Radio Exposure Evaluation Report

FCC ID	:	**TVE-111T15H**
Equipment	:	**Network Security Gateway**
Brand Name	:	**FORTINET**
Model Name	:	**FG-3700F, FG-3701F, FG-3700F-DC, FG-3701F-DC FortiGate 3700Fxxxxxxxxxx, FORTIGATE-3700Fxxxxxxxxxx, FG-3700Fxxxxxxxxxx, FortiGate 3701Fxxxxxxxxxx, FORTIGATE-3701Fxxxxxxxxxx, FG-3701Fxxxxxxxxxx, FortiGate 3700F-DCxxxxxxxxxx, FORTIGATE-3700F-DCxxxxxxxxxx, FG-3700F-DCxxxxxxxxxx, FortiGate 3701F-DCxxxxxxxxxx, FORTIGATE-3701F-DCxxxxxxxxxx, FG-3701F-DCxxxxxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)**
Applicant	:	**Fortinet, Inc. 899 Kifer Road, Sunnyvale, CA 94086, USA**
Manufacturer	:	**Fortinet, Inc. 899 Kifer Road, Sunnyvale, CA 94086, USA**
Standard	:	**47 CFR FCC Part 2 Subpart J, section 2.1091**

The product was received on Feb. 14, 2023, and testing was started from Mar. 01, 2023 and completed on Mar. 09, 2023. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR FCC Part 2 Subpart J, section 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Hsinhua Laboratory, the test report shall not be reproduced except in full.

Approved by: Jackson Tsai

SPORTON INTERNATIONAL INC. Hsinhua Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FA320837	01	Initial issue of report	Mar. 29, 2023

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
None

Reviewed by: Barry Hsiao
Report Producer: Amber Chiu

1 General Description

1.1 Information

1.1.1 EUT General Information

RF General Information			
Evaluation Mode	**Frequency Range (MHz)**	**Operating Frequency (MHz)**	**Modulation Type**
Bluetooth	2400-2483.5	2402-2480	LE: DSSS (GFSK)

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	INPAQ	WA-F-LA-02-120	PIFA	I-PEX	1.78
2	Wieson	ARY196-0346-002-00	PIFA	I-PEX	-0.2

Note 1: The EUT has two antennas.

Note 2: EUT can match with above antennas for using. Higher gain of antenna was used to perform the worst configuration and result of that was recorded as the final test result.

For BT function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX)

Ant. 1 or Ant. 2 could transmit/receive.

1.1.3 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Model Name	PSU	SSD
FG-3700F, FortiGate 3700Fxxxxxxxxxx, FORTIGATE-3700Fxxxxxxxxxx, FG-3700Fxxxxxxxxxx (where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software changes or marketing purposes only)	AC	-
FG-3700F-DC, FortiGate 3700F-DCxxxxxxxxxx, FORTIGATE-3700F-DCxxxxxxxxxx, FG-3700F-DCxxxxxxxxxx, (where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software changes or marketing purposes only)	DC	-
FG3701F, FortiGate 3701Fxxxxxxxxxx, FORTIGATE-3701Fxxxxxxxxxx, FG-3701Fxxxxxxxxxx (where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software changes or marketing purposes only)	AC	V
FG-3701F-DC, FortiGate 3701F-DCxxxxxxxxxx, FORTIGATE-3701F-DCxxxxxxxxxx, FG-3701F-DCxxxxxxxxxx (where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software changes or marketing purposes only)	DC	V

1.1.4 Accessories

Accessories				
AC PSU *2	Brand Name	muRata	Model Name	D1U54P-W-1500-12-HA4TC
	Manufacturer	MURATA	SN	-
	Power Rating	I/P: 100 - 240 Vac, 15/12/10 A, O/P: 12 Vdc, 105/116.6/125 A		
	Power Cord	1.8 meter, non-shielded cable, w/o ferrite core		
DC PSU *2	Brand Name	muRata	Model Name	D1U54P-D-1500-12-HA4C
	Manufacturer	MURATA	SN	-
	Power Rating	I/P: -48 - -60 Vac, 44 A, O/P: 12 Vdc, 125 A; 5 Vdc, 4 A		
Ethernet Cable	Brand Name	ENERGY FULL	Model Name	R047685R
	Manufacturer	ENERGY FULL	SN	-
	Signal Line	2 meter, non-shielded cable, w/o ferrite core		
SFP+Transceiver	Brand Name	FINISAR	Model Name	FTLX8574D3BCLFTN
Console Cable	Brand Name	FORTINET	Model Name	C85881A02E1M8

Reminder: Regarding to more detail and other information, please refer to user manual.

1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 2 Subpart J, section 2.1091
- KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- 47 CFR Part 1.1307
- 47 CFR Part 1.1310

1.3 Testing Location

Test Lab.：Sporton International Inc. Hsinhua Laboratory		
☒ Hsinhua **(TAF:** 3785**)**	**ADD:** No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
	TEL: 886-3-327-3456	**FAX:** 886-3-327-0973
Test site Designation No. TW3785 with FCC.		

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
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

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 RF Exposure Exempt Measurement

Option	Refer Std.	Exemption Exposure Thresholds (TL)
A	§1.1307(b)(3)(i)(A)	Available maximum time-averaged power is no more than 1 mW
B	§1.1307(b)(3)(i)(B)	$\mathrm{P}th(mW) = \begin{cases} ERP_{20cm}(d/20cm)^x \rightarrow d \le 20cm \\ ERP_{20cm} \rightarrow 20cm < d \le 40cm \end{cases}$ $x = -\log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right)$ and f is in GHz $\begin{cases} ERP_{20cm} : 0.3GHz \le f < 1.5GHz \rightarrow 2040\ f\,(mW) \\ ERP_{20cm} : 1.5GHz \le f \le 6GHz \rightarrow 3060\,(mW) \end{cases}$
C	§1.1307(b)(3)(i)(C)	$\begin{cases} 0.3 \sim 1.34MHz \rightarrow ERP(\mathrm{W}) = 1920\,R^2 \\ 1.34 \sim 30MHz \rightarrow ERP(\mathrm{W}) = 3450\,R^2 / f^2 \\ 30 \sim 300MHz \rightarrow ERP(\mathrm{W}) = 3.83R^2 \\ 300 \sim 1500MHz \rightarrow ERP(\mathrm{W}) = 0.0128\,R^2 f \\ 1500 \sim 100000\ MHz \rightarrow ERP(\mathrm{W}) = 19.2R^2 \end{cases}$ f is in MHz; R is in m; $\mathrm{R} > \lambda/2\pi$

2.3 Multiple RF Sources Exposure

Refer Std.	Exemption Exposure Thresholds (TL)
§1.1307(b)(3)(ii)(A)	The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required)
§1.1307(b)(3)(ii)(B)	$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{ExposureLimit_k}\le 1$ a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P , including existing exempt transmitters and those being added. b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added. c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters. P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive). $P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i. ERP_j = the ERP of fixed, mobile, or portable RF source j. $ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph §1.1307 (b)(3)(i)(C) of this section. $Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure. $Evaluated\ Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.

2.4 MPE Calculation Method

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:

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 \times P \times G}{377 \times d^2}$

2.5 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option *1	TL EIRP (dBm) *2	TL Ratio *3
2.4G;BT-LE	1.78	3.14	4.92	0.50	2.12	20	0.00069	1.00000	B	3060.000	0.00069

Note 1: Option A, B and C refer as clause 2.2
Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)
Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

————THE END————