT20 MCS0	52	5260	20.00	20.00	23.00
		60	5300	20.00	20.00	23.00
		64	5320	20.00	20.00	23.00
	802.11n-HT40 MCS0	54	5270	20.98	20.98	23.98
		62	5310	19.50	19.50	22.50
	802.11ac-VHT20 MCS0	52	5260	20.00	20.00	23.00
		60	5300	20.00	20.00	23.00
		64	5320	20.00	20.00	23.00
	802.11ac-VHT40 MCS0	54	5270	20.98	20.98	23.98
		62	5310	19.50	19.50	22.50
	802.11ac-VHT80 MCS0	58	5290	16.00	16.00	19.00
	802.11ax-HE20 MCS0	52	5260	20.50	20.50	23.50
		60	5300	20.50	20.50	23.50
		64	5320	20.50	20.50	23.50
	802.11ax-HE40 MCS0	54	5270	20.98	20.98	23.98
		62	5310	18.50	18.50	21.50
	802.11ax-HE80 MCS0	58	5290	16.00	16.00	19.00

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.5GHz WLAN	802.11a 6Mbps	100	5500	19.50	19.50	22.50
		116	5580	19.50	19.50	22.50
		140	5700	19.00	19.00	22.00
		144	5720	19.00	19.00	22.00
	802.11n-HT20 MCS0	100	5500	19.50	19.50	22.50
		116	5580	19.50	19.50	22.50
		140	5700	20.00	20.00	23.00
		144	5720	20.00	20.00	23.00
	802.11n-HT40 MCS0	102	5510	20.98	20.98	23.98
		110	5550	20.98	20.98	23.98
		134	5670	20.98	20.98	23.98
		142	5710	20.98	20.98	23.98
	802.11ac-VHT20 MCS0	100	5500	20.00	20.00	23.00
		116	5580	20.00	20.00	23.00
		140	5700	20.00	20.00	23.00
		144	5720	20.00	20.00	23.00
	802.11ac-VHT40 MCS0	102	5510	20.98	20.98	23.98
		110	5550	20.98	20.98	23.98
		134	5670	20.98	20.98	23.98
		142	5710	20.98	20.98	23.98
	802.11ac-VHT80 MCS0	106	5530	18.00	18.00	21.00
		122	5610	20.98	20.98	23.98
		138	5690	20.98	20.98	23.98
	802.11ax-HE20 MCS0	100	5500	20.00	20.00	23.00
		116	5580	20.50	20.50	23.50
		140	5700	20.00	20.00	23.00
		144	5720	20.00	20.00	23.00
	802.11ax-HE40 MCS0	102	5510	20.98	20.98	23.98
		110	5550	20.98	20.98	23.98
		134	5670	20.98	20.98	23.98
		142	5710	20.98	20.98	23.98
	802.11ax-HE80 MCS0	106	5530	17.50	17.50	20.50
		122	5610	20.98	20.98	23.98
		138	5690	20.98	20.98	23.98

<Beamforming mode>

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.3GHz WLAN	802.11n-HT20 MCS0	52	5260	20.00	20.00	23.00
		60	5300	20.00	20.00	23.00
		64	5320	20.00	20.00	23.00
	802.11n-HT40 MCS0	54	5270	20.98	20.98	23.98
		62	5310	19.50	19.50	22.50
	802.11ac-VHT20 MCS0	52	5260	20.00	20.00	23.00
		60	5300	20.00	20.00	23.00
		64	5320	20.00	20.00	23.00
	802.11ac-VHT40 MCS0	54	5270	20.98	20.98	23.98
		62	5310	19.50	19.50	22.50
	802.11ac-VHT80 MCS0	58	5290	16.00	16.00	19.00
	802.11ax-HE20 MCS0	52	5260	20.50	20.50	23.50
		60	5300	20.50	20.50	23.50
		64	5320	20.50	20.50	23.50
	802.11ax-HE40 MCS0	54	5270	20.98	20.98	23.98
		62	5310	18.50	18.50	21.50
	802.11ax-HE80 MCS0	58	5290	16.00	16.00	19.00

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.5GHz WLAN	802.11n-HT20 MCS0	100	5500	19.50	19.50	22.50
		116	5580	19.50	19.50	22.50
		140	5700	20.00	20.00	23.00
		144	5720	20.00	20.00	23.00
	802.11n-HT40 MCS0	102	5510	20.98	20.98	23.98
		110	5550	20.98	20.98	23.98
		134	5670	20.98	20.98	23.98
		142	5710	20.98	20.98	23.98
	802.11ac-VHT20 MCS0	100	5500	20.00	20.00	23.00
		116	5580	20.00	20.00	23.00
		140	5700	20.00	20.00	23.00
		144	5720	20.00	20.00	23.00
	802.11ac-VHT40 MCS0	102	5510	20.98	20.98	23.98
		110	5550	20.98	20.98	23.98
		134	5670	20.98	20.98	23.98
		142	5710	20.98	20.98	23.98
	802.11ac-VHT80 MCS0	106	5530	18.00	18.00	21.00
		122	5610	20.98	20.98	23.98
		138	5690	20.98	20.98	23.98
	802.11ax-HE20 MCS0	100	5500	20.00	20.00	23.00
		116	5580	20.50	20.50	23.50
		140	5700	20.00	20.00	23.00
		144	5720	20.00	20.00	23.00
	802.11ax-HE40 MCS0	102	5510	20.98	20.98	23.98
		110	5550	20.98	20.98	23.98
		134	5670	20.98	20.98	23.98
		142	5710	20.98	20.98	23.98
	802.11ax-HE80 MCS0	106	5530	17.50	17.50	20.50
		122	5610	20.98	20.98	23.98
		138	5690	20.98	20.98	23.98

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 26 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 26cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN5.3GHz Band	1.88	23.98	25.86	0.39	385.48	0.045	1.000	0.045
WLAN5.5GHz Band	2.45	23.98	26.43	0.44	439.54	0.052	1.000	0.052

<Beamforming mode>

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 26cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN5.3GHz Band	4.89	23.98	28.87	0.77	770.90	0.091	1.000	0.091
WLAN5.5GHz Band	5.46	23.98	29.44	0.88	879.02	0.104	1.000	0.104

Note:

1. This device supports Beamforming for WLAN 5GHz HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80 only; therefore, in the table above which consider maximum directional Gain 4.89dBi and 5.46dBi for WLAN 5GHz Beamforming mode.

4.2. Collocated Power Density Calculation

<non-Beamforming mode>

EN-DC		2.4GHz WLAN Power Density / Limit	5GHz WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit)
LTE Power Density / Limit	5G NR Power Density / Limit				
0.096	0.121	0.057	0.205	0.002	0.481

<Beamforming mode>

EN-DC		2.4GHz WLAN Power Density / Limit	5GHz WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit)
LTE Power Density / Limit	5G NR Power Density / Limit				
0.096	0.121	0.071	0.409	0.002	0.699

Note:

1. ∑(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for LTE + 5G NR + WLAN + Bluetooth.
2. Considering all the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 5 collocated transmitters is compliant

Conclusion:

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