



SAR Evaluation Report

Application No.: GZCR2108020822AT
Applicant: Fortinet Inc.
Address of Applicant: 899 Kifer Road, Sunnyvale, California, 94086 United States
Manufacturer: Fortinet, Inc.
Address of Manufacturer: 899 Kifer Road, Sunnyvale, CA. 94086 USA
Equipment Under Test (EUT):
EUT Name: Secured Network Extension Device
Model No.: FEX-212F, FortiExtender 212Fxxxxxx, FORTIEXTENDER-212Fxxxxxx, FEX-212Fxxxxxx (where "x" can be "0-9", or "A-Z", or "-", or blank for marketing purposes or software changes only and no Safety or EMC related changes) ♣
♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark: FORTINET
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
Date of Receipt: 2021-08-13
Date of Test: 2021-08-14 to 2021-08-28
Date of Issue: 2021-09-01

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian
EMC Laboratory Manager



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SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch

EMC-TRF-03 Rev 1.0

Report No.: GZCR210802082203

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-09-01		Original

Authorized for issue by				
				
		Curry Wu/Project Engineer		
				
		Ricky Liu/Reviewer		



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4 General Information

4.1 General Description of EUT

Power supply:	DC 12V by AC adapter or POE adapter.
For BT	
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Antenna Type:	PIFA Antenna
Antenna Gain:	3.5dBi
For BLE	
Bluetooth Version:	V5.0
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Channel Spacing:	2MHz
Date Rate:	1Mbps, 2Mbps
Number of Channels:	40
Antenna Type:	PIFA Antenna
Antenna Gain:	3.5dBi





For WCDMA/LTE	
Operation Frequency Band:	WCDMA Band 2/ WCDMA Band 5/ WCDMA Band 4 LTE FDD Band 2, 4, 5, 7, 12, 13, 26, 30, 41, 48, 66
Modulation Type:	WCDMA: UL up to 16QAM, DL up to 64QAM LTE: UL&DL up to 256QAM
HSDPA UE Category:	13
HSUPA UE Category:	6
LTE Release Version:	R8
LTE Power Class:	Level 3
Antenna Type:	Dipole Antenna
Antenna Gain:	WCDMA Band 2/4, LTE Band 2/4/7/30/41/66: 3.8 dBi WCDMA Band 5, LTE Band 5/12/13/26: 1.64 dBi LTE Band 48: -0.94dBi;
Based on Module certification(FCC ID: N7NEM75)	

Declaration of EUT Family Grouping:

Model No.: FEX-212F, FortiExtender 212Fxxxxxx, FORTIEXTENDER-212Fxxxxxx, FEX-212Fxxxxxx (where "x" can be "0-9", or "A-Z", or "-", or blank for marketing purposes or software changes only and no Safety or EMC related changes)

Only the model FEX-212F was tested. According to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on marketing purposes or software with on EMC related changes

4.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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4.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

● **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

● **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

● **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

● **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

● **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

● **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

● **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.





4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.



5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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/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				
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

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



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5.2 EUT RF Exposure Evaluation

For BT:

Antenna Gain: 3.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.24 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2480	5.38	3.45	0.0015	1.0	PASS

Note: Refer to report No. GZCR210802082201 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For BLE:

Antenna Gain: 3.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.24 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2402	10.18	10.42	0.0046	1.0	PASS

Note: Refer to report No. GZCR210802082202 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.





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For standalone WCDMA/LTE

Based on Module certification(FCC ID: N7NEM75), refer to the Module certification N7NEM75 for WCDMA/LTE Module test Max Conducted Peak Output Power value.

The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

Test Mode	Maximum Conducted Power (dBm)	Antenna Gain (dBi)	Power (mW)	Power Density at 20cm (mW/cm2)	Limit (mW/cm2)	MPE Ratio
WCDMA B2	24.00	3.8	251.19	0.1199	0.4476	0.2678
WCDMA B4	24.00	3.8	251.19	0.1199	0.4242	0.2826
WCDMA B5	24.00	1.64	251.19	0.0729	0.2576	0.2830
LTE B2	24.00	3.8	251.19	0.1199	0.4476	0.2678
LTE B4	24.00	3.8	251.19	0.1199	0.4242	0.2826
LTE B5	24.00	1.64	251.19	0.0729	0.2576	0.2830
LTE B7	23.80	3.8	239.88	0.1145	0.5499	0.2082
LTE B12	24.00	1.64	251.19	0.0729	0.2302	0.3167
LTE B13	24.00	1.64	251.19	0.0729	0.2474	0.2947
LTE B26	24.00	1.64	251.19	0.0729	0.2554	0.2854
LTE B30	23.00	3.8	199.53	0.0952	0.5202	0.1830
LTE B41	23.80	3.8	239.88	0.1145	0.5493	0.2084
LTE B48	23.00	-0.94	199.53	0.0320	0.6988	0.0457
LTE B66	24.00	3.8	251.19	0.1199	0.4242	0.2826

The simultaneous transmission result between of B T and 2 WCDMA/LTE module:

The SAR Exclusion Threshold Level:

$$= \text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \text{CPD3} / \text{LPD3}$$

(CPD = Calculation power density, LPD = Limit of power density)

$$= 0.0046 + 0.3167 + 0.3167 = 0.638 < 1$$

Since the SAR Exclusion Threshold Level is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

- End of the Report -



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