MPE Evaluation Report for FCC

Applicant Name	:	***Fortinet Inc.***
Applicant Address	:	***909 Kifer Road, Sunnyvale, California 94086 United States***
Product Name	:	***Network Security Gateway***
Brand Name	:	***FORTINET***
Model Number	:	***FG-701G, FG-700G, FG-700G-DC, FG-701G-DC***
FCC ID	:	***TVE-111T17B***
Report Number	:	***USSC251268001***
Compliant Standards	:	***FCC 47 CFR §2.1091***
Sample Received Date	:	***Jan. 21, 2025***
Report Issued Date	:	***Mar. 12, 2025***

*The above equipment has been tested by **Eurofins E&E Wireless Taiwan Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Device Under Test (DUT) configurations represented herein are true and accurate accounts of the measurements of the sample's characteristics under the conditions specified in this report.*

Note:

1. *The test results are valid only for samples provided by customers and under the test conditions described in this report.*
2. *This report shall not be reproduced except in full, without the written approval of Eurofins E&E Wireless Taiwan Co., Ltd.*
3. *The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.*

Approved By :

Roy Wu / SAR Technical Director

Testing Laboratory
1330

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Revision History

Rev.	Issued Date	Description	Revised by
00	Mar. 12, 2025	Initial Issue	Rowan Hsieh

1. Test Regulations

1.1. Reference Standard and Guidance

The Maximum Permissible Exposure (MPE) evaluation documented in this report were performed in accordance with following FCC published KDB guidance and standard：

47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
KDB Publication 447498 D01 – General RF Exposure Guidance v06
KDB Publication 447498 D04 – Interim General RF Exposure Guidance v01

1.2. RF Exposure Limits

According to *47 CFR §1.1310*, for operations within the frequency range of 300 kHz and 6 GHz (inclusive), the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in below table, may be used instead of whole-body SAR limits to evaluate the environmental impact of human exposure to RF radiation as specified in *§1.1307(b)*, except for portable devices as defined in *§2.1093* of this chapter as these evaluations shall be performed according to the SAR provisions in *§2.1093*. At operating frequencies above 6 GHz, the MPE limits listed in below table shall be used in all cases to evaluate the environmental impact of human exposure to RF radiation as specified in *§1.1307(b)*.

Limits for Maximum Permissible Exposure (MPE) to Radiofrequency Electromagnetic Fields

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
(i) Limits for Occupational / Controlled Exposure				
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	N/A	N/A	*f* / 300	< 6
1500 – 100000	N/A	N/A	5	< 6
(ii) 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	N/A	N/A	*f* / 1500	< 30
1500 – 100000	N/A	N/A	1.0	< 30

Notes:

1. *f* = frequency in MHz. * = Plane-wave equivalent power density.

2. ***Occupational / Controlled Exposure Limits*** apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. The phrase fully aware in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of transient persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. In situations when an untrained person is transient through a location where occupational / controlled limits apply, he or she must be made aware of the potential for exposure and be supervised by trained personnel pursuant to *§1.1307(b)(2)* of this part where use of time averaging is required to ensure compliance with the general population exposure limit. The phrase exercise control means that an exposed person is allowed and also knows how to reduce or avoid exposure by administrative or engineering work practices, such as use of personal protective equipment or time averaging of exposure.
3. ***General Population / Uncontrolled Exposure Limits*** apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure. For example, RF sources intended for consumer use shall be subject to the limits for general population / uncontrolled exposure in this section.

2. Information of Testing Laboratory

Test Facilities

Company Name: Eurofins E&E Wireless Taiwan Co., Ltd.
Address No.: 140-1, Changan Street, Bade District, Taoyuan City, Taiwan
Website: https://www.atl.com.tw
Telephone: +886-3-271-0188
Fax: +886-3-271-0190
E-mail: infoEETW@eurofins.com

Test Site Location

☑ No. 140-1, Changan Street, Bade District, Taoyuan City, Taiwan
☐ No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan

Laboratory Accreditation

Location	TAF	FCC	ISED
No. 140-1, Changan Street, Bade District, Taoyuan City, Taiwan	Accreditation No.: 1330	Designation No.: TW0010	Company No.: 7381A CAB ID: TW1330
No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan	Accreditation No.: 1330	Designation No.: TW0034	Company No.: 28922 CAB ID: TW1330

3. DUT (Device Under Test) Information

3.1. Device Overview

<table>
<tr><td>Product Name</td><td colspan="2">Network Security Gateway</td></tr>
<tr><td>Brand Name</td><td colspan="2">FORTINET</td></tr>
<tr><td>Model Name</td><td colspan="2">FG-701G, FG-700G, FG-700G-DC, FG-701G-DC</td></tr>
<tr><td>Models different description</td><td colspan="2">Regarding the differences, please see the table below.
<table>
<tr><th>Model</th><th>SSD</th><th>PSU</th></tr>
<tr><td>FG-700G</td><td>No</td><td>AC*1 model</td></tr>
<tr><td>FG-701G</td><td>Yes</td><td>AC*1 model</td></tr>
<tr><td>FG-700G-DC</td><td>No</td><td>DC*1 model</td></tr>
<tr><td>FG-701G-DC</td><td>Yes</td><td>DC*1 model</td></tr>
</table></td></tr>
<tr><td>Marketing Name</td><td colspan="2">FortiGate 700Gxxxxxxxxxx, FORTIGATE-700Gxxxxxxxxxx, FG-700Gxxxxxxxxxx,
FortiGate 701Gxxxxxxxxxx, FORTIGATE-701Gxxxxxxxxxx, FG-701Gxxxxxxxxxx,
FortiGate 700G-DCxxxxxxxxxx, FORTIGATE-700G-DCxxxxxxxxxx, FG-700G-DCxxxxxxxxxx,
FortiGate 701G-DCxxxxxxxxxx, FORTIGATE-701G-DCxxxxxxxxxx, FG-701G-DCxxxxxxxxxx
(where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software changes or marketing purposes only)</td></tr>
<tr><td>FCC ID</td><td colspan="2">TVE-111T17B</td></tr>
<tr><td rowspan="2">Supported Wireless Technologies</td><td>Tx Frequency (MHz)</td><td>Operating Mode</td></tr>
<tr><td>Bluetooth
2402 ~ 2480</td><td>LE</td></tr>
</table>

Note:

The above DUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

4. Maximum Permissible Exposure (MPE) Assessment

4.1. Introduction

According to *47 CFR §2.1091*, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the RF source's radiating structure(s) and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location while transmitting. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal desktop computer, are considered to be mobile devices if they meet the 20-centimeter separation requirement. The exposure limits to be used for MPE evaluation are specified in *§1.1310*. All unlicensed personal communications service (PCS) devices and unlicensed NII devices shall be subject to the limits for general population / uncontrolled exposure.

4.2. Determination of Exemption for Low Power Devices

For Single RF Sources, a single RF source is exempt if:

Option A :

The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph *§1.1307(b)(3)(ii)(A)*. Medical implant devices may only use this exemption and that in paragraph *§1.1307(b)(3)(ii)(A)*.

Option B :

The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th}(mW) = \begin{cases} ERP_{20\,cm}(d/20\,cm)^{x} & d \le 20\,cm \\ ERP_{20\,cm} & 20\,cm < d \le 40\,cm \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right) \; and \; f \; is \; in \; GHz$$

and

$$ERP_{20\,cm}(mW) = \begin{cases} 2040f & 0.3\,GHz \le f < 1.5\,GHz \\ 3060 & 1.5\,GHz \le f \le 6\,GHz \end{cases}$$

d = the separation distance (cm).

Option C :

Using *Table 1* and the minimum separation distance (*R* in meters) from the body of a nearby person for the frequency (*f* in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, *R* must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1: Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (Watts)
0.3 – 1.34	1.920 x R^2
1.34 – 30	3.450 x R^2 / f^2
30 – 300	3.83 x R^2
300 – 1500	0.0128 x R^2 x f
1500 – 100000	19.2 x R^2

For Multiple RF Sources, multiple RF sources are exempt if:

Option 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). This exemption may not be used in conjunction with other exemption criteria other than those is *§1.1307(b)(3)(i)(A)*. Medical implant devices may only use this exemption and that in *§1.1307(b)(3)(i)(A)*.

Option B :

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption per *§1.1307(b)(3)(i)(B)* for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption per *§1.1307(b)(3)(i)(C)* 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 *§1.1307(b)(3)(i)(B)* 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 *§1.1307(b)(3)(i)(C)*.

$Evaluated_k$ = 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.

$Exposure\ Limit_k$ = 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*.

Tx Bands	Frequency (MHz)	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Peak Antenna / Directional Gain (dBi)	ERP (mW)	LPE Level in Option A (mW)	LPE Level in Option B (mW)	LPE Level in Option C (mW)	Low-Power Exemption Verdict
Bluetooth	2402.0	7.07	5	1.85	4.75	N/A	3060	768	Pass by Option B

Summary:

Since the maximum EIRP of this device is less than the LPE level and this device is qualified for Low Power Exemption under the field reference level exposure exemption limits of §1.1310, the emitted RF fields will be incapable of producing exposures that exceed the exposure limits. Hence, this device complies with the reference levels and a complete MPE evaluation is not required.

4.3. Standalone Maximum Permissible Exposure Evaluation

Maximum Permissible Exposure Assessment Method:

Calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations below. This equation is generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction.

$$S_{eq} = \frac{P_{avg} \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:

S_{eq} = Equivalent Plane Wave Power Density in mW/cm^2.
P_{avg} = Average Power at Antenna Terminals in Watts.
G = Gain of the Transmitting Antenna.
R = Distance from the Transmitting Antenna in meters.

Evaluation for Standalone MPE:

The manufacturer expects that the radiated component of this device will not close to the human body during normal usage and the warning statement was also stated in the user instruction. Since the transmitting antenna will be kept at least ***20 cm*** away from the human body, the MPE level is calculated based on this condition and the result is listed in below table.

Tx Bands	Frequency (MHz)	EIRP (mW)	Separation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Compliance
Bluetooth	2402	4.8	20	0.001	1.00	Pass

Conclusion:

Since the Maximum Permissible Exposure evaluation for standalone exposure is below the criteria of *47 CFR §1.1310*, this device complies with *FCC* RF exposure requirements.

Since the summation of the ratio on worst condition comply the above formula; the simultaneous transmission operations also complies with the FCC restriction as specified in 47 CFR §1.1310.

Note:

The basic calculation formula is a conservative formula used to estimate RF field strength or power density. No uncertainty estimates are required when using these formulas. Determination of MPE compliance is based on calculation results and does not take measurement uncertainty into account.

********** End of Report **********