



Radio Exposure Evaluation Report

FCC ID : TVE-121101

Equipment : Wireless Network Extender

Brand Name : FORTINET

Model Name : FortiExtender 201Exxxxxx, FORTIEXTENDER-201Exxxxxx, FEX-201Exxxxxx
(where "x" can be "0-9", or "A-Z", or "-", or blank for marketing purposes or software changes only and no HW related changes.)
Note: All three model names are the same, no difference. The purpose for these three model names are for marketing sales.

FortiExtender 202Exxxxxx, FORTIEXTENDER-202Exxxxxx, FEX-202Exxxxxx
(where "x" can be "0-9", or "A-Z", or "-", or blank for marketing purposes or software changes only and no HW related changes.)
Note: All three model names are the same, no difference. The purpose for these three model names are for marketing sales.

Applicant : Fortinet, Inc.
899 Kifer Road, Sunnyvale, CA 94086 USA

Manufacturer : Fortinet, Inc.
899 Kifer Road, Sunnyvale, CA 94086 USA

Standard : 47 CFR Part 2.1091

The product was received on Apr. 09, 2019, and testing was started from Sep. 03, 2019 and completed on Sep. 05, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

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

The test 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.



Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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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: Ben Tseng

Report Producer: Jenny Yang

1 General Description

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)
WCDMA Band I	1920 - 1980	1922.4 - 1976.6	BPSK
WCDMA Band III	1710 - 1785	1712.4~1782.6	BPSK
WCDMA Band VIII	880 - 915	882.4 - 912.6	BPSK
LTE Band I	1920 - 1980	1922.5 - 1977.5	QPSK, 16QAM, 64QAM
LTE Band III	1710 - 1785	1710.7 - 1784.3	QPSK, 16QAM, 64QAM
LTE Band VII	2500 - 5570	2502.5 - 2567.5	QPSK, 16QAM, 64QAM
LTE Band VIII	880 - 915	880.7 - 914.3	QPSK, 16QAM, 64QAM
LTE Band XX	832 - 862	834.5 - 859.5	QPSK, 16QAM, 64QAM

Multiple Transmitters Condition
Co-location as simultaneously transmitting (co-transmitting) and the evaluation shall be consider that simultaneous transmissions from co-located devices the individual transmitters are evaluated separately. After sum of the individual value (basic restriction / reference level) are measured/calculated also have to under basic restriction / reference level.
Co-transmitting mode: Bluetooth + WWAN Mode

1.2 Table for Multiple Listing

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

Model Name	LTE Module	BT	PCBA	Description
FortiExtender 201Exxxxxx	LTE module chip: EM7455*1	BT*1	Same PCBA	All three model names are the same, no difference. The purpose for these three model names are for marketing sales.
FORTIEXTENDER-201Exxxxxx	LTE module chip: EM7455*1	BT*1	Same PCBA	
FEX-201Exxxxxx	LTE module chip: EM7455*1	BT*1	Same PCBA	
FortiExtender 202Exxxxxx	LTE module chip: EM7455*2	BT*1	Same PCBA	All three model names are the same, no difference. The purpose for these three model names are for marketing sales.
FORTIEXTENDER-202Exxxxxx	LTE module chip: EM7455*2	BT*1	Same PCBA	
FEX-202Exxxxxx	LTE module chip: EM7455*2	BT*1	Same PCBA	

1.3 Testing Location

Testing Location			
☒	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			
☐	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085
Test site Designation No. TW0006 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/ cm ²)	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 / 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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	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/f ²)*	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 MPE Calculation Method

The MPE was calculated at 33 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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

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

2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Bluetooth+ WWAN Mode

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;BT-LE	4.00	10.87	14.87	0.50	15.37	0.03443	33	0.00685	1.00000	0.00252
3G B5	4.80	23.50	28.30	0.50	28.80	0.75858	33	0.05543	0.55093	0.10062
3G B5	4.80	23.50	28.30	0.50	28.80	0.75858	33	0.05543	0.55093	0.10062
4G B12	4.80	23.94	28.74	0.50	29.24	0.83946	33	0.06134	0.46647	0.13150
4G B12	4.80	23.94	28.74	0.50	29.24	0.83946	33	0.06134	0.46647	0.13150
									Sum Ratio	0.46676
									Ratio Limit	1

————THE END————