

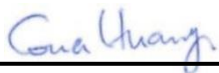
RF EXPOSURE EVALUATION REPORT

FCC ID : TVE-240702
Equipment : Secured Network Extension Device
Brand Name : 
Model Name : FortiExtender 511Gxxxxxxxxxx,
FORTIEXTENDER-511Gxxxxxxxxxx, FEX-511Gxxxxxxxxxx
(where "x" can be used as "A-Z", or "0-9", or "-", or blank
for software changes or marketing purposes only)
Marketing Name : FortiExtender 511G
Applicant : Fortinet, Inc.
909 Kifer Road, Sunnyvale, CA. 94086 USA
Manufacturer : Fortinet, Inc.
909 Kifer Road, Sunnyvale, CA. 94086 USA
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3786) and the FCC designation No. TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

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



Approved by: Cona Huang / Deputy Manager



SPORTON INTERNATIONAL INC. Wensan Laboratory

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan



Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	5
3. RF EXPOSURE LIMIT INTRODUCTION	6
4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	7
4.1. Standalone Power Density Calculation	7
4.2. Collocated Power Density Calculation.....	8



History of this test report

Report No.	Version	Description	Issued Date
FA490210-01	Rev. 01	Initial issue of report	Dec. 12, 2024

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Secured Network Extension Device
Brand Name	FORTINET 
Model Name	FortiExtender 511Gxxxxxxxx, FORTIEXTENDER-511Gxxxxxxxx, FEX-511Gxxxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)
Marketing Name	FortiExtender 511G
FCC ID	TVE-240702
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3550 MHz ~ 3550 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n13: 777 MHz ~ 787 MHz 5G NR n14 : 788 MHz ~ 798 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n26 : 814 MHz ~ 849 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n70 : 1695 MHz ~ 1710 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz 5G NR n78: 3700 MHz ~ 3800 MHz, 3450MHz ~ 3550MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink) LTE: QPSK, 16QAM, 64QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM Bluetooth LE
HW Version	v1.0
EUT Stage	Production Unit

Reviewed by: Jason Wang

Report Producer: Daisy Peng

2. Maximum RF average output power among production units

MODE		Maximum Power(dBm)
WCAMA	BAND 2	24.5
	BAND 4	24.5
	BAND 5	24.5
LTE	BAND 2	24.5
	BAND 4	24.5
	BAND 5	24.5
	BAND 7	24
	BAND 12	24
	BAND 13	24.5
	BAND 14	24
	BAND 17	24
	BAND 25	24
	BAND 26	24
	BAND 41_PC3	24
	BAND 41_PC2	26
	BAND 42_PC3	24
	BAND 42_PC2	26
	BAND 66	24.5
	BAND 71	24
5G NR	n2	25.5
	n5	25.5
	n7	25.5
	n12	25.5
	n13	25.5
	n14	25.5
	n25	25.5
	n26	25.5
	n41_PC3	25.5
	n41_PC2	27.5
	n66	25.5
	n70	25.5
	n71	25.5
	n77_PC3	25.5
	n77_PC2	27.5
	n78_PC3	25.5
	n78_PC2	27.5

LE		
Channel	Frequency(MHz)	Maximum power(dBm)
CH 00	2402 MHz	7
CH 19	2440 MHz	4.5
CH 39	2480 MHz	4.8

BLE5.0-2M		
Channel	Frequency(MHz)	Maximum power
0	2402	6.9
19	2440	5.1
39	2480	5.8

3. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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

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:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum PG (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	3.80	24.50	676.08	0.135	1.000	0.135
WCDMA Band 4	3.80	24.50	676.08	0.135	1.000	0.135
WCDMA Band 5	1.64	24.50	411.15	0.082	0.536	0.153
LTE Band 2	3.80	24.50	676.08	0.135	1.000	0.135
LTE Band 4	3.80	24.50	676.08	0.135	1.000	0.135
LTE Band 5	1.64	24.50	411.15	0.082	0.549	0.149
LTE Band 7	3.80	24.00	602.56	0.120	1.000	0.120
LTE Band 12	1.64	24.00	366.44	0.073	0.466	0.157
LTE Band 13	1.64	24.50	411.15	0.082	0.518	0.158
LTE Band 14	1.64	24.00	366.44	0.073	0.525	0.139
LTE Band 17	1.64	24.00	366.44	0.073	0.469	0.155
LTE Band 25	3.80	24.00	602.56	0.120	1.000	0.120
LTE Band 26	1.64	24.00	366.44	0.073	0.543	0.134
LTE Band 41_PC3	3.80	24.00	602.56	0.120	1.000	0.120
LTE Band 41_PC2	3.80	26.00	954.99	0.190	1.000	0.190
LTE Band 42_PC3	3.35	24.00	543.25	0.108	1.000	0.108
LTE Band 42_PC2	3.35	26.00	860.99	0.171	1.000	0.171
LTE Band 66	3.80	24.50	676.08	0.135	1.000	0.135
LTE Band 71	1.64	24.00	366.44	0.073	0.442	0.165
5G NR n2	3.80	25.50	851.14	0.169	1.000	0.169
5G NR n5	1.64	25.50	517.61	0.103	0.549	0.188
5G NR n7	3.80	25.50	851.14	0.169	1.000	0.169
5G NR n12	1.64	25.50	517.61	0.103	0.466	0.221
5G NR n13	1.64	25.50	517.61	0.103	0.518	0.199
5G NR n14	1.64	25.50	517.61	0.103	0.525	0.196
5G NR n25	3.80	25.50	851.14	0.169	1.000	0.169
5G NR n26	1.64	25.50	517.61	0.103	0.543	0.190
5G NR n41_PC3	3.80	25.50	851.14	0.169	1.000	0.169
5G NR n41_PC2	3.80	27.50	1348.96	0.269	1.000	0.269
5G NR n66	3.80	25.50	851.14	0.169	1.000	0.169
5G NR n70	3.80	25.50	851.14	0.169	1.000	0.169
5G NR n71	1.64	25.50	517.61	0.103	0.442	0.233
5G NR n77_PC3	3.35	25.50	767.36	0.153	1.000	0.153
5G NR n77_PC2	3.35	27.50	1216.19	0.242	1.000	0.242
5G NR n78_PC3	3.35	25.50	767.36	0.153	1.000	0.153
5G NR n78_PC2	3.35	27.50	1216.19	0.242	1.000	0.242
Bluetooth	3.57	7.00	11.40	0.002	1.000	0.002

4.2. Collocated Power Density Calculation

General Note:

1. The device support DPS (Dynamic Power Share) function to achieve higher uplink data rate keeping the total power unchanged in 5G NR NSA EN-DC mode according to 3GPP 38.213, when the equipment has a dynamic power sharing capability, it adjusts the LTE or NR transmission power so that the instantaneous total power does not exceed the specified value, when the maximum transmission power of NR (P_{LTE}, P_{NR}) and the specified total power (P_{total}) have been set and the instantaneous calculated total transmission power exceeds P_{total}, the NR transmission power is reduced so that the actual transmission power of the user equipment will not exceed P_{total} power. So if the LTE and NR standalone SAR is testing at total power level, the EN-DC combine MPE(LTE+NR) will not higher than the each standalone LTE and NR MPE, therefore, the simultaneous transmission analysis is used standalone MPE at total power level to show compliance.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + Bluetooth.
3. Considering the WWAN module collocation with the Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant

WWAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN + Bluetooth
0.269	0.002	0.271

Note:

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.