RF EXPOSURE EVALUATION REPORT

FCC ID	: TVE-3901M12
Equipment	: Network Security Gateway
Brand Name	: FORTINET
Model Name	: FortiWifi 50Gxxxxxxxxxx, FORTIWIFI-50Gxxxxxxxxxx, FWF-50Gxxxxxxxxxx, FortiWifi 51Gxxxxxxxxxx, FORTIWIFI-51Gxxxxxxxxxx, FWF-51Gxxxxxxxxxx, FortiWiFi 50G-SFPxxxxxxxxxx, FORTIWIFI-50G-SFPxxxxxxxxxx, FWF-50G-SFPxxxxxxxxxx, FortiWiFi 51G-SFPxxxxxxxxxx, FORTIWIFI-51G-SFPxxxxxxxxxx, FWF-51G-SFPxxxxxxxxxx (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, FortiWiFi 51G, FortiWiFi 50G-SFP, FortiWiFi 51G-SFP
Applicant	: Fortinet Inc. 909 Kifer Rd., Sunnyvale, CA 94086, United States
Manufacturer	: Fortinet Inc. 909 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.

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.)

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History of this test report

Report No.	Version	Description	Issued Date
FA3D0631-02	Rev. 01	Initial issue of report	Jun. 27, 2024

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Network Security Gateway
Brand Name	FORTINET
Model Name	FortiWifi 50Gxxxxxxxxxx, FORTIWIFI-50Gxxxxxxxxxx, FWF-50Gxxxxxxxxxx, FortiWifi 51Gxxxxxxxxxx, FORTIWIFI-51Gxxxxxxxxxx, FWF-51Gxxxxxxxxxx, FortiWiFi 50G-SFPxxxxxxxxxx, FORTIWIFI-50G-SFPxxxxxxxxxx, FWF-50G-SFPxxxxxxxxxx, FortiWiFi 51G-SFPxxxxxxxxxx, FORTIWIFI-51G-SFPxxxxxxxxxx, FWF-51G-SFPxxxxxxxxxx (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, FortiWiFi 51G, FortiWiFi 50G-SFP, FortiWiFi 51G-SFP
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

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	

Reviewed by: Jason Wang

Report Producer: Daisy Peng

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
2.4GHz WLAN	802.11b 1Mbps	1	2412	22.00	22.00	25.00
		6	2437	23.50	23.50	26.50
		10	2457	20.50	20.50	23.50
		11	2462	20.00	20.00	23.00
	802.11g 6Mbps	1	2412	19.50	19.50	22.50
		6	2437	21.50	21.50	24.50
		10	2457	18.50	18.50	21.50
		11	2462	17.50	17.50	20.50
	802.11n-HT20 MCS0	1	2412	18.50	18.50	21.50
		6	2437	21.00	21.00	24.00
		10	2457	18.50	18.50	21.50
		11	2462	17.00	17.00	20.00
	802.11n-HT40 MCS0	3	2422	17.00	17.00	20.00
		6	2437	18.00	18.00	21.00
		9	2452	17.00	17.00	20.00
	802.11ax-HE20 MCS0	1	2412	18.50	18.50	21.50
		2	2417	19.00	19.00	22.00
		6	2437	21.50	21.50	24.50
		10	2457	18.50	18.50	21.50
		11	2462	18.00	18.00	21.00
	802.11ax-HE40 MCS0	3	2422	17.00	17.00	20.00
		6	2437	18.00	18.00	21.00
		9	2452	17.00	17.00	20.00

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.2GHz WLAN	802.11a 6Mbps	36	5180	21.50	21.50	24.50
		44	5220	24.00	24.00	27.00
		48	5240	25.50	25.50	28.50
	802.11n-HT20 MCS0	36	5180	21.50	21.50	24.50
		44	5220	24.00	24.00	27.00
		48	5240	24.00	24.00	27.00
	802.11n-HT40 MCS0	38	5190	19.00	19.00	22.00
		46	5230	21.00	21.00	24.00
	802.11ac-VHT20 MCS0	36	5180	22.00	22.00	25.00
		44	5220	23.50	23.50	26.50
		48	5240	24.50	24.50	27.50
	802.11ac-VHT40 MCS0	38	5190	19.50	19.50	22.50
		46	5230	21.00	21.00	24.00
	802.11ac-VHT80 MCS0	42	5210	15.50	15.50	18.50
	802.11ax-HE20 MCS0	36	5180	22.00	22.00	25.00
		44	5220	23.50	23.50	26.50
		48	5240	25.50	25.50	28.50
	802.11ax-HE40 MCS0	38	5190	19.00	19.00	22.00
		46	5230	21.00	21.00	24.00
	802.11ax-HE80 MCS0	42	5210	15.00	15.00	18.00

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.3GHz 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

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.8GHz WLAN	802.11a 6Mbps	149	5745	26.80	26.80	29.80
		157	5785	26.70	26.70	29.70
		165	5825	26.50	26.50	29.50
	802.11n-HT20 MCS0	149	5745	26.90	26.90	29.90
		157	5785	26.70	26.70	29.70
		165	5825	25.50	25.50	28.50
	802.11n-HT40 MCS0	151	5755	25.50	25.50	28.50
		159	5795	24.50	24.50	27.50
	802.11ac-VHT20 MCS0	149	5745	26.90	26.90	29.90
		157	5785	26.70	26.70	29.70
		165	5825	25.50	25.50	28.50
	802.11ac-VHT40 MCS0	151	5755	25.50	25.50	28.50
		159	5795	24.50	24.50	27.50
	802.11ac-VHT80 MCS0	155	5775	22.00	22.00	25.00
	802.11ax-HE20 MCS0	149	5745	26.90	26.90	29.90
		157	5785	26.70	26.70	29.70
		165	5825	25.50	25.50	28.50
	802.11ax-HE40 MCS0	151	5755	25.50	25.50	28.50
		159	5795	24.50	24.50	27.50
	802.11ax-HE80 MCS0	155	5775	20.50	20.50	23.50

<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
2.4GHz WLAN	802.11n-HT20 MCS0	1	2412	18.50	18.50	21.50
		6	2437	21.00	21.00	24.00
		10	2457	18.50	18.50	21.50
		11	2462	17.00	17.00	20.00
	802.11n-HT40 MCS0	3	2422	17.00	17.00	20.00
		6	2437	18.00	18.00	21.00
		9	2452	17.00	17.00	20.00
	802.11ax-HE20 MCS0	1	2412	18.50	18.50	21.50
		2	2417	19.00	19.00	22.00
		6	2437	21.50	21.50	24.50
		10	2457	18.50	18.50	21.50
		11	2462	18.00	18.00	21.00
	802.11ax-HE40 MCS0	3	2422	17.00	17.00	20.00
		6	2437	18.00	18.00	21.00
		9	2452	17.00	17.00	20.00

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.2GHz WLAN	802.11n-HT20 MCS0	36	5180	21.50	21.50	24.50
		44	5220	24.00	24.00	27.00
		48	5240	24.00	24.00	27.00
	802.11n-HT40 MCS0	38	5190	19.00	19.00	22.00
		46	5230	21.00	21.00	24.00
	802.11ac-VHT20 MCS0	36	5180	22.00	22.00	25.00
		44	5220	23.50	23.50	26.50
		48	5240	24.50	24.50	27.50
	802.11ac-VHT40 MCS0	38	5190	19.50	19.50	22.50
		46	5230	21.00	21.00	24.00
	802.11ac-VHT80 MCS0	42	5210	15.50	15.50	18.50
	802.11ax-HE20 MCS0	36	5180	22.00	22.00	25.00
		44	5220	23.50	23.50	26.50
		48	5240	25.50	25.50	28.50
	802.11ax-HE40 MCS0	38	5190	19.00	19.00	22.00
		46	5230	21.00	21.00	24.00
	802.11ax-HE80 MCS0	42	5210	15.00	15.00	18.00

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.3GHz 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

	Mode	Channel	Frequency (MHz)	Port 3+6 (3) Tune-up Limit	Port 3+6 (6) Tune-up Limit	Port 3+6 Tune-up Limit
5.8GHz WLAN	802.11n-HT20 MCS0	149	5745	26.90	26.90	29.90
		157	5785	26.70	26.70	29.70
		165	5825	25.50	25.50	28.50
	802.11n-HT40 MCS0	151	5755	25.50	25.50	28.50
		159	5795	24.50	24.50	27.50
	802.11ac-VHT20 MCS0	149	5745	26.90	26.90	29.90
		157	5785	26.70	26.70	29.70
		165	5825	25.50	25.50	28.50
	802.11ac-VHT40 MCS0	151	5755	25.50	25.50	28.50
		159	5795	24.50	24.50	27.50
	802.11ac-VHT80 MCS0	155	5775	22.00	22.00	25.00
	802.11ax-HE20 MCS0	149	5745	26.90	26.90	29.90
		157	5785	26.70	26.70	29.70
		165	5825	25.50	25.50	28.50
	802.11ax-HE40 MCS0	151	5755	25.50	25.50	28.50
		159	5795	24.50	24.50	27.50
	802.11ax-HE80 MCS0	155	5775	20.50	20.50	23.50

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	0.31	26.50	26.8	0.48	479.73	0.095	1.000	0.095
WLAN5.2GHz Band	2.54	28.50	31.0	1.27	1270.57	0.253	1.000	0.253
WLAN5.3GHz Band	1.88	23.98	25.86	0.39	385.48	0.077	1.000	0.077
WLAN5.5GHz Band	2.45	23.98	26.43	0.44	439.54	0.087	1.000	0.087
WLAN5.8GHz Band	2.50	29.90	32.40	1.74	1737.80	0.346	1.000	0.346

<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	3.32	24.50	27.82	0.61	605.34	0.120	1.000	0.120
WLAN5.2GHz Band	5.55	28.50	34.05	2.54	2540.97	0.506	1.000	0.506
WLAN5.3GHz Band	4.89	23.98	28.87	0.77	770.90	0.153	1.000	0.153
WLAN5.5GHz Band	5.46	23.98	29.44	0.88	879.02	0.175	1.000	0.175
WLAN5.8GHz Band	5.51	29.90	35.41	3.48	3475.36	0.692	1.000	0.692

Note:

1. This device supports Beamforming for WLAN 2.4GHz VHT20/VHT40/HE20/HE40 and WLAN 5GHz HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80 only; therefore, in the table above which consider maximum directional Gain 3.32dBi for WLAN 2.4GHz Beamforming mode and 5.55dBi, 4.89dBi, 5.46dBi and 5.51dBi for WLAN 5GHz Beamforming mode.

4.2. Collocated Power Density Calculation

<non-Beamforming mode>

2.4GHz WLAN Power Density / Limit	5GHz WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit)
0.095	0.346	0.002	0.443

<Beamforming mode>

2.4GHz WLAN Power Density / Limit	5GHz WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit)
0.120	0.692	0.002	0.814

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 2.4GHz WLAN + 5GHz 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 3 collocated transmitters is compliant

Conclusion:

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