



FCC RADIO EXPOSURE TEST REPORT

FCC ID : TVE-121101A

Equipment : Wireless Network Extender

Brand Name : FORTINET

Model Name : FortiExtender 211Exxxxxx,
FORTIEXTENDER-211Exxxxxx, FEX-211Exxxxxx
(Please refer to section 1.2 for detail information.)

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 May 25, 2020. 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 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: Sam Chen

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



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Photographs of EUT v01



Summary of Test Result

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

Note:

Reference to Sporton Project No.: 8D2027 (After evaluating, related test items have been verified, and the original test data is replaced.)

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:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Vicky Huang



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	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: GFSK

Note: The EUT contains a certified WWAN module (FCC ID: N7NEM75)

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 211Exxxxxx	LTE module chip: EM7565*1	BT*1	Same PCBA	All the models are identical, the difference model for difference brand served as marketing strategy.
FORTIEXTENDER-211Exxxxxx	LTE module chip: EM7565*1	BT*1	Same PCBA	
FEX-211Exxxxxx	LTE module chip: EM7565*1	BT*1	Same PCBA	
(where “x” can be “0-9”, or “A-Z”, or “-“, or blank for marketing purposes or software changes only and no HW related changes.)				

From the above models, model: FEX-211E was selected as representative model for the test and its data was recorded in this report.

1.3 Testing Location

Testing Location		
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

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)*	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)*	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 20 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

For Bluetooth

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)
2.4G;BT-BR	4.00	9.00	13.00	0.50	13.50	0.02239	20	0.00445	1.00000
2.4G;BT-LE	4.00	10.87	14.87	0.50	15.37	0.03443	20	0.00685	1.00000

For WWAN

Band	Frequency (MHz)	Maximum Power (dBm)	Antenna Gain (dBi)	Tune-up tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Power Density /Limit
WCDMA Band 2	1850	24.00	4.80	0.50	29.30	0.85114	20	0.16932	1.00000	0.16932
WCDMA Band 4	1710	24.00	4.80	0.50	29.30	0.85114	20	0.16932	1.00000	0.16932
WCDMA Band 5	824	24.00	3.20	0.50	27.70	0.58884	20	0.11714	0.54933	0.21324
LTE Band 2	1850	24.00	4.80	0.50	29.30	0.85114	20	0.16932	1.00000	0.16932
LTE Band 4	1710	24.00	4.80	0.50	29.30	0.85114	20	0.16932	1.00000	0.16932
LTE Band 5	824	24.00	3.20	0.50	27.70	0.58884	20	0.11714	0.54933	0.21324
LTE Band 7	2500	23.80	4.60	0.50	28.90	0.77625	20	0.15443	1.00000	0.15443
LTE Band 12	699	24.00	3.20	0.50	27.70	0.58884	20	0.11714	0.46600	0.25137
LTE Band 13	777	24.00	3.20	0.50	27.70	0.58884	20	0.11714	0.51800	0.22614
LTE Band 26	814	24.00	3.20	0.50	27.70	0.58884	20	0.11714	0.54267	0.21586
LTE Band 30	2305	23.00	4.60	0.50	28.10	0.64565	20	0.12845	1.00000	0.12845
LTE Band 41	2496	23.80	4.60	0.50	28.90	0.77625	20	0.15443	1.00000	0.15443
LTE Band 66	1710	24.00	4.80	0.50	29.30	0.85114	20	0.16932	1.00000	0.16932

Note:

- 1.The above antenna gain was declared by manufacturer.
- 2.For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band



Simultaneous Transmission Analysis Mode: Bluetooth+WWAN(WCDMA)

WWAN(WCDMA) Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN(WCDMA)+Bluetooth
0.21324	0.00685	0.22009

Note:

- 1 For collocation analysis, WCDMA Band 5 is chosen for summation due to the highest (power density/limit) among all WWAN modes.
- 2 Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)]
- 3 The aggregated (power density /limit) is smaller than 1, and MPE of collocated transmitters is compliant.

Simultaneous Transmission Analysis Mode: Bluetooth+WWAN(LTE)

WWAN(LTE) Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN(LTE)+Bluetooth
0.00543	0.00685	0.01228

Note:

- 1 For collocation analysis, LTE Band 12 is chosen for summation due to the highest (power density/limit) among all WWAN modes.
- 2 Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)]
- 3 The aggregated (power density /limit) is smaller than 1, and MPE of collocated transmitters is compliant.

————THE END————